

**THE STANN CREEK REGIONAL ARCHAEOLOGY PROJECT:
REPORT OF THE FOURTH (2018) FIELD SEASON**

Edited by

Meaghan M. Peuramaki-Brown & Shawn G. Morton



© 2018

Stann Creek Regional Archaeology Project

Faculty of Humanities and Social Sciences
Athabasca University, Alberta, Canada



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

**THE STANN CREEK REGIONAL ARCHAEOLOGY PROJECT:
REPORT OF THE FOURTH (2018) FIELD SEASON**

Edited by
Meaghan M. Peuramaki-Brown
&
Shawn G. Morton

© 2018
Stann Creek Regional Archaeology Project

Cover Photo: SCRAP 2018 Week 2 Field Crew (by Dave Blaine).
Layout and formatting: M. M. Peuramaki-Brown
Font: Times New Roman and Calibri
Included images: © Stann Creek Regional Archaeology Project 2018.
Contact: scrap.arky@gmail.com
Website: www.scraparchaeology.com

Table of Contents

Acknowledgements.....	5
Chapter 1. The Stann Creek Regional Archaeology Project: Introduction to the 2018 Investigations.....	7
<i>M. M. Peuramaki-Brown & S. G. Morton</i>	
Chapter 2. 2018 Investigations in the Alabama Monumental Core: Operation 5 (Str 10) & Operation 6 (Strs 1 & 2).....	29
<i>M. M. Peuramaki-Brown, S. G. Morton, A. M. Williams, M. Longstaffe, & D. Blaine</i>	
Chapter 3. 2018 Settlement Investigations: Continuing Excavation in Operation 3 at ALA-045	61
<i>S. G. Morton & J. Delos Reyes</i>	
Chapter 4. Preliminary Report on the Alabama Ceramic Assemblage.....	75
<i>L. Howie & J. Jordan</i>	
Chapter 5. 2018 Geological Survey: The Cockscomb Granites of Alabama.....	87
<i>J. Potter</i>	
Chapter 6. GPS Data Capture for GIS Data Integration in the Alabama Monumental Core.....	119
<i>D. Blaine</i>	
Chapter 7. Maya Archaeology in Belize Field School Program.....	133
<i>M. M. Peuramaki-Brown, J. Delos Reyes & K. Hubenig</i>	
Appendix A. Classification Guides, Recording Sheets & Codifi.....	141
Appendix B. Field School Program Documents.....	153

Acknowledgements

This research was supported by the Social Sciences and Humanities Research Council of Canada.

Members of SCRAP 2018 would like to thank the Belize Institute of Archaeology, in conjunction with the National Institute of Culture and History, for granting us the permit to conduct investigations at Alabama. In particular, we wish to thank Dr. John Morris. Thank you also to Ms. Melissa Badillo, Ms. Sylvia Batty, Mr. Antonio Beardall, and Mr. Josue Ramos for their support with various administrative issues and wonderful collegiality.

Additional institutional support was provided by the Faculty of Humanities and Social Sciences, Athabasca University; The Research Centre, Athabasca University. Our field school programming operated through the Study Abroad Office of the University of Calgary, in collaboration with the Department of Anthropology & Archaeology. Our thanks to Dr. Kathryn Reese-Taylor of the University of Calgary for working with us on this programme.

We would like to thank Mr. G. Greene for permission to work on his property; Ms. J. Canton (on behalf of Mr. Greene); Mr. C. Teul, the Maya Mopan alcalde, for assisting with our public engagement/outreach initiatives; Mr. Caballero, the principal at Maya Mopan Primary School, for encouraging our future collaboration with local teachers and students; Mr. H. Chiac Sr., our field foreman, for arranging and directing local individuals from Maya Mopan to assist us in the field; Mr. E. Saqui and Ms. A. Saqui, and the staff at Nuuk Che'il Cottages for our wonderful accommodations; Mr. C. Teul and Ms. J. Teul for providing us with delicious food each day in the field; Ms. Ella and Mr. Kenny at Ella's Cool Spot in Hopkins for providing us with a nice weekend and evening breaks (and perhaps the best fried conch we've ever had); and Mr. Josh Arana and Ms. Audrey at the Stann Creek House of Culture and the Gulisi Garifuna Museum for their on-going support and collaboration.

Finally, thank you to all our colleagues, friends, and family at home and in Belize, who continue to support our research.

Chapter 1. The Stann Creek Regional Archaeology Project: Introduction to the 2018 Investigations

Meaghan M. Peuramaki-Brown (Athabasca University)

Shawn G. Morton (Northern Arizona University)

In 2018, the Stann Creek Regional Archaeology Project (SCRAP) initiated a 4-year (2018-2022) renewed research focus on the where, when, why, and how of boomtown development at the site of Alabama in the southern portion of the Stann Creek District. This followed three successful seasons of preliminary reconnaissance and testing at the site from 2014 to 2016 (with a break in 2017). In 2018, we returned to Alabama with our permit [IA/H/2/1/18(07), Accession No. 10437] granted from the Belize Institute of Archaeology for investigations that ran over the course of six weeks (May 14th-June 22nd, 2018). This chapter provides an introduction to the site and region, summary of previous and proposed research, and summary of 2018 research results.

Site AL-52, Alabama

The area was initially named *Alabama* (a.k.a. *Alabama Site*, *Alabama Ruins*), meaning “cleared forest” in Muskogean, by owners of the Waha Leaf Banana Co. in the 1950s, and adopted for the archaeological site in the 1970s by Elizabeth Graham. In the 1980s, J. Jefferson MacKinnon renamed the site *Chacben Kax* (a.k.a. *C’hacben K’ax*, *Ch’akben K’aax*, *Ch’akbe’en K’aax*), meaning “recently-cleared forest” in Mopan (ch’akbe’en “milpa roza, nombre que se da al terreno recién tumbado y quemado” + k’aax “bosque, montaña, selva, campo, monte de arboles”; or more literally “forest that has been cleared on someone’s behalf” [Marc Zender, personal communication, 2014]). SCRAP continues to use the name Alabama in recognition of historical happenings in the area; the ancient name of the site remains unknown.

Property

The site is located approximately 22 km inland from the Placencia Lagoon, along the upper tributaries of the Waha Leaf Creek. The property that includes the site has belonged to a number of companies/individuals since the 1950s. This historical chronology of the property is being added to as SCRAP members come across additional information.

- 1950’s-1967: Waha Leaf Banana Company, a.k.a. Alabama Plantation, operated by Greene & Atkins Banana Co. Owners were M.D. Greene and J. Atkins, based out of Mobile, Alabama (Hubbard 2000:7; Moberg 1997:34-35; see also Bulmer-Thomas and Bulmer-Thomas 2012:133).
- 1967-1970: Property sold to a “pair of European investors” (Moberg 1997:35)
- 1984: J. Cullen, missionary and original citrus planter (TMCC & TAA 1997:113).
- 1980s/1990s(?): Outreach Ranch, owned by J. Collier (MacKinnon 1987).
- 1996: M. Dunken, citrus operation (TMCC & TAA 1997:113).
- Current: Greene Groves & Ranch Belize Ltd. citrus orchards, owned by G. Greene.

Research & Exploration

Over the past 100 years, various investigations have been conducted in and around the Alabama area.

- 1931: T.A. Joyce's (British Museum) visit to the Cockscomb Basin, identifying the Pearce Ruins (~10 km north of Alabama). Compass survey and excavations (Joyce 1931, unpublished report does not include maps or notes). See summary in Peuramaki-Brown and Morton 2016, *In press a*.
- 1970s: The Stann Creek Project, directed by Elizabeth Graham. General survey and testing throughout the Stann Creek District, including a portion of the Alabama site (Graham 1978, 1983, 1985, 1987, 1994).
- 1980s: The Point Placencia Archaeological Project (PPAP), directed by J. Jefferson MacKinnon. Survey, testing, and excavation/consolidation of monumental architecture at Alabama and secondary satellite sites (Lagarto, Danto), as well as throughout the southern Stann Creek District (MacKinnon 1987, 1988a, 1988b, 1989a, 1989b; MacKinnon and May 1991; MacKinnon et al. 1993; Schafer 1987; Walters 1988). Also, A. Rabinowitz (1987) who explored areas of the Cockscomb Basin and recorded the Kuchil Balum site.
- 1990s: The Maya Mountains Archaeology Project (MMAP), directed by Peter Dunham. Survey/mapping of various sites to the north, west, and south of Alabama, including Pearce Ruins, Huntul Mo', Bats'ub (25 Flight?), Xa'ayilh, and Muklebal Tzul (Dunham et al. 1995).
- 2014-present: The Stann Creek Regional Archaeology Project (SCRAP), directed by Meaghan Peuramaki-Brown. Reconnaissance and testing at Alabama (Peuramaki-Brown and Schwake 2014; Peuramaki-Brown 2015, 2016a, 2016b, 2017; Peuramaki-Brown et al. 2017b, 2018; Peuramaki-Brown and Morton *In press b*).

Dates

Some absolute and relative dates are currently available for Alabama.

- Radiocarbon: 1980s PPAP epicentre testing (on floor and fill deposits, Str. 3)
 - cal. AD 760 ± 80 yrs. (Wis-1914)
 - cal. AD 850 ± 70 yrs. (Wis-1915) – epicentre, PPAP
- Obsidian hydration: 1980s PPAP epicentre testing (on floor + fill deposits, Str. 3)
 - cal. AD 874 ± 77 yrs. (MOHLAB) – epicentre, PPAP
- AMS: 2016 SCRAP settlement testing (habitation debris/ fill lots)
 - cal. AD 260-280 and cal. AD 325-420 (2 sigma, 95% probability; Beta-456254)
 - cal. AD 640-680 (2 sigma, 95% probability; Beta-457816)
 - cal. AD 655-720 and cal. AD 740-765 (2 sigma, 95% probability; Beta-457817)
 - cal. AD 675-780 and cal. AD 790-870 (2 sigma, 95% probability; Beta-457818)
 - cal. AD 885-995 (2 sigma, 95% probability; Beta-457819)
 - cal. AD 895-1020 (2 sigma, 95% probability; Beta-457820)
- Artifacts: 1980s PPAP epicentre testing, 2014-2018 SCRAP settlement survey/testing
 - Late facet Late Classic to Terminal Classic, Early Postclassic (ceramic, lithic)
 - possible Early Classic (ceramic jar forms)

Description

Alabama abuts the eastern slopes of the Maya Mountains—a projection of metamorphic and igneous rock (including sought-after granites and derived clays) that forms a sharp geological contrast to the otherwise limestone-dominated landscape of the Maya lowlands. The site sits on an alluvial plain, with foothills on three sides, along the banks of the Waha Leaf Creek, which runs 20 km east to Placencia Lagoon and the Caribbean coast, passing through broadleaf forest and pine savannah along the way. Alabama was home to 600-900+ people, based on our 2014-2015 settlement survey and accepted calculation methods (Rice & Culbert 1990).

The monumental core (epicentre) consists of 20 separate structures (the tallest, Str. 3, measuring 7.5 m), 4 plazas, and a sacbe (causeway). These are distributed over 2.48 hectares*, slightly larger than the monumental core of Nim Li Punit in Southern Belize (see Houk 2015:240, Tab. 10.2). Fourteen (14) plain granite monuments have been recorded.

**Note the significant size difference from our 2015 report, from over 4 hectares to 2.48 hectares. This is due to discovered inaccuracies in scales of PPAP maps in 2016, as well as the exclusion of Strs 19 and 20 and the borrow pits, based on calculation guidelines presented in Houk (2015).*

East-Central Belize

East-Central Belize (Figure 1.1) is roughly delineated to the north by the end of the Maya Mountains and beginning of a relatively flat landscape and bigger/longer rivers; to the west by the eastern foothills and face of the Maya Mountains; to the east by the Caribbean Sea; and to the south by the north end of the Bladen Formation, south of the Swasey Branch of the Monkey River. This is roughly the area of the modern-day Stann Creek District.

The nucleated settlements of the region are found primarily inland, toward the eastern foothills of the Maya Mountains. These minor and major civic-ceremonial centres share a number of common material culture patterns, which may serve to identify East-Central Belize as a material culture sub-region of the eastern Maya lowlands, in a manner similar to neighbouring Southern Belize (Braswell and Prufer 2009; Graham 2001; Leventhal 1992; MacKinnon 1991). These features include location atop alluvial terraces with direct access (less than a day's travel) to coastal lagoons and shores via navigable rivers; low, large, non-vaulted architecture; alluvial-clay fill for architecture; large borrow pits surrounding/enclosing monumental architecture; architectural facing blocks, megalithic slabs, and stelae-altars of non-limestone rock (e.g., granite, slate); a general lack of epigraphic materials; and special-context use of imported limestone (e.g., ball court markers, corner stones, tomb walls).

Despite significant research, some of which is listed above, East-Central Belize remains one of the most poorly understood regions of the Maya lowlands, particularly in terms of ancient settlement processes, including the nucleating of populations (increasing population densities, relative to surrounding areas); the presence of multiple and diverse activities (including craft specialization); and central-place relationships along a continuum of rural-urban localities, all of which emphasize “urban-ness” and “rural-ness” to varying degrees (urban society; see Grauman Wolf 1980; Leeds 1980; Siembieda and López Moreno 1998; Zenner 2010).



Figure 1.1: Elevational map of Central Belize, showing inland and coastal archaeological sites.

Notions of settlement as process and associated continuums are reflected in concepts such as “rural complexity”—diminutive village sites that exemplify social institutions normally interpreted as “urban” in distinctly “rural” settings (Falconer 1987; Falconer and Savage 1995; Iannone and Connell 2003)—and the complex relationships between agricultural and non-agricultural pursuits, as well as core-periphery world systems. In the humid neotropics in general, the relationships between humans and the environment are distinctive enough to lead to unique forms of settlement development and, hence, diverse forms of urban and urban-like centres. We argue that East-Central Belize presents one such distinct region, with unique forms of settlement and urban-like development dependent on local geology; significant micro-management of local environments; and the integration of residents within multiple social, political, and economic spheres of varying scales, related to resident agency, local geography, and known transportation/communication corridors.

Notions of settlement and urbanism are not only ones of processes, but also dynamics and “mechanisms” (Flannery 1968), linked intimately with local histories and environments as well as larger systems in action (politics, economics, societies, ideologies, ecologies). Thus, an archaeological attempt to understand such complex developments must not only examine the end results, but also the beginnings and changes over time; ideally leading to an understanding of particular settlement tendencies in a given region, the development of associated socio-environmental networks, and their ultimate undoing. Any attempt to understand these processes, dynamics, and mechanisms in a given region should consider four diachronic and dynamic elements:

1. Population development (chronology) and scale of land conversion.
2. Social fabric of resident populations.
3. Integration beyond the individual household (community, infrastructure, services, etc.).
4. Situation in larger social, economic, and political organizations.

SCRAP Research at Alabama: Past, Present, and Future

The site of Alabama is considered to be a boomtown of the ancient Maya world. Previous research (2014-2016) demonstrated the *where* and *when* of this rapid-growth community in East-Central Belize (today, the Stann Creek District), dating overwhelmingly to the late facet of the Late Classic to Terminal Classic periods (ca. 700–900 CE). The following four years of research (2018-2022) will focus on a unique approach to understanding *why* and *how* such boomtowns were created, and how resources motivated Maya industry, mobility, and short-term relocation. Broader fundamental questions underpin this socio-natural study in archaeology: Where, when, and why do people choose to colonize a landscape? How do they survive, making use of available resources? How do they interact with and understand people, spaces (geographies), and things (material items) of both near and far (Hutson 2017; Rockman 2003; Scarborough & Valdez 2003, 2009; van der Leeuw & Redman 2002)?

Key human–environment relations and relational geographies are expressed in the development and sustainability of rapid-growth communities, or “boomtowns” (Barnes 1988; Barth 1975; Rodriguez 1982), which are remarkable settlements that arise in regions typically perceived as severely disadvantaged or isolated frontier zones. They are also often at the boundary between shifting geo-political entities; however, throughout human history and prehistory, many reasons account for rapid settlement growth.

Our earlier phase of research (2014-2016) addressed the where and when of Maya boomtown development by initiating investigations of the monumental core (epicentre), settlement biography, and resource procurement. *This research phase is required to further examine such development, expanding from the concrete results of previous research and assembling a new suite of tools to pursue the following questions:*

Q1: *Why* did this rapid growth and development occur at Alabama?

Q2: *How* was rapid growth and development supported at Alabama?

Our 2018-2022 research will take an archaeological, biochemical, and geological approach to these questions. *Two hypotheses* shape the structure and direction of this research (detailed in the following pages), which focus on local resource exploitation and foreign migration.

Boomtowns: Relational Geographies and Rural Complexity

The development of communities, including boomtowns, is shaped by complex and intimate interactions between people, spaces, and things. Two concepts aid in assessing the archaeological record of East-Central Belize, as the complexities of this location result from responses of both those who lived in these temporalities and those who analyze and react to them for various reasons, archaeologists included. Together, these diverse groups are mutually entangled and co-constitute the region through various types of engagements (Graham 1998), which relational geographies and rural complexity make manageable.

The notion of *relational geographies* is useful to unpack imbricated processes through its framing of geographic developments as open-ended, mobile, networked, and actor-centred (Jones 2009). Relational geographies thus allow us to understand space as physical and conceptual, and as entangled within social, economic, and political processes (Bathelt & Glückler 2003; Thrift 2003). Space reflects ways of moving, knowing, interacting, and living

(Crampton & Elden 2007; Hodder 2012; Lefebvre 1991, 2003; Malpas 2012), since the spaces through which we move daily are constituted by human experience (Heidegger 1971; Soja 1996). This experience itself is grounded in the surrounding material things—other “living” or “non-living” elements (depending on beliefs), including objects we make, exchange, and discard (Hendon 2010; Watts 2013).

We invoke the concept of *rural complexity* (Barnes & Hayter 1994; Iannone & Connell 2003) when geographic developments (village or town sites) in rural settings are interpreted as “urban-like” because of exemplified social institutions, physical realities, and human-environment relations normally associated with urban locales (Guengerich 2017; Paz 2002). The settlements that typically represent boomtown development around the world, and often exemplify rural complexity, flower rapidly in response to several factors: (1) resources and environmental opportunities or challenges, and (2) socio-economic or socio-political fluctuations—which include the outcomes of centralizing, decentralizing, colonization, migration, and defense strategies (Benson et al. 2009; Bradbury 1979; Isendahl et al. 2014). Such development has been traced back as far as the Sumerian Period of ancient Mesopotamia, attributed to valued resource extraction (Barbier 2011). Social scientists (e.g. Woodworth 2011, 2015) recognize unique boomtown flows of people, spaces, and things through four interwoven elements:

- a relatively rapid pace and scale of population growth and land conversion
- a unique and changing social fabric due to sudden population appearance
- the swift advent of functional and place-making features, such as hallmark urban elements
- situation in political and/or economic frontier zones

Boomtown Alabama: Early Findings

Through our 2014-2016 research into the where and when of Alabama’s boom, a team of researchers, students, and local assistants *mapped the epicentre* (Figure 1.2); *conducted a systematic settlement survey and surface collection* (Figure 1.3); *piloted preliminary sourcing studies of granite, ceramic, and obsidian artifacts, as well as building materials; and initiated test excavations at multiple mounds (domestic platforms) in a portion of the settlement zone*. Along with results of preliminary investigations in the epicentre from the 1980s (MacKinnon et al. 1993), multiple lines of evidence exist in support of the boomtown designation:

- The presence of hallmark Maya urban features (Houk 2015), such as a causeway, large plazas, a ball court, reservoirs, temple-pyramid(s), and a simple palace complex.
- Very strict orientation of buildings comprising the epicentre, reflective of a short planning and construction program—that is, one that was highly planned and coordinated (Smith 2007).
- Few artifacts in the fill of monumental and domestic platforms—atypical of Maya construction that normally incorporates refuse—reflective of limited pre-construction occupation.
- Single-phase monumental architecture constructed in the late facet of the Late Classic period (ca. 700–800 CE), with use extending into the Terminal Classic period (ca. 800–900 CE), based on ceramic, carbon-14, and obsidian hydration dating. A similar pattern was observed in the settlement, where surface collection from all mounds resulted in almost exclusively late facet Late Classic to Terminal Classic materials, confirmed through ceramic

chronologies and accelerator mass spectrometry (AMS) dating of charcoal from test excavations at multiple mounds.

- A predominance of single mound settlement sites (groups) and a lack of typical mound group “clustering,” suggesting the absence of neighbourhoods (Smith 2011; Smith et al. 2015), which is a common observance in boomtowns (Freudenburg 1982, 1986; Greider & Krannich 1985a, 1985b).

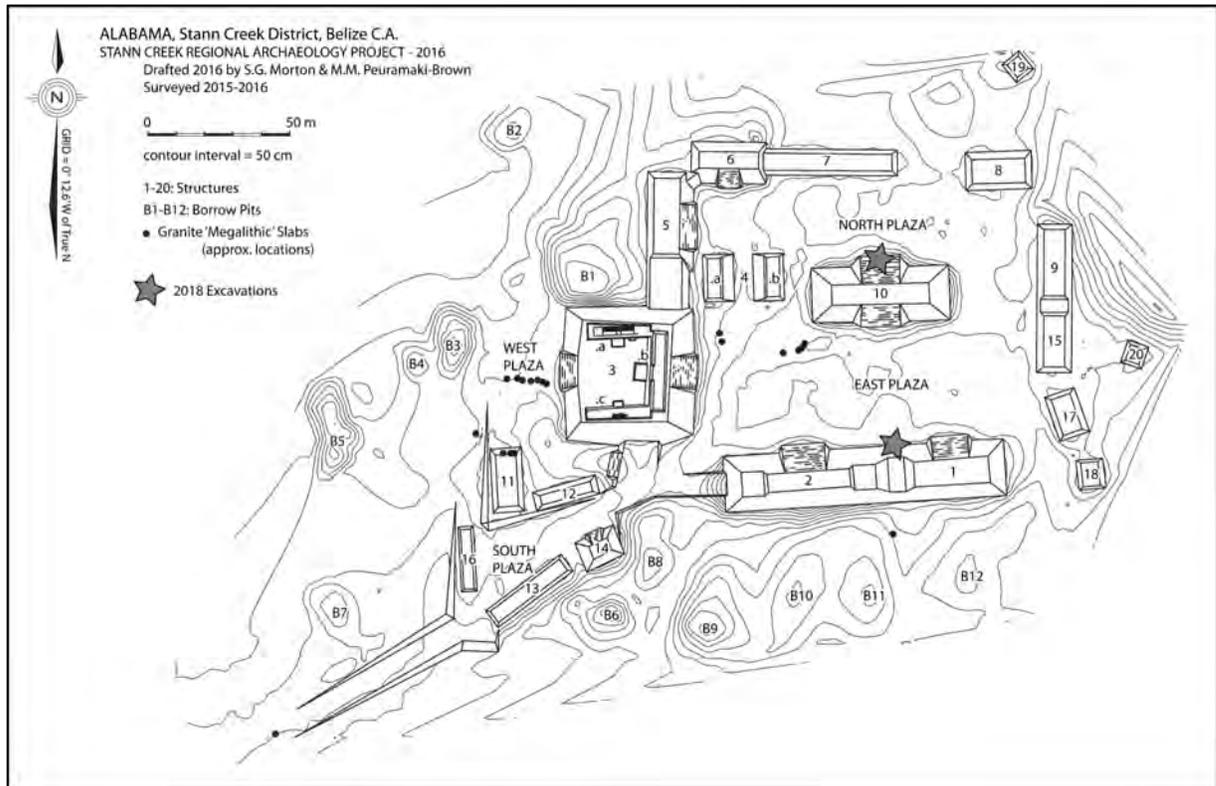


Figure 1.2: Map of monumental core of Alabama, showing location of 2018 excavations.

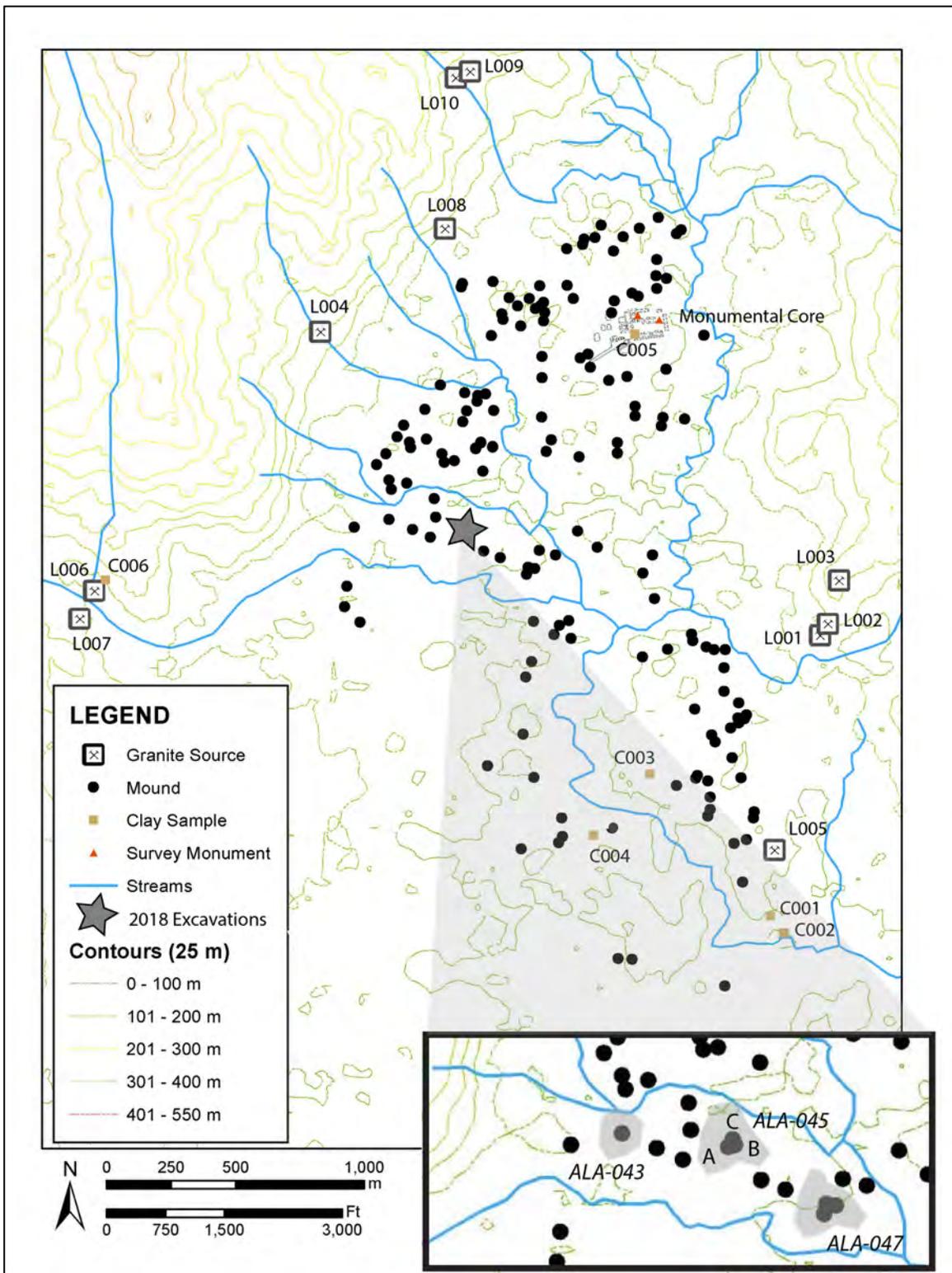


Figure 1.3: GPS map of settlement zone of Alabama, showing location of 2018 excavations.

Hypotheses

Our research to date has resulted in two primary hypotheses regarding the *why* and *how* of Alabama's boom. We anticipate these lines of inquiry will not be mutually exclusive, and will coalesce around intersecting factors.

H1: Settlement development is related to local resource exploitation

The development of a boomtown is often associated with nucleated populations (local or foreign) aimed at exploiting valued resources for commercial (market exchange) purposes—for example, a mining town full of miners and service providers (Murillo 2016)—with access to major trade/communication corridors (Innis 1977). We know that commerce existed at Alabama, based on easy access to a major coastal trade route and the widespread distribution of non-local material commodities such as obsidian (Guatemala), and Belize Red and Ahk'utu' moulded-carved ceramics (Belize Valley and Northern Belize). But what did they offer in return and was this site a focal point, “bulk-breaking point” (Dunham 1996: 331), or gateway (Burghardt 1971), for trade in the region? Our research, and that of colleagues, has begun to identify and investigate various valued local (0–20 km) resources exploited by the Alabama Maya, including granite, clays, salt, and cacao.

Granites are limited to specific geographic localities in the Maya lowlands, and the Alabama Maya had direct access to extensive outcropping sources forming the Cockscomb pluton of the Maya Mountains. Evidence for granite working—debitage, preforms, associated tools (McAnany 2010)—to produce architectural blocks as well as ground stone tools (e.g. *manos* and *metates*) has been tentatively identified in multiple areas of the settlement through surface collection. Potential raw material extraction sites have also been identified in the surrounding foothills. We know that granite implements were traded widely throughout the Maya world (Graham 1987; Shipley & Graham 1987; Ward 2013), and our own preliminary macrovisual, microscopic, and geochemical studies have confirmed the presence of some Cockscomb-derived artifacts at archaeological sites over 100 km away via known trade routes (Peuramaki-Brown & Tibbits 2015; Tibbits 2016).

East-Central Belize is also a source of distinctive natural clays, formed from igneous and metamorphic parent material—vs. the weathering of carbonate rock, which is prevalent elsewhere in the Maya lowlands (Bartlett et al. 2000; Jordan & Prufer 2017). Graham (1994) hypothesized that residents of the region were involved in the exchange of these clays, desired for their unique visual and textural characteristics. Our preliminary comparative petrographic study of natural clays from a single upland drainage system at Alabama, and a small sample of pottery vessel fragments recovered from an associated settlement block (see below), identified two different kinds of locally produced pottery (products of potters working at two different production localities in the surrounding area). We also found “foreign” pottery from distant production localities to the south (Bladen Formation) and north (Hummingbird Batholith) of Alabama (Peuramaki-Brown et al. 2017a). Pottery containing crushed pottery fragments (grog) originating from the west (Belize Valley) provides evidence of ceramic connections to other regions.

Salt is essential to human survival, particularly in the humid tropics; the ancient Maya also used it as a flavouring and preservative (McKillop 2002). The Placencia Lagoon salt works sit 20 km east of Alabama, dated to the Late to Terminal Classic (MacKinnon 1989). Sills (2017) proposes that the Maya of Alabama did seasonal work at these specialized sites, since they lack

a permanent settlement along the coast. Pervasive in the Alabama settlement was a standardized jar form (rim sherds only) with distinctive macroscopic paste characteristics, which may have served as a salt transport container.

Finally, cacao has historically grown in the region, and exists throughout the Alabama area today (Dunham 1996; Evans 1948). This resource is limited as to where it can be successfully grown in the lowlands, and was used as a currency in the Maya world and beyond (McNeil 2009).

In sum, this research will target a more comprehensive understanding of production, distribution, and exploitation patterns of resources, to expand our knowledge of associated settlement.

H2: Settlement is related to migration linked to the Classic Period “collapse”

At the time Alabama was experiencing its boom, many other Maya communities were experiencing dramatic, even catastrophic, declines. These were marked by the complete collapse of elite socio-political institutions and economic upheaval, due to disruption of trade networks and regional politico-economic turmoil (Demarest et al. 2004; cf. Aimers 2007). Many cities and towns were eventually abandoned, with local climatic events (e.g., drought) and even warfare worsening an already grave situation (Iannone 2014; Webster 2002). The predominant hypothesis is that many populations ended up in the Northern Yucatan generations later; evidence of the influx of migrants at sites in Northern Belize offer clues to more immediate population movements (Cucina 2015). How new settlements like Alabama fit into the larger regional picture of the lowlands is unclear. Did the community constitute a colonizing group who migrated together from a single location, or did people from diverse locations coalesce there, all in search of opportunities and more stable surroundings? How would “foreign peoples”—a problematic notion as “The Maya” comprise many language and ethnic groups (Beyyette & LeCount 2017)—have adjusted to life in the region, which is physically quite distinct from the rest of the Maya lowlands?

Current evidence of a foreign presence at Alabama includes the specialized use of limestone and chert—resources not found naturally in East-Central Belize—possibly signifying populations from karst areas of the lowlands. A few *mano* stones made of granite from the southern edge of the Belize Valley—possibly heirlooms brought in by migrating populations—have been an odd finding, since this is a granite-rich area. Additionally, our petrographic analyses have revealed potting techniques unique to Northern Belize, but these pots use local materials. Access to finished obsidian products of diverse source origins by entire settlement sections, independent of socio-economic factors, are thought to show key differences in population identities and spatial organization, reflective of different origins and established trade relations (Williams et al. 2017).

Finally, Graham (1985) has noted that the 8th century CE Maya centre of Mayflower in the northern end of the district was quite different from earlier sites in East-Central Belize in terms of monumental core layout and architectural styles. The site also lacked debris in architectural fill. Significantly, the different patterns at Mayflower may reflect cultural preferences, indicating different people with different building practices suddenly appeared in the area. It is similar to patterns at both Alabama and Pearce.

In sum, in the absence of human remains to analyze (currently non-existent at Alabama), we

will examine domestic contexts to compare and contrast the practices of everyday life at Alabama. As a final note, we will *manage the scope of this research* by deferring a third hypothesis related to the Pearce site, 10 km to the north, to a later research endeavour. Pearce appears to also have boomed at the same time, based on our preliminary reconnaissance—suggesting Alabama may have emerged as part of larger political consolidation processes. To properly investigate the relationship between these two settlements will require mounting a comparable research program at Pearce—an intended focus of our longer-term (10+ years) research plans in the area.

SCRAP 2018 Season Summary

Data collection took place in Belize over 6 weeks (May 14th to June 22nd, 2018): one-week set up, four-weeks of excavations, a two-week geological survey (overlapping with last week of excavation and shutdown week), and a one-week shutdown/lab session.

Permission in 2018 was granted by the Institute of Archaeology (Belize) for the following activities, the final and/or ongoing results of which are reported in this volume:

Settlement Excavations

We received permission to excavate an extension off Suboperation 3A at ALA-045A (2016 Phase II excavations), where we encountered the edge of what was thought to possibly be a simple cyst burial feature to the back of the penultimate platform. We wished to fully expose the feature and excavate inside to determine if any human remains were present, as this would allow us material to isotopically test to determine some population origins. Due to the highly acidic soils in the region, we were not convinced any remains would survive; however, it would allow us to better understand burial practices of the area, which may provide clues as to population origins.

Monumental Core Excavations

We received permission to conduct test excavations (horizontal and stratigraphic column) at Structures 1, 2, and 10 to further refine the construction and occupation chronologies for the monumental core, as well as to conduct a preliminary assessment of architectural styles and techniques for the purpose of beginning to better understanding cultural affiliations represented at Alabama and to determine how best to tackle future large-scale excavations on earthen-core monumental constructions at Alabama.

Geological Survey

We received permission to conduct a preliminary baseline geological survey. This involved both targeted and systematic sampling—focused primarily on granitic materials and sediments—along the drainages of the Alabama area. This survey will serve as a foundation for our on-going ceramic manufacture and granite use studies.

Other Permissions

Additional permissions were granted for the following activities:

- Hosting a 4-week undergraduate field school in archaeological techniques.
- Continue gathering geospatial data for our growing project GIS database.
- Continue experimenting with the generation of 3D models of artifacts and excavations (Figure 1.4). Models have been generated using a combination of Pentax K-x SLR Digital Camera + 18 mm lens + Agisoft OR iPhone 5S slow-motion video + Photoshop + Agisoft.
- Pilot a new mobile relational database system developed for use in field by Codifi, Inc.
- Continue conducting characterization and sourcing studies of obsidian artifacts, pottery sherds, and building materials, including non-destructive Energy Dispersive X-Ray Fluorescence (EDXRF) and petrographic thin section analysis.

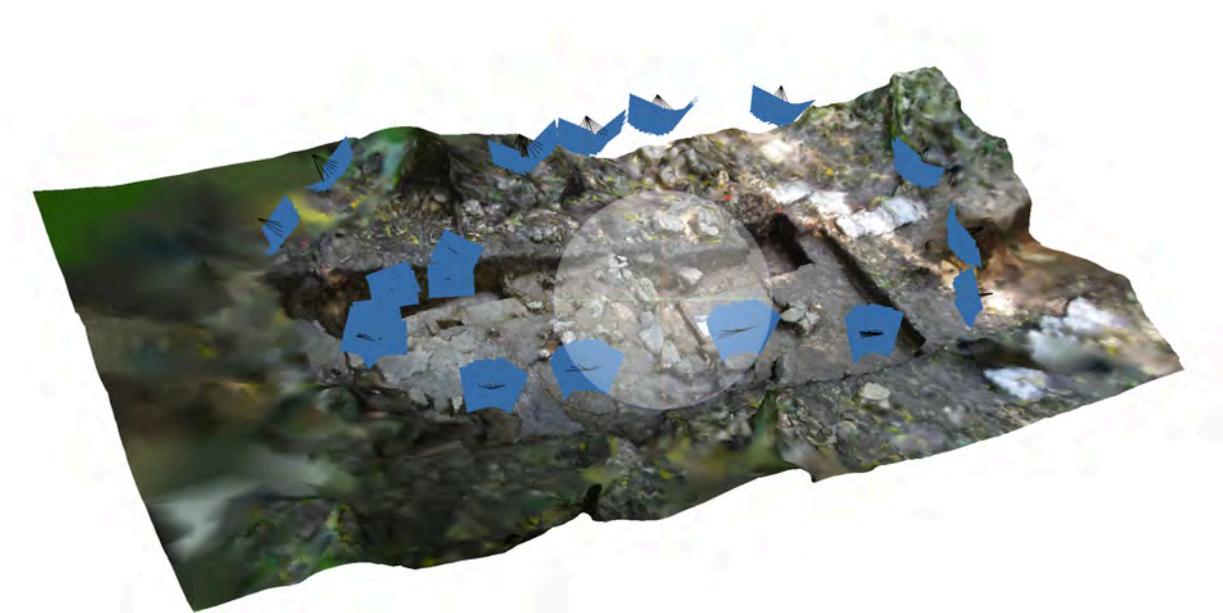


Figure 1.4: Locations of cameras for 3D model development at Operation 6 excavations at Str 1 & 2 at Alabama (Pentax K-x SLR Digital Camera + 18 mm lens + Agisoft).

2018 SCRAP Field Crew

Name	Role (Affiliation)
Blaine, Dave	Field Supervisor (Canada)
Cal, Idelfonso	Field Assistant (Belize)
Chiac Jr., Higinio	Field Assistant (Belize)
Chiac Sr., Higinio	Field Assistant (Belize)
Chiac, Justino	Field Assistant (Belize)
Chiac, Sylvestro	Field Assistant (Belize)
Delos Reyes, Johana	Field School Student (Canada)
Dowler, Jada	Field School Student (Canada)
George, Miranda	Field School Student (Canada)
Hiwatashi-Kreusch, Stephany	Field School Student (Canada)
Howie, Linda (Ph.D.)	Ceramicist (Canada)
Hubenig, Kristine	Field School Student (Canada)
Jordan, Jillian	Lab Director, Ceramicist (USA)
Leslie, Dorian	Field Volunteer (Belize)
Longstaffe, Matthew	Field Volunteer (Canada)
Melena, Adela	Field School Student (Canada)
Morton, Shawn (Ph.D.)	Field Director, Field School Instructor (USA)
Ovando, Alson	Field Volunteer (Belize)
Paquiul, Juan	Field Assistant (Belize)
Peuramaki-Brown, Meaghan M. (Ph.D.)	Permit Holder, PI, Field School Instructor (Canada)
Phillips, Erin Niki	Field School Student (Canada)
Potter, Joanna (Ph.D)	Geologist (Canada)
Reese-Taylor, Kathryn (Ph.D.)	Field School Instructor (Canada)
Salam, Lupercio	Field Assistant (Belize)
Smith, Douglas	Field School Student (Canada)
Taylor, Gillian	Field School Student (Canada)
Teul, Nicki	Field Assistant (Belize)
Teul, Tyson	Field Assistant (Belize)
Williams, A. Megan	Field Supervisor (Canada)
Zborover, Danny (Ph.D.)	Field Volunteer (USA)

References Cited

Aimers, James J.

2007 What Maya Collapse? Terminal Classic Variation in the Maya Lowlands. *Journal of Archaeological Research* 15(4): 329–377.

Barbier, Edward B.

2011 *Scarcity and Frontiers: How Economies Have Developed Through Natural Resource Exploitation*. Cambridge University Press, Cambridge.

Barnes, Trevor

- 1988 Borderline Communities. Canadian Single Industry Towns, Staples, and Harold Innis. In *B/ordering Space*, edited by H. Van Houtum, O. Kramsch, and W. Zierhofer, pp. 111-122. Ashgate, Burlington, VT
- Barnes, Trevor J., and Roger Hayter
 1994 Economic Restructuring, Local Development and Resource Towns: Forest Communities in Coastal British Columbia. *Canadian Journal of Regional Science* 17(3): 289–310.
- Barth, Gunther
 1975 *Instant Cities: Urbanization and the Rise of San Francisco and Denver*. Oxford University Press, New York.
- Bathelt, Harald, and Johannes Glückler
 2003 Toward a Relational Economic Geography. *Journal of Economic Geography* 3: 117–144.
- Bartlett, Mary Lee, Hector Neff, and Patricia A. McAnany
 2000 Differentiation of Clay Resources on a Limestone Plain: The Analysis of Clay Utilization during the Maya Formative at K'axob Belize. *Geoarchaeology* 15(2): 95–133.
- Benson, Larry, Timothy R. Pauketat, and Edward R. Cook
 2009 Cahokia's Boom and Bust in the Context of Climate Change. *American Antiquity* 74(3): 467–483.
- Beyyette, Bethany J., and Lisa J. LeCount (eds.)
 2017 *"The Only True People": Linking Maya Identities Past and Present*. University Press of Colorado, Boulder.
- Bradbury, John H.
 1979 Towards an Alternative Theory of Resource-Based Town Development in Canada. *Economic Geography* 55(2): 147–166.
- Braswell, Geoffrey E., and Keith M. Prufer
 2009 Political Organization and Interaction in Southern Belize. *Research Reports in Belizean Archaeology* 6:43-54.
- Bulmer-Thomas, Barbara, and Victor Bulmer-Thomas
 2012 *The Economic History of Belize: From the 17th Century to Post-Independence*. Cubola Books, Benque Viejo del Carmen, Belize.
- Burghardt, A. F.
 1971 A Hypothesis about Gateway Cities. *Annals of the Association of American Geographers* 61(2): 269-285.
- Crampton, Jeremy, and Stuart Elden (eds.)
 2007 *Space, Knowledge and Power: Foucault and Geography*. Ashgate, Burlington, VT.
- Cucina, Andrea (ed.)

2015 *Archaeology and Bioarchaeology of Population Movement Among the Prehispanic Maya*. Springer, London.

Demarest, Arthur A., Prudence M. Rice, and Don S. Rice (eds.)

2004 *The Terminal Classic in the Maya Lowlands: Collapse, Transition, and Transformations*. University Press of Colorado, Boulder.

Dunham, Peter S.

1996 Resource Exploitation and Exchange among the Classic Maya: Some Initial Findings of the Maya Mountains Archaeological Project. In *The Managed Mosaic: Ancient Maya Agriculture and Resource Use*, edited by S.L. Fedick, pp. 315–334. University of Utah Press, Salt Lake City.

Dunham, Peter S., Robert C. Murray, William E. Brooks, Robert P. Reynolds, Theresa H. Cookro, and Jeremy F. Jacobs

1995 *Field Report of the 1995 Season of the Maya Mountains Archaeological Project (MMAP)*. Report submitted to the Department of Archaeology, Forest Department, Office of Geology and Petroleum, and the Belize Audubon Society, Belize.

Evans, G.

1948 Cacao Prospects in British Guiana and British Honduras. In *Report of Cacao Conference*, edited by The Cocoa, Chocolate and Confectionary Alliance, Ltd., pp. 6–12. Grosvenor House, London.

Falconer, Steven E.

1987 *Heartland of Villages: Reconsidering Early Urbanism in the Southern Levant*. Unpublished Ph.D. dissertation, University of Arizona, Tucson.

Falconer, Steven E., and Stephen H. Savage

1995 Heartlands and Hinterlands: Alternative Trajectories of Early Urbanization in Mesopotamia and the Southern Levant. *American Antiquity* 60(1):37-58.

Flannery, Kent

1968 Archaeological systems theory and early Mesoamerica. In *Anthropological Archaeology in the Americas*, edited by B.J. Meggers, pp. 67-87. Anthropological Society of Washington, Washington, D.C.

Freudenburg, William

1982 The Effects of Rapid Population Growth on the Social and Personal Well-Being of Local Community Residents. In *Coping with Rapid Growth in Rural Communities*, edited by B.A. Weber and R.E. Howell, pp. 137–170. Westview Press, Boulder, CO.

1986 The Density of Acquaintanceship: An Overlooked Variable in Community Research? *American Journal of Sociology* 92(1): 27–63.

Graham, Elizabeth

1978 Archaeological Investigations in the Stann Creek District. *Belizean Studies* 6(4):16-26.

1983 *The Highlands of the Lowlands: Environment and Archaeology in the Stann Creek District, Belize, Central America*. Unpublished PhD dissertation. University of Cambridge.

- 1985 Facets of Terminal to Post Classic Activity in the Stann Creek District, Belize.” In *The Lowland Maya Postclassic*, edited by A. Chase and P. Rice, pp.213-229. University of Texas, Austin.
- 1987 Resource diversity in Belize and its implications for models of lowland trade. In: *American Antiquity* 52(4):753-767.
- 1994 *The Highlands of the Lowlands: Environment and Archaeology in the Stann Creek District, Belize, Central America*. Monographs in World Archaeology, Vol. 19. Prehistory Press and the Royal Ontario Museum, Madison, WI and Toronto, ON.
- 1998 Metaphor and Metamorphism: Some Thoughts on Environmental Metahistory. In *Advances in Historical Ecology*, edited by W. Balée, pp. 119–137. Columbia University Press, New York.
- 2001 Stann Creek District. In *Archaeology of Mexico and Central America: An Encyclopedia*, edited by Susan Toby Evans and David L. Webster, pp.684-686. Garland Publishing, New York.

Grauman Wolf, Stephanie

- 1980 *Urban Village: Population, Community, and Family Structure in Germantown, Pennsylvania 1683-1800*. Princeton University Press, Princeton, New Jersey.

Greider, Thomas, and Richard S. Krannich

- 1985a Neighboring Patterns, Social Support, and Rapid Growth: A Comparison Analysis from Three Western Communities. *Sociological Perspectives* 28(1):51-70.
- 1985b Perceptions of Problems in Rapid Growth and Stable Communities: A Comparative Analysis. *Journal of the Community Development Society* 16(2):80-96.

Guengerich, Anna

- 2017 Domestic Architecture and the Materiality of Public-Making in Pre-Columbian Eastern Peru. *Journal of Social Archaeology* 17(3):263-284.

Heidegger, Martin

- 1971 *Poetry, Language, Thought*, translated by A. Hofstadter. Harper & Row, New York.

Hendon, Julia A.

- 2010 *Houses in a Landscape: Memory and Everyday Life in Mesoamerica*. Duke University Press, Durham and London.

Hodder, Ian (ed.)

- 2012 *Entangled: An Archaeology of the Relationships between Humans and Things*. Wiley-Blackwell, Oxford.

Houk, Brett A.

- 2015 *Ancient Maya Cities of the Eastern Lowlands*. University Press of Florida, Gainesville.

Hubbard, Michael

- 2000 *Country Report on Assistance to Belize: Evaluation of EU Assistance to ACP Banana Producers*. EVA – EU Association, Taastrup, Denmark.

Hutson, Scott R. (ed.)

2017 *Ancient Maya Commerce: Multidisciplinary Research at Chunchucmil*. University Press of Colorado, Boulder.

Iannone, Gyles (ed.)

2014 *The Great Maya Droughts in Cultural Context: Case Studies in Resilience and Vulnerability*. University Press of Colorado: Boulder.

Iannone, Gyles, and Samuel V. Connell (eds.)

2003 *Perspectives on Ancient Maya Rural Complexity*. The Cotsen Institute of Archaeology, University of California, Los Angeles.

Innis, Harold

1977 [1930] *The Fur Trade in Canada*, revised and reprinted. University of Toronto Press, Toronto.

Isendahl, Christian, Nicholas P. Dunning, and Jeremy A. Sabloff

2014 Growth and Decline in Classic Maya Puuc Political Economies. *Archaeological Papers of the American Anthropological Association* 24: 43–55.

Jones, Martin

2009 Phase Space: Geography, Relational Thinking, and Beyond. *Progress in Human Geography* 33(4): 487–506.

Jordan, Jillian M., and Keith M. Prufer

2017 Identifying Domestic Ceramic Production in the Maya Lowlands: A Case Study from Uxbenka, Belize. *Latin American Antiquity* 28(1): 66–87.

Joyce, T. A.

1931 Report of the British Museum expedition to British Honduras, 1931. Unpublished manuscript. Copy on file in The Latin American Library at Tulane University (Rare Collections, RBC 972.82(910)J89 1 LAL).

Leeds, Anthony

1980 Towns and Villages in Society: Hierarchies of Order and Cause. In *Cities in a Larger Context*, edited by T.W. Collins, pp.6-33. The University of Georgia Press, Athens.

Lefebvre, Henri

1991 *The Production of Space*. Blackwell, Oxford.

2003 *The Urban Revolution*. University of Minnesota Press, Minneapolis.

Leventhal, Richard M.

1992 The Development of a Regional Tradition in Southern Belize. In *New Theories on the Ancient Maya*, edited by E. C. Danien and R. J. Sharer, pp. 145-153. University Museum Symposium Series, Volume 3. University Museum Monograph, 77. University of Pennsylvania, Philadelphia.

MacKinnon, J. Jefferson

- 1987 *Preliminary Report: Point Placencia Archaeological Project, December 1986-January 1987*. Unpublished report submitted to the Belize Department of Archaeology, Belmopan, Belize.
- 1988a *Point Placencia Archaeological Project Belize, Central America: Excavations at C'hacben K'ax, Alabama, Stann Creek District, Belize, 1986-1988*. Unpublished report submitted to the Belize Department of Archaeology, Belmopan, Belize.
- 1988b *C'hacben K'ax, 1985-1988: Excavations at Alabama, Stann Creek District, Belize*. Unpublished report submitted to the Belize Department of Archaeology, Belmopan, Belize.
- 1989a *Spatial and Temporal Patterns of Prehistoric Maya Settlement, Procurement, and Exchange on the Coast and Cays of Southern Belize*. Unpublished PhD dissertation. University of Wisconsin-Madison.
- 1989b *1989 Preliminary Report of the Point Placencia Archaeological Project: Consolidation of the Ballcourt at C'hacben K'ax and Archaeological Survey of the Northern Cays of the Stann Creek District, Belize*. Unpublished report submitted to the Belize Department of Archaeology, Belmopan, Belize.
- 1991 Preliminary Reconnaissance of the Quebrada de Oro Site: Implications for a Regional Model of Maya Civilization in Southern Belize. *Mexicon* 13(5):87-92.

MacKinnon, J. Jefferson, and Emily M. May

- 1991 The Ballcourts of C'hacben K'ax and Its Neighbors: The Maya Ballgame and the Late Classic Colonial Impulse in Southern Belize. In *The Mesoamerican Ballgame: papers presented at the international colloquium "The Mesoamerican Ballgame 2000 BC-AD 2000, Leiden, June 30th-July 3rd, 1988"*, edited by G.W. van Bussel, P. L. F. van Dongen, and T. J. J. Layenaar, pp.71-80. Rijksmuseum voor Volkenkunde, Leiden.

MacKinnon, J. Jefferson, Jeffrey M. Olson, and Emily M. May

- 1993 "Megalithic" Maya Architectural Features at the site of Chacben Kax, Alabama, Stann Creek District, Belize, CA. *Mexicon* 15(1):1-4.

Malpas, Jeff

- 2012 Putting Space in Place: Philosophical Topography and Relational Geography. *Environment and Planning D: Society and Space* 30(2): 226–242.

McAnany, Patricia A.

- 2010 *Ancestral Maya Economies in Archaeological Perspective*. Cambridge University Press, Cambridge.

McKillop, Heather I.

- 2002 *Salt: White Gold of the Ancient Maya*. University Press of Florida, Gainesville.

McNeil, Cameron L.

- 2009 *Chocolate in Mesoamerica*. University Press of Florida, Gainesville.

Moberg, Mark

- 1997 *Myths of Ethnicity and Nation: Immigration, Work, and Identity in the Belize Banana Industry*. University of Tennessee Press, Knoxville.

Murillo, Dana Valasco

2016 *Urban Indians in a Silver City: Zacatecas, Mexico, 1546–1810*. Stanford University Press, Stanford.

Paz, Yitzhak

2002 Fortified Settlements of the EB IB and the Emergence of the First Urban System. *Tel Aviv* 29(2): 238–261.

Peuramaki-Brown, Meaghan (ed.)

2015 *The Stann Creek Regional Archaeology Project: Report of the Second (2015) Field Season*. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

2016a *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

Peuramaki-Brown, Meaghan

2016b Settlement and Resource Development at Alabama, Belize: Past, Present, and Future Investigations. *Research Reports in Belizean Archaeology* 13:239-250.

2017 Revisiting the Ancient Maya of Alabama, Belize: Description, Recent Research, and Future Directions. *Mexicon* 39(3):64-72.

Peuramaki-Brown, Meaghan M., Linda Howie, and Joanna Potter.

2017a Pre-Columbian Pottery and Building Materials of the East-Central Belize Maya: A Petrographic Characterization Study. Paper presented at the Annual Meetings of the Society for American Archaeology, Vancouver, British Columbia, March 29-April 2, 2017.

Peuramaki-Brown, Meaghan M., and Shawn G. Morton

2016 The 2016 Reconnaissance of the Pearce Sites of the Cockscomb Basin Reserve. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. Peuramaki-Brown, pp. 111-124.

In press a Archaeological Reconnaissance at the Pearce Sites of the Cockscomb Basin, Stann Creek District. *Research Reports in Belizean Archaeology* 16.

In press b Maya Monumental ‘Boom’: Rapid Development, Hybrid Architecture, and ‘Pretentiousness’ in the Fabrication of Place at Alabama, East-Central Belize. *Journal of Field Archaeology*.

Peuramaki-Brown, Meaghan M., Shawn G. Morton, and Cristina Oliveira

2018 “Some Lessons Can’t Be Taught, They Simply Have To Be Learned”: Experiences from Three Seasons of Investigations at Alabama, Stann Creek District, Belize. *Research Reports in Belizean Archaeology* 15:297-306.

Peuramaki-Brown, Meaghan, Shawn Morton, Tawny Tibbits, Lisa Green, Jesucita Guerra, Brittany Johnson

2017b Phase I Reconnaissance (2014-2015) At Alabama: A Summary of SCRAP Investigations In East-Central Belize. *Research Reports in Belizean Archaeology* 14:299-309.

Peuramaki-Brown, Meaghan, and Sonja Schwake (eds.)

2014 *The Stann Creek Regional Archaeology Project (SCRAP): Results of the First (2014) Field Season*. Report submitted to the Institute of Archaeology, National Institute of Culture and History, Belize.

Peuramaki-Brown, Meaghan M., and Tawny Tibbits

2015 Granite Use and Extraction Among the Ancient Maya of Belize. Paper presented at the Annual Meetings of the Canadian Archaeological Association, St. John's, Newfoundland, April 29–May 2, 2015.

Rabinowitz, Alan

1987 *Jaguar: One Man's Struggle to Save Jaguars in the Wild*. Collins, London.

Rice, Don S., and Patrick T. Culbert

1990 Historical Contexts for Population Reconstruction. In *Precolumbian Population History in the Maya Lowlands*, edited by P.T. Culbert and D. Rice, pp. 1-37. University of New Mexico Press, Albuquerque.

Rockman, Marcy

2003 Knowledge and Learning in the Archaeology of Colonization. In *Colonization of Unfamiliar Landscapes: The Archaeology of Adaptation*, edited by M. Rockman and J. Steele, pp. 3–24. Routledge, London and New York.

Rodriguez, Oscar Salazar

1982. Life and Death in an Oil Boom. Unpublished M.A. Thesis, Department of Urban Studies and Planning, Massachusetts Institute of Technology.

Scarborough, Vernon L., and Fred Valdez Jr.

2003 The Engineered Environment and Political Economy of the Three Rivers Region. In *Heterarchy, Political Economy, and the Ancient Maya: The Three Rivers Region of the East-Central Yucatán Peninsula*, edited by V.L. Scarborough, F. Valdez Jr., and N. Dunning, pp. 3–13. The University of Arizona Press, Tucson.

2009 An Alternative Order: The Dualistic Economies of the Ancient Maya. *Latin American Antiquity* 20(1): 207–227.

Schafer, Kevin

1987 Chacben Kax: The First Excavations of a Newly Discovered Ceremonial Site Provide New Links to Maya Sea Traders. *Earthwatch* Oct/Nov:19-23.

ShIPLEY III, Webster E., and Elizabeth Graham

1987 Petrographic Analysis and Preliminary Source Identification of Selected Stone Artifacts from the Maya Sites of Seibal and Uaxactun, Guatemala. *Journal of Archaeological Science* 14: 367–383.

Siembieda, William J., and Eduardo López Moreno

1998 Barrios and the Hispanic American City: Cultural value and social representation. *Journal of Urban Design* 3(1):39*52.

Sills, Cory E.

2016 Re-Evaluating the Ancient Maya Salt Works at Placencia Lagoon, Belize. *Mexicon* XXXVIII: 69–74.

Smith, Michael E.

2007 Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning. *Journal of Planning History* 6(1): 3–47.

2011 Classic Maya Settlement Clusters and Urban Neighbourhoods: A Comparative Perspective on Low-Density Urbanism. *Journal de la Société des Americanistes* 97(1):51-73.

Smith, Michael E., Ashley Engquist, Cinthia Carvajal, Katrina Johnston-Zimmerman, Monica Alegra, Bridgette Gilliland, Yuri Kuznetsov, and Amanda Young

2015 Neighborhood Formation in Semi-Urban Settlements. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 8(2): 173–198.

Soja, E.W.

1996 *Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Place*. Blackwell, Oxford.

Thrift, Nigel

2003 Space: The Fundamental Stuff of Human Geography. In *Key Concepts in Geography*, edited by S.L. Holloway, S. Rice, and G. Valentine, pp. 95–108. Sage Publications, London.

Tibbitts, L.B. Tawny

2016 Geochemical Sourcing of Granite Ground Stone Tools from Belize. Unpublished PhD dissertation, University of Iowa, Iowa City.

Toledo Maya Cultural Council (TMCC) & Toledo Alcaldes Association (TAA)

1997 *Maya Atlas: The Struggle to Preserve Maya Land in Southern Belize*. North Atlantic Books, Berkeley, California.

van der Leeuw, Sander, and Charles L. Redman

2002 Placing Archaeology at the Center of Socio-Natural Studies. *American Antiquity* 67(4): 597–605.

Walters, Gary Rex

1988. *Field Report Dec. 1987-Jun. 1988 Point Placencia Archaeological Project*. Unpublished report submitted to the Belize Department of Archaeology, Belmopan, Belize.

Ward, Drew T.

2013 Investigations of a Ground Stone Tool Workshop at Pacbitun, Belize. Unpublished MA Thesis, Department of Anthropology, Georgia State University, Atlanta.

Watts, Christopher

2013 *Relational Archaeologies: Humans, Animals, Things*. Routledge, London and New York.

Webster, David.

2002 *The Fall of the Ancient Maya: Solving the Mystery of the Maya Collapse*. Thames & Hudson, London.

Williams, A. Megan, Meaghan Peuramaki-Brown, Elizabeth Paris, and Tristan Carter

2017 The Implications of Obsidian Source Analysis to Occupation Chronology and Economic Relations at Alabama, Belize. *Paper presented at the 50th Annual Meeting of the Canadian Archaeological Association, Ottawa, Ontario, May 10-13, 2017.*

Woodworth, Max

2011 Frontier Boomtown Urbanism in Ordos, Inner Mongolia Autonomous Region. *Cross-Currents: East Asian History and Culture Review*, E-Journal No. 1. Electronic document, <http://cross-currents.berkeley.edu/sites/default/files/e-journal/articles/woodworth.pdf>, accessed 8 December 2014.

2015 Ordos Municipality: A Market-Era Resource Boomtown. *Cities* 43: 115–132.

Zenner, Walter P.

2010 Beyond Urban and Rural Communities in the 21st Century. In *Urban Life: Readings in the Anthropology of the City*, edited by G. Gmelch, R.V. Kemper, and W.P. Zenner, pp. 413-420. Waveland Press, Long Grove, Illinois.

Chapter 2. 2018 Investigations in the Alabama Monumental Core: Operation 5 (Str 10) & Operation 6 (Strs 1 & 2)

Meaghan M. Peuramaki-Brown (Athabasca University)

Shawn G. Morton (Northern Arizona University)

A. Megan Williams (Athabasca University)

Matthew Longstaffe (University of Calgary)

Dave Blaine (Creating Context, Inc.)

Following three seasons of Stann Creek Regional Archaeology project (SCRAP) reconnaissance and topographic survey in the monumental core (epicentre) of the Alabama site (Peuramaki-Brown et al. 2014; Morton 2015, 2016), the 2018 season focused on preliminary testing in two areas of the monumental core: Structure 10 (Str 10) and the interstice of Structures 1 and 2 (Str 1/2). Reasons for the selection of these locations included:

1. An understanding—albeit tentative in one case—that these two areas had not been previously tested by the 1980s Point Placencia Archaeological Project (PPAP); thus, avoiding any possible repetition of data collection.
2. A working hypothesis that these structures possibly represent examples of both earlier (Strs 1/2) and later (Str 10) construction phases within the monumental core, based on observations regarding orientation and overall layout (Morton 2016: 25; Peuramaki-Brown and Morton *in press*).

As we were unfamiliar with the full nature of the monumental architecture at Alabama (descriptions from 1980s excavations were minimal), we decided to set up large area excavations (8 m x 3 m) at each building(s) to expose significant portions of the terminal architecture. We then initiated trench- and phonebooth-style excavations (profile windows) in small slivers of the exposed areas to get a sense of the nature of internal constructions and what challenges they posed for future excavation.

Recording of excavations were conducted using the forms/guides/systems described in Appendix A of this volume, and all matrix was screened using ¼-inch mesh, unless otherwise indicated. Summaries of excavation contexts are provided below—including individual lot data presented in Table 2.1—while artifact tallies are presented in Table 2.2. Copies of all associated paperwork, drawings, and photos are on file at the Belize Institute of Archaeology. Artifacts are currently in storage in Belize.

Structure 10, Operation 5

This section presents the results of 2018 test excavations at Str 10, which is the second tallest structure of the Alabama monumental core (after Str 3), and consists of a large construction platform (approx. 45 m E/W x 20 m N/S x 5 m tall), with both range-structure- and pyramid-platform-like features. Str 10 is centrally positioned within the monumental core, located just east of the ball court and to the north of Structures 1 and 2 (refer to Figure 1.2 in this volume). The positioning of Str 10—its northern and southern outset stairs descending into the North and East Plazas, respectively—gives it the appearance of having been purposefully constructed so as to bisect an otherwise conventional (square) plaza space, creating two separate, elongated

plaza areas; this placement may suggest that Str 10 was added as part of a later phase of construction within the Alabama monumental core.

The 2018 excavations at Str 10 were undertaken with the aim of clarifying construction sequence(s) and history of use vis-à-vis other constructions in the Alabama monumental core, in particular Str 1/2 located to the south of Str 10 on the southern edge of the East Plaza. Mention of intended future excavations in 1980s reports by the PPAP led to questions regarding past archaeological activity at Str 10—ultimately, unreported by PPAP if they did, in fact, occur (MacKinnon 1988a); therefore, SCRAP 2018 excavations at Str 10 also sought to confirm or dismiss past archaeological investigations. The north face of the structure was selected over the south face as a means of avoiding the significant damage caused by bulldozer activity in the 1950s (see comments in Morton 2015).

The 2018 excavations at Str 10 were designated Operation 5 (Op 5) and consisted of two contiguous suboperations (units), oriented 13° east of magnetic north and positioned as close to the primary axis of the platform/face of the northern outset stair as was permitted (large trees prohibited exact alignment, and fallen material has caused difficulties in predicting accurate architectural orientations). Suboperation 5A (Subop 5A) was positioned to the south, with Suboperation 5B (Subop 5B) to the north with partial placement on the North Plaza surface (Figure 2.1). The goals of such placement included recovery of architectural data, artifacts, and other datable materials, along with partial alignment with what appeared to be the south end (atop the platform) of a possible backfilled trench—potentially the location of 1980s excavations; we later confirmed from a local resident who had worked with the project in the late 80s that, as far as they could recall, investigations had not occurred at Str 10.

The excavations and documentation reported here were directed by Meaghan Peuramaki-Brown (MPB); supervised at various times by A. Megan Williams (AMW), Matthew Longstaffe (ML), and Shawn G. Morton (SGM); and assisted at various times by Idelfonso Cal (IC), Higinio Chiac Jr. (HC), Sylvestro Chiac (SC), Mira George (MG), Dorian Leslie (DL), Adela Melena (AM), Alson Ovando (AO), Lupercio Salam (LS), Douglas Smith (DS), Gillian Taylor (GT), Frank Tzib (FT), and Danny Zborover (DZ).

Op	Subop	Lot	Context		Ceramic Date	Metrics		Matrix Description	
			Designation			Avg thick (m)	Vol. (m3)	Colour	Inclusions
5	A	1	Humus		LC/TC	0.08	0.97	10R 2/2.5 Very Dusty Red	80% Silty Clay Loam; 20% root
5	A	2	Colluvium/Fall			0.02	0.19	5YR 5/6 Yellowish Red	95% Sandy Loam; 3% medium cobble; 2% roots
5	A	3	Colluvium/Fall		LC/TC	0.06	0.19	2.5YR 4/8 Red; 5YR 5/6 Yellowish Red	95% Silty Loam; 5% medium cobble
5	A	4	Construction Fill 1			0.09	0.09	2.5YR 4/8 Red	50% Sandy Clay Loam; 50% medium to large cobble
5	A	5	Construction Fill 2		TC	0.04	0.04	10YR 4/6 Red	100% Silty Clay Loam
5	A	6	Feature 1A			0.23	0.12	7.5YR 4/4 Brown	100% Silty Clay Loam
5	A	7	Construction Fill 2			0.05	0.03	10YR 4/6 Red	95% Silty Clay Loam; 5% pebble
5	A	8	Construction Fill 2			0.13	0.07	7.5YR 5/6 Strong Brown	90% Silty Loam; 10% sand
5	A	9	Construction Fill 2			0.07	0.07	5YR 4/6 Yellowish Red	90% Silty Loam; 10% sand
5	A	10	Construction Fill 3			0.15	0.15	7.5YR 4/6 Strong Brown	60% cobble; 40% Sandy Loam
5	A	11	Construction Fill 4			0.19	0.19	7.5YR 4/6 Strong Brown	100% Sandy Loam
5	B	1	Humus		LC/TC	0.19	2.33	10R 3/2 Dusty Red	80% Clay Loam; 20% root
5	B	2	Colluvium/Fall		LC/TC; PC?	0.13	1.55	5YR 5/4 Reddish Brown	80% Clay Loam; 20% medium to large cobble
5	B	3	Colluvium/Fall		TC	0.05	0.30	5YR 5/4 Reddish Brown	80% Clay Loam; 20% medium to large cobble
5	B	4	Colluvium/Fall		TC	0.14	0.31	5YR 4/6 Yellowish Red	80% Clay Loam; 20% medium to large cobble
5	B	5	Construction Fill 5			0.02	0.02	7.5YR 4/4 Brown	50% Sandy Clay; 50% medium cobble
5	B	6	Feature 1B			0.13	0.01	5YR 4/4 Reddish Brown	99% Clay Loam; 1% carbon
5	B	7	Construction Fill 5			0.11	0.11	5YR 4/4 Reddish Brown	50% Loamy Sand; 50% medium cobble
5	B	8	Plaza Ballast			0.07	0.05	5YR 5/6 Yellowish Red	50% cobbles; 30% pebbles; 20% Sand
5	B	9	Construction Fill 5			0.02	0.02	7.5YR 4/4 Brown	50% Sandy Clay; 50% medium cobble
5	B	10	Sand Horizon			0.13	0.07	10YR 4/4 Dark Yellowish Brown	97% Sand/Sandy Loam; 3% Clay
5	B	11	Construction Fill 6			0.05	0.01	5YR 4/4 Reddish Brown	100% Clay Loam
5	B	12	Construction Fill 6			0.17	0.03	5YR 6/4 Light Reddish brown	100% Clay Loam
5	B	13	Construction Fill 5			0.20	0.06	7.5YR 4/4 Brown	80% Clay Loam; 15% pebble; 5% cobble
5	B	14	Sand Horizon			0.15	0.07	7.5YR 4/4 Brown	95% Sandy Clay to Clay; 5% pebble
5	B	15	Construction Fill 6			0.06	0.02	7.5YR 4/4 Brown	80% Clay Loam; 15% pebble; 5% pebble
5	B	16	Clay Horizon			0.20	0.10	5YR 4/6 Yellowish Red	95% Sandy Clay Loam; 5% pebble
5	B	17	Construction Fill 6			0.20	0.07	7.5YR 4/6 Strong Brown	80% Clay Loam; 15% pebble; 5% pebble
5	B	18	Clay Horizon			0.09	0.04	5YR 4/6 Yellowish Red	90% Sandy Clay Loam; 10% pebble
5	B	19	Construction Fill 6			0.29	0.10	10YR 4/3 Brown to Dark Brown	90% Clay Loam; 5% pebble; 5% cobble
5	B	20	Clay Horizon			0.19	0.09	2.5YR 4/6 Red	85% Clay Loam; 15% pebble
5	B	21	Clay Horizon			0.09	0.05	2.5YR 4/8 Red	95% Clay Loam; 5% pebble
5	B	22	Construction Fill 7			0.26	0.09	5YR 5/4 Reddish brown	90% Clay Loam; 5% pebble; 5% cobble
5	B	23	Construction Fill 7			0.14	0.05	5YR 4/4 Reddish brown	95% Clay Loam; 5% pebble
Total Volume Excavated, Op 5, 2018 (m3)							7.64		

Table 2.1: Summary of lot descriptions for Operations 5 & 6

Context			Ceramic Date	Metrics		Matrix Description		
do	Subno	Lot		Designation	Avg thick (m)	Vol. (m3)	Colour	Inclusions
6	A	1	Humus		0.12	1.45	7.5YR 2/2.5 Very Dark Brown	80% Silty Clay Loam; 15% root; 5% pebble
6	A	2	Colluvium/Fall		0.15	1.80	7.5YR 3/2 Dark Brown	92% Sandy Clay Loam; 5% coarse/very coarse pebble, small cobble; 3% root
6	A	3	Colluvium/Fall		0.09	0.09	7.5YR 4/3 Brown	92% Sandy Clay; 5% coarse/very coarse pebble, small cobble; 3% root
6	A	4	Colluvium/Fall		0.02	0.02	7.5YR 4/3 Brown	92% Sandy Clay; 5% coarse/very coarse pebble, small cobble; 3% root
6	A	5	Construction Fill 3		0.11	0.11	7.5YR 4/3 Brown	100% Sandy Clay Loam
6	A	6	Construction Fill 3		0.28	0.21	10YR 4/4 Dark Yellowish Brown	90% Sandy Loam; 10% pebble
6	A	7	Construction Fill 3		0.02	0.01	10YR 4/4 Dark Yellowish Brown	85% Sandy Loam; 10% pebble; 5% cobble
6	A	8	Construction Fill 3: Layer 1 & 2		0.13	0.01	10YR 4/4 Dark Yellowish Brown	100% Sandy Clay Loam (cap to 40% small pebble and cobble (sub-floor fill))
6	A	9	Construction Fill 3: Layer 1		0.18	0.02	10YR 4/4 Dark Yellowish Brown	100% Sandy Clay Loam (cap to 40% small pebble and cobble (sub-floor fill))
6	A	10	Construction Fill 3: Layer 2		0.12	0.14	10YR 4/4 Dark Yellowish Brown	100% Sandy Clay Loam (cap to 40% small pebble and cobble (sub-floor fill))
6	A	11	Construction Fill 3: Layer 3		0.23	0.29	10YR 5/4 Yellowish Brown	100% Sandy Clay (cap to 40% small pebble and cobble (sub-floor fill))
6	A	12	Colluvium/Fall		0.08	0.12	10YR 5/4 Yellowish Brown	92% Sandy Clay; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	1	Humus		0.13	1.61	7.5YR 2/2.5 Very Dark Brown	80% Loam; 15% root; 5% pebble
6	B	2	Colluvium/Fall		0.07	0.82	10 YR 3/2 Very Dark Greyish Brown	92% Clay Loam; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	3	Colluvium/Fall		0.13	0.24	7.5YR 3/3 Brown	92% Sandy Loam; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	4	Colluvium/Fall		0.06	0.09	7.5YR 3/3 Brown	92% Sandy Clay; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	5	Colluvium/Fall		0.29	0.66	7.5YR 4/3 Brown	92% Sandy Clay Loam; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	6	Colluvium/Fall		0.07	0.03	10YR 4/3 Brown	70% Sandy Loam; 25% cobble; 5% pebble
6	B	7	Construction Fill 1		0.13	0.07	10YR 4/6 Dark Yellowish Brown	60% angular cobbles/pebble; 40% Sandy Clay
6	B	8	Colluvium/Fall		0.04	0.02	7.5YR 3/3 Brown	92% Sandy Loam; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	9	Construction Fill 1		0.09	0.04	10YR 4/6 Dark Yellowish Brown	60% angular cobbles/pebble; 40% Sandy Clay
6	B	10	Construction Fill 2		0.04	0.01	10YR 4/4 Dark Yellowish Brown	85% Sandy Loam; 5% cobble; 10% pebble
6	B	11	Construction Fill 2		0.05	0.01	10YR 4/4 Dark Yellowish Brown	85% Sandy Loam; 5% cobble; 10% pebble
6	B	12	Colluvium/Fall		0.79	2.97	10YR 5/4 Yellowish Brown	92% Loamy Sand; 5% coarse/very coarse pebble, small cobble; 3% root
6	B	13	Colluvium/Fall		0.21	0.32	10YR 4/6 Dark Yellowish Brown	100% Sandy Clay
6	B	14	Construction Fill 1		0.08	0.07	10YR 4/6 Dark Yellowish Brown	60% angular cobbles/pebble; 40% Sandy Clay
6	B	15	Colluvium/Fall		0.06	0.05	10YR 4/6 Dark Yellowish Brown	100% Sandy Clay
6	B	16	Construction Fill 1		0.27	0.20	10YR 4/6 Dark Yellowish Brown	60% angular cobbles/pebble; 40% Sandy Clay
6	C	1	Humus		0.15	0.07	10 YR 3/2 Very Dark Greyish Brown	80% Silty Clay Loam; 15% root; 5% pebble
6	C	2	Colluvium/Fall		0.13	0.06	10YR 4/6 Dark Yellowish Brown	100% Sandy Loam
6	C	3	Construction Fill 1 & 2		0.32	0.16	10YR 3/6 Dark Yellowish Brown	40% Sandy Clay; 60% Cobbles
Total Volume Excavated, Op 6, 2018 (m3)					11.76			

Table 2.1 cont.: Summary of lot descriptions for Operations 5 & 6

Context			Ceramic bulk				Lithic bulk		Daub bulk				TOTAL BULK ARTIFACT COUNT
OP	Subop	Lot	Diagnostic Count	Diagnostic Weight (0.0g)	Non- Diagnostic Count	Diagnostic Weight (0.0g)	Count	Weight (0.0g)	Regular Weight	Regular Weight (0.0g)	Irregular Count	Irregular Weight (0.0g)	
5 A	1		2	21.8	18	83.0	27	285.8	1	11.9	0	0.0	48
5 A	2		0	0.0	8	130.9	0	0.0	0	0.0	0	0.0	8
5 A	3		1	8.2	11	52.8	4	60.5	0	0.0	0	0.0	16
5 A	4		0	0.0	0	0.0	2	22.1	0	0.0	0	0.0	2
5 A	5		1	5.6	4	9.2	0	0.0	0	0.0	0	0.0	5
5 A	6		0	0.0	0	0.0	6	37.0	0	0.0	0	0.0	6
5 A	7		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 A	8		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 A	9		1	7.0	1	5.2	8	58.6	0	0.0	0	0.0	10
5 A	10		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 A	11		0	0.0	5	11.7	0	0.0	0	0.0	0	0.0	5
5 B	1		4	24.4	1	3.1	41	768.0	2	18.6	0	0.0	48
5 B	2		2	68.9	20	101.5	52	293.2	1	1.2	3	24.2	78
5 B	3		4	42.0	13	54.3	16	91.2	2	16.9	0	0.0	35
5 B	4		1	9.1	10	49.1	40	183.8	0	0.0	0	0.0	51
5 B	5		0	0.0	2	2.2	0	0.0	0	0.0	0	0.0	2
5 B	6		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	7		2	11.8	7	66.2	7	24.8	0	0.0	0	0.0	16
5 B	8		0	0.0	3	12.3	20	85.6	0	0.0	0	0.0	23
5 B	9		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	10		0	0.0	3	16.8	2	16.0	0	0.0	0	0.0	5
5 B	11		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	12		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	13		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	14		0	0.0	3	6.0	0	0.0	0	0.0	0	0.0	3
5 B	15		0	0.0	0	0.0	3	30.9	1	4.1	0	0.0	4
5 B	16		0	0.0	4	12.2	3	3.2	0	0.0	0	0.0	7
5 B	17		0	0.0	0	0.0	2	15.8	0	0.0	0	0.0	2
5 B	18		0	0.0	7	36.6	1	4.1	1	8.5	0	0.0	9
5 B	19		0	0.0	1	2.7	0	0.0	0	0.0	0	0.0	1
5 B	20		0	0.0	0	0.0	1	0.3	0	0.0	0	0.0	1
5 B	21		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5 B	22		0	0.0	3	6.9	3	19.1	0	0.0	0	0.0	6
5 B	23		0	0.0	2	1.9	0	0.0	0	0.0	0	0.0	2
			18	198.8	126	664.6	238	2000.0	8	61.2	3	24.2	393

Table 2.2: Summary of bulk artifact counts and weights for Operations 5 & 6

Context			Ceramic bulk				Lithic bulk		Daub bulk				TOTAL BULK ARTIFACT COUNT
Op	Subop	Lot	Diagnostic Count	Diagnostic Weight (0.0g)	Non- Diagnostic Count	Non- Diagnostic Weight (0.0g)	Count	Weight (0.0g)	Regular Weight	Regular Weight (0.0g)	Irregular Count	Irregular Weight (0.0g)	
6 A	1		10	57.8	116	464.4	46	785.7	147	815.7	269	2310.3	588
6 A	2		9	52.6	73	249.3	21	208.0	80	629.0	158	1061.4	341
6 A	3/4		0	0.0	20	64.2	5	10.5	7	37.0	15	191.4	47
6 A	5		1	5.0	27	87.8	2	1.0	0	0.0	2	11.7	32
6 A	6		4	30.9	26	84.9	5	17.5	3	27.6	8	58.2	46
6 A	7		1	4.7	5	20.2	8	170.4	2	9.9	2	7.7	18
6 A	8		0	0.0	2	2.5	0	0.0	1	2.6	1	5.1	4
6 A	9		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6 A	10		0	0.0	13	46.5	1	0.6	2	8.9	0	0.0	16
6 A	11		2	14.7	32	99.1	6	46.3	2	17.5	27	170.9	69
6 A	12		0	0.0	8	17.0	0	0.0	5	28.9	19	125.6	32
6 B	1		2	16.3	40	183.5	55	1142.6	24	185.5	112	1540.0	233
6 B	2		16	133.3	128	535.3	47	802.2	32	589.6	184	2859.8	407
6 B	3		7	29.2	98	263.1	18	36.5	44	303.6	72	762.8	239
6 B	4		0	0.0	9	90.7	0	0.0	5	40.5	3	15.0	17
6 B	5		5	20.8	81	279.7	17	51.7	44	275.0	162	1372.0	309
6 B	6		2	29.5	13	25.9	0	0.0	5	27.0	3	46.2	23
6 B	7		2	7.4	31	73.5	2	7.3	0	0.0	4	57.0	39
6 B	8		7	70.7	22	75.6	2	66.1	8	60.6	22	260.8	61
6 B	9		7	54.1	0	0.0	0	0.0	2	8.3	1	8.8	10
6 B	10		0	0.0	4	4.8	0	0.0	1	7.1	0	0.0	5
6 B	11		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6 B	12		2	50.8	25	64.5	10	314.8	6	88.1	54	393.7	97
6 B	13		1	3.2	26	78.3	2	6.7	4	25.1	21	190.6	54
6 B	14		0	0.0	36	88.4	8	63.0	7	52.8	2	35.5	53
6 B	15		1	37.4	15	46.6	0	0.0	1	13.6	2	18.4	19
6 B	16		1	11.9	8	47.9	0	0.0	0	0.0	0	0.0	9
6 C	1		1	6.7	6	13.9	0	0.0	1	3.0	2	39.2	10
6 C	2		2	68.4	17	67.8	0	0.0	1	1.4	2	66.4	22
6 C	3		0	0.0	8	28.3	3	130.4	3	50.2	8	87.6	22
			83	705.4	889	3103.7	258	3861.3	437	3308.5	1155	11696.1	2822

Table 2.2 cont.: Summary of bulk artifact counts and weights for Operations 5 & 6

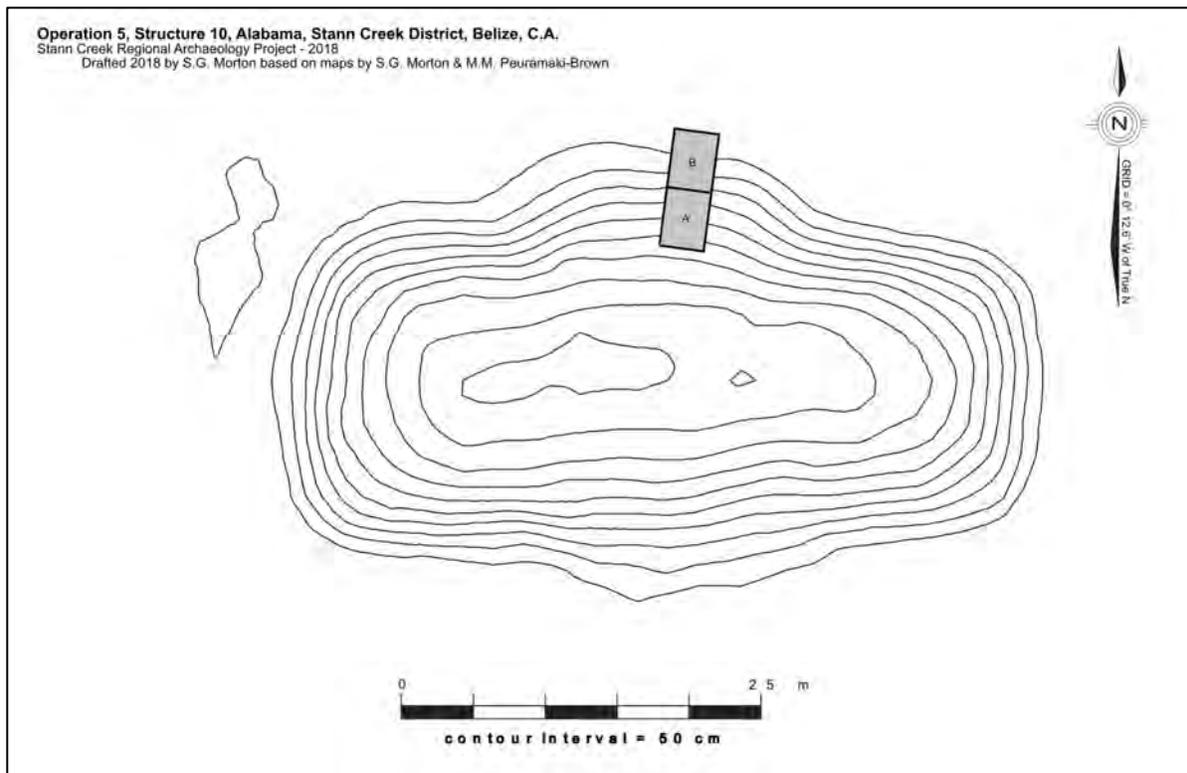


Figure 2.1: Topographic contour map of Str 10 showing placement of Suboperations 5A & 5B

Suboperation 5A and 5B

Subop 5A was a 4 m (N/S) x 3 m (E/W) excavation unit, placed toward the south end (upper end) of the face of the north stair of Str 10. The unit was positioned to align with the overall structure orientation (as could be determined on ground) and was contiguous with Subop 5B (also 4 m x 3 m), which was positioned on the bottom half of the stair extending slightly into the North Plaza (Figure 2.2 and 2.3). A rough east-west alignment of partially hewn granite blocks was visible at surface at the interstice of the two units, assumed to represent what remained of a single step. Associated excavation drawings on file at the Institute of Archaeology in Belmopan include SCRAP2018-DN004 to DN011.

Humus. The humus layer was removed as Lots 5A-1 and 5B-1, which extended over the entire excavation area and was found to be thicker on the lower half of the stair and plaza (Subop 5B). Excavation was initiated with surface collection of any artifacts, followed by the clearing of leaves and fallen debris, as well as the cutting down of two small trees (discussed below). The removal of the humus exposed two granite blocks in the southwest corner of Subop 5A, a half-exposed granite block in the northwest corner of Subop 5A (protruding from the west unit wall), and the east/west alignment of granite blocks in the north end of Subop 5A (the downslope faces of which were observable at surface in Subop 5B; Alignment 1 on profile). A series of fallen blocks were also exposed throughout the central portion of Subop 5B, including one shaped limestone block. Two tree stumps were present in the northwest and northeast sections of Subop 5A, with roots extending into Subop 5B; we excavated around these until pebbles and small cobbles started to appear—presumed to be the start of a fall/colluvium layer—and this was followed into other parts of the excavation area. The presence of daub in this layer confirmed the likelihood of a perishable superstructure once

present atop the construction platform. Associated excavation photos include Black Camera 102-3073 to 3076, and 104-3085 to 3094.

Bulk ceramic, daub, and lithic-chippedstone debris (quartzite [shatter, primary and secondary flakes, tertiary shaping flakes, multi-directional core], quartz [primary and secondary flakes, tertiary unknown flake, shatter], phyllite [primary flake], feldspar [shatter], chert [retouched flake], slate [tertiary unknown flakes]) were recovered from this context. Small finds included one worked ceramic sherd of unknown function (Cat. 10437-T001), and a piece of unknown carbonate material (Cat. 10437-SP008) not local to the area and possibly of cave origin (perhaps from the Bladen area to the south). Ceramic materials were stylistically assigned to the Late/Terminal Classic.

Colluvium/Fall. The colluvium/fall layer was removed from across the suboperations in Lots 5A-2 and 5B-2 (on stair), and 5B-3 (on plaza). The goal of these lots was to further expose additional masonry and/or terminal construction core (fill) of the stair upon which the alignment of granite blocks (located at the interstice of the units) were resting, as well as to expose the terminal plaza surface and debris resting on this surface. The pebble/cobble matrix uncovered below the humus was followed across much of the Suboperation 5A area, and reached another rough east-west, interrupted (missing blocks) alignment of granite blocks (Alignment 2 on profile), and one limestone block, appearing about 1.5 m south of the north wall of Subop 5A. Work in the north end of Lot 5B-2 uncovered a large granite block in the northwest corner resting flat atop the plaza, and excavation was terminated to continue removing matrix from directly above the plaza surface in a new lot (5B-3) to keep any possible on-plaza material separate from above fall.

Lots 5A-3 and 5B-4 were limited in depth and area to profile windows to the north and south of the tree stumps, running down the mid-line of the suboperations, as excavation in the other areas were not helping to identify significant in-tact architectural blocks or definite in-tact construction core, as it appeared most granite blocks associated with the stair were missing. Excavations in the upslope profile window were terminated when a compact, alluvial cobble matrix was encountered in the south and north ends of Lot 5A-3 (Construction Fill 1), and the appearance of a large patch of bright red clay in the centre of the profile window (Construction Fill 2 on profile) (Figure 2.4), and a circular patch of brown soil at the south end of the lot (south wall of Subop 5A; Feature 1A on profile); a soil sample (Cat. 10437-SL002) was collected of the red clay to compare with the very red sandy clay core matrix collected in 2014 from the looter's trench of Structure 14 and observed in the exposed fill of a looter's hole in the St 3 platform.

At the base of the stair, to the south of the plaza area, a compact, alluvial cobble matrix was also encountered in Lot 5B-4 (Construction Fill 5 on profile), and was traced uphill, uncovering two pockets of different matrix within the cobble fill, including a smaller area with no cobbles and red clay (Feature 2A) and an adjacent larger area of no cobbles and brown sediment (Feature 2B). No artifacts were found within these pockets. Associated excavation photos include Black Camera 103-3077 to 3084; 106-3109 to 3117; 107-3118 to 3122; 108-3123 to 3134, 3138 to 3141; 109-3142 to 3155; and 110-3156 to 3167.

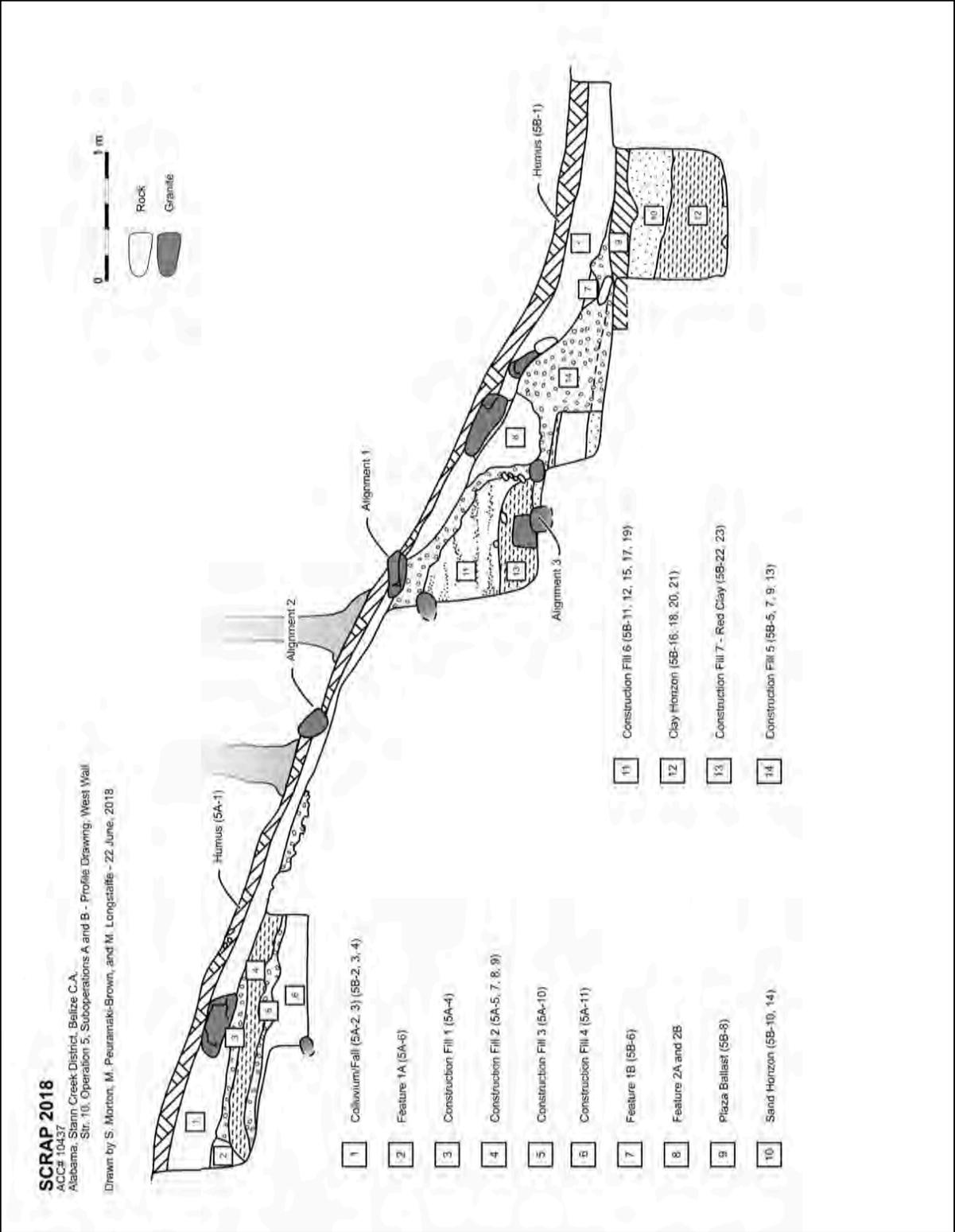


Figure 2.2: Profile drawing of Suboperations 5A & 5B at Structure 10, facing west.

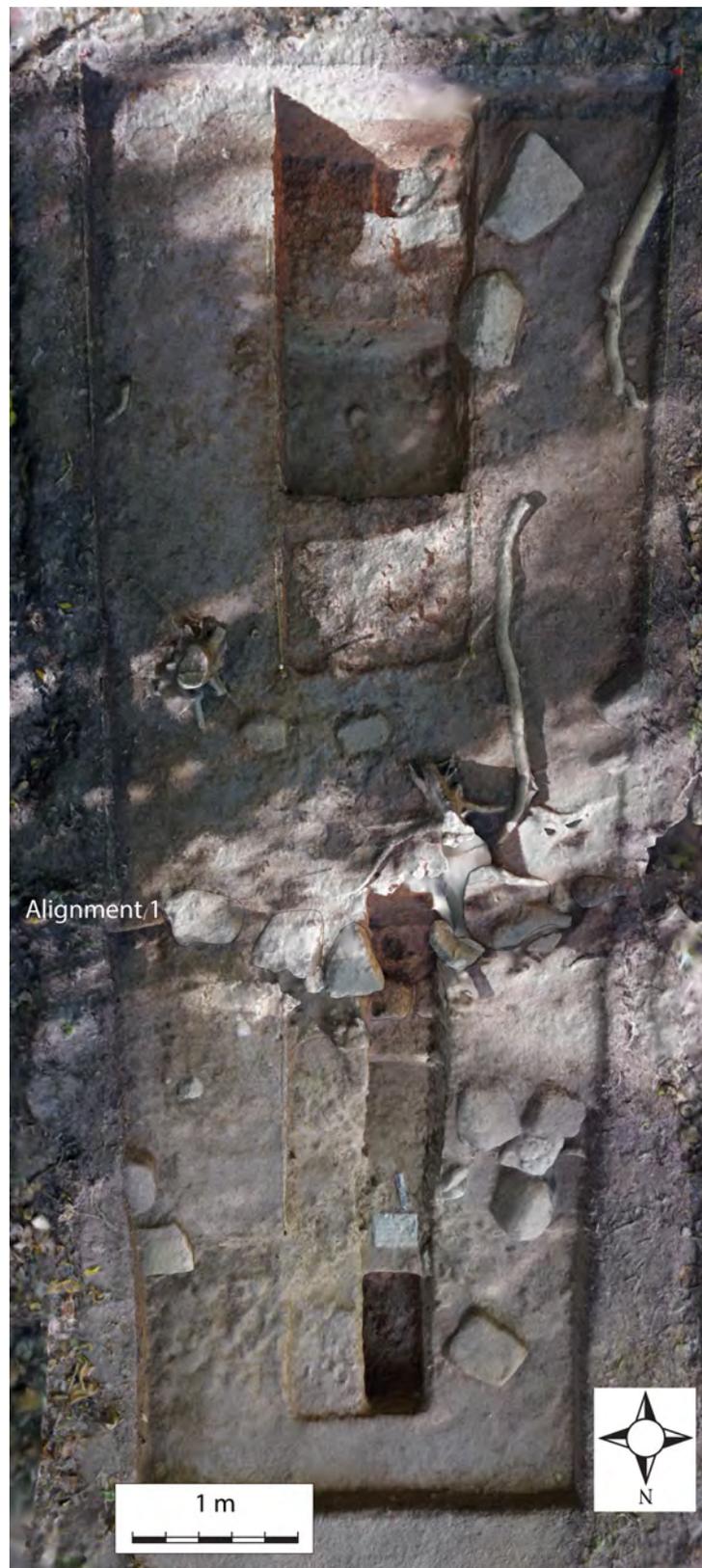


Figure 2.3: Final overhead view of Operation 5 excavations (still photo captured from 3D model generated via on-ground and pole-assisted photogrammetry; slight warping at north end).

On the south/upslope end of the stair (Lots 5A-2, 5A-3), only bulk ceramic and lithic-chippedstone debris (chert [shatter, tertiary shaping flake], quartz [shatter, secondary flake], quartzite [shatter, primary and secondary flakes], phyllite [secondary flake], slate [secondary flake]) were encountered. Ceramic materials were stylistically assigned to the Late/Terminal Classic.

On the north/downslope end of the stair (Lots 5B-2, 5B-4), bulk ceramic, lithic-chippedstone debris (phyllite [shatter, primary flakes, tertiary unknown flake], quartz [shatter, secondary flakes, tertiary finishing and unknown flakes], quartzite [primary and secondary flakes, tertiary shaping flakes, shatter], slate [primary flakes, tertiary unknown flakes, shatter], chert [tertiary shaping and unknown flakes, shatter], feldspar [tertiary unknown flakes]), and daub was encountered. Some of the ceramics were exposed to heat (charring), not related to production or typical use. Daub finds consisted of two types: a typical 'popcorn' looking material, and a possible layered, resurfacing type daub (see summary discussion), suggesting two types of daub construction was present at this structure. Small finds included an obsidian blade (Cat. 10437-OB037); two whole quartz crystals (Cat. 10437-SP010, SP011); two more pieces of unknown, non-local carbonate material (Cat. 10437-SP001, SP002), possibly from a cave context; a quartzite hammerstone (Cat. 10437-LT001); and two possible sandstone grinding implements (Cat. 10437-GS006, GS007). Ceramic materials were stylistically assigned to the Late/Terminal Classic, Terminal Classic, and possible Postclassic material.

Directly above the plaza surface (Lot 5B-3), bulk ceramic, lithic-chippedstone debris (quartz [shatter, primary and secondary flakes, tertiary unknown flake], slate [unknown flake], chert [tertiary shaping flake]), and daub was encountered. Ceramic materials were stylistically assigned to the Terminal Classic.

Upper Half of Stair Face: Subop 5A Profile Window

The following section describes the construction core (fill) layers encountered during excavation of a maximum 2 m x 1 m profile window along the centre line of the upper half of the northern stair in Subop 5A (Figure 2.5).

Feature 1A. Lot 5A-6 was designated as Feature 1A, located directly against the south wall of the suboperation. We excavated into the semi-circular, dark brown dirt feature. All material removed from this lot was placed into an artifact bag for flotation, and separated by heavy and light fraction for future study (Cat. 10437-HF002, LF001). Associated excavation photos include Black Camera 111-3177 to 3179, 3182, and 3184 to 3189.

Only 6 lithic chipped-stone debris pieces were recovered from this context (quartzite [shatter, secondary flake], chert [shatter], feldspar [shatter], quartz [shatter]).

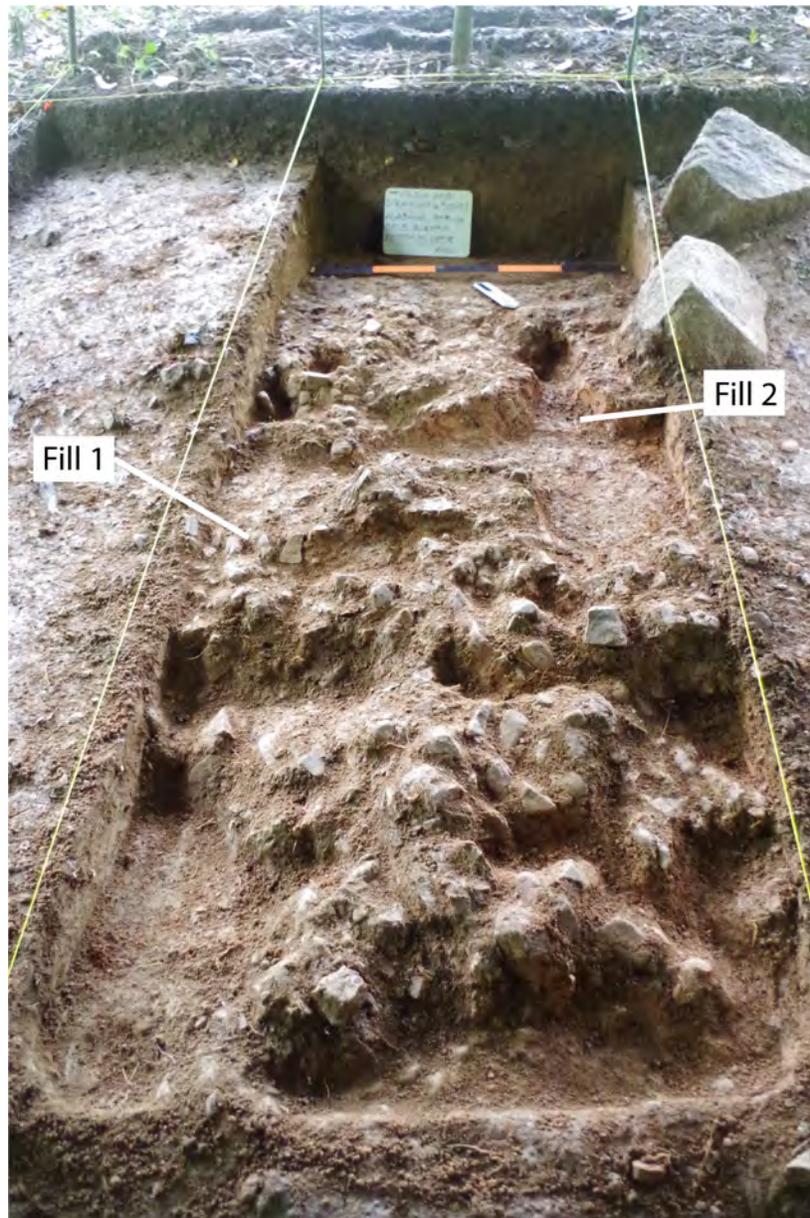


Figure 2.4: Bottom of Lot 5A-3 showing exposed Construction Fill 2 and small exposure of lower Construction Fill 3 at south end of north stair, Structure 10 (photo facing south).

Construction Fill 1. Lot 5A-4 was designated as Construction Fill 1, and involved removal of the very compact matrix—roughly 50 % medium-sized alluvial cobbles and 50 % dirt—at the south end of the profile window. Excavation further exposed the lower bright red to strong brown silty clay loam fill (Construction Fill 2) exposed after removal of colluvium/fall, and was found to continue up to the south wall of Subop 5A. Excavation was ended in order to remove the next fill layer as a separate lot. It is unclear whether this fill layer matches up with any layers in the profile window of Subop 5B. Associated excavation photos include Black Camera 110-3170 to 3171, and 3175 to 3176.

The only bulk material recovered included two pieces of lithic-chippedstone debris (quartzite [shatter]). A small, unknown-use, granite, groundstone sphere (Cat. 10437-GS003) was also recovered.

Construction Fill 2. Lots 5A-5, 5A-7, 5A-8, and 5A-9 were designated as Construction Fill 2, consisting primarily of a red to strong brown silty clay loam. Excavation was terminated with the intent to dig further down in a smaller area to expose any potential early architecture of the building. Associated excavation photos include Black Camera 111-3177 to 3179; 112-3193 to 3198; 113-3199 and 3200.

Bulk ceramic (7 sherds only) and lithic-chippedstone debris (8 pieces of quartzite shatter) were recovered from this context. A complete quartz crystal (Cat. 10437-SP009) was also recovered. We were able to stylistically assign only one pottery sherd, which was Terminal Classic in date.

Construction Fill 3. Immediately below the red-brown silty clay loam, another dense, compact deposit of alluvial cobbles (60 %) and strong brown sandy loam fill was encountered. This was removed as Lot 5A-10 and designated Construction Fill 3. Below this roughly 10 cm thick layer, a different matrix of pure, strong brown sandy loam was encountered (and partially excavated in this lot). When this was noticed, lots were changed to isolate this new fill material. Associated excavation photos include Black Camera 113-3204, 3205, 3212, 3213, and 116-3247.

No bulk artifact materials were encountered in this context, but one spherical, granite groundstone mano of local granite (not Mountain Pine Ridge, based on visual assessment) was recovered (Cat. 10437-GS001).

Construction Fill 4. Lot 5A-11 was designated Construction Fill 4 and involved removal of the strong brown sandy loam in a 1 m x 1m area and only penetrated 20 cm down, due to time constraints. Associated excavation photos include Black Camera 113-3204, 3205, 3212, 3213, and 116-3247.

Only five non-diagnostic ceramic sherds were recovered from this context. They could not be stylistically attributed to any time period.



Figure 2.5: Close-up on south end of of Subop 5A profile window (bottom of Lot 5A-8), showing sequence of construction fills (photo facing west).

Lower Half of Stair Face: Subop 5B Profile Window

The following section describes the construction core (fill) layers encountered during excavation of the maximum 2 m x 1 m profile window along the centre line of the lower half of the northern stair in Subop 5B (Figure 2.6). When possible, layers described here are connected to those encountered in the Subop 5A profile window discussed above.

Construction Fill 5. Lots 5B-5, 5B-7, 5B-9, and 5B-13 were designated as Construction Fill 5, and consisted of a compact, alluvial cobble fill that had slumped out over the plaza surface (probably due to removal/fall of terminal facing blocks at some point in time), and surrounded Feature 1B atop the plaza surface. It is believed this fill is the same as Construction Fill 1 further up the stair in Subop 5A, and represents the terminal fill of the stair, with the majority of step facings now missing. This fill did meet up with the slumped east-west Alignment 1 at the south end of Subop 5B. Lot 5B-7 focused on the area of the fill that slumped out onto the plaza surface and surrounded Feature 1B (discussed below); removal of the matrix in this area exposed a lower level of tamped pebbles, cobbles, and yellowish red sand, believed to be the terminal surface of the plaza (see Plaza Ballast context below). Further up in the profile window, lots were switched when a brown, mottled clay loam (80-90 % of matrix) was encountered, containing few pebble and cobble inclusions. Associated excavation photos include Black Camera 110-3168, 3169; 111-3172, 3180, 3181; 112-3191, 3192; 113-3208, 3209.

Bulk ceramic and lithic-chippedstone debris (shatter of feldspar, phyllite, quartz, and quartzite) were recovered from this context. No special or small finds were recovered from this context. A piece of daub or sandstone (uncertain) with a drill-hole was recovered (Cat. 10437-SP004) was found in the fill surrounding Feature 1B; the function of this item remains unclear. Two samples recovered from two discrete areas of the fill in Lots 5B-5 (Cat. 10437-CB009) and 5B-13 (Cat. 10437-CB011). The 11 pottery sherds recovered could not be stylistically attributed to any time period.

Feature 1B. This circular feature, found among the slumped terminal fill of the north stair atop the plaza surface, was partially excavated as Lot 5B-6; it consisted of removal of the matrix in the southern half of the feature for flotation resulting in both heavy and light fraction (Cat. 10437-HF003, 10437-LF002). It remains unclear as to whether this feature is the result of a decomposed tree, post, or other man-made or natural event. Associated excavation photos include Black Camera 110-3168 to 3169, and 111-3173 to 3174.

No bulk material was found in this context, although a carbon sample (Cat. 10437-CB010) was recovered.

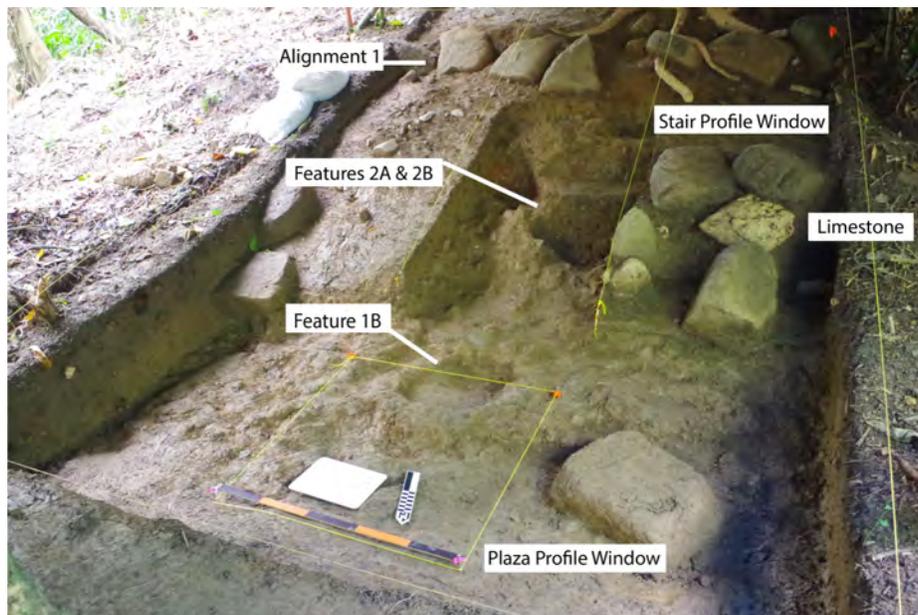


Figure 2.6: Location of profile windows and features in Subop 5B (photo facing southeast).

Construction Fill 6. Lots 5B-11, 5B-12, 5B-15, 5B-17, and 5B-19 were designated as Construction Fill 6; the goal of these lots was to continue to explore the construction fill of the north stair to expose the stratigraphy, removing the mottled brown clay loam matrix encountered below Construction Fill 5 in the south end of the profile window. Excavation was terminated in this area when the matrix changed to a reddish-brown clay loam. Associated excavation photos include Black Camera 114-3223 to 3229.

Five lithic-chippedstone debris pieces (quartz [shatter] and quartzite [shatter, primary and secondary flakes]), one piece of daub, and one pottery sherd were recovered from this context. One obsidian blade fragment (Cat. 10437-OB031) was also recovered. The single pottery sherd recovered could not be stylistically attributed to any time period.

Construction Fill 7. Lots 5B-22 and 5B-23 were designated Construction Fill 7 and consisted of a red to reddish-brown clay loam with some pebble content below the Construction Fill 6. An alignment of contiguous, eroding, roughly hewn granite blocks was found at the bottom of Lot 5B-23 (Alignment 3 on profile) and is presumed to be part of an earlier phase of the stair or the face of the construction platform that was later covered over with the addition of the north stair (Figure 2.7). Due to time constraints, Lot 5B-23 marked the end of excavations in this area of Suboperation 5B, but will be reopened in future seasons to be further investigated. Associated excavation photos include Black Camera 113-3233; 114-3234; 115-3235, 3240, 3241, and 3246.

Five ceramic sherds and 3 pieces of lithic-chippedstone debris (quartz [shatter], chert [tertiary thinning flake], quartzite [unknown flake]) were all that was recovered from this context. The pottery sherds recovered could not be stylistically attributed to any time period.



Figure 2.7: Head-on shot of Subop 5B stair profile window with Alignment 3 (three eroding and partially excavated granite blocks) surrounded by Construction Fill 7 (photo facing south).

Plaza Area: Subop 5B Profile Window

The following is a description of contexts encountered within a maximum 1m x 1m profile window into the plaza area at the base of the Str 10 north stair (see previous Figure 2.5 for location of window).

Plaza Ballast. A level of tamped pebbles, cobbles, and yellowish red sand was designated as the terminal Plaza Ballast, atop of which fallen granite blocks were resting, and excavated as Lot 5B-8. Excavations continued down into the plaza until a matrix change was observed, consisting of dark yellowish brown sandy loam with patches of brown clay. Associated excavation photos include Black Camera 113-3201 to 3203.

Plaza Ballast. A level of tamped pebbles, cobbles, and yellowish red sand was designated as the terminal Plaza Ballast, atop

Bulk ceramic (3 non-diagnostic sherds) and twenty pieces of lithic-chippedstone debris (quartz [shatter] and quartzite [shatter, secondary flakes, tertiary shaping and thinning flakes, and unknown tertiary flakes) were recovered from this context. The pottery sherds recovered could not be stylistically attributed to any time period.

Sand Horizon. Lots 5B-10, and 5B-14 were designated as Sand Horizon, consisting of dark yellowish brown sandy loam with patches of brown clay. Lot 5B-14 was terminated upon reaching another matrix change, this time a yellowish red (5 YR 4/6) to red (2.5 YR 4/6, 2.5 YR 4/8) sandy clay loam to clay loam. Associated excavation photos include Black Camera 113-3210 and 3211.

Six ceramic sherds and two pieces of lithic-chippedstone debris (quartz shatter) were recovered, along with one obsidian blade fragment (Cat. 10437-OB027). The pottery sherds recovered could not be stylistically attributed to any time period.

Clay Horizon. Lots 5B-16, 5B-18, 5B-20, and 5B-21 were designated Clay Horizon, being the yellowish red (5 YR 4/6) to red (2.5 YR 4/6, 2.5 YR 4/8) sandy clay loam to clay loam encountered directly below the sandy loam horizon of the plaza profile window. The goal of these lots was to continue excavating down in order to reach sterile levels or a matrix shift. Lots were arbitrarily terminated at a depth of 20 cm; however, what appear to be the tops (approx. 20 cm long by 7 cm) of two or more stones were come down upon in Lot 5B-21 (Figure 2.8). Given the continued presence of cultural material in this context, it is assumed that the placement of these stones is cultural, and their perpendicular positioning is reminiscent of a “box-like configuration of stone slabs” uncovered at the foot of the east building stairway atop Str 3, “which was likely used for the placement of offerings and the burning of incense” (MacKinnon 1987:1). Due to time constraint, excavations were concluded at this point, and are



to be reopened in coming seasons. Associated excavation photos include Black Camera 114-3230 to 3232 and 115-3242 to 3244.

Bulk finds recovered from this context included 11 ceramic sherds, five pieces of lithic-chippedstone debris (chert [shatter], quartzite [tertiary shaping flake], and quartz [unknown flake]), and one piece of daub. The pottery sherds recovered could not be stylistically attributed to any time period.

Carbon was found throughout all four lots, and collected as four separate samples—one per lot (Cat. 10437-CB034, 10437-CB035, 10437-CB036, and 10437-CB037).

Figure 2.8: Profile window into plaza, showing stratigraphy and tops of rocks encountered at bottom of excavations in the clay horizon (outline of rocks have been emphasized by shading in Adobe Illustrator due to difficult visibility).

shading in Adobe Illustrator due to difficult visibility).

Structure 1 & 2, Operation 6

Over the course of our survey within the monumental core in 2015-2016, a number of unique features of Alabama's layout became apparent; chief among these was the remarkable degree of spatial control imposed on Alabama's public spaces by borrow pits along the south, west, and north margins of the monumental core, and by the construction of long platforms along plaza margins. These mechanisms of control have been important in SCRAP's investigations of site development processes and governance (Peuramaki-Brown and Morton *in press*). It appears that the primary points of entrance into the monumental core were via the causeway and between structures off the northeast and southeast corners. During 2016, it was observed that a section of elevated terrain between Borrow Pits 11 and 12 seemed to align with a low section of the approximately +100 m long x 20 m wide construction platform that supports Structures 1 and 2 (see Figure 1.2 in this volume); it was hypothesized that this area served as an additional formal entrance to the site. Excavations were established to evaluate this possibility, in addition to the temporal questions stated at the start of this chapter.

This section presents results of 2018 test excavations along the north face of the construction platform at the interstice of Structures 1 and 2 (Str 1/2) described above. Initially intended for the south face, our excavations were moved to the north side to avoid a large cohune palm. The 2018 excavations at Str 1/2 were designated Operation 6 (Op 6) and consisted of three contiguous suboperations (units), oriented 0° (magnetic north) and positioned as close to the primary axis of the targeted low section of the construction platform (north face) as was permitted. Suboperation 6A (Subop 6A) was positioned to the south, with Suboperation 6B (Subop 6B) to the north with partial placement on the East Plaza surface, and an extension to the west in Suboperation 6C (Subop 6C) (Figure 2.9). The goals of such placement included recovery of architectural data, artifacts, and other datable materials. The excavations and documentation reported here were directed by Meaghan Peuramaki-Brown (MPB); supervised at various times by Dave Blaine (DB), Kathryn Reese-Taylor (KRT), and Shawn G. Morton (SGM); and assisted at various times by Higinio Chiac Sr. (HC), Justino Chiac (JC), Jada

Dowler (JD), Stephany Hiwatashi-Kreusch (SHK), Dorian Leslie (DL), Alson Ovando (AO), Niki Phillips (NK), Nicki Teul (NT), Tyson Teul (TT), Frank Tzib (FT), and Danny Zborover (DZ).

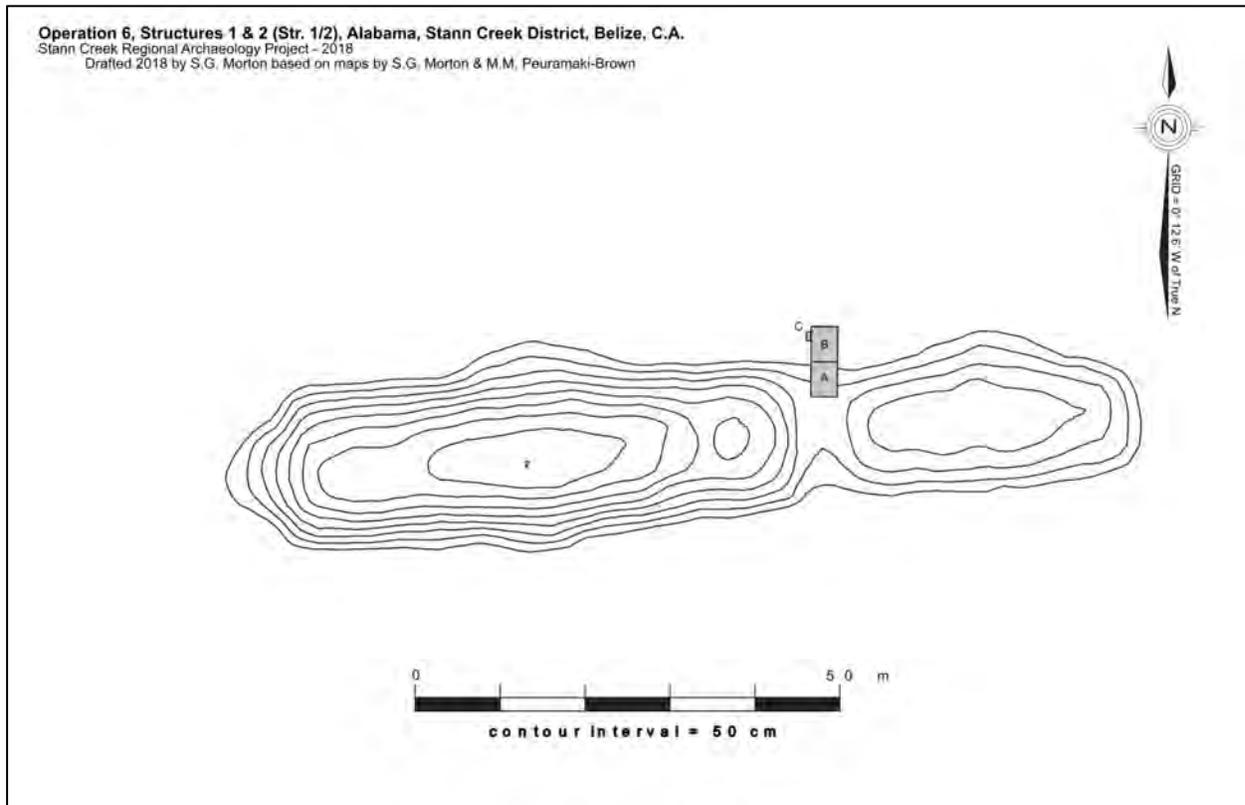


Figure 2.9: Topographic contour map of Str 1 and Str 2 showing placement of Suboperations 6A, 6B, and 6C.

Suboperations 6A, 6B, and 6C

Subop 6A was a 4 m (N/S) x 3 m (E/W) excavation unit, placed toward the south end (upper end) of the face of the construction platform of Str 1/2. The unit was positioned to align with the overall structure orientation (as could be determined on ground) and was contiguous with Subop 6B (also 4 m x 3 m), which was positioned on the bottom half of the face, extending slightly into the East Plaza, and a small 1 m (N-S) x 50 cm (E-W) extension (Subop 6C) was established 50 cm south of the NW corner of Subop B along its west wall (Figures 2.10 and 2.11). No architecture was visible at surface. Associated excavation drawings on file at the Institute of Archaeology in Belmopan include SCRAP2018-DN012 to DN018.

Humus. Lots 6A-1, 6B-1, and 6C-1 covered the entire area of Subops 6A, 6B, and 6C and were collectively designated as humus, including a thick root mat. It was terminated with the exposure of architectural tumble/fall and colluvium. Associated excavation photos include DB Camera 6A-1_May_22, 6A-2_May28, 6B-1_May_22, 6B-2_May_28; SGM Camera 0744-47, 0766-69.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary and tertiary shaping flake], phyllite [primary, secondary, tertiary and tertiary shaping flakes, and shatter], quartz [primary, secondary, tertiary, and retouch flakes, and shatter], quartzite [primary, secondary, tertiary, and

tertiary shaping flakes, and shatter], and slate [tertiary and tertiary shaping flakes and shatter]), and daub were recovered from this context. Daub, in particular, may shed light on the nature of the deposits revealed by our excavations. While sorting daub in the lab, it became apparent that it could be sub-divided into two discrete categories: the first accords with our expectations as amorphous blobs (regular or ‘popcorn-like’) with stick impressions, while the second (irregular) showed no such impressions and clearly presented parallel strata (Figure 2.12; discussed below). From the humic layer, as in most others, this second type of daub accounts for the greater mass of such material recovered (Regular: 1004.2 g vs. Irregular: 3889.5 g). Small finds included an obsidian blade fragment (Cat. 10437-OB001), obsidian flakes (Cat. 10437-OB028-029), and the fragment of a possible oyster shell (Cat. 10437-SP007). A retouched chert flake was also recovered. While no radiocarbon samples were recovered from this context, ceramic materials were stylistically assigned to the Terminal Classic.

Colluvium/Fall. Lots 6A-2, 6A-3, 6A-4, 6A-12, 6B-2, 6B-3, 6B-4, 6B-5, 6B-6, 6B-8, 6B-12, 6B-13, 6B-15, and 6C-2, cumulatively, covered the entire area of Subops 6A, 6B, and 6C and were collectively designated as colluvium and architectural fall. Lot 6B-12, which covered the SW quadrant of Subop 6B, terminated with the exposure of extant architecture in the form of at least two alignments of cut granite facing stones in the southern-most portion of the lot and exposure of a relatively uniform surface of angular cobbles that is interpreted as the terminal habitation surface of the plaza. No *in situ* on-surface deposits were noted. Associated excavation photos include DB Camera Lot6A-2_May28, Lot6A-2_Flood_June_01, Lot6B-2_May_28, Lot6B-2_Flood_June_01; KRT Camera 3531 to 3543, 3560 to 3587, 3592 to 3596, and 3616 to 3633; SGM Camera 0811 to 0813, 0755 to 0757, 0759 to 0764, 0844 to 0846, and 0778 to 0780.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary thinning, shaping, and finishing flakes, and shatter], feldspar, phyllite [tertiary and tertiary shaping flake, and shatter], quartz [secondary, tertiary and tertiary flakes, and shatter], quartzite [primary, secondary, tertiary, and tertiary shaping flakes, and shatter], and slate [tertiary finishing and shaping flakes, and shatter]), and daub (traditional: 2119.4 g vs. striated: 7364.1 g) were recovered from this context. Small finds included six obsidian blade fragments (Cat. 10437-OB011, 10437-OB014, 10437-OB026, 10437-OB030, 10437-OB036 and 10437-OB038), and an unknown carbonate (Cat. 10437-SP003). A possible bark beater of unknown stone (Cat. 10437-GS002; Figure 2.13) was also recovered and, although much smaller than typical Maya bark beaters, is similar to the small “fine metamorphosed sediment” bark beaters described in MacKinnon (1989: 616).

Eleven carbon samples were recovered from this context (including Cat. 10437-CB018 to 10437-CB027, and 10437-CB029), as well as a number of chronologically diagnostic ceramic sherds dating to the Late/Terminal Classic.

SCRAP 2018

ACC# 10437

Alabama, Stann Creek District, Belize C.A.

Str. 1/2, Operation 6, Suboperations A, B, and C - Plan Drawing (Close of Excavations)

Drawn by S. Morton - 22 June, 2018

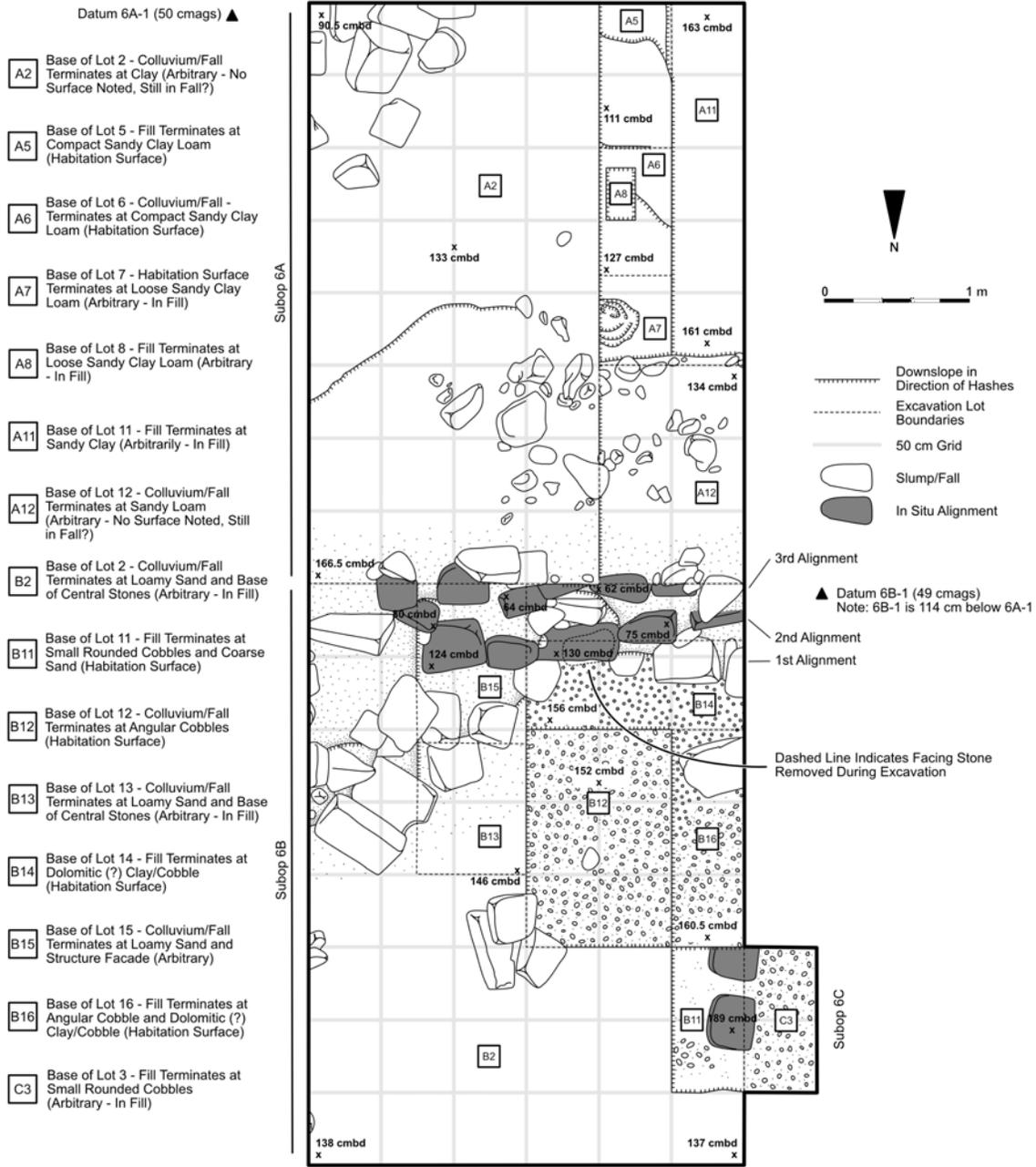


Figure 2.10: Plan drawing of Suboperation 6A, 6B & 6C excavations at Structure 1/2.

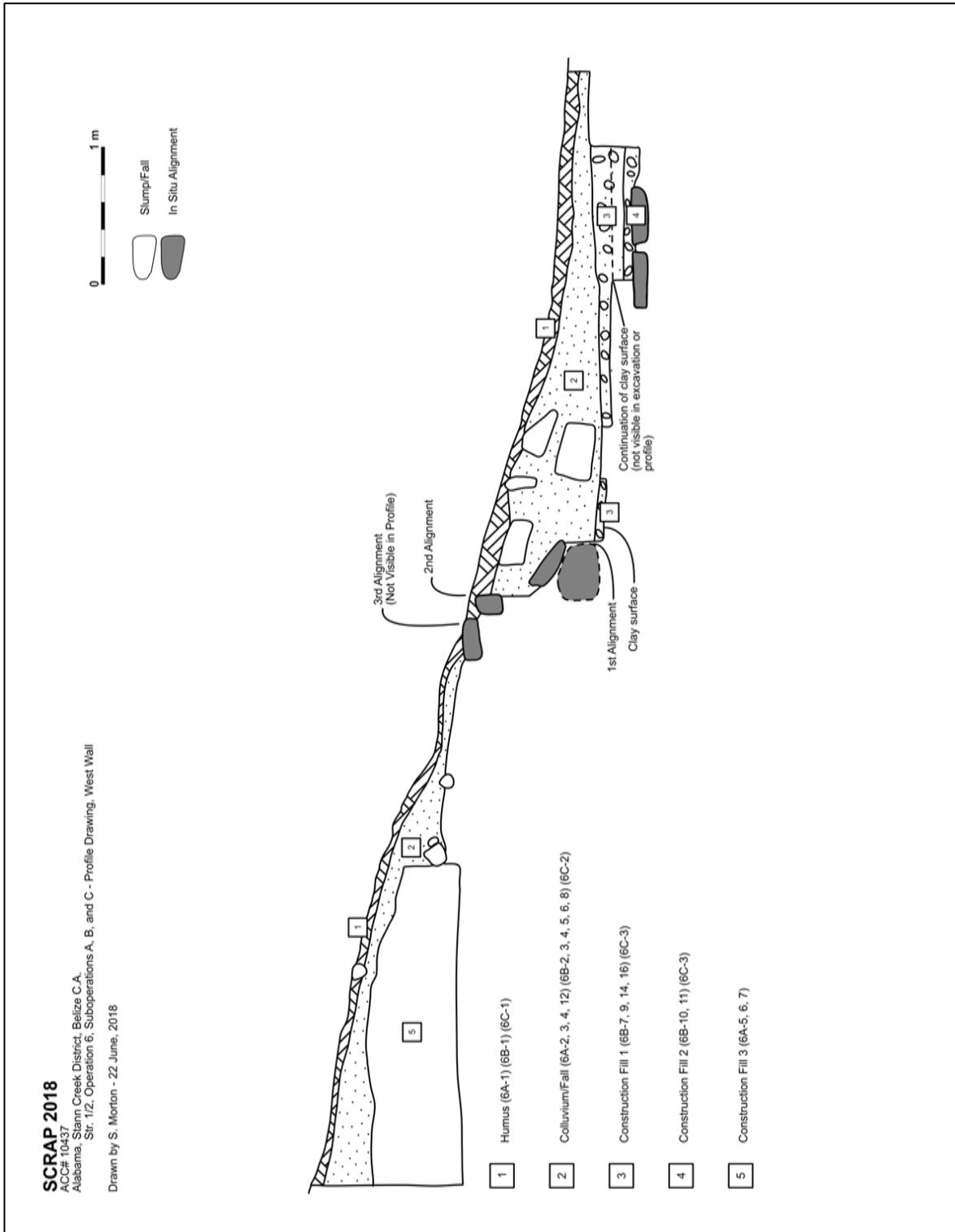


Figure 2.11: Profile drawing of Suboperations 6A, 6B & 6C at Structure 1/2, facing west.



Figure 2.12: Regular (right) and irregular (left) daub from Lot 6A-2, with Belizean dollar coin for scale.



Figure 2.13: Possible bark beater of unknown metamorphosed(?) material (Cat. 10437-GS002).

Construction Fill 1. Lots 6B-14 and 6B-16 were designated as Construction Fill 1, consisting of angular cobbles and dark yellowish brown sandy loam. Construction Fill 1 is interpreted as plaza ballast/fill, averaging between 7.7 and 13.3 cm thick, terminating at the exposure of a second (rounded) cobble and sandy clay surface (Construction Fill 2) at the north end of the subop (the upper portions of Lots 6B-7, 6B-9, and 6C-3 in the plaza area profile window are also part of this context). No *in situ* on-surface deposits were noted. When this small profile window in the NW of the unit was initially excavated, the transition between Construction Fill 1 and Construction Fill 2 was not noted. It was only later observed in profile and subsequently guided excavations of the additional Subop 6B lots. In the area immediately adjacent to the façade of Structure 1/2, a compact surface of consolidated white clay (dolomitic?) and pebbles was encountered below Construction Fill 1—likely the cap and ballast atop Construction Fill 2

of the penultimate plaza surface—and may extend below the exposed terminal facing stones (Figure 2.14). Associated excavation photos include KRT Camera 3588 to 3591, 3610 to 3614; SGM Camera 0803 to 0805, 0819 to 0822, 0840 to 0842, 0788 to 0793, and 0796 to 0801.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary shaping flake], phyllite [secondary and tertiary flakes], quartz [tertiary flake and shatter], and quartzite [tertiary shaping flake, and shatter]), and daub (traditional: 61.1 g vs. striated: 101.3 g). The only formal tool found in the entire operation, a side-notched phyllite cobble (possible net sinker), was found in this context (Cat. 10437-LT002). Three carbon samples were recovered from this context (Cat. 10437-CB028, 10437-CB032, and 10437-CB033). Ceramics could not be stylistically attributed to any time period.



Figure 2.14: Close up on consolidated clay surface with pebbles encountered below Construction Fill 1 immediately adjacent the platform face in Subop 6B.

Construction Fill 2. Lots 6B-10 and 6B-11 were designated as Construction Fill 2. Consisting of rounded cobbles and sandy clay, Construction Fill 2 appears to represent a second and distinct plaza surface, averaging 4.8 cm thick, and may actually have served as the ballast layer for the clay surface encountered immediately adjacent the structure (since deteriorated further out into the plaza). This fill was also partially excavated as part of Lot 6C-3. Excavation of Lot 6B-11 and 6C-3 terminated with the exposure of a horizontal plane of small rounded cobbles and coarse sand representing a habitation surface. The flat surfaces of two cut granite blocks, facing west, and running perpendicular to the south face of Str 1/2 were similarly exposed at the base of Construction Fill 2 (Figure 2.15). No *in situ* on-surface deposits were noted. Associated excavation photos include SGM Camera 0788 to 0793 and 0796 to 0801.

Bulk ceramic, lithic-chippedstone debris (arkose sandstone [shatter], and quartzite [shatter]), and daub (traditional: 7.1 g vs. striated: 0 g). No small finds were recovered from this context.

A carbon sample was recovered from this context (Cat. 10437-CB030). Ceramics could not be stylistically attributed to any time period.



Figure 2.15: Close up on profile window in northwest quadrant of Subop 6B, with small Subop 6C attached to the west. Tops of granite blocks—face to west—shown at bottom.

Construction Fill 3. Lots 6A-5, 6A-6, and 6A-7 were designated as Construction Fill 3, consisting of yellowish brown sandy clay loam with very few inclusions. Measuring up to 73 cm thick, it seems likely that Construction Fill 3 extends further south into the platform and may represent the terminal fill of the underlying construction platform of Structure 1 and 2. The precise division between Colluvium/Fall and Construction Fill 3 was difficult to ascertain as they consisted of the same matrix and no extant structure surface or façade remains to differentiate between the two; however, the number of artifacts dropped dramatically within these lots (vs. colluvium above), in particular the bulk daub counts. Excavation of this context was arbitrarily terminated within structure fill. No *in situ* on-surface deposits were noted. Associated excavation photos include KRT Camera 3543 to 3559, and 3597 to 3609.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary shaping flake], phyllite [tertiary shaping flake], quartz [tertiary shaping flake], quartzite [primary flake and shatter], and slate [tertiary shaping flake]), and daub (traditional: 37.5 g vs. striated: 77.6 g). Small finds included three obsidian blade fragments (Cat. 10437-OB032, 10437-OB033, 10437-OB034). Six carbon samples were recovered from this context (Cat. 10437-CB012 to 10437-CB017). Ceramics were stylistically attributed to the Late/Terminal Classic.

Construction Fill 3: Layers 1-3. Lots 6A-8, 6A-9, 6A-10, and 6A-11 represent something of an enigma. Identified during excavation as alternating bands of yellowish brown compact

sandy clay and looser sandy clay loam, they vary between 4.5 and 38 cm thick and were excavated in a series of small excavation windows in the SW quadrant of Subop 6A. No subdivisions were visible in the profile exposed through excavation of Lots 6A-5 to 7. No *in situ* on-surface deposits were noted. It is unclear whether these ‘felt’ surfaces may be related to construction activity, actual living surfaces, or other taphonomic activity (e.g. compaction from walking over same area in excavation); another thought to consider in future is its relationship to the striated (irregular) daub. Associated excavation photos include SGM Camera 0782 to 0784, and 0807 to 0809; KRT Camera 3543 to 3559, and 3597 to 3609.

Bulk ceramic, lithic-chippedstone debris (chert [shatter, and a multidirectional core], phyllite, quartz [tertiary shaping flake, and shatter], and quartzite [tertiary shaping flake]), and daub (traditional: 29 g vs. striated: 176 g). Small finds included a single obsidian blade fragment (Cat. 10437-OB035). No datable materials were recovered from these lots. A floatation sample was recovered from this context, resulting in heavy fraction only (Cat. 10437-HF001).

Summary & Interpretations

SCRAP 2018 preliminary excavations in the monumental core have proven fruitful with regard to clarifying issues from the 1980s, potential chronological construction developments within the monumental core, and considerations for future investigation.

Str 10

With regard to the nature of the Str 10 architecture, as mentioned above, the presence of standard architectural daub within excavations suggests the presence of a perishable structure atop the platform at some point in its history; additionally, the presence of the ‘layered’ (irregular) daub might hint at the presence of clay floors/surfaces that were resurfaced (washes) at intervals (Littmann 1967; see discussions below). Construction materials were likely collected from the nearby Waha Leaf Creek (approx. 150 m east), as well as surrounding foothills and borrow pits (based on profiles in MacKinnon 1988a), for cobbles, granite, and clayey sediments, respectively.

A typical colluvium layer was encountered, although relatively few fallen or slumped architectural blocks were recovered and might suggest removal at a later date (Precolumbian or modern)—such activity is mentioned by MacKinnon (1988b, 1988c; MacKinnon et al. 1993) for Str 3, where banana company employees (1950s) removed stones from the east stair for ramp construction purposes and shoring up parts of the airstrip. The rather complex layering of construction core materials (fills) exposed in the Subop 5A profile window is interesting, and will require more expanded profile windows/trenches to determine if these represent task units associated with construction (intercalated lenses; see Brouwer Burg et al. 2016), different construction phases, or perhaps construction techniques related to issues of stability and drainage (e.g. the layering of cobbles and clays; see Littmann 1967). Rapid construction—or construction prior to significant local occupation—is possibly confirmed by a general lack of artifacts in fill deposits (see Table 2; average 45 artifacts/m³ of confirmed fill deposits). The buried alignment of granite blocks (Alignment 3) within Construction Fill 7 might suggest that the north stair may have been added at a later date in order to reorient the building—although, this is an extremely tentative hypothesis and will require further, more penetrating investigations within our trench. Finally, the profile window excavations within the plaza area to the immediate north of the building (North Plaza) have revealed a different construction

style and, possibly, history, from that of the East Plaza at Str 1/2 (Op 6 below)—a detail to be further examined in coming seasons.

The nature and quantity of artifacts recovered does not, at this point in time, help us with clarifying the function of the building; however, the presence of multiple pieces of non-local carbonate material, possibly from cave formations (speleothems), may point toward a more sacred/ritual purpose to the structure (Brady et al. 1997), as might the overall form of the platform and central positioning within the monumental core, and the possible “box-like configuration of stone slabs” encountered at the end of excavations in the plaza (discussed above). Additionally, unmodified, hexagonal quartz crystals were recovered from multiple contexts; ritual specialists used modified and unmodified rock crystal in ancient times (and ethnohistorically documented) for the purpose of curing and diving (Brady and Prufer 1999). Determining whether such material represents items intentionally used for such purpose, as opposed to naturally occurring items in gathered fill materials, is difficult; many crystal formations were observed at the modern quarry of the Alabama area, and could have been easily included in sediments gathered for construction core material from various parts of the surrounding landscape.

Based on the small amount of stylistically datable ceramic material recovered, the terminal phase of the north stair at Str 10 is believed to date to the Terminal Classic; this is possibly slightly later than construction at Str 1/2, where Late/Terminal Classic material dominates the identifiable portion of the ceramic assemblage, perhaps confirming our aforementioned hypotheses (see Howie and Jordan, this volume, for discussion regarding the difficulty of using standard ceramic dating at Alabama). In addition to clarifying contexts, we also hope that future seasons’ work will recover additional carbon samples to allow for a full sequence of absolute chronometric dates.

As mentioned above, personal communication with a local individual who had worked with the previous PPAP project confirmed that no excavations were undertaken at this building in the 1980s. Our excavations have confirmed that (in the case of Str 10 at least) the possibility of multiple phases of construction at Alabama is more prevalent than indicated by previous PPAP excavations in the monumental core, although perhaps still limited to the short timespan of late facet of the Late Classic to Terminal Classic; that complex taskscapes/stratigraphy should be considered when investigating these large platforms—requiring more than narrow trenching efforts; and that a variety of materials were put to use in construction and will offer tremendous potential for examining the use of locally available resources—as well as more exotic materials (i.e. limestone; nearest known sources being in the Bladen to the south and Quarry Hill at the north end of the district [Dunham 1996; Graham 1994])—by the residents of ancient Alabama.

Str 1/2

As noted above, excavations at Operation 6 were intended to determine whether or not the “gap” between Structures 1 and 2 served as an additional formal entry point to the monumental core. The placement of the unit potentially held the additional benefit of shedding light on the construction history of this portion of the site. In the end, our excavations provided relatively sound resolution of the first objective and raised significant new questions with respect to the second.

In short, our excavations suggest at least four distinct construction episodes at the locale—One associated with a buried structure, two with the overlying plaza, and one with the Structures 1 and 2 construction platform itself. The earliest episode, for which we have recovered no datable materials, was only exposed within the confines of a 1m x 1m excavation window. It is defined by only two cut granite slabs running perpendicular to the transverse axis of Structures 1 and 2, facing west, and backed by a fill of rounded cobbles and coarse sand. Our excavations terminated with the exposure of the superior surface of these slabs. We have plans to expand excavations in this locale during the coming season(s) to better define this feature. This earlier feature is capped by two discrete layers of plaza fill/ballasts: Construction Fill 1 and Construction Fill 2, defined in turn by larger angular cobbles and smaller rounded cobble, respectively. Excavations running immediately adjacent to the base of Structures 1 and 2 demonstrate that both of these surfaces run below the extant facing stones of the platform.

Atop this plaza base was constructed—apparently during the Late-Terminal Classic period—a construction platform, composed of compact sandy clay loam (Construction Fill 3) faced by hewn granite blocks (20 cm x 20 cm x 10 cm in size and larger); this platform, in turn, supports the building platforms of Structures 1 and 2. Only three alignments of stones were apparent (with some displacement) below an unexpectedly large quantity of architectural tumble; identifying the origins/nature of this material will additionally occupy our field operations in 2019 (Figure 2.16). It remains unclear whether the north face of the construction platform at the interstice of Structures 1 and 2 originally presented a solid vertical façade (although, this seems unlikely); a short, shallow stair (thus, leaving open the idea of a possible entrance way to the site); or a “stepped-perpendicular” style of construction terrace as is seen at sites such as Lubaantun (Houk 2015:108).

We get additional resolution on the ancient form of this building by paying attention to one of the most innocuous of artifacts: daub. Despite the prevalence of granite, generally interpreted as architectural tumble, it seems clear from the ubiquitous presence of daub that the superstructures supported upon this construction platform were made of perishable materials, likely including wattle-and-daub walls (suggested by stick marks in the daub) and thatch roofing. This isn’t precisely unexpected; some of the largest civic-ceremonial centres in the Maya area included perishable structures within their monumental core and certainly it would be expected that structures at a relatively small site like Alabama would be so constructed. What is more interesting is the presence of large quantities of clearly parallel striated, often thick, fragments of daub with no stick impressions. As noted above, this material is usually present in much greater quantity in any single context than more “typical” examples. We tentatively suggest that this material may represent flooring at Alabama:

Floors have been constructed from various coherent loamy and clayey deposits that are local to a site, producing so-called ‘clay’ floors... often found alternating with dark coloured, charcoal-rich occupation accumulations, which are not constructed floors per se but represent beaten or trampled material and are unlikely to have been deposited on purpose. Constructed clay floors thus mark the renewal of a clean living surface (Macphail and Goldberg 2010:589).

In the absence of limestone with which to make plaster, it seems possible that clay could have been used as a substitute, laid down in layers atop the superior surface of the Structure 1 and 2 construction and building platforms (and, perhaps, even used as a ‘plaster’ on vertical surfaces?). In accordance with this view, the majority of both varieties of daub was recovered

from the Colluvium/Fall and Humus contexts; presumably deposited after the monumental core was abandoned and the perishable structures collapsed. Moreover, that both variations of this material were found in almost every context excavated suggests a continuity of use that, once clarified, should perhaps be added to our general characterization of architectural style in East-Central Belize. In addition to engaging in further excavation in upcoming seasons, designed to clarify the relationship between this material and the superior surface(s) of Structures 1 and 2, samples of collected material are currently undergoing petrographic analysis.

While it is clear that our excavations did penetrate into the shared construction platform of Structures 1 and 2, particularly in the profile window in Subop 6A, the interface between fill and colluvium/fall was difficult to ascertain; a product of the nature of the undifferentiated fill. A slight change in matrix and a significant drop in artifact counts are really all that served to differentiate the two levels. An additional enigma revolves around a series of compact clay surfaces (Construction Fill 3: Layers 1-3) identified during excavation in the SW quadrant of Subop A and initially interpreted as “habitation surfaces.” In retrospect, there are a number of reasons to doubt this interpretation: predominantly, compact clay surfaces were only identified toward the centre of the excavation unit, never extending to the margins of the Subop. It has been our experience that such patterns of compaction are likely caused by the movement of the excavators themselves around the unit; they do in this sense represent compact living surfaces, but specifically, modern compact living surfaces. This suggestion is supported by our inability to identify these surfaces in profile; while they exist at different places on a horizontal plane, they do not appear to overlay one another, though clearly being identified at different levels along a vertical plane. However, we cannot yet safely rule out the possibility that these may represent compact layers associated with clay core and floor construction style (Littmann 1967).

Our excavations at Structures 1 and 2 (Figure 2.17) during the 2018 field season succeeded in providing us with some clarity as to potential avenues of movement around the monumental core, while at the same time opening up new questions regarding construction history. Resolution of these issues will have to wait for future seasons.



Figure 2.16: Overhead view of Operation 6 excavations (still photo captured from 3D model generated via on-ground and pole-assisted photogrammetry).



Figure 2.17: Profile view of Operation 6 excavations, looking southwest (still photo captured from 3D model generated via on-ground and pole-assisted photogrammetry).

References Cited

Brady, James E., and Keith M. Prufer

1999 Caves and Crystalmancy: Evidence for the Use of Crystals in Ancient Maya Religion. *Journal of Anthropological Research* 55:129-144.

Brady, James E., Ann Scott, Hector Neff, and Michael D. Glascock

1997 Speleothem Breakage, Movement, Removal, and Caching: An Aspect of Ancient Maya Cave Modification. *Geoarchaeology: An International Journal* 12(6): 725-750.

Brouwer Burg, Mariëka, Astrid Runggaldier, and Eleanor Harrison-Buck

2016 The Afterlife of Earthen-Core Buildings: A Taphonomic Study of Threatened and Effaced Architecture in Central Belize. *Journal of Field Archaeology* 41(1):17-36.

Dunham, Peter S.

1996 Resource Exploitation and Exchange among the Classic Maya: Some Initial Findings of the Maya Mountains Archaeological Project. In *The Managed Mosaic: Ancient Maya Agriculture and Resource Use*, edited by S. Fedick, pp. 315-334. University of Utah Press, Salt Lake City.

Graham, Elizabeth

1994 *The Highlands of the Lowlands: Environment and Archaeology in the Stann Creek District, Belize, Central America*. Monographs in World Archaeology No. 19. Prehistory Press, Madison, WI.

Houk, Brett A.

2015 *Ancient Maya Cities of the Eastern Lowlands*. University of Florida Press, Tallahassee, FL.

Littmann, Edwin R.

1967 Patterns in Maya Floor Construction. *American Antiquity* 32(4):523-533.

MacKinnon, J. Jefferson

1987 Preliminary Report: Point Placencia Archaeological Project, December, 1986-January 1987. Unpublished report on file at the Institute of Archaeology, Belmopan, Belize.

1988a C'hacben K'ax, 1985-1988: Excavations at Alabama, Stann Creek District, Belize. Unpublished report on file at the Institute of Archaeology, Belmopan, Belize.

1988b Point Placencia Archaeological Project Belize, Central America; Excavations at C'hacben K'ax, Alabama, Stann Creek District, Belize, 1986-88. on file at the Institute of Archaeology, Belmopan, Belize.

1989 Spatial and Temporal Patterns of Prehistoric Maya Settlement, Procurement, and Exchange on the Coast and Cays of Southern Belize. Unpublished Ph.D. dissertation, University of Wisconsin, Madison, WI.

MacKinnon, J. Jefferson, Jeffrey M. Olson, and Emily M. May

1993 "Megalithic" Maya Architectural Features at the Site of Chacben Kax, Alabama, Stann Creek District, Belize, CA. *Mexicon* 15(1):1-4.

Macphail, Richard I., and Paul Goldberg

2010 Archaeological Materials. In *Interpretation of Micromorphological Features of Soils and Regoliths*, edited by G. Stoops, V. Marcelino, and F. Mees, pp. 589-622. Elsevier Science, Amsterdam, Netherlands.

Morton, Shawn G.

2015 The 2015 Epicentre Investigations at Alabama. In *The Stann Creek Regional Archaeology Project: Report of the Second (2015) Field Season*, edited by M. Peuramaki-Brown, pp. 19-28. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

2016 The 2016 Epicentre Investigations at Alabama. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. Peuramaki-Brown, pp. 21-26. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

Peuramaki-Brown, Meaghan M.

2017 Revisiting the Ancient Maya of Alabama, Belize: Description, Recent Research, and Future Directions. *Mexicon* 39:64-72.

Peuramaki-Brown, Meaghan M., and Shawn G. Morton

In Press Maya Monumental 'Boom': Rapid Development, Hybrid Architecture, and 'Pretentiousness' in the Fabrication of Place at Alabama, East-Central Belize. *Journal of Field Archaeology*.

Peuramaki-Brown, Meaghan M., Sonja. A. Schwake, Steven J. M. Moodie, and Julilla Paul

2014 The 2014 Epicentre Investigations at Alabama. In *The Stann Creek Regional Archaeology Project: Report of the First (2014) Field Season*, edited by M. Peuramaki-

Brown and S. A. Schwake, pp. 17-28. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

Chapter 3. 2018 Settlement Investigations: Continuing Excavation in Operation 3 at ALA-045

Shawn G. Morton (Northern Arizona University)

Johana Delos Reyes (University of Calgary)

This chapter presents results of ongoing excavations at mound A of the ALA-045 settlement site, located in Property Block C1 within the southwest portion of the settlement area of the Alabama site, approximately 1 km from the monumental core (see Figure 1.3 of this volume). Our 2018 excavations are a continuation of Phase II Test excavations initiated in 2016 (Pennanen and Peuramaki-Brown 2016). The site was initially chosen for testing as a representative sample of a Type III settlement site form (Ashmore et al. 1994) identified during Phase I Reconnaissance.

Recording of excavations were conducted using the forms/guides/systems described in Appendix A of this volume, and all matrix was screened using ¼-inch mesh, unless otherwise indicated. Summaries of excavation contexts are provided below—including individual lot data presented in Table 3.1—while bulk artifact tallies are presented in Table 3.2. Copies of all associated paperwork, drawings, and photos are on file at the Belize Institute of Archaeology. Artifacts are currently in storage in Belize.

ALA-045 Settlement Site, Operation 3

The 2016 excavations at mound A of ALA-045 (ALA-045A) revealed architectural and material remains consistent with the region's domestic sites, including a granite-faced house platform; daub from perishable superstructures; habitation debris off the backside of the platform, including ceramic sherds from bowl, dish, jar, and special-function forms; and lithic-chippedstone and groundstone debitage and formal tools. Stratigraphy revealed by the long, narrow, trench (Suboperations 3A, 3C, and 3E; 5m N-S by 1m E-W) suggested three distinct phases of construction. The reason for our return to this locale in 2018 was to follow up on the 2016 identification of a rounded stone feature interpreted as a possible uncapped burial cyst (Pennanen and Peuramaki-Brown 2016: 78; see also Welsh 1988). We wished to fully expose the feature and excavate inside to determine if any human remains were present, as this would allow us material to isotopically test to begin determining the origins of Alabama occupants. Due to the highly acidic soils in the region, we were not convinced any remains would survive; however, it would allow us to better understand burial practices of the area, which may provide clues as to population origins.

The 2018 excavations at ALA-045A retained the designation Operation 3 (Op 3) and added a single suboperation (unit), Suboperation 3F (Subop 3F), oriented 28° east of magnetic north and positioned contiguously to the NW of the 2016 suboperations (Subops 3A, 3C, and 3E), to cover and further delineate the stone feature previously identified (Figure 3.1). The excavations and documentation reported here were directed by Shawn G. Morton (SGM) and Meaghan Peuramaki-Brown (MPB); supervised by Johana Delos Reyes (JDR); and assisted at various times by Higinio Chiac Jr. (HC), Sylvestro Chiac (SC), Juan Paquiul (JP), Kristine Hubenig (KH), and Gillian Taylor (GT).

Context				Metrics			Matrix Description	
Op	Subop	Lot	Designation	Ceramic Date	Avg thick (m)	Vol. (m3)	Colour	Inclusions
3	F	1	Plough Zone	TC	0.19	0.90	10YR 4/3 Brown	97% Loamy Sand; 2% roots; 1% small pebbles (few cobbles)
3	F	2	Colluvium/Fall	LC/TC	0.10	0.48	10YR 4/3 Brown	99% Loamy Sand; 1% pebbles
3	F	3	Colluvium/Fall	LC/TC-EPC	0.06	0.27	10YR 4/3 Brown	97% Loamy Sand; 2% roots; 1% small pebbles (few cobbles)
3	F	4	Fall/Fill	LC/TC-EPC	0.08	0.27	10YR 4/3 Brown	95% Loamy Sand; 5% gravel
3	F	5	Fall/Fill	TC	0.14	0.39	10YR 4/3 Brown	100% Loamy Sand
3	F	6	Construction Fill 2	LC/TC	0.10	0.41	10YR 4/3 Brown	98% Loamy Sand; 2% pebbles
3	F	7	Plough Zone		0.19	0.19	10YR 4/3 Brown	98% Loamy Sand; 2% roots
3	F	8	Plough Zone		0.31	0.19	10YR 4/3 Brown	98% Loamy Sand; 2% roots
3	F	9	Construction Fill 1		0.20	0.20	10YR 4/3 Brown	95% Loamy Sand; 5% gravel
3	F	10	Fall/Habitation Debris	TC	0.33	0.30	10YR 4/3 Brown	50% Loamy Sand; 50% sandy patches and small gravel
3	F	11	Construction Fill 1		0.20	0.12	10YR 4/3 Brown	100% Loamy Sand
3	F	12	Construction Fill 2		0.06	0.31	10YR 4/5 Yellowish Brown	80% Loamy Sand; 20% gravel
3	F	13	Construction Fill 2	LC-PC	0.25	0.15	10YR 4/3 Brown	80% Loamy Sand; 20% gravel
3	F	14	Construction Fill 2	LC/TC	0.14	0.17	10YR 4/3 Brown	80% Loamy Sand; 20% gravel
3	F	15	Construction Fill 2		0.11	0.13	10YR 4/5 Yellowish Brown	90% Loamy Sand; 10% pebbles/gravel
3	F	16	Construction Fill 2		0.06	0.34	10YR 4/5 Yellowish Brown	80% Loamy Sand; 20% gravel
3	F	17	Construction Fill 2		0.03	0.16	10YR 4/5 Yellowish Brown	80% Loamy Sand; 20% gravel
3	F	18	Construction Fill 2	LC	0.14	0.76	10YR 4/5 Yellowish Brown	80% Loamy Sand; 20% gravel
3	F	19	Construction Fill 2 to sterile (?)		0.51	0.13	10YR 5/6 Yellowish Brown to 10YR 4/6 Dark Yellowish Brown	Top 25 cm: 80% Loamy Sand; 20% gravel. Bottom 35 cm: 100% Loamy Sand
Total Volume Excavated, Op 3, 2018 (m3)						5.87		

Table 3.1: Lot designations and matrix descriptions from Suboperation 3F.

Context			Ceramic bulk				Lithic bulk		Daub bulk				TOTAL BULK ARTIFACT COUNT
Op	Subop	Lot	Diagnostic Count	Diagnostic Weight (0.0g)	Non-Diagnostic Count	Diagnostic Weight (0.0g)	Count	Weight (0.0g)	Regular Weight	Regular Weight (0.0g)	Irregular Count	Irregular Weight (0.0g)	
3	F	1	4	15.0	67	348.2	16	102.2	4	33.5	0	0.0	91
3	F	2	4	11.0	31	112.0	2	24.8	2.0	13	0.0	0	39
3	F	3	9	70.0	65	440.0	13	211.5	0	0.0	0	0.0	87
3	F	4	7	52.5	40	160.0	18	304.6	1	7.3	0	0.0	66
3	F	5	12	69.6	85	270.9	29	125.5	3	22.9	0	0.0	129
3	F	6	7	101.0	44	260.5	16	63.8	2.0	27.1	0.0	0	69
3	F	7	0	0.0	3	8.6	0	0.0	0	0.0	0	0.0	3
3	F	8	0	0.0	10	37.2	24	48.2	0	0.0	0	0.0	34
3	F	9	0	0.0	7	10.7	0	0.0	0	0.0	0	0.0	7
3	F	10	21	217.8	363	1042.1	26	127.9	2.0	27.2	0.0	0.0	412
3	F	11	0	0.0	25	72.4	0	0.0	0	0.0	0	0.0	25
3	F	12	1	8.4	49	208.1	13	157.3	1	6.6	0	0.0	64
3	F	13	9	59.0	49	207.9	6	37.7	1	11.3	0	0.0	65
3	F	14	8	78.7	66	204.1	4	31.2	0	0.0	0	0.0	78
3	F	15	0	0.0	30	131.9	4	51.3	0	0.0	0	0.0	34
3	F	16	2	53.4	96	486.6	17	504.9	0	0.0	0	0.0	115
3	F	17	2	19.6	39	128.6	11	31.3	0	0.0	0	0.0	52
3	F	18	6	42.2	99	330.1	36	122.2	0	0.0	0	0.0	141
3	F	19	1	10.8	20	86.8	1	0.3	0	0.0	0	0.0	22
			93	809.0	1188	4546.7	236	1944.7	16	148.9	0	0.0	1533

Table 3.2: Bulk artifact counts by lot from Suboperation 3F.

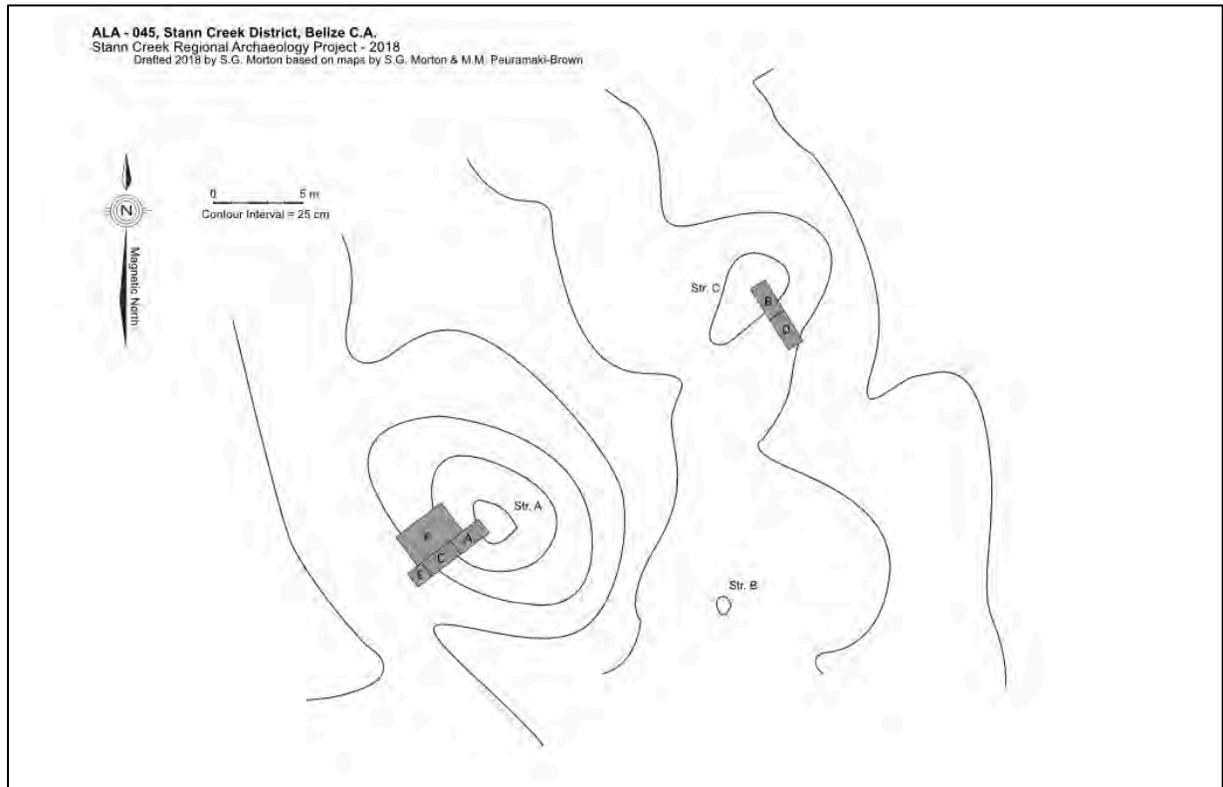


Figure 3.1: Topographic contour map of ALA-045A, indicating locations of 2016 suboperations and the addition of 2018 Suboperation 3F.

Suboperation 3F

Subop 3F is a 3.2 m (N/S) x 2 m (E/W) excavation unit, placed toward the south end (lower end) of the face of the construction platform of ALA-045A (Figures 3.2, 3.3, 3.4, 3.5). The unit was positioned to align with the overall structure orientation (as could be determined on ground) and was contiguous with Subops 3A, 3C, and 3E, its position being finalized only after removing a portion of the backdirt from this trench—the 2016 units had been prepared for our return, with a tarpaulin (visible in some photos) being placed in the base of the excavation prior to backfilling. Associated excavation drawings on file at the Institute of Archaeology in Belmopan include SCRAP2018-DN001, DN002, and DN003.

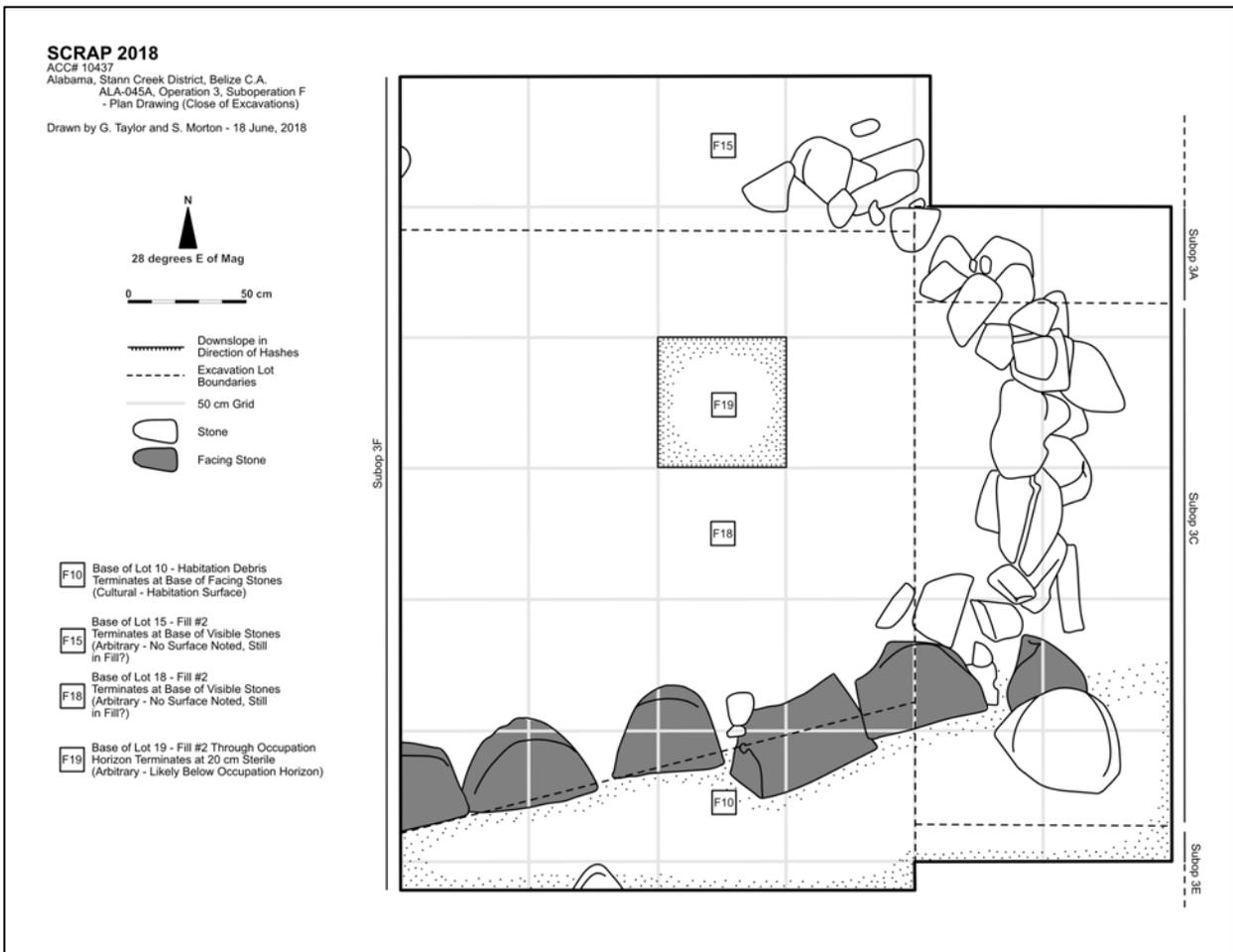


Figure 3.2: Plan drawing of Suboperation 3F, noting relative positions of 3A, 3C & 3E.



Figure 3.3: Vertical image of Suboperation 3F, rendered from 3D photogrammetric model.

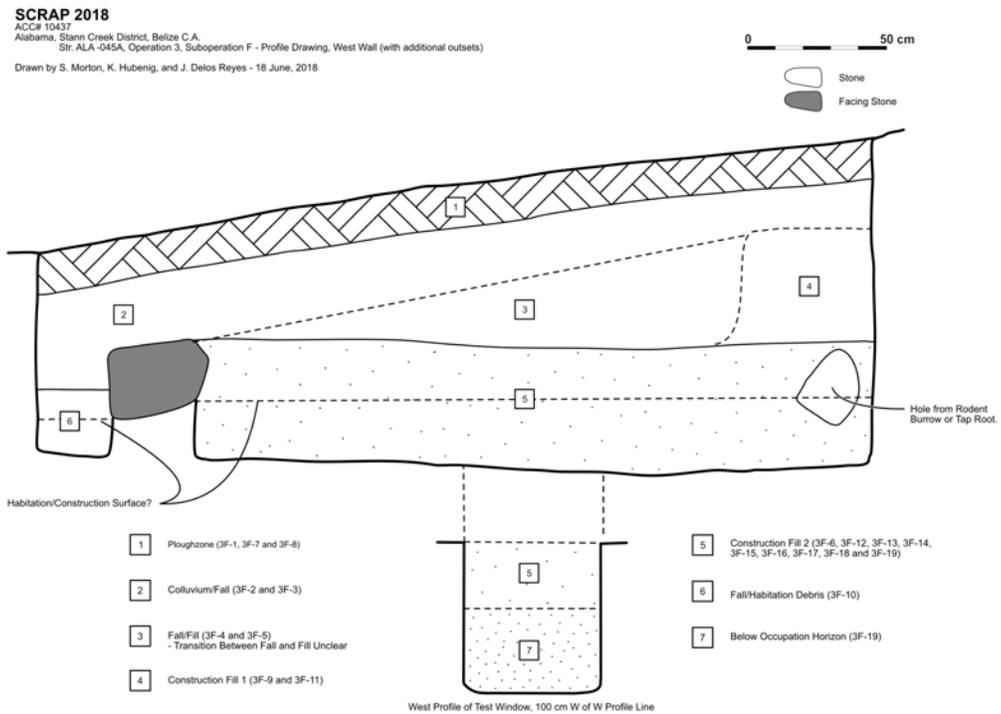


Figure 3.4: Profile drawing of Suboperation 3F, facing west.



Figure 3.5: Oblique image of Suboperation 3F, rendered from 3D photogrammetric model, facing northwest.

Ploughzone. Lots 3F-1, 3F-7, and 3F-8, cumulatively, covered the entire area of Subop 3F and were collectively designated as ploughzone. Excavation of this context terminated with the exposure of architectural fall and eroded construction fill. Associated excavation photos include SGM Camera 127-0408 to 127-0413.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary shaping, thinning, finishing, and retouch flakes, and shatter], granite [tertiary flake], phyllite [primary, tertiary shaping, and tertiary flakes, and shatter], quartz [secondary and tertiary flakes, and shatter], and quartzite [primary and tertiary shaping flakes, and shatter]), and daub were recovered from this context. All daub recovered was consistent with that which was used to ‘plaster’ perishable structures (amorphous blobs, regular or ‘popcorn-like’, with stick impressions). Small finds included a fragment of a general utility thick biface (Cat. 10437-LT008), a cylindrical ground slate fishing line weight (Cat. 10437-GS004), and a disc-shaped worked ceramic sherd (Cat. 10437-CR001). While no radiocarbon samples were recovered from this context, a chronologically diagnostic sherd (moulded-carved) can be stylistically assigned to the Terminal Classic.

Colluvium/Fall. Lots 3F-2 and 3F-3, cumulatively, covered the entire area of Subop 3F and were collectively designated as colluvium and architectural fall. Associated excavation photos include SGM Camera 128-0426 and 128-0441.

Bulk ceramic, lithic-chippedstone debris (arkose sandstone [shatter], chert [tertiary shaping flake], granite [tertiary flake and shatter], phyllite [tertiary and tertiary shaping flake], and quartz [secondary and tertiary shaping flakes]), and daub were recovered from this context. All daub recovered was consistent with that which was used to ‘plaster’ perishable structures. Small finds include a general utility thick biface made of chert (Cat. 10437-LT004) and a

retouched flake of arkose sandstone (Cat. 10437-LT006), as well as four obsidian blade fragments (Cat. 10437-OB002, OB004, OB005, and OB023) and a single obsidian flake (Cat. 10437-OB024). While no radiocarbon samples were recovered from this context, chronologically diagnostic sherds can be stylistically assigned to the Late-Terminal Classic and Early Postclassic periods.

Fall/Fill. Lots 3F-4 and 3F-5 were isolated to the northmost 2.5 m of the subop. Due to the nature of the effaced earthen-core architecture (Brouwer Burg et al. 2016) that is typical of Alabama's settlement zone, the distinction between the loamy sand of the colluvium/eroded fall, and that of the intact construction fill (in particular, Construction Fill 1) was difficult to ascertain. These lots are thus, likely, a combination of intact and eroded material. Associated excavation photos include SGM Camera 128-0445 and 128-0450.

Bulk ceramic, lithic-chippedstone debris (chert [tertiary and tertiary shaping flakes], phyllite (primary, secondary and tertiary flakes, and shatter), quartz [secondary, tertiary, tertiary thinning and tertiary shaping flake, and shatter], quartzite [tertiary shaping and tertiary flake, and shatter], slate [tertiary flake], and perhaps granodiorite [tertiary flake]), and daub were recovered from this context. All daub recovered was consistent with that which was used to 'plaster' perishable structures. Small finds include two fragments of thin bifaces made of chert (Cat. 10437-LT005 and 10437-LT007), two retouched flakes of chert, and a granite groundstone metate fragment (Cat. 10437-GS005). Two obsidian blade fragments (Cat. 10437-OB008 and OB012) were also recovered. Perhaps the most interesting finds were a small, hardened nodule of copal (Cat. 10437-SP005; see discussion below and Figure 3.6) and a whole quartz crystal (Cat. 10437-SP012). While no radiocarbon samples were recovered from this context, chronologically diagnostic sherds can be stylistically assigned to the Late-Terminal and Early Post-Classic periods.

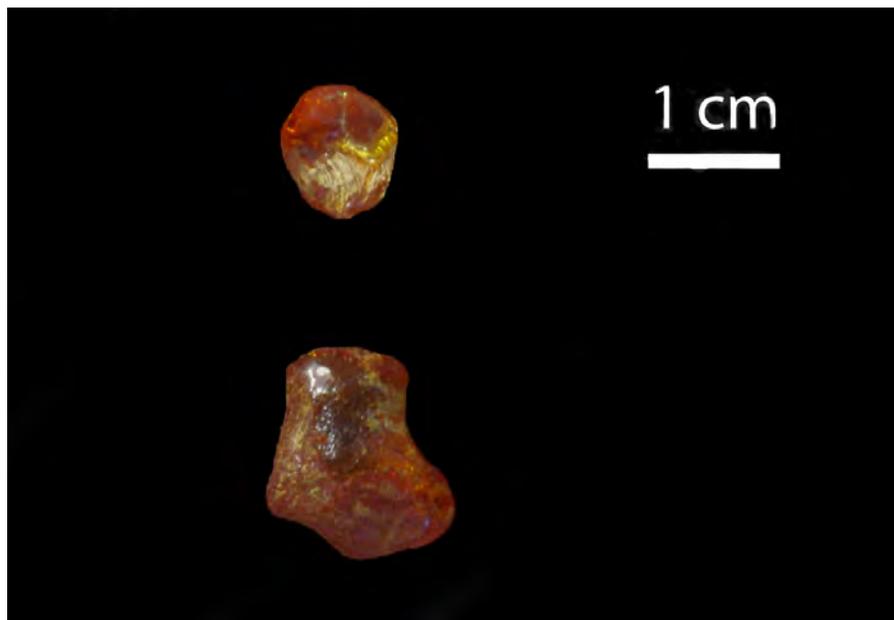


Figure 3.6: Hardened nodules of copal (top, Cat. 10437-SP012; bottom, Cat. 10437-SP006).

Construction Fill 1. Lots 3F-9 and 3F-11 cover the northmost 50 cm of Subop 3F and were collectively designated as Construction Fill 1. There is likely a certain amount of overlap between lots designated in this context and in the previous (specifically, Lots 3F-4 and 3F-5). However, it is possible that a sharp decrease in the number of artifacts recovered from Lots 3F-9 and 3F-11 (both in the northmost portion of the subop) denotes the transition from fall to fill. Associated excavation photos include SGM Camera 128-0472 and 128-0478.

Bulk ceramics were recovered from this context, as well as a single obsidian flake (Cat. 10437-OB020) were recovered. No radiocarbon samples or diagnostic sherds were recovered to help with dating.

Construction Fill 2. Lots 3F-6, 3F-12, 3F-13, 3F-14, 3F-15, 3F-16, 3F-17, 3F-18, and 3F-19 fill the entirety of the suboperation to the north of the line of granite facing stones visible in Figures 3.2 and 3.3. No differentiation of matrix indicated an intact habitation or construction surface, remaining a consistent 20% gravel, 80% loamy sand and consistently contained artifacts conforming to a variety of material classes. It seems likely, however, that such a horizon would have existed at the base of the granite facing stones exposed in the south of the subop. As time was limited, we excavated a small 50 cm by 50 cm window into this fill to assess its depth. At a depth of approximately 2.3 m below surface, no additional artifacts were recovered; a further 30 cm depth was excavated in confirmation. This likely represents the occupation horizon for the locale. Associated excavation photos include SGM Camera 128-0452, 128-0480, 128-0485, 128-0502, 128-0531, 128-0570, 128-0579, 128-0591, and 128-0725.

Bulk ceramic, lithic-chippedstone debris (arkose sandstone [primary and secondary flakes], chert [tertiary, tertiary shaping, tertiary thinning, and tertiary finishing flakes, and shatter], granite [shatter], phyllite [primary, secondary and tertiary flakes, and shatter], quartz [primary, secondary, tertiary shaping, tertiary thinning, and tertiary finishing flakes and tertiary flakes, and shatter], quartzite [primary, tertiary and tertiary shaping flakes], and slate [primary flakes]), and daub were recovered from this context. All daub recovered was consistent with that which was used to 'plaster' perishable structures. Small finds include two worked ceramic sherd discs (Cat. 10437-CR007 and CR008), several obsidian blade fragments (Cat. 10437-OB003, OB006, OB007, OB015, OB017, OB018, OB019, and OB021), several obsidian flakes (Cat. 10437-OB016, OB022, OB025) and a nodule of hardened copal (Cat. 10437-SP006; Figure 3.6). Six radiocarbon samples (Cat. 10437-CB001, CB002, CB003, CB005, CB006, and CB007) were recovered from this context, and chronologically diagnostic sherds can be stylistically assigned to the Late-Terminal and Post-Classic periods. A single soil sample was collected for future analysis (Cat. 10437-SL001).

Fall/Habitation Debris. Lot 3F-10 was identified as a combination of fall and habitation debris. No differentiation of matrix indicated a habitation or construction surface, remaining a constant (if heterogeneous) combination of 50% loamy sand and 50% sand and small gravel. It seems likely, however, that such a horizon would have existed at the base of the granite facing stones exposed in the south of the subop. Associated excavation photos include SGM Camera 128-0474.

Bulk ceramic, lithic-chippedstone debris (arkose sandstone [secondary flake, and shatter], chert [multidirectional cores, tertiary, tertiary finishing and tertiary shaping flakes], feldspar [shatter], granite [shatter], phyllite [secondary flake], and quartz [tertiary shaping and tertiary

finishing flakes, and shatter]), and daub were recovered from this context. All daub recovered was consistent with that which was used to ‘plaster’ perishable structures. Small finds include a thin biface of chert (Cat. 10437-LT003), a basalt mano fragment (Cat. 10437-GS008) and a complete quartzite mano (Cat. 10437-GS009). A single radiocarbon sample (Cat. 10437-CB004) was recovered from this context, and chronologically diagnostic sherds can be stylistically assigned to the Late-Terminal Classic period.

Summary/Interpretation

As noted above, the 2018 excavations at Operation 3 were intended to clarify the nature and relationship of the “mysterious stone feature” identified in 2016. In the completion of this task our efforts resulted in abject failure, though our overall understanding of the architecture and construction history of this residential structure has been improved and the recovery of a wide variety of artifacts conforming to several material classes is a useful addition to our project catalogue.

In general, our excavation results confirmed the stratigraphic designations presented in the 2016 report (Pennanen and Peuramaki-Brown 2016: 71), with a distinct difference in matrix and inclusions noted above the superior level of in situ masonry (2016 Lots 3A-2, 3A-3, 3A-4, 3A-5, 3A-7, 3A-8, 3A-10, 3A-11, 3C-4; 2018 Lots 3F-2, 3F-3, 3F-4, 3F-5)—its upper surface blending with eroded material—and between the superior and inferior levels of this same (2016 Lots 3C-7; 2018 Lots 3F-6, 3F-12, 3F-13, 3F-14, 3F-15, 3F-16, 3F-17, 3F-18, 3F-19). The occupation horizon was likewise similarly identified approximately 40-50 cm below the lowest exposed architectural stone (2016 Lots 3C/E-4, 3C/E-5; 2018 Lot 3F-19). We were unable to find a direct equivalent of 2016 Fill #3 (Lots 3A-6, 3A-9, 3A-12) located further to the north, though 2018 Construction Fill 1 (2018 Lots 3F-4, 3F-5) is somewhat similar in its horizontal distribution, albeit closer to surface; the relative paucity of artifactual material recovered from both is striking (Figure 3.4).

While datable ceramic materials place construction and use of the platform(s) in the late facet of the Late Classic to Terminal Classic, with occupation extending into the Early Postclassic as indicated by AMS dating of carbon samples from the terminal habitation debris deposits excavated in 2016, the construction history of the structure is anything but clear. Tentatively identified as the edge of an uncapped burial cyst in 2016 (Pennanen and Peuramaki-Brown 2016: 78), the masonry bulk exposed running parallel to the line of Subops 3A, 3C, and 3E, was exposed in its entirety in 2018’s Subop 3F (Figure 3.2). From this, it seems clear that the stone feature was not a burial cyst—its line discontinued shortly beyond that exposed in 2016 and no evidence of a burial was recovered. But what was it? How do we explain this feature? We propose variations on four alternative models of site construction (Figure 3.7):

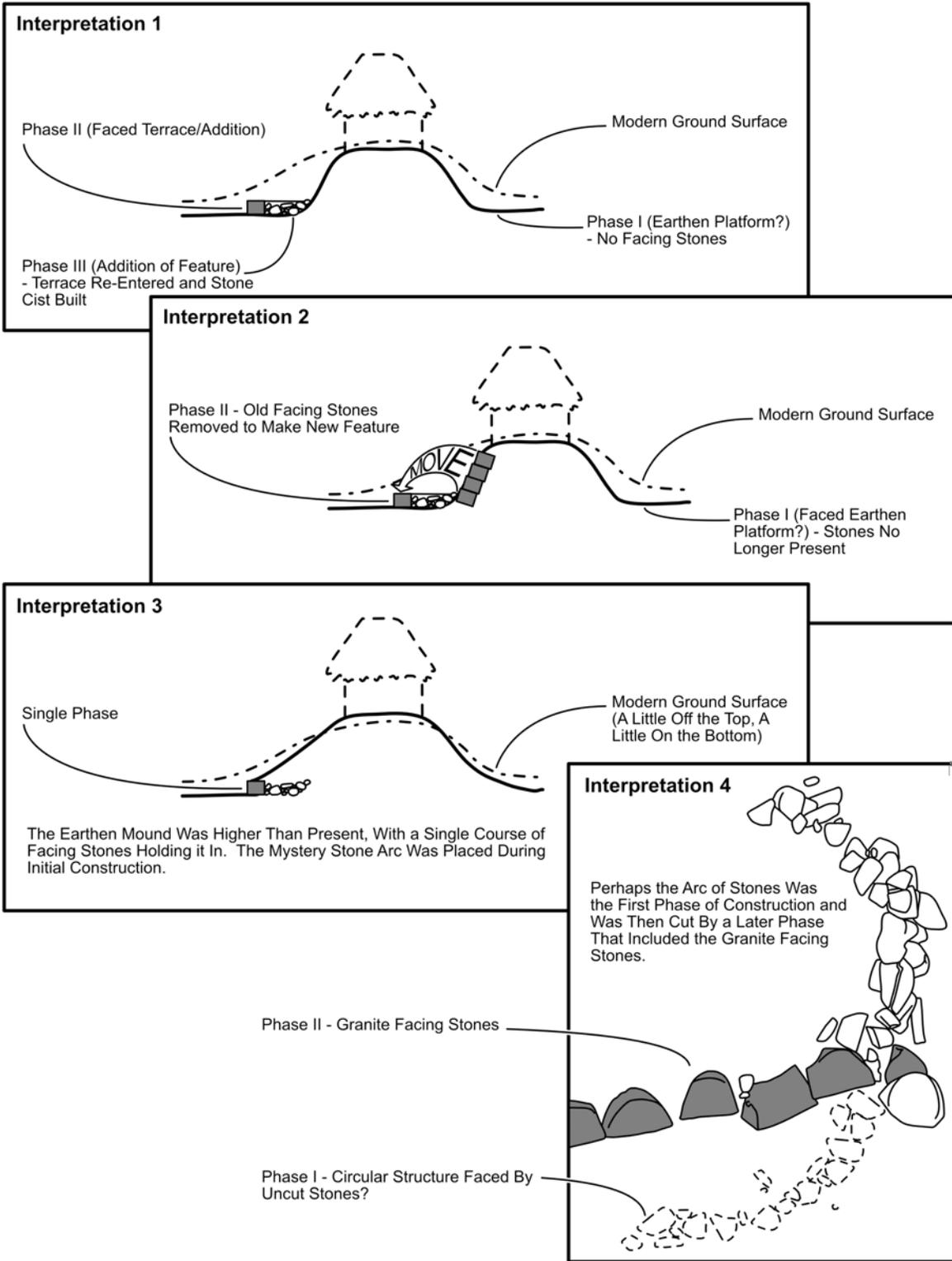


Figure 3.7: Proposed interpretations of ALA-045A construction.

Interpretation 1. ALA-045A is comprised of at least three phases of construction, beginning with a simple (perhaps unfaced?) earthen platform (Phase I). At some point, this was embellished with a low terrace, faced in cut granite, opposite the shared courtyard of the residential group (Phase II). Finally, the terrace was re-entered and our mystery stone feature constructed. What this feature is, or why it was constructed remains unknown. A fourth phase of construction may have eventually capped the rest.

Interpretation 2. ALA-045A is comprised of two main phases of construction, beginning with a simple earthen platform faced with cut granite (Phase I). Later, this was expanded with a low terrace opposite the shared courtyard of the residential group, faced in cut granite stripped from the older façade (Phase II). Our mystery stone feature was constructed at the same time, perhaps demarcating some sort of construction cell or stabilization feature.

Interpretation 3. ALA-045A was constructed in a single phase, with the various fills simply representing task units or discrete stages of construction. Here too, our mystery stone feature may have simply demarcated a construction cell.

Interpretation 4. Our mystery stone feature may have been an earlier construction, perhaps a small, low, rounded platform, roughly faced with stacked cobbles (Phase I). This was subsequently cut by a rectangular platform faced by cut granite slabs (Phase II and beyond).

Beyond this, if the ALA-045A remains are reflective of a household and its activities, we can confirm that residents were able to obtain items from a distance (beyond the East-Central Belize region), including chert, obsidian, and ceramic materials, in addition to locally available resources including various materials used in chippedstone and groundstone activities (quartz, quartzite, phyllite, sandstones, slates, granites) and, likely, local pottery. In addition, several more “exotic,” though locally available, objects were recovered from construction fill layers at ALA-045A, including quartz crystals and nodules of copal incense, with the latter positively identified via Mohs Hardness Scale (fingernail, softer than 2.5), UV fluorescence (yellow-green, same as modern copal and pine resin samples), and scent via hot needle test (confirmed copal smell).

We interpret both the quartz and copal in a symbolic/ritualized light. The incorporation of symbolically charged materials/objects into architecture is often interpreted as an attempt to infuse something of the symbolic value of the object itself, or via the object, of the symbolic acts related to its deposition, into the structure (Brady et al. 2005; see also Chapter 2 of this volume). Quartz and other rock crystals appear to have been generally venerated across early Colonial Mesoamerica (Sahagún 1963 [1590]: 222, 225, 229). They were used in personal adornment (Sahagún 1963 [1590]: 8, 18, 80), and are suggested to have been incorporated into medicine bundles of the 16th-century Yucatan (Tozzer 1941: 130, n.608). Brady and Prufer (1999: 129, 133) note that in other ethnographically attested ritual from the Maya area, quartz crystal was restricted to ritual specialists concerned with curing and divining and suggest that its introduction into an archaeological assemblage marks the work of ritual specialists. While the precise meaning of its presence in the architectural fill of ALA-045A remains opaque, it is perhaps quartz’s colonial associations with purity that were at work during the Late-to-Terminal Classic.

Likewise, the presence of copal in both the Fall/Fill and Construction Fill 2 layers may be indicative of ritual activities associated with the construction of ALA-045A. In particular, it is

the form of the recovered copal that is most telling. When copal resin is collected it is sticky, opaque, and liquid, hardening to a more useable form (often yellow-white in colour) through contact with air (Cano 2008: 2). Early stage air-hardened copal is commonly used today as an incense, either recreationally, or through the course of ceremony. In this lightly-processed form, copal is likely to decompose or erode through contact with water. However, when exposed to air for longer periods or when partially burned, copal can solidify into a hard, yellowish, transparent substance similar in appearance to amber, and is much more durable. A likely explanation for such hard, transparent, nodules of copal in the architectural fill of ALA-045A is that it was introduced as a byproduct of burning incense. In Zinacantan, Evon Vogt (1969: 391, 1976: 54), has noted that the construction of a house is often accompanied by ritual acts meant to invoke the moment of creation, and involve the ritual purification and delimitation of the building site. Perhaps such rites account for the presence of these objects at ALA-045A. Together, the quartz and copal, while found in only minute quantities, thus remind us of the thin line between the natural and supernatural in the lives of the ancient Maya, and the importance placed on satisfying ritual obligations at all levels of status.

References Cited

- Brady, James E., Allan B. Cobb, Sergio Garza, Cesar Espinosa and Robert Burnett
2005 An Analysis of Ancient Maya Stalactite Breakage at Balam Na Cave, Guatemala. In *Stone Houses and Earth Lords: Maya Religion in the Cave Context*, edited by K. M. Prufer and J. E. Brady, pp. 213-224. University Press of Colorado, Boulder, CO.
- Brady, James E., and Keith M. Prufer
1999 Caves and Crystalmancy: Evidence for the Use of Crystals in Ancient Maya Religion. *Journal of Anthropological Research* 55:129-144.
- Brouwer Burg, Marieka, Astrid Runggaldier, and Eleanor Harrison-Buck
2016 The Afterlife of Earthen-Core Buildings: A Taphonomic Study of Threatened and Effaced Architecture in Central Belize. *Journal of Field Archaeology* 41(1):17-36.
- Cano, Mirtha
2008 *Processing Maya Incense*. Association FLAAR Mesoamerica. Available online: http://www.wide-format-printers.org/FLAAR_report_covers/705193_Prossessing_incense.pdf.
- Pennanen, Kelsey, and Meaghan M. Peuramaki-Brown
2016 Chapter 4. The 2016 Settlement Investigations at Alabama: Operation 3 at ALA-045. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. M. Peuramaki-Brown, pp. 69-90. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.
- Sahagún, Bernadino de.
1963 [1590] *General History of the Things of New Spain, Book 9: The Merchants*, C.E. Dibble and A.J.O. Anderson, trans. University of Utah Press, Salt Lake City, UT.
- Tozzer, Alfred M.

1941 *Landa's Relación de las Cosas de Yucatan: A Translation*, edited with notes. Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge, MA.

Vogt, Evon Z.

1969 *Zinacantan: A Maya Community in the Highlands of Chiapas*. Belknap Press of Harvard University, Cambridge, MA.

1976 *Tortillas for the Gods: A Symbolic Analysis of Zinacanteco Rituals*. Harvard University Press, Cambridge, MA.

Welsh, W.B.M.

1988 *An Analysis of Classic Lowland Maya Burials*. BAR International Series 409. British Archaeological Reports, Oxford, England.

Chapter 4. Preliminary Report on the Alabama Ceramic Assemblage

Linda Howie (HD Analytical Solutions/Western University)

Jillian Jordan (University of New Mexico)

The Stann Creek District of Belize has received relatively little archaeological attention, particularly with regard to ceramic assemblages (see Graham 1994 for exception). Richard Wilk (1977) once wrote of the ceramic assemblage from Nim Li Punit, located roughly 50 km south of the Alabama site, “In general, no poorer collection of sherds could be imagined. Most were of small size, with little remaining surface and few easily identifiable time-markers or exotic imports.” Similarly, Elizabeth Graham (1994) observed for sites situated to the north of Alabama, in proximity to Stann Creek, that the paucity of ceramic artifacts in comparison to other Lowland Maya sites was undoubtedly the result of depositional contexts that promote poor preservation to complete disintegration of sherds, as opposed to a comparatively low frequency of occurrence. The ceramic collections recovered from the Alabama site area present similar challenges to analysis and characterization. The Alabama ceramic assemblage is highly fragmented, with the majority of sherds measuring less than 2.5 cm² (the size of an American quarter). Rim sherds and other diagnostic anatomical components of value in determining temporal associations, such as bases, appendages and reasonably sized portions of vessel profiles that include inflection points, are rare. Surface finish and decorative characteristics are highly and inconsistently altered, and original slips and paints are oftentimes completely eradicated. To further complicate matters, the acidic soils of the region alter the visual appearance of both surface treatment and macroscopic paste characteristics differentially across archaeological contexts, and have leached out carbonate inclusions (e.g. different limestones, crystalline calcite, dolomite and carbonate sand) originally present in the pastes, hindering description of original compositional characteristics and complicating direct inter-site comparison on the macroscopic level.

An important objective of current research at Alabama is to investigate and establish the demographic character of the community. To this end, a main question being addressed is whether the settlement constituted a group of people who migrated together to the area from a single location, or the coalescence of people/families from the region or diverse parts beyond. Of further interest is to what degree of physical evidence exists of material connections to other geographic areas as manifest in the provenance or technological characteristics of ceramic and other artifact assemblages, and the nature and extent of these connections. In the absence of human skeletal remains at Alabama, which would permit isotopic investigation of the geographic origin and/or mobility of the people buried at the site, inquiry must rely on indirect, material indicators of identity and intra-community variability in this regard. Possession of and differential access to particular kinds of finished products—potentially derived from or connected to different manufacturing origins—by sections of a settlement are not determined by socio-economic differences alone; rather, this is thought to potentially indicate key differences in population identities, reflective of different geographic origins and patterns of socio-economic interaction. Ceramic artifacts, the raw materials for which derive from physical locations on the geological landscape, can be connected to points of origin, either broadly or specifically, and thus differentiated on this basis. As we are limited in our ability to use assessment of surface treatment, decoration, and form criteria as a principal analytical tool for investigating the manufacturing origins of the pottery recovered from Alabama, additional

characteristics such as paste attributes must be strategically incorporated at all levels of analysis. This approach will allow us to identify, differentiate, and quantify pottery made locally vs. elsewhere and begin to characterize local production patterns and priorities.

Given these broader research questions and goals, the 2018 field season, in addition to results of a preliminary petrographic study of a small selection of surface collected sherds and building material (Peuramaki-Brown et al. 2017), formed a preliminary planning phase of a multi-year study of ceramic artifacts recovered from the Alabama area. Our analysis included pottery recovered from excavation lots at two separate settlement sites (mound groups) excavated during the 2016 field season (Koster and Peuramaki-Brown 2016; Morton et al. 2016): ALA-047 (Operation 2 at mounds ALA-047A [12 lots] and ALA-047B [26 lots]) and ALA-043 (Operation 4 at mound ALA-043A [20 lots])(Figure 1.3 of this volume). The work took place over a 10-day period in June, and principal personnel involved in the lab study included Dr. Linda Howie, Jillian Jordan, and Frank Tzib, with additional, relevant, local resource information and traditional knowledge input provided by Ms. Aurora Saqui and Mr. Ernesto Saqui of Maya Centre village.

The main goals of 2018 in-field study were to:

1. Assess the general condition of the ceramic assemblage and variation in this regard across archaeological contexts.
2. Investigate the range of functional and stylistic categories of vessels present.
3. Begin to establish an analytical framework for assemblage quantification and description appropriate to the nature and condition of pottery collections and creating a ceramic typology for the Alabama area.
4. To identify imported vessels based on comparative stylistic and compositional information from other regions (e.g. northern Belize [Howie 2000, 2012; Howie et al. 2014; Howie et al. 2016; Wiewall and Howie 2010], Uxbenká [Jordan 2014], Lubaantun [Hammond 1975], and the Belize Valley [Gifford 1976]).

To this end, the study focused on documenting and describing the macroscopic attributes of the different pottery comprising the selected household assemblages, according to visual characteristics of their form, surface treatment, and decoration and pastes, as well as determining the range and frequency of the different stylistic and functional categories of pottery represented within these assemblages. A main objective was to establish groups of 'like vessels' based on functional, stylistic, and macroscopic paste criteria, and to examine variability in this regard across lots and household contexts. This macroscopic baseline will form the basis of sample selection for future detailed microscopic assessment of provenance and technological characteristics of Alabama pottery. This report presents some preliminary observations and plans for future ceramic research at Alabama.

The Ceramic Assemblage and Chronology

During the comparatively short 2018 in-field study, we focused primarily on familiarizing ourselves with the Alabama ceramic assemblage. Dr. Peuramaki-Brown had previously identified significant diagnostic pottery based on stylistic and Type:Variety criteria and numerical abundance to begin the process of creating a ceramic type collection for the area. Our work in 2018 focused on conducting a detailed exploratory assessment of the pottery recovered from spatially separated contexts (two possible houses within a single Type VI settlement site [ALA-047], and one possible house at a Type I settlement site [ALA-043]) in the Alabama settlement area. The majority of the lots excavated at these household contexts consist of very small, highly eroded body sherds. We identified any sherds that provided information about the shape and form of the original vessel (e.g. rims, bases, jar necks, appendages) as well as surface treatment (e.g. slip, paint, incision, punctuations, fillets). *Evaluation of this material suggests that the majority of the assemblage dates to the Late Classic to Terminal Classic Period.* Form and surface treatment modes include serving dishes and bowls with ring bases and flat bottoms, rare vase base fragments and oven feet, a prevalence of monochrome serving vessels with red or black slips and lacking a waxy surface finish, and rare volcanoclastic/ash-tempered polychromes. These observations, along with the presence in both household collections of Zakpah Orange Group chalice and incised out-curving bowl fragments, typical of Early Postclassic assemblages in northern Belize (e.g. Buk phase Lamanai), but certainly produced during the Terminal Classic, this confirm time frame. Additionally, the presence of rare flanges and everted to outflared rims with incision hint at an Early Classic component (Peuramaki-Brown et al. 2017: 305-306); however, these sherds are small and slips are not preserved, making it impossible to definitively assign them to an earlier time period and are found in mixed contexts with later material. Two flanges, in particular, from Lots 4A-10 (site ALA-043) and Lot 2B-2 (site ALA-047) may be part of an Early Classic polychrome serving vessel.

Creating a Ceramic Typology for Alabama

Type-variety is the predominant classification system for ceramics in the Maya Lowlands; it is a hierarchical system in which varieties are “nested” within types described as “an aggregate of distinct ceramic attributes that is indicative of a particular category of pottery produced during a specific time interval within a specific region” (Gifford 1960: 9). This framework is useful in chronology building and determining relationships between sites, and it is necessary to continue in this tradition in order to facilitate comparisons with other sites and regions of the Maya Lowlands. As many researchers have pointed out (Aimers 2013; Rice 1976), the placement of macroscopic paste characteristics varies in the hierarchical type:variety classification system. Most studies privilege surface treatment and form above paste characteristics. Technological attributes associated with vessel fabrication (texture, temper material, hardness, porosity, and color [Rice 2013:19]) and attributes associated with surface finish (presence/absence of a slip, smoothness, lustrous/matte finish, and color [Rice 2013:19]) are often combined into a single ware category (see Gifford [1976:4] for a discussion of ware as “gross technological characteristics” in the Belize Valley). The outward visual appearance of a vessel is most often elevated as the most important distinguishing criteria in analysis, and characteristics relating to the ‘nuts and bolts’ of fabrication (e.g. raw material choice, paste recipe, forming and firing method) are lumped together into broader, inconsistently defined categories of similarity. However, the nature of the Alabama ceramic assemblage does not

allow for such an analytical approach and, consequently, a site typology in which ceramic groups, types, and varieties are defined primarily on surface treatment and form is not possible.

The small size of sherds and poor preservation of surface and decorative characteristics naturally led to a focus on identifying different paste ware (paste + temper) categories, which we determined for two broadly defined functional classes of vessels—‘serving/table’ wares and ‘utilitarian’ food preparation and storage wares—and on making some preliminary distinction between locally produced versus non-local vessels. We grouped all sherds, including diagnostic and non-diagnostic body sherds larger than a quarter, according to paste characteristics (Figure 4.1). These groups were not based on a rigorously applied set of physical and compositional attributes and relied heavily on distinctive characteristics like color and texture, as well as the expertise of Jordan and Howie who have analyzed pottery from across Belize. Our goal was to determine what pottery may have been produced in the local area around the site of Alabama, what pottery may have been brought to the site from other geographic areas, and to use these preliminary groups as the starting point for creating a reproducible ceramic typology that could be used in future laboratory seasons.



Figure 4.1: Example of how paste groups were preliminarily organized.

What is Local?

The site of Alabama is located near the Cockscomb Batholith, one of the three major granite batholiths in Belize. The Cockscomb Batholith is completely surrounded by Santa Rosa Formation rocks in a large basin south of the Cockscomb Mountains (Bateson and Hall 1977; Kesler et al. 1974). It is comprised of “coarsely porphyritic, modal granodiorites with euhedral to subhedral laths of oligoclase in a matrix of anhedral quartz, alkali feldspar, biotite and muscovite” (Kesler et al. 1974: 550; although, see chapter by Potter, this volume, regarding results of the 2018 geological survey in the Alabama area, and on-going issues surrounding

differentiation of granites, granodiorites, and related metamorphosed rocks of the area via macrovisual and petrographic study). The pottery that we have tentatively identified as ‘locally produced’ has a coarse texture and contains granitic sand and/or crushed granite rock, with abundant fine mica inclusions. Some of the sherds had evidence of red or black slip and others appeared to have been coated in a wash, although this could have been the remnants of an eroded or highly altered slip. The sandy-textured paste fabrics, containing predominantly rounded to subrounded inclusions typical of a sediment, were roughly grouped into comparatively finer and coarser sandy pastes. Preliminary assessment suggests that the finer pastes are comparatively thin-walled vessels and often retained traces of the original slip. These likely functioned as serving vessels and table wares (e.g. bowls or dishes). The coarser textured paste was often identified in jar neck fragments, and both slipped and unslipped examples were observed. These coarse-textured granitic pastes may not be the only locally produced pottery in the ceramic assemblage but they were most distinctive, containing readily identifiable rock and mineral inclusions consistent with the geology of the local area. Future work will focus on subdividing these fabrics into unique paste ware groups based on Munsell color, sorting, size, angularity, and composition of the inclusions.

Preliminary Identification of Non-local/Imported Vessels

Some ware groups were immediately recognizable and could be tied to existing ceramic literature; for example, British Honduras Volcanic Ash (Gifford 1976) has a distinctive ashy feel and Hondo Red (Hammond 1975) has a distinctive buff to orange paste with very fine to no visible inclusions and thin walls (generally less than 2 cm). Volcanic ash is present in Late Classic monochrome red and polychrome serving vessels across the Maya lowlands and production of ‘ashy-paste’ vessels is thought to have been geographically widespread. The Alabama household assemblages contain vessel fragments with orangish, buff, and yellowish-brown ashy pastes, and colour and other differences suggest multiple manufacturing origins. In some cases, the presence of red slip and form characteristics are comparable to Belize Red pottery described for sites in the Belize Valley. Traces of polychrome decoration occur on rare examples. Hondo Red has heretofore only been identified and described in the Toledo District of southern Belize (Fauvelle 2012; Hammond 1975; Irish 2017; Jordan 2014). It has been suggested that this type of ceramic was produced around Nim Li Punit based on its abundance at the site. The abundance of Hondo group sherds at Alabama is certainly interesting (Figure 4.2).



Figure 4.2: Possible Hondo Red body sherds with no preserved slip

Fragments of vessels that originally contained carbonate rock and mineral inclusions, both, naturally occurring and representing an added tempering material, are abundant in the Alabama assemblages. Leached sherds that originally contained abundant carbonate were very light weight due to the removal of carbonate inclusions (regularly floating to the top of buckets when matrix samples were occasionally subject to wet sieving in lab by field excavation teams) and could be easily distinguished based on both their light weight and distinctive ‘pock-marked’ and sometimes ‘foamy’ appearance, due to abundant voids or pores that once contained carbonate rock and mineral grains (Figure 4.3). All sherds that once contained carbonate were placed into the same general paste category at this preliminary stage of the study, and this coarse grouping subsumes considerable variation in other paste characteristics that requires further study to fully understand; these differences, in addition to variability in surface treatment and morphological characteristics, suggests that this pottery derives from multiple production localities and geographic areas. Given that the majority of the Maya lowlands are underlain by marine carbonates (limestones and dolomitic limestones), composed primarily of calcite and dolomite, the provenance of these vessels is unknown. In some cases, jar forms are comparable to Cayo Unslipped jars suggesting a provenance of the Belize River Valley (examples in Lots 2B-3 and 2B-12). The vast majority of leached sherds were body sherds, and paste and surface color, wall thickness, and morphological characteristics vary greatly. Fragments derived from different jar, bowl, and dish forms were identified, and both larger utilitarian jars and comparatively thin-walled table ware jars are represented. Other serving vessels identified in this group include incurving and outcurving bowls, flaring and outcurving dishes, and numerous ring based forms.



Figure 4.3: Variety of body sherds with no carbonate. Note the porous and foamy looking pastes that originally contained abundant carbonate inclusions.

Deep red to reddish brown, sandy pastes with abundant iron inclusions are similar to those analyzed by Jordan (2014) at Uxbenká and would likely be classified as Late Classic Remate Red (red slipped serving wares and jars) or Turneffe Unslipped (unslipped serving wares and jars). The exact provenance of these vessels is unknown; however, the paste characteristics suggest that they were produced using clays that form above the clastic Toledo beds located in southern Belize (Millan 1979; Schafhauser et al. 2003).

Howie's (2000, 2012; Howie et al. 2014; Howie et al. 2016; Wiewall and Howie 2010) extensive work on pottery collections in northern Belize, coastal regions, and the off-shore cayes permitted her to identify vessel fragments comparable to stylistic types prevalent in the north and coastal regions. The detailed microscopic studies of the technological and provenance characteristics of different northern and coastal pottery conducted by Howie and others (e.g. Angelini 1998; Jones 1986; Ting 2013; Ting et al. 2014;) provide relevant information on the potential provenance of comparable examples recovered from Alabama based on the similarity of macroscopic paste and stylistic (surface treatment and morphological) characteristics. Of particular significance is the presence in the assemblages of both settlement sites (Lots 2A-5 and 4C/D-1) of Zakpah Orange Group/Buk phase chalice fragments (derived from the dish portion; Figure 4.4), which despite leaching of carbonate inclusions, display sufficient macroscopic paste characteristics, including the presence of grog temper, to suggest they derive from the Lamanai area specifically (Ting and colleagues' [2014] study of the large chalice assemblage at Marco Gonzalez suggested multiple production localities in Northern Belize for chalices, in addition to Lamanai). Additional Alabama pottery comparable to pottery known to have been produced at Lamanai include Zakpah Group orange slipped and incised out-curving bowls (Lot 2B-2); a plain out-curving bowl/tripod bowl, likely originally orange-slipped (Lot 4D-1); and a fragment of a drum. Each of these examples display the distinctive thick black core bordered by thin, lighter-coloured margins typical of pottery produced at Lamanai. Alabama pottery comparable to stylistic types prevalent in northern Belize include: rare examples comparable Ahk'utu' Molded-Carved pottery described for Altun Ha (e.g. Ting et al. 2014; although it is unknown if this pottery was actually produced there); a fragment of a Red-Necked Mother type storage jar (Lot 2B-2; Slipped Rim jars in Howie 2012); highly fragmented examples of Achote Black pottery (Lot 4D-1), identified based on similarity of surface finish and paste (chocolate brown and greenish-grey)

characteristics to examples at Lamanai (although not produced there); and highly eroded examples of jar rim and body sherds with orange ‘dusty-looking’ pastes (Lot 2B-2), which are prevalent at coastal sites. Except for examples comparable to Achote Black, the pottery akin to styles and pastes prevalent in the north and coastal regions appears to have originally contained abundant carbonate inclusions, providing some evidence of compositional similarity. All preliminary designations are pending future petrographic work to determine their provenance.



Figure 4.4: Chalice fragments at Alabama

Directions for Future Work

The goal of future laboratory seasons will be to create a formal ceramic typology for Alabama that focuses primarily on technological attributes to define ceramic types. All of the identified paste groups from the 2018 season were labeled and bagged separately and will be the starting point for future analyses. We will begin by identifying and describing sherds that can be confidently placed into existing ware categories (e.g. British Honduras Volcanic Ash). We will likely need to create ware categories for the locally produced (Stann Creek District) pottery because it is so vastly different from other regions of the Maya lowlands due to the underlying geology and lack of limestone in the region. These local ware distinctions will aid in classifying the Alabama pottery and help future researchers. Previous work in the Stann Creek District conducted by Graham (1994) will also be used to evaluate the Alabama ceramic assemblage. Like all typologies in the Maya lowlands, the ceramic types will be named after local place names and varieties will be descriptive (e.g. incised variety). When present, the following attributes will be recorded: fragment type, primary vessel class, form, lip form, rim form, rim diameter, lip thickness, paste Munsell color, a brief description of paste inclusions, inclusion sorting, inclusion percent composition, inclusion angularity, slip and/or wash Munsell color, the presence of fireclouding, reaction to hydrochloric acid, and type of decoration. The form designations will follow the standards established by Sabloff (1975) at Seibal. Given the highly fragmented, eroded, and poorly preserved nature of the Alabama ceramic assemblage, future work will continue to privilege paste characteristics because surface treatment is rare to non-existent and the vast majority of the assemblage cannot be classified according to form.

References Cited

Aimers, James John

2013 *Ancient Maya Pottery: Classification, Analysis, and Interpretation*. University of Florida Press, Gainesville, FL.

Angelini, Mary L.

1998 *The Potter's Craft: A Study of Formative Maya Ceramic Technology at K'axob, Belize*. Unpublished Ph.D. dissertation, Boston University, Boston, MA.

Bateson, J.H. and I.H.S. Hall

1977 *The geology of the Maya Mountains, Belize*. Institute of Geological Science, Overseas Memoir 3. On file at the Ministry of Natural Resources, Belize.

Fauvelle, Mikael David Hayden

2012 *Small Seats on the Maya Periphery: Royal Seats or Provincial Centers? A Perspective from the Ceramic Economy of Nim li Punit*. Unpublished M.A. thesis, University of California, San Diego, CA.

Gifford, James C.

1960 *The Type-Variety Method of Ceramic Classification as an Indicator of Cultural Phenomena*. *American Antiquity* 25(3):341-347.

1976 *Prehistoric Pottery Analysis and the Ceramics of Barton Ramie in the Belize Valley*. Peabody Museum Memoirs, Vol. 18. Harvard University, Cambridge, MA.

Graham, Elizabeth

1994 *The Highlands of the Lowlands: Environment and Archaeology in the Stann Creek District, Belize, Central America*. Monograph in World Archaeology No. 19. Prehistory Press, Madison, WI.

Hammond, Norman

1975 *Lubaantun: A Classic Maya Realm*. Monographs of the Peabody Museum, Number 2. Harvard University, Cambridge, MA.

Howie, Linda

2000 *Production and Consumption at Altun Ha, Belize: A Petrographic Study*. Unpublished M.A. thesis, University of Sheffield, Sheffield, U.K.

2012 *Ceramic Change and the Maya Collapse: A Study of Pottery Technology, Manufacture, and Consumption at Lamanai, Belize*. BAR International Series 2373. British Archaeological Reports, Oxford, U.K.

Howie, Linda, Jim Aimers, and Elizabeth Graham

2014 *50 Left Feet: The Manufacture and Meaning of Effigy Censers from Lamanai, Belize*. In *Craft and Science: International perspectives on archaeological ceramics*, UCL Qatar Series in Archaeology and Cultural Heritage, Vol. 1, edited by M. Martinon-Torres, pp. 39-54. Bloomsbury Qatar Foundation, Doha, Qatar.

Howie, Linda, Terry Powis, and Elizabeth Graham

2016 *Sitting on the Dock of the Bay: Ceramic Connections Between Lamanai and the Chetumal Bay Area Over More Than Two Millennia*. In *Perspectives on the Ancient Maya of Chetumal Bay*, edited by Debra Walker, pp. 162-185. University of Florida Press.

Irish, Mark David

2017 *The Ceramics of Lubaantun: Stasis and Change in the Southern Belize Region during the Late and Terminal Classic*. Unpublished M.A. thesis, University of California, San Diego, CA.

Jones, Lea, D.

1986 *Lowland Maya Pottery: The place of petrological analysis*. BAR International Series 288. British Archaeological Reports, Oxford, U.K.

Jordan, Jillian M.

2014 *Uxbenká Ceramic Analyses: Results from Site Core and Hinterland Contexts*. In *The Uxbenká Archaeological Project: Reports on the 2013 Field Season in Toledo, Belize*, edited by K. M. Prufer and A. E. Thompson, pp. 115-158. Report submitted to the Institute of Archaeology, Government of Belize, and the National Science Foundation, USA.

Kesler, Stephen E., Clive F. Kienle, and J. Howard Bateson

1974 *Tectonic significance of Intrusive Rocks in the Maya Mountains, British Honduras*. *Geological Society of America Bulletin* 85(4):549-552.

Koster, Teaghan, and Meaghan M. Peuramaki-Brown

2016 *The 2016 Settlement Investigations: Operation 4 at ALA-043*. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. Peuramaki-Brown, pp. 101. Report submitted to the Belize Institute of Archaeology, Belmopan, Belize.

Millan, S.M.

1979 *Preliminary Stratigraphic Lexicon North and Central Guatemala*. A report prepared by S.M. Millan and Associates Limited, St. Johns, for Van Meurs and Associates Limited, Ottawa, Canada.

Morton, Shawn G., Cristina Oliveira, A. Megan Williams, Virginia Chiac, and Meaghan M. Peuramaki-Brown

2016 *The 2016 Settlement Investigations: Operation 2 at ALA-047*. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. Peuramaki-Brown, pp. 27-68. Report submitted to the Belize Institute of Archaeology, Belmopan, Belize.

Peuramaki-Brown, Meaghan, Linda Howie, and Joanna Potter.

2017 *Pre-Columbian Pottery and Building Materials of the East-Central Belize Maya: A Petrographic Characterization Study*. Paper presented at the 82nd Annual Meetings of the Society for American Archaeology, Vancouver, British Columbia. Manuscript in authors' possession.

Peuramaki-Brown, Meaghan M., Shawn G. Morton, Tawny L.B. Tibbits, and Lisa Green
2017 Phase I Reconnaissance (2014-2015) at Alabama: A Summary of SCRAP Investigations in East-Central Belize. *Research Reports in Belizean Archaeology* 14:299-309.

Rice, Prudence M.

1976 Rethinking the Ware Concept. *American Antiquity* 41(4):538-543.

2013 Type-Variety: What Works and What Doesn't. In *Ancient Maya Pottery: Classification, Analysis, and Interpretation*, edited by J.J. Aimers, pp. 11-28. University of Florida Press, Tallahassee, FL.

Sabloff, Jeremy A.

1975 *Excavations at Seibal: Ceramics*. Memoirs of the Peabody Museum of Archaeology and Ethnology. Vol. 13, No. 2. Harvard University, Cambridge, MA.

Schafhauser, A., W. Stinnesbeck, B. Holland, T. Adate, and J. Remane

2003 Lower Cretaceous Pelagic Limestones in Southern Belize: Proto-Caribbean Deposits on the Southeastern Maya Block. In *The Circum-Gulf of Mexico and the Caribbean: Hydrocarbon Habitats, Basin Formation, and Plate Tectonics*, APPG Memoir 79, edited by C. Bartolini, R. T. Buffler, and J. F. Blickwede, pp. 624-637. AAPG, Online Bookstore.

Ting, Carmen

2013 A Study of Regional-Level Patterns in the Production and Consumption of 'Buk-Phase' Pottery among the Lowland Maya. Unpublished Ph.D. dissertation, Institute of Archaeology, University College London, London, U.K.

Ting Carmen, Elizabeth Graham, and Marcos Martín-Torres

2014 Molding the 'Collapse': Technological Analysis of the Terminal Classic Molded-Carved Vases from Altun Ha, Belize. In *Craft and Science: International perspectives on archaeological ceramics*, UCL Qatar Series in Archaeology and Cultural Heritage, Vol. 1, edited by M. Martinon-Torres, pp. 53-63. Bloomsbury Qatar Foundation, Doha, Qatar.

Wiewall, Darcy, and Linda Howie

2010 A Synthesis of Ceramic Production and Consumption at Lamanai, Belize, During the Postclassic to Spanish Colonial Periods. *Archaeological Investigations in the Eastern Maya Lowlands* 7:201-217.

Wilk, Richard

1977 Preliminary Operations at Nim li Punit, Belize, 1976. Unpublished manuscript in the authors' possession.

Chapter 5. 2018 Geological Survey: The Cockscomb Granites of Alabama

Joanna Potter (HD Analytical Solutions)

This chapter covers descriptions of ten granitic samples from the Silurian Cockscomb Granitic Complex that comprise a large proportion of the hills surrounding the archaeological site of Alabama in the Stann Creek District of Belize (Map 1). These initial samples were collected over the course of SCRAP's 2-week 2018 geological field survey (conducted by Dr. Joanna Potter, with assistance provided by Mr. Sylvestro Chiac and Mr. Douglas Smith) in order to characterise local granitic formations that may have been utilised by the local, ancient population of Alabama for the purpose of architectural block/slab, groundstone tool, and ceramic production at the site. Four additional samples/artifacts collected by M. Peuramaki-Brown (2014) and T. Tibbits (2015) from around the Alabama site were also analysed.



Map 1: Location of samples collected (tag colours reflect granite type)

Geological Background

The Alabama archaeological site lies in the foothills of the Cockscomb Granitic Complex that is one of four Silurian plutonic complexes that make up the Maya Mountains dated at 420-406 Ma: Cockscomb Complex – biotite granodiorite-granite, Hummingbird Complex – granodiorite-quartz monzonite-two mica granite, Pine Mountain Complex – diorite-granodiorite-quartz monzonite-two mica granite, and the Sapote Complex – biotite granite (U-Pb zircon dating; Martens et al. 2010). These complexes have intruded Pre-Cambrian-Early Palaeozoic metasediments composed of banded quartzites, sandstones, and phyllites. Andalusite-bearing phyllitic hornfels have been observed around these intrusions (Weber et al. 2012). Younger cover comprise the Carboniferous Santa Rosa Group (carbonates, argillites, arenites), Jurassic Todos-Santos red beds (shales, sandstones, lignites) and Cretaceous-Pliocene limestones, dolomites, marls, and coralliferous limestones. Locally, the younger cover is limited to quaternary topsoil, although river deposits may indicate the presence of arenaceous units that might comprise the Santa Rosa Group but limited exposure cannot confirm if post-Palaeozoic units are present in the Alabama area. The limestone deposits are not present in this area.

The Pre-Cambrian-Early Palaeozoic history of the Yucatan-Mayan block region is potentially linked with the peri-Gondwanan rocks that make up the majority of the Eastern Appalachians of North America. Subsequently, rotation of the block in the Late Palaeozoic-Mesozoic during closure of the Central Atlantic Ocean, the opening of the Gulf of Mexico, and evolution of the Caribbean plate created multiple seaways and trans- and regressive marine sediment deposition and eventual capturing of obducted Caribbean oceanic crust in suture zones (i.e. the Motagua Fault Zone at the Belize-Guatemala border) represented by serpentinites, blueschists, and associated jadeite deposits (e.g. Dickinson and Lawton 2001; Endo et al. 2011).

The report here describes petrographic features of ten biotite granites from the Silurian Cockscomb granite. Field observations and collections also identified andalusite-bearing phyllites, banded quartzites, and a large quarry site (modern) that may represent a slice of young (Caribbean?) oceanic hydrothermal vent-type deposits composed of carbonates, oxides, and epidote-quartz veins. These have yet to be comprehensively analysed.

2018 Sampling and Petrographic Analyses

Based on field observations, up to nine distinct granitic “types” were identified based on morphological, compositional, and presence/absence of xenoliths in this complex; seven were brought back to Canada for further analysis (Types II and III occur in a small transitional area between Type I and IV, and have yet to be subject to additional inspection). Type I relates to the foothills of the Alabama area and can be found in the granitic slabs of the monumental core of the site— composed of white granite with large euhedral plagioclase phenocrysts. At higher elevations, the granitic types are more diverse, with a large proportion composed of assigned Type IV, a pinkish-coloured granite with citrinous (yellow-discolouration) quartz and a high mafic xenolithic component; Type VI is in close proximity and could be regarded as closely associated with Type IV but comprised of more abundant euhedral feldspar phenocrysts and less mafic xenoliths. Type V is a white granite, more quartz dominated, with large rounded plagioclase phenocrysts. Type VII is a more equicrystalline granite with a higher mafic (biotite) content including mafic clots. Type VIII is a hydrothermally altered, more mafic-rich

granite with euhedral, zoned plagioclase phenocrysts. Finally, Type IX is a discrete sample of medium-grained granite with abundant blueish microveins.

Petrographic analyses of these rocks also reveal distinct features, some of which could be used as diagnostic tools to identify a local provenance in archaeological artifacts. These hypabyssal calc-alkaline biotite granites contain a rather unique assemblage of feldspars that may differentiate these granites from others in the region. Complex sector zoning in plagioclase associated with an array of alkali feldspar (perthite, microcline, and albite) make up Type IV and, to some extent, Type VI. This is paired with biotite containing abundant mineral inclusions of zircon showing radiation haloes, quartz, and opaques, and the appearance of rare brown hornblende and secondary interstitial quartz. Type I (to the west of the monumental core) has distinct square euhedral, zoned plagioclase crystals with sericitised cores enclosed by large perthitic alkali feldspar; no complex sector zoning is observed in this type. Type V is quartz-dominated and contains rounded, concentric zoned plagioclase phenocrysts with sericitised cores. Type VII is a more mafic (granite-granodioritic) type with high biotite content with associated opaques and brown hornblende. The opaques (Fe-oxide/magnetite) are highly distinctive, taking on a globular morphology with rims of titanite (?). Type VIII, found in the vicinity of a waterfall, contains chloritised biotite, highly sericitised feldspars, and fractured quartz, indicative of hydrothermal alteration. Type IX also shows signs of hydrothermal alteration to sericite, chlorite, and epidote, but seems to be a discrete granitic type near the modern quarry (southeast of the monumental core) so its extent cannot be firmly established.

The four samples from past field seasons comprise two raw granite samples (ALA-1 and ALA-3) and two potential granite groundstone tool fragments (011 and 007). Samples ALA-1 and ALA-3 are consistent with the Type IV granite, whereas Sample 011, a highly weathered granitic specimen, is highly consistent with Type VIII. Sample 007, upon sectioning, was revealed to be an andalusite hornfels that has been found in river beds around the Maya Centre area (roughly 20 km northeast; noted on a June 2018 fieldtrip), and possibly noted in previous publications as a chiastolite(andalusite)-bearing metamorphic aureole hornfels.

What follows are detailed descriptions of the 14 samples analysed, with a summary provided in Table 5.1. These descriptions will be used during future excavations/analyses to identify granite type for artifacts/architectural materials at Alabama and to, possibly in the future upon further sampling, firmly tie such material culture to source locales in the surrounding landscape.

Table 5.1: Summary of field and petrographic features from discussed samples (diagnostic features of the Cockscomb Granitic Complex).

GRANITE TYPE	DESIGNATION	FIELD APPEARANCE	DIAGNOSTIC FEATURES	SAMPLES
I	Bt-plg-granite	White plg-granite + euhedral plg-phenocrysts	<ul style="list-style-type: none"> No sector-zoned plagioclase Square plagioclase with sericite cores "Zig-zag" biotite 	B-5
IV	Alk. Bt-granite	Slightly pinker alkali granite + citrine Qtz + mafic xenoliths	<ul style="list-style-type: none"> Sector zoned plagioclase Abundant zircon + other mineral inclusions in biotite Microcline and alkali feldspar phenocrysts Interstitial secondary quartz Rare brown hornblende 	B-10 B-11 B-27? ALA-1? ALA-3?
V	Bt-plg-granite	White granite + euhedral plg phenocrysts	<ul style="list-style-type: none"> Quartz-dominated Rounded plagioclase with sericitised cores and zoned rims 	B-9
VI	Alk. Bt-granite	Alkali granite + euhedral fs phenocrysts + less mafic xenoliths	<ul style="list-style-type: none"> Complex array of alkali feldspars Abundant zircon inclusions in biotite Muscovite replacement cores in feldspars 	B-12 B-33
VII	Alk. Bt-granite-granodiorite	Equicrystalline alkali granite + mafic clots	<ul style="list-style-type: none"> Globular oxides with titanite rims are prevalent High biotite content Rare brown hornblende 	B-14
VIII	Bt-granite	Altered more mafic-rich granite + euhedral zoned plg phenocrysts	<ul style="list-style-type: none"> Hydrothermally altered (bt-chlorite + fs-sericite) Highly fractured quartz Highly sericitised feldspar 	B-26 011?
IX	Bt-granite	Medium grained granite + blueish microveins	<ul style="list-style-type: none"> Medium grained equicrystalline Epidotised biotite 	B-44

Sample B-5

Granite Type: I

Location: L004 on SCRAP 2016 settlement map (see Figure 1.3 in introduction to this volume) (collected by Potter, 2018)

Field and hand specimen description: A feldspar-dominated biotite granite with abundant euhedral plagioclase phenocrysts (1-3 cm), in close proximity to the monumental core. The hand specimen (Figure 1a) contains occasional 2 cm plagioclase phenocrysts and consists of approximately 50% white feldspar, 25% quartz with some showing a citrine discolouration, 25% biotite, and <1% muscovite (<0.5 cm crystal size).

Thin section description: This rock is composed of 50% fractured, subhedral quartz (1-3 mm), 15% euhedral "square" plagioclase (0.5-1 mm) that show concentric zoning that include sericitised cores and albite rims (Figures 1b and 1c), 20% alkali feldspar composed of large 2-4 mm perthite crystals enclosing euhedral plagioclase crystals (Figures 1b and 1c), 1-2 mm microcline (Figure 1d) and 1-2 mm simple twinned albitic phenocrysts that also show perthite exsolution textures (Figure 1e), 15% biotite lathes (1-2 mm) that contain abundant zircon

inclusions with radiation haloes and “zig-zag” crenulations (Figure 1f). Clots of biotite are also observed with 1 mm muscovite crystal rims (~1%; Figures 1g and 1h) as well as evidence of secondary interstitial quartz crystallization (Figure 1i).

Sample B-9

Granite Type: V

Location: L005 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: Plagioclase-rich biotite granite with abundant euhedral and rounded plagioclase phenocrysts (2-5 cm; Figure 2a). The hand specimen consists of approximately 50% quartz, 35% feldspar, and 15% biotite (<0.5-1 cm crystals; Figure 2b).

Thin section description: This rock is composed of 60% strained, sutured, anhedral quartz (<1 mm), 20% subhedral-rounded plagioclase phenocrysts (2 mm) that show concentric zoning with sericitised cores (Figures 2c and 2h) and euhedral plagioclase crystals (<1 mm) with multiple twinning and albite rims (Figure 2d), 5% alkali feldspar composed of large 2-4 mm altered perthite and microcline (Figure 2e) and occasional 1-2 mm simple twinned albitic phenocrysts that also show perthite exsolution textures (Figure 2f), 15% biotite lathes (1-2 mm) that contain abundant titanite, quartz and zircon inclusions (Figure 2g).

Sample B-10

Granite Type: IV

Location: L001 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: More alkali biotite granite similar to B-8 sample (Milpa House, not discussed in this report) with abundant mafic xenoliths (30-60 cm – sample B-11) and occasional euhedral plagioclase phenocrysts (2 cm; Figure 3a). The hand specimen consists of approximately 50% quartz showing abundant citrine discolouration, 30% feldspar, and 20% biotite (<0.5-1 cm crystals; Figure 3b).

Thin section description: This rock is composed of 60% highly fractured, anhedral quartz (1-3 mm), 30% euhedral plagioclase (0.5-1 mm) that show complex sector zoning with occasional sericitised/epidote cores and less common multiple twinning (Figures 3c and 3d), 1% alkali feldspar composed of large sub-euhedral 3 mm perthite-microcline phenocrysts (Figure 3e and 3f), 9% biotite lathes (1-3 mm) that contain abundant zircon inclusions with radiation haloes + quartz + titanite + garnet (?) (Figures 3g to 3j). Secondary, interstitial quartz is also present (Figure 3k).

Sample B-11

Granite Type: IV (with mafic xenolith)

Location: L001 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: A sample of the abundant mafic xenoliths (30-60 cm) observed in Type IV. The hand specimen consists of a medium grained mafic assemblage of plagioclase, biotite, and quartz (Figure 4a).

Thin section description: This rock is composed of 60% an-subhedral quartz (<0.5 mm), 20% euhedral “square” plagioclase (0.1-0.2 mm) that show concentric zoning and twinning (Figures

4b to 4d), 1% an-subhedral alkali feldspar phenocrysts (1 mm; Figure 4e), and 20% biotite lathes (0.1-0.5 mm; Figure 4b).

Sample B-12

Granite Type: VI

Location: L003 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: Porphyritic alkali biotite granite with occasional less mafic xenoliths and large euhedral feldspar phenocrysts (3-5 cm). The hand specimen consists of approximately 45% quartz, 35% feldspar, and 20% biotite (<0.5-1 cm crystals; Figure 5a).

Thin section description: This rock is composed of 50% fractured, strained, sutured an-subhedral quartz (1-3 mm), 40% alkali feldspar composed of a mix of 1-1.5 mm euhedral perthite crystals with microcline rims and microcline with albite rims (Figures 5b and 5c), large anhedral perthite enclosing euhedral feldspars (Figure 5d), occasional euhedral 1-1.5 mm plagioclase-alkali feldspar crystals showing multiple-simple twinning with sericitised/muscovite cores (Figure 5e), and 10% biotite lathes (1-2 mm) that contain abundant zircon inclusions with radiation haloes (Figures 5f and 5g).

Sample B-14

Granite Type: VII

Location: L003 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: Equicrystalline alkali biotite granite with mafic (biotite) clots (2-5 cm). The hand specimen consists of approximately 50% quartz, 30% feldspar and 20% biotite/mafic (<0.5-1 cm crystals; Figure 6a).

Thin section description: This rock is composed of 20% fractured, anhedral quartz (0.5-1 mm), 35% plagioclase showing multiple-simple twinning (Figure 6b), 43% biotite lathes (1-2 mm; Figures 6b and 6c) that contain zircon inclusions with radiation haloes, 2% opaques, and <1% muscovite. This rock is mafic-rich containing vugs of biotite-chlorite (Figures 6d and 6e), biotite-muscovite-opaques (Figures 6f and 6g). Opaques are relatively abundant and distinctive, occurring as globular crystals (magnetite?) with rims of titanite (?) (Figures 6f to 6j). Brown hornblende is also present but only as a minor component (Figure 6k).

Sample B-26

Granite Type: VIII

Location: L010 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: More alkali mafic-rich granite with large euhedral zoned plagioclase phenocrysts (~5 cm). The hand specimen consists of approximately 45% feldspar, 30% quartz, and 25% biotite/mafic (<0.5-1 cm crystals; Figure 7a).

Thin section description: This rock is composed of 50% fractured, anhedral quartz (0.5-1 mm), 25% euhedral plagioclase (0.5-1 mm) showing sector zoning and multiple twinning (Figure 7b); 15% alkali/plagioclase feldspar composed of large an-subhedral 3 mm phenocrysts completely sericitised feldspar (Figures 7c and 7d) and 1 mm sub-euhedral simple twinned albitic feldspar with minor alteration (Figures 7e and 7f), and 15% biotite lathes (0.5-1 mm)

that are highly chloritized (Figures 7c and 7d). Minor chlorite vugs with biotite are also observed in this hydrothermally altered sample (Figures 7g and 7h).

Sample B-27

Granite Type: IV?

Location: L011, newly added to SCRAP settlement map (collected by Potter, 2018)

Field and hand specimen description: Ex situ (near source, close to banded quartzite boundary) finer-grained plagioclase-dominated granite. The hand specimen consists of approximately 50% plagioclase, 30% quartz, and 20% biotite (<0.5 cm crystals; Figure 8a).

Thin section description: This rock is composed of 55% strained, sutured anhedral quartz (0.5-1.5 mm; Figures 8b and 8c), 30% plagioclase composed of 0.5-1 mm euhedral plagioclase with sericitised cores, concentric zoning with albite rims (Figures 8d and 8e) and complex sector zoned plagioclase (Figure 8f), 5% alkali feldspar composed of 1-2 mm sub-euhedral microcline-perthite crystals (Figures 8g and 8h), and 10% Fe-rich biotite lathes (1-2 mm) associated with muscovite, chlorite, and rare brown hornblende (Figures 8i and 8j). This assemblage would seem to be indicative of Cockscomb Granite type IV.

Sample B-33

Granite Type: VI

Location: L006/L007 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: Biotite granite with large (2-5 cm) plagioclase phenocrysts and mafic xenoliths (Figure 9a). The hand specimen consists of approximately 50% quartz, 35% feldspar, and 15% biotite (<0.5-1 cm crystals; Figure 9b).

Thin section description: This rock is composed of 25% fractured, strained, sutured anhedral quartz (1-2mm), 55% plagioclase composed of 0.5-1 mm euhedral plagioclase lathes with occasional sericitisation (Figure 9c) and a complex mixture of 0.5-1 mm sector zoned plagioclase, concentric zoned, multiple twinned plagioclase with albite rims and some showing muscovite cores (Figures 9d to 9h), 5% alkali feldspar composed of 2-4 mm sub-euhedral simple-twinned albitic crystals with perthite exsolution enclosing earlier plagioclase crystals (Figure 9i), and 15% biotite lathes (1-2 mm) with zircon, quartz, and opaque inclusions (Figure 9j).

Sample B-44

Granite Type: IX

Location: L006/L007 on SCRAP 2016 settlement map (collected by Potter, 2018)

Field and hand specimen description: Medium-grained granite with abundant microveins. The hand specimen consists of approximately 50% quartz, 35% feldspar, and 15% biotite (<0.5 cm crystals; Figure 10a).

Thin Section Description: This rock is composed of 60% fractured anhedral quartz (0.5-1 mm; Figure 10b), 20% euhedral plagioclase with sericitised cores (0.5-1 mm; Figures 10b to 10d), and 20% Fe-rich biotite lathes (1-2 mm) associated with chlorite, epidote, and opaques (Figures 10e to 10f).

Sample ALA-1

Granite Type: CG IV? (similar to B27)

Location: L001 on SCRAP 2016 settlement map (collected by Tibbits, 2015)

Hand specimen description: Labelled as a biotite-muscovite granite from the foothills. The hand specimen consists of approximately 50% feldspar, 35% quartz, and 15% biotite (<0.5 cm crystals; Figure 11a).

Thin Section Description: This biotite granite is composed of 30% fractured, strained, sutured anhedral quartz (0.5-1.5 mm; Figure 11b), 40% plagioclase composed of 0.5-1 mm euhedral plagioclase with concentric zoning and albite rims, multiple twinned plagioclase also with albite rims (Figures 11b to 11d) with some showing sericitised/muscovite/epidote replacement cores (Figure 11e), and complex sector zoned plagioclase (Figure 11f), 20% alkali feldspar composed of a wide array of 0.5-2 mm perthitic crystals with abundant exsolution textures (Figures 11g to 11i), and 10% biotite lathes (0.5-2 mm; Figure 11j) with minor brown hornblende and muscovite (Figure 11k). A vug of chlorite with a biotite rim is also present (Figures 11l and 11m). This assemblage would be consistent with the B27 – Type IV.

Sample ALA-3

Granite Type: IV?

Location: L005 on SCRAP 2016 settlement map (collected by Tibbits, 2015)

Hand specimen description: A pinkish more alkali granite. The hand specimen consists of approximately 45% feldspar, 40% quartz, 15% biotite, and 1% muscovite (<0.5-1 cm crystals; Figure 12a).

Thin Section Description: This rock is composed of 35% fractured, strained, anhedral quartz (1-2 mm), 30% plagioclase composed of 0.5-1 mm euhedral plagioclase lathes with sericitised cores (Figure 12b) and 0.5-1 mm concentric zoned plagioclase with albite rims (Figure 12c), 20% alkali feldspar composed of 2-4 mm sub-euhedral simple-twinned albitic crystals with perthite exsolution (Figure 12d) and perthite enclosing earlier plagioclase crystals (Figures 12c to 12e), and 15% biotite lathes (1-2 mm) with zircon haloes and opaque inclusions (Figure 12f). Occasional muscovite is observed (<1%) as well as secondary interstitial quartz (Figure 12g). This assemblage would be consistent with Type IV.

Sample 011

Granite Type: VIII? (similar to B26)

Location: ALA-017 settlement site on SCRAP 2016 settlement map (collected by Peuramaki-Brown, 2014)

Hand specimen description: Possible artifact (mano) fragment of alkali granitic composition. Weathering is pink-brown with indications of pinkish minerals (alkali feldspar granite; Figures 13a and b).

Thin Section Description: This rock is composed of 50% fractured, anhedral quartz (1-2 mm; Figure 13c), 25% euhedral plagioclase (1-2 mm) that is almost entirely altered to sericite (Figure 13d) but remnant concentric zoning and albite rims can be observed (Figures 13d and 13e), occasional remnant perthite can be observed (Figure 13f), 25% biotite lathes (0.5-1 mm) that are chloritised (Figures 13g and 13h). Minor muscovite showing “kinked” cleavage is

present (Figure 13i) along with chlorite-muscovite-biotite vugs (Figures 13j and 13k). The rock is highly altered with large interstices but consistent with the Type VIII (B 26) assemblage.

Sample 007

Granite Type: Not applicable – metamorphic andalusite-bearing shale hornfels

Location: Structure 14 of Alabama monumental core (collected by Peuramaki-Brown, 2014)

Hand specimen description: Weathered artifact (possible mano fragment) of preliminarily unknown composition. Weathering is brown with indications grey-white minerals (quartz/feldspar?; Figures 14a and 14b). Upon cutting, an andalusite hornfels composition becomes readily evident and what was potentially feldspar in the uncut specimen are predominantly andalusite crystals.

Thin Section Description: This rock is composed of 70% matrix of microcrystalline (<0.1 mm) quartz, feldspar, and muscovite (Figure 14c); 25% andalusite crystals (0.5-1 mm; Figures 14d and 14e) with “ghost” feldspar or andalusite crystals (Figure 14f), and 5% opaque needles (<0.2 mm) dispersed randomly throughout the sample (Figure 14g).

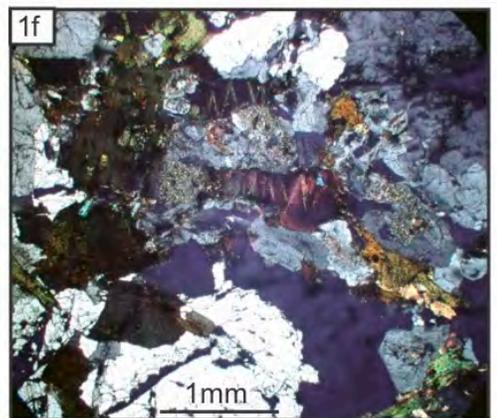
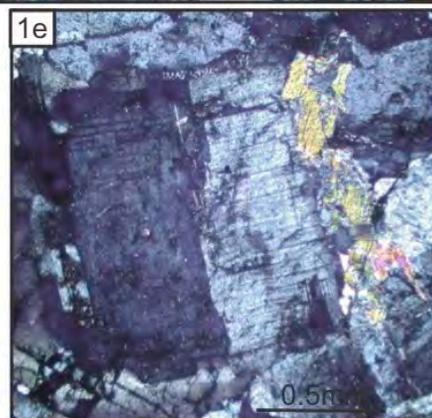
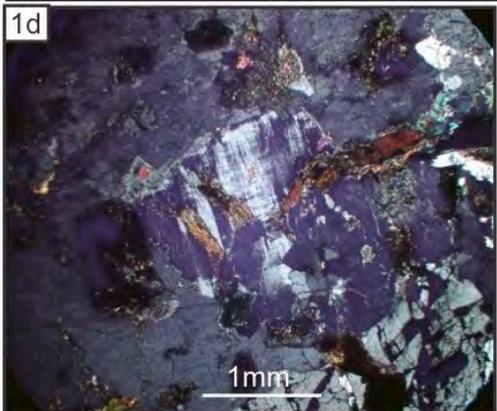
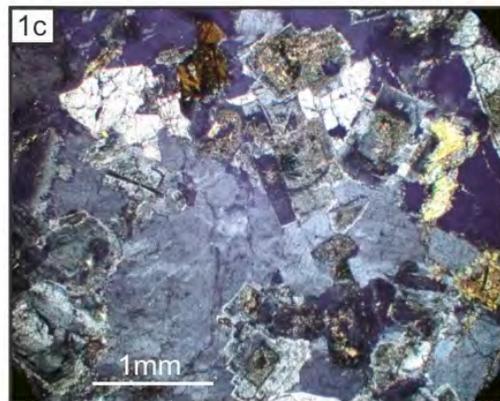
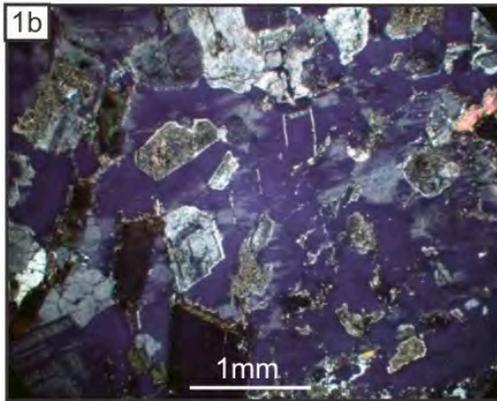


Figure 1: B-5 CG I (a) Hand specimen of B-5- red line indicates cut orientation for thin section, (b) euhedral plagioclase with sericitised cores and concentric zoning with albite rims enclosed by perthite, (c) euhedral "square" plagioclase with sericitised cores and concentric zoning, (d) microcline-perthite + biotite, (e) simple twinned albite with perthite exsolution, (f) biotite with distinct "zig-zag" crenulation.

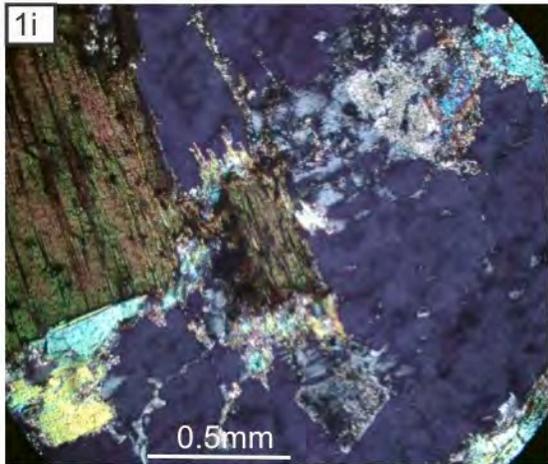
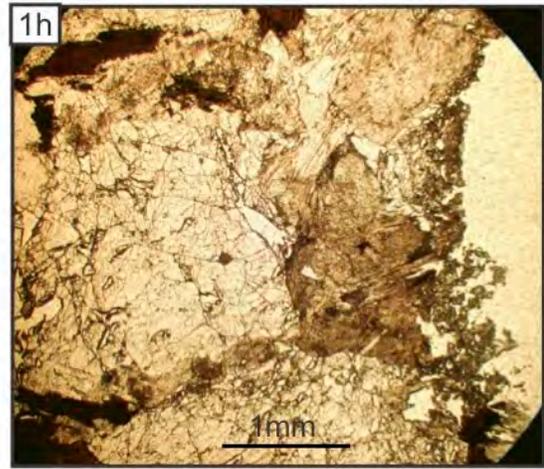
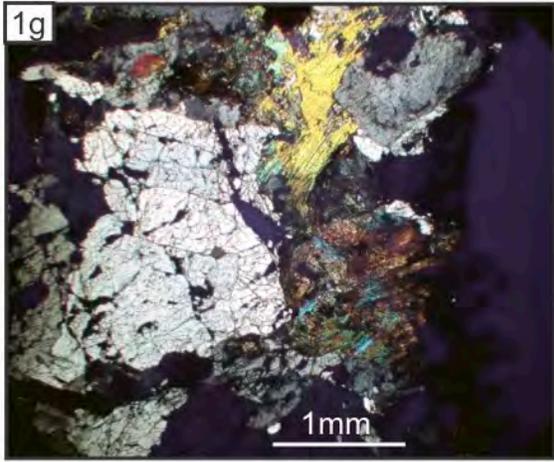


Figure 1: B-5 CG I (g;h) biotite clots with muscovite + fractured quartz (xpl;ppl), (i) biotite with muscovite rim and secondary quartz.

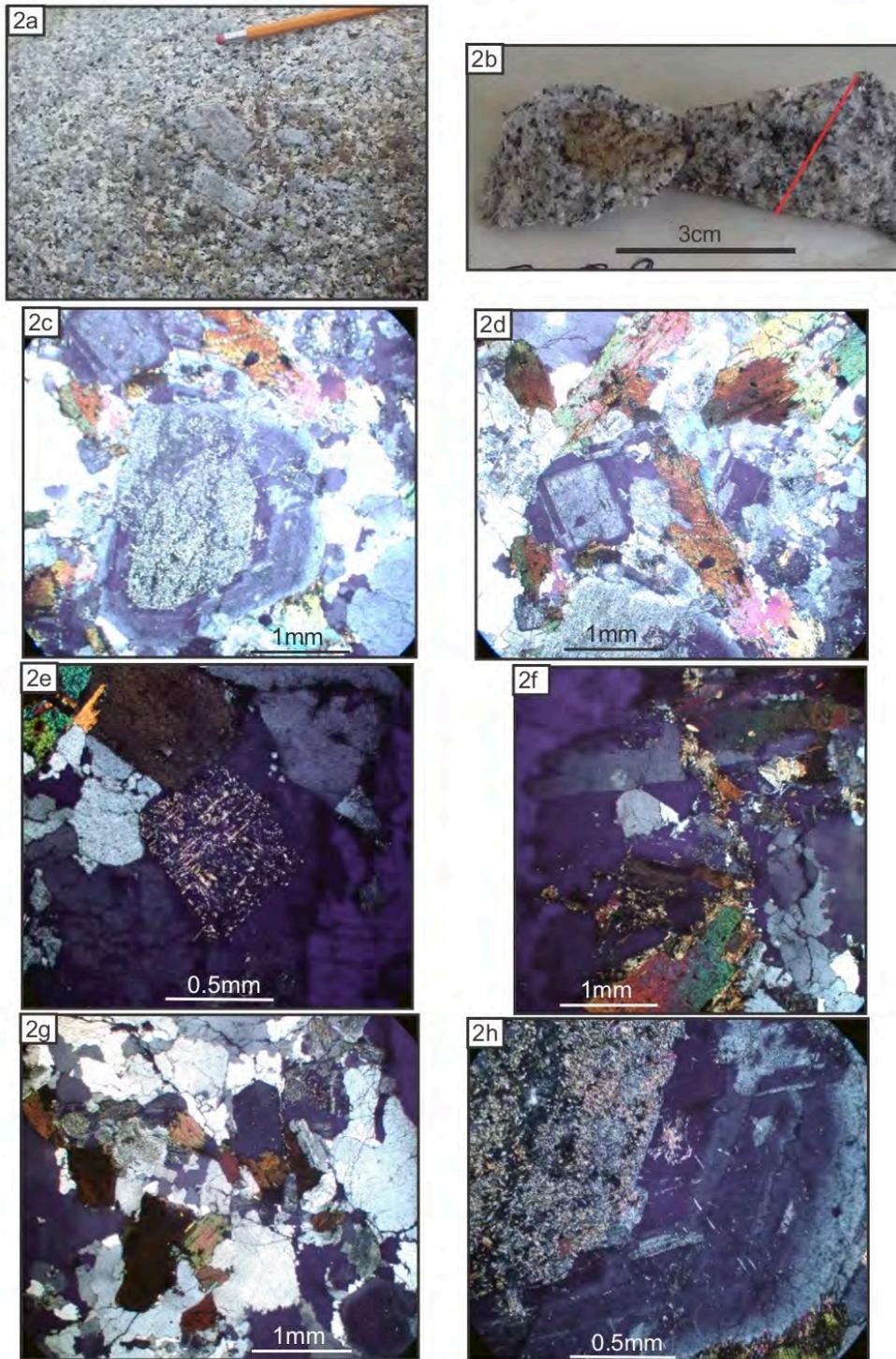


Figure 2: B-9 CG V (a) field photo of CG V with sub-euhedral plagioclase phenocrysts, (b) hand specimen of B-9 - red line indicates cut orientation for thin section, (c) rounded plagioclase phenocryst with concentric zoning and sericitised cores, (d) euhedral plagioclase with multiple twinning and albite rims + biotite with abundant mineral inclusions, (e) altered microcline, (f) simple twinned albite with perthite exsolution, (g) biotite with abundant mineral inclusions + alkali feldspar (micr/ab) + plagioclase (multiple twins) + quartz, (h) zoom on sericitised core of concentric zoned plagioclase (c).

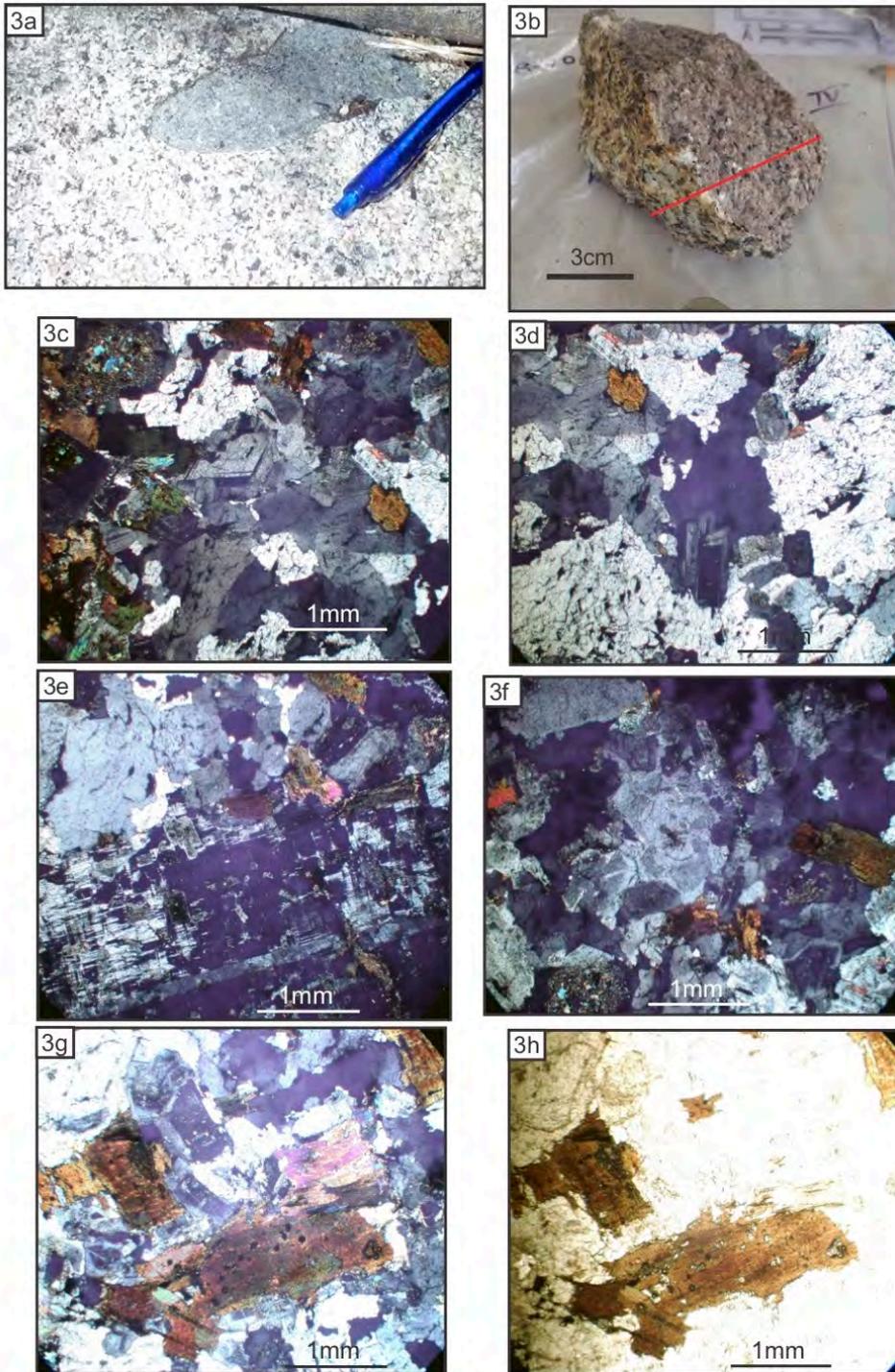


Figure 3: B-10 CG IV (a) field photo of CG IV with mafic xenoliths, (b) hand specimen of B-10 - red line indicates cut orientation for thin section, (c) complex array of euhedral plagioclase with [i] multiple twinning, [ii] sector zoning and [iii] sericitised cores, (d) multiple twinned-sector zoned plagioclase and albite rims + fractured quartz, (e) microcline enclosing euhedral plagioclase with sericitised cores, (f) subhedral, zoned/exsolved alkali feldspar + biotite + quartz, (g,h) biotite with abundant mineral inclusions + complex plagioclase (xpl;ppl).

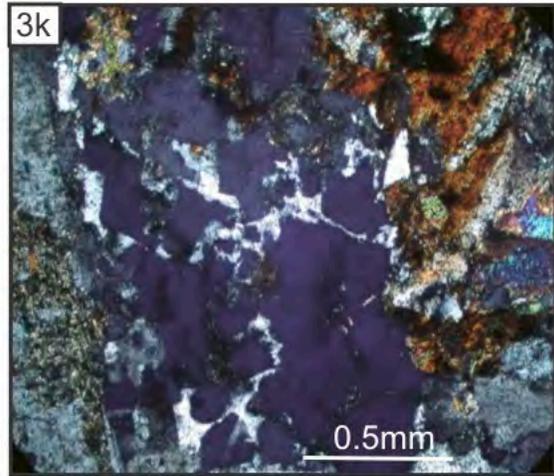
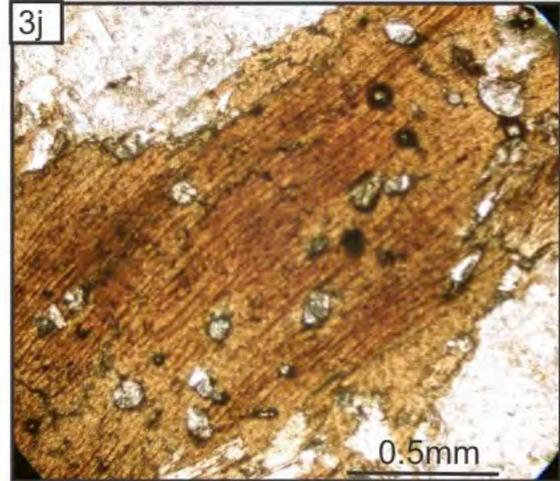
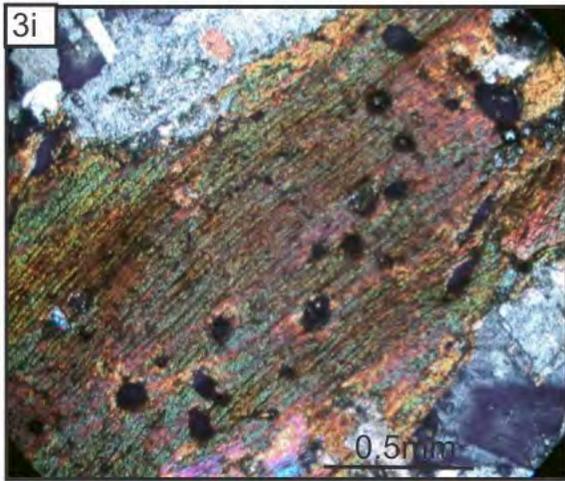


Figure 3: B-10 CG IV (i;j) zoom of biotite with abundant mineral inclusions of zircon with haloes and garnet (?) (xpl;ppl), (h) secondary interstitial quartz.

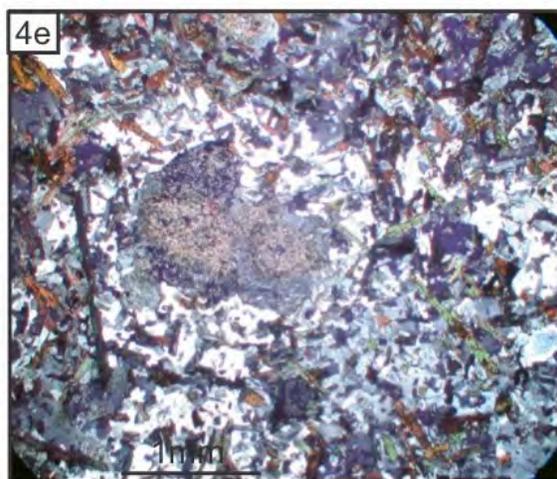
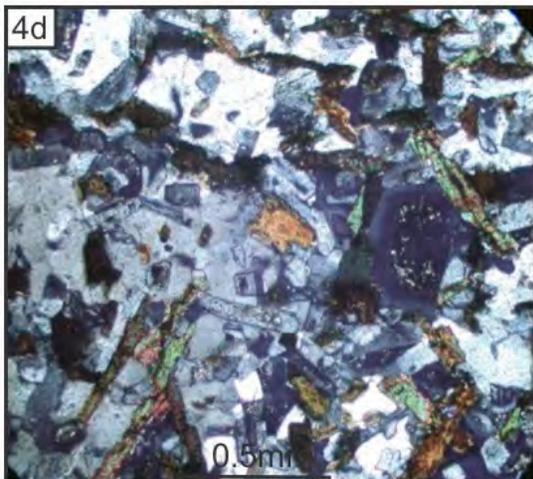
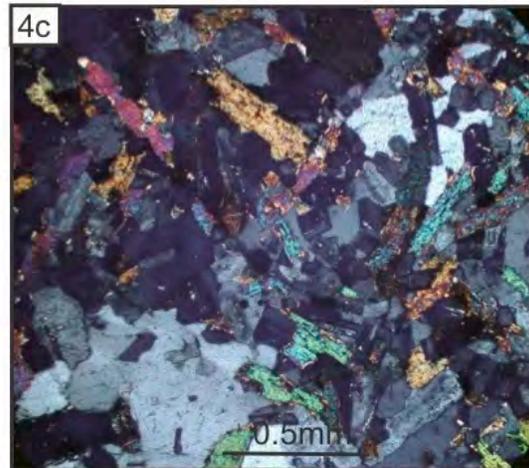
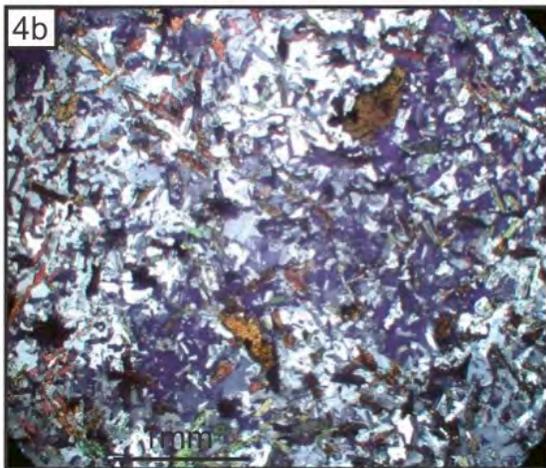


Figure 4: B-11 xenolith in CG IV - B-10 (a) hand specimen of B-11 - red line indicates cut orientation for thin section, (b) groundmass composed of medium grained quartz, biotite and plagioclase, (c;d) zoom revealing euhehedral and concentric zoned plagioclase with sericitised areas, (e) rare alkali feldspar phenocryst altered to sericite.

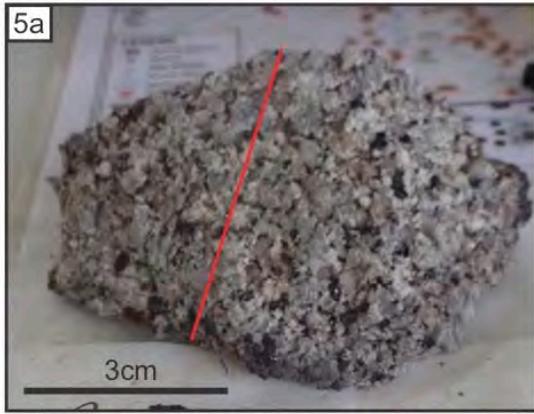
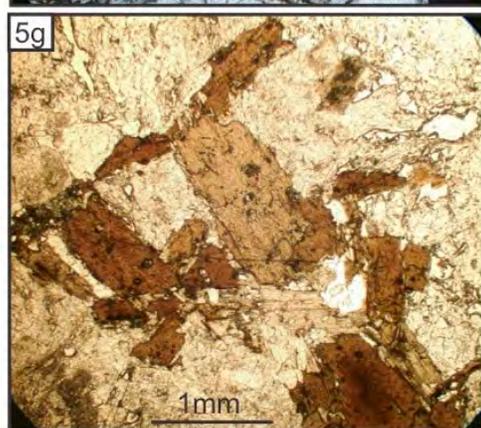
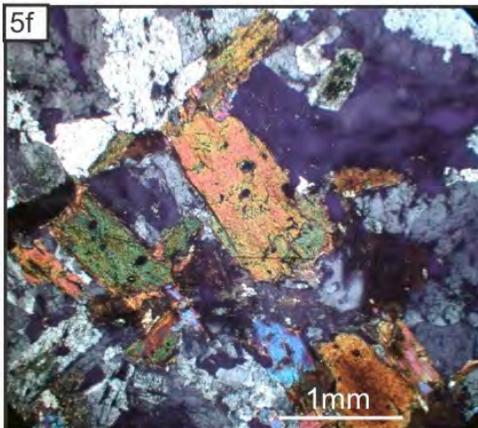
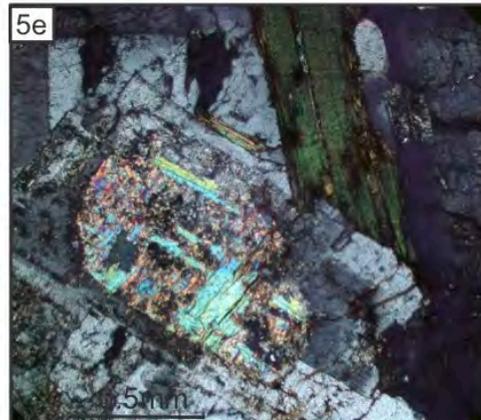
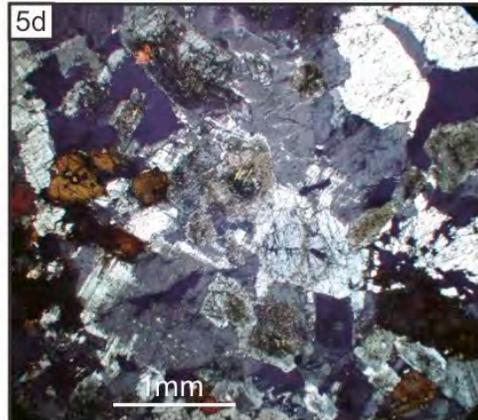
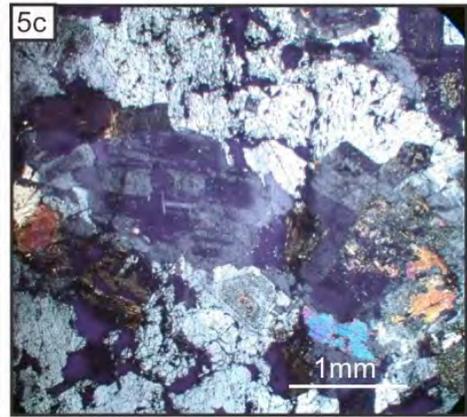
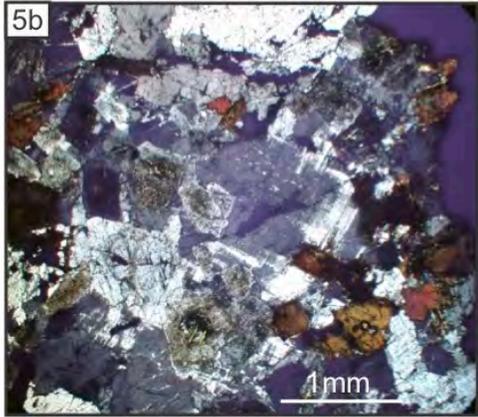


Figure 5: B-12 CG VI (a) hand specimen of B-12 - red line indicates cut orientation for thin section, (b) euhedral perthite with microcline rims + sericitised feldspar, (c) euhedral microcline with albite rims + fractured quartz, (d) perthite enclosing euhedral alkali-plag feldspar, (e) multiple twinned plagioclase with muscovite alteration core, (f;g) biotite with abundant zircon inclusions with haloes (xpl;ppl).



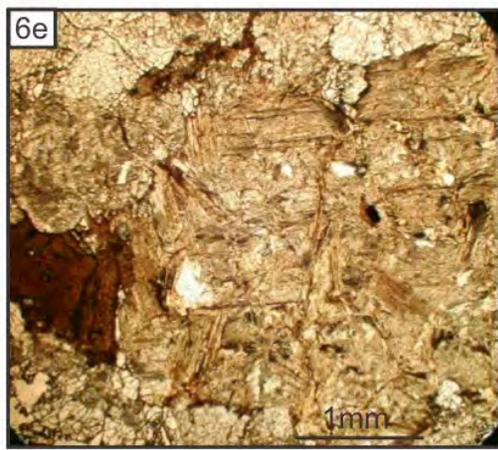
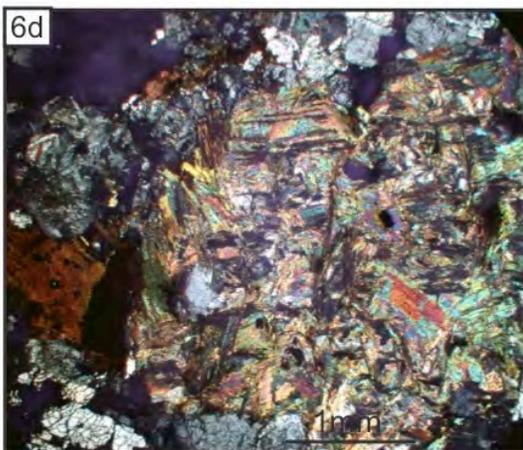
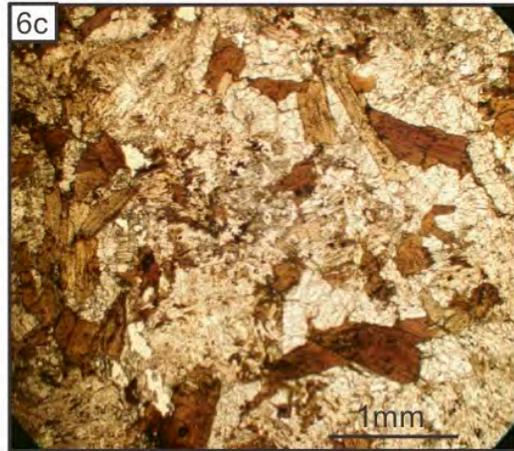
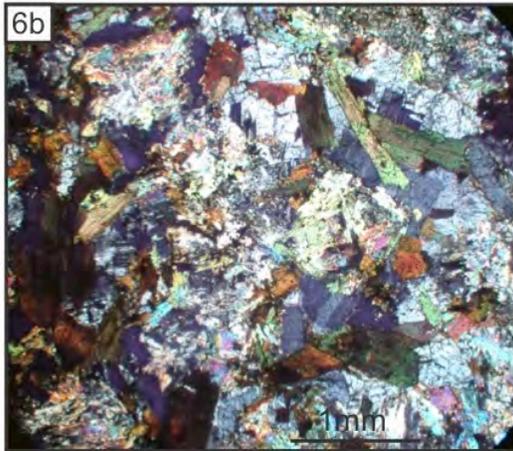


Figure 6: B-14 CG VII (a) hand specimen of B-14 with mafic clot - red line indicates cut orientation for thin section, (b;c) multiple twinned plagioclase + biotite with zircon haloes (xpl;ppl), (d;e) chlorite vug with biotite (xpl;ppl).

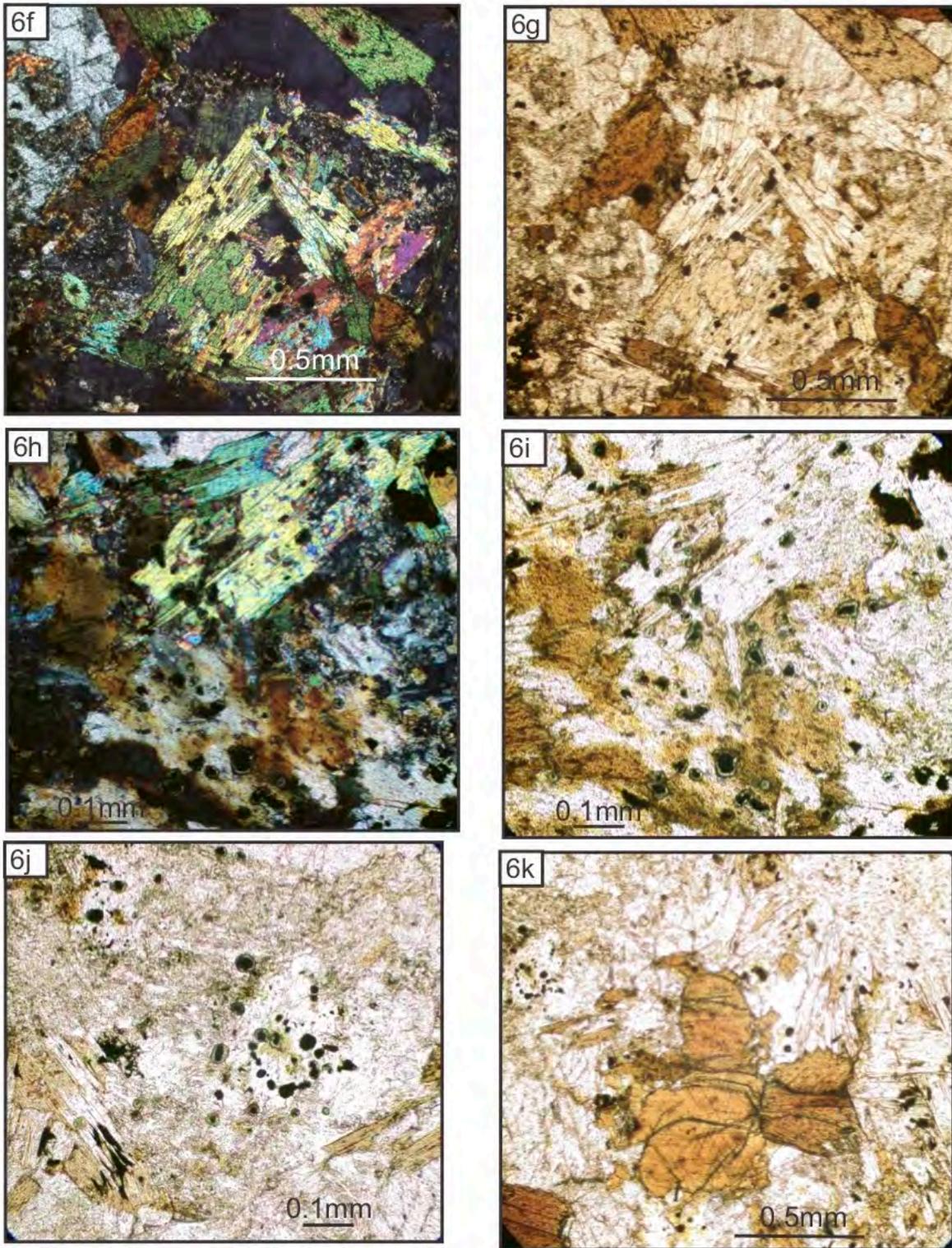


Figure 6: B-14 CG VII (f;g) muscovite-biotite vug with opaques (xpl;ppl), (h;i) zoom of opaques (Fe-oxides) in biotite showing distinct globular morphology with rims of titanite (?) (xpl;ppl), (j) opaque cluster in feldspar, (k) rare brown hornblende.

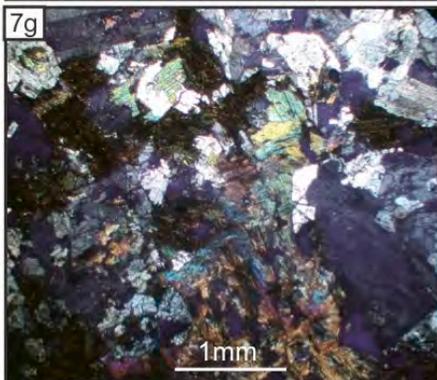
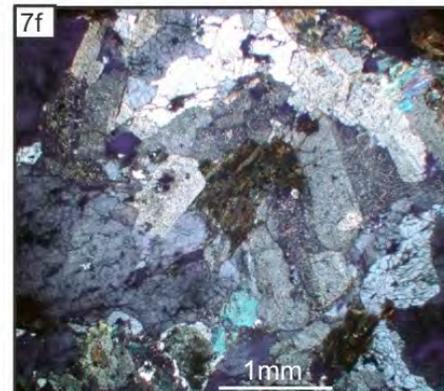
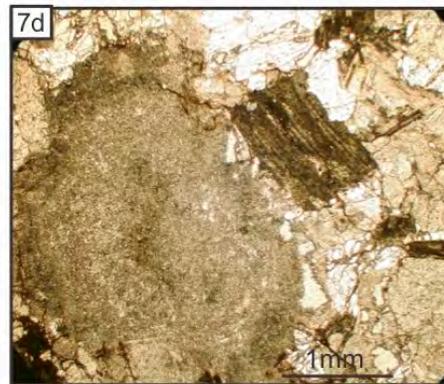
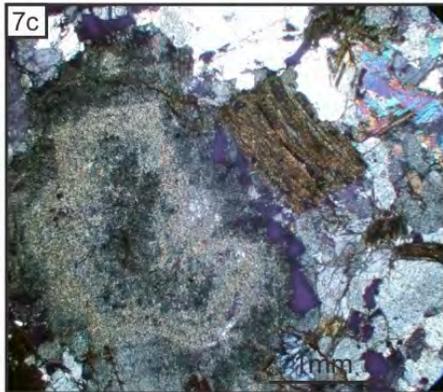
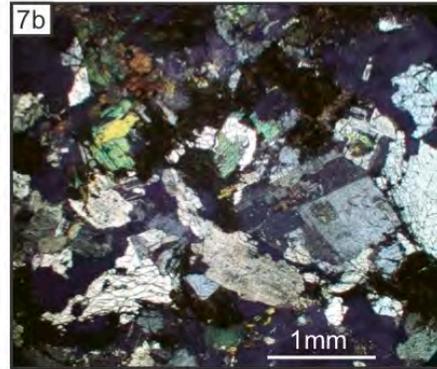


Figure 7: B-26 CG VIII (a) hand specimen of B-26 - red line indicates cut orientation for thin section, (b) euhedral plagioclase with sector zoning + biotite + fractured quartz, (c;d) large, concentric zoned, sericitised alkali feldspar + chloritised biotite (xpl;ppl), (e) simple twinned albite with minor alteration, (f) simple twinned albite + chloritised biotite + fractured quartz, (g;h) chlorite vug with chloritised biotite (xpl;ppl).

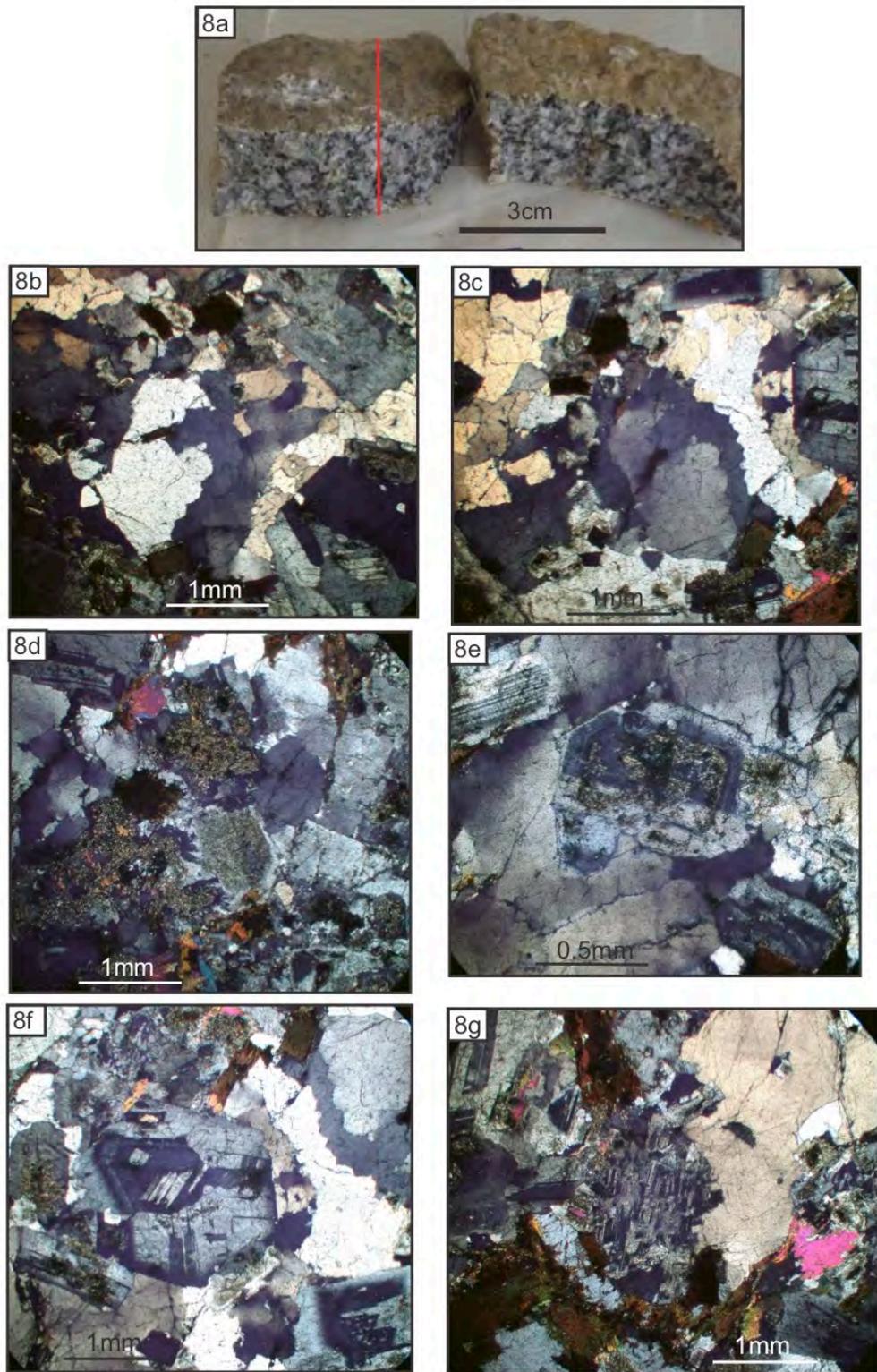


Figure 8: B-27 CG IV (?) (a) hand specimen of B-27 - red line indicates cut orientation for thin section, (b;c) strained, sutured quartz + sector zoned plagioclase, (d) euhedral twinned plagioclase with sericitised cores, (e) euhedral, concentric zoned plagioclase, (f) complex sector zoned plagioclase, (g) microcline-perthite + biotite. ¹⁸

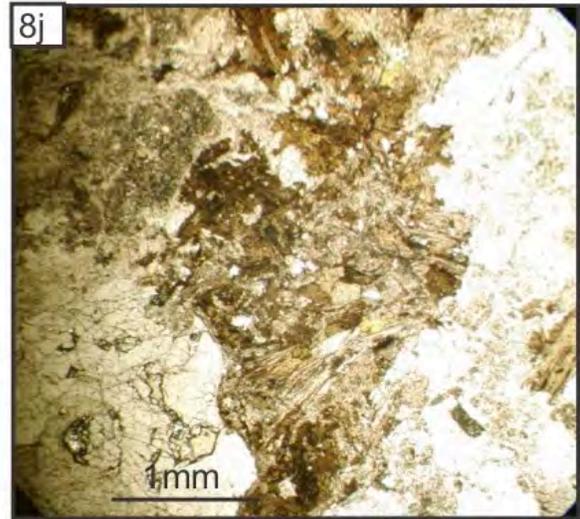
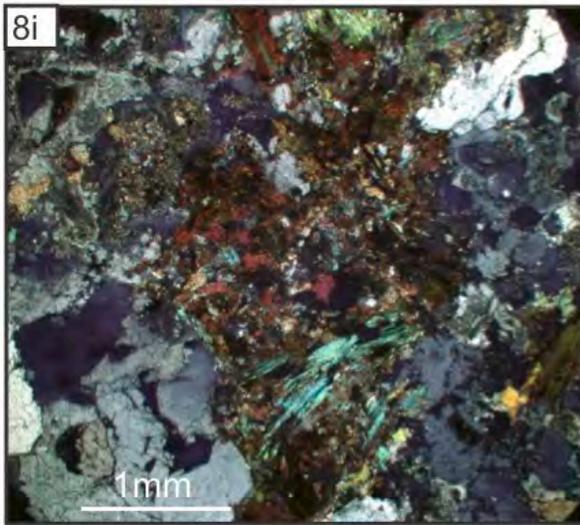
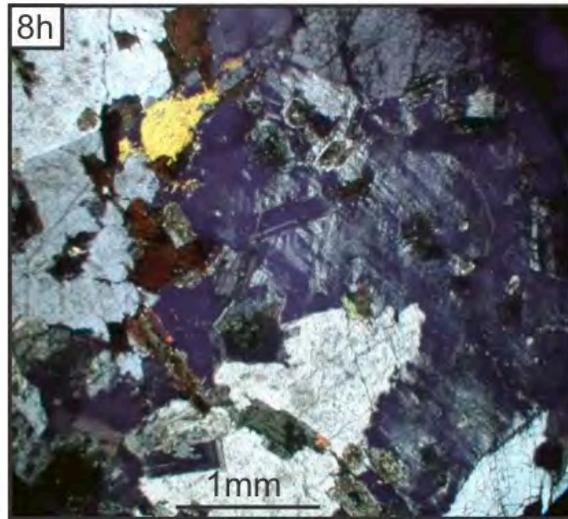


Figure 8: B-27 CG VII (h) microcline-perthite enclosing euohedral plagioclase with sericitised cores, (i;j) biotite-rich area with muscovite and chlorite (xpl;ppl).

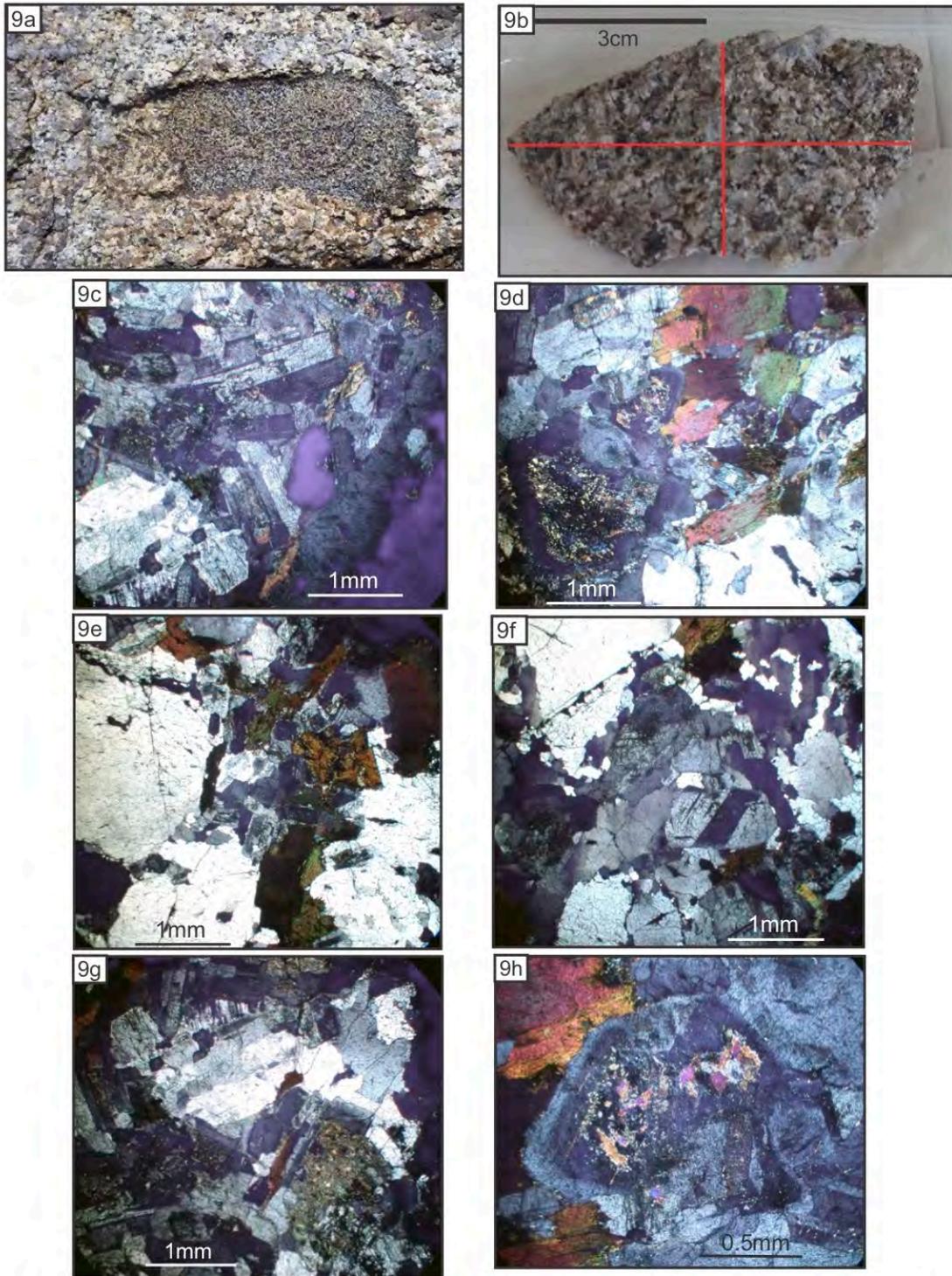


Figure 9: B-33 CG VI (a) field photo of CG VI with mafic xenoliths (b) hand specimen of B-33 - red line indicates cut orientation for thin section, (c) twinned plagioclase lathes with minor sericitisation, (d) concentric zoned plagioclase with albite rims and muscovite cores, (e) plagioclase with multiple and simple twinning and albite rims + muscovite cores, (f) sector and concentric zoned plagioclase, (g) multiple twinned plagioclase + zoned plagioclase with sericite/muscovite cores + perthite, (h) zoom of concentric zoned plagioclase with muscovite replacement.

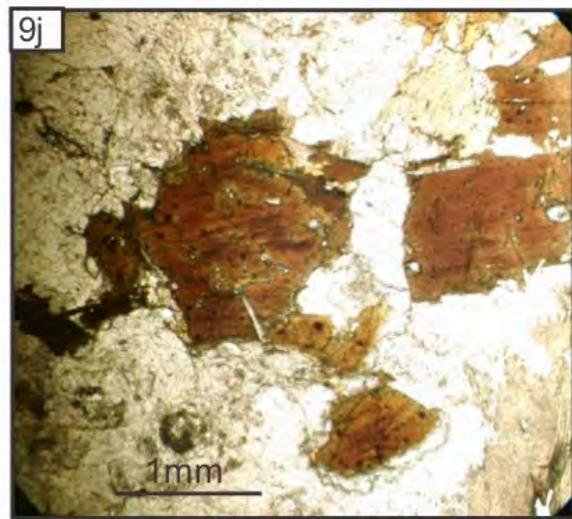
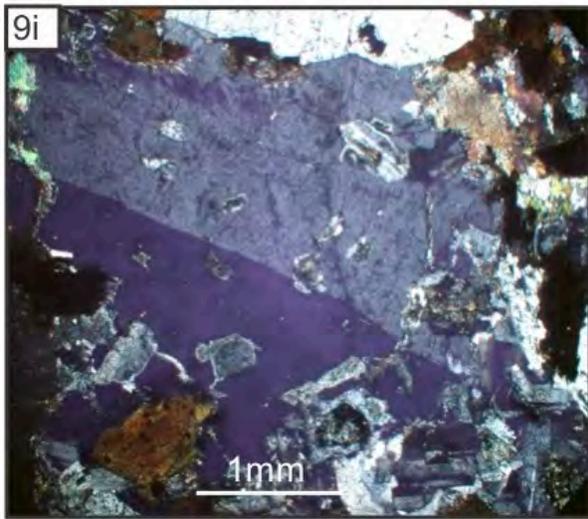


Figure 9: B-33 CG VII (i) simple twinned alkali feldspar with perthite exsolution, (j) biotite with zircon, opaque and quartz inclusions.

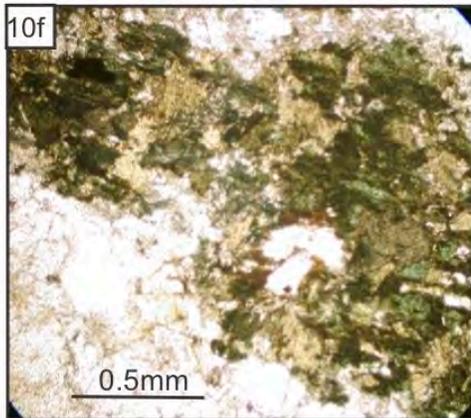
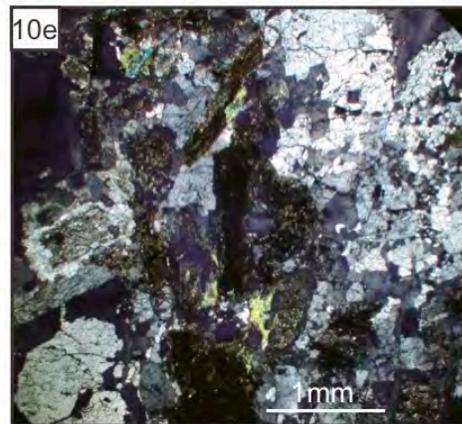
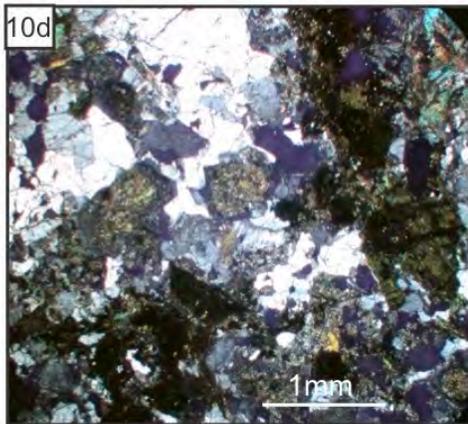
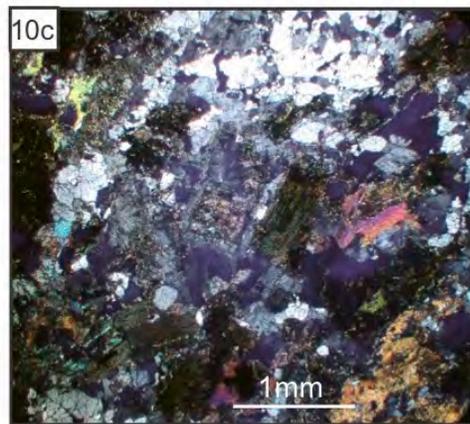
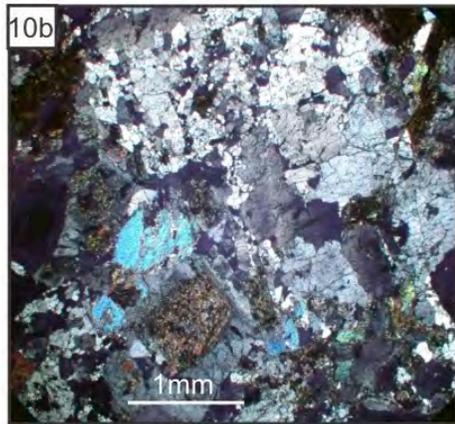


Figure 10: B-44 CG IX (a) hand specimen of B-44 - red line indicates cut orientation for thin section, (b) euhedral, concentric zoned plagioclase with sericite cores + fractured quartz, (c;d) euhedral "square" plagioclase with sericite cores + chloritised biotite, (e;f) chloritised biotite + epidote + opaques.

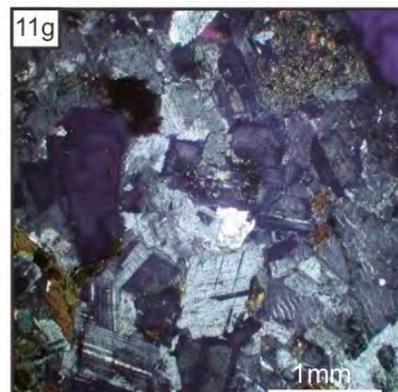
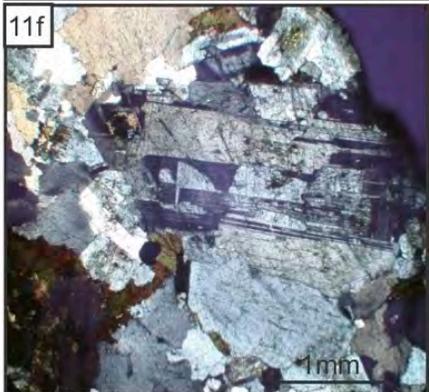
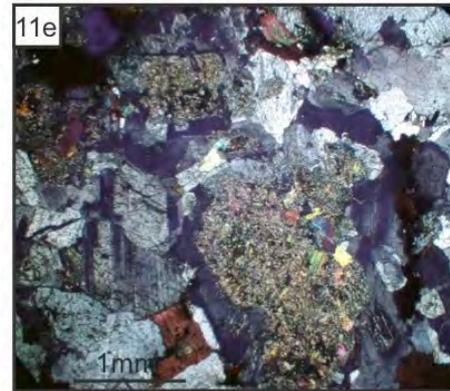
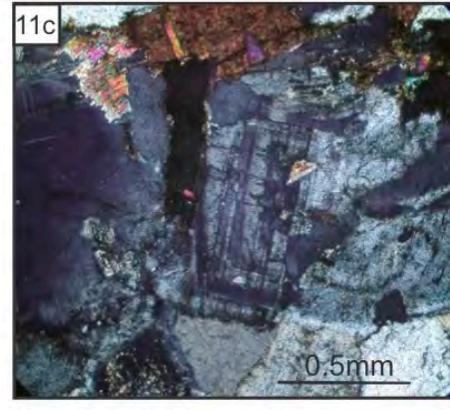
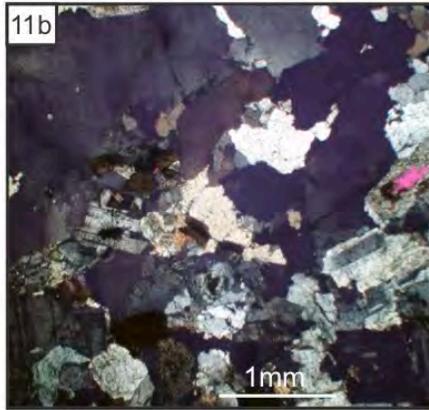


Figure 11: ALA-1 SCRAP 2015 (a) hand specimen of ALA-1 - red line indicates cut orientation for thin section, (b) multiple twinned plagioclase + fractured quartz, (c) multiple twinned and concentric zoned plagioclase, (d) multiple twinned plagioclase with albite rims and perthite exsolution area, (e) multiple twinned plagioclase replaced by sericite-muscovite, (f) sector zoned plagioclase lathe, (g) multiple twinned plagioclase + perthite.

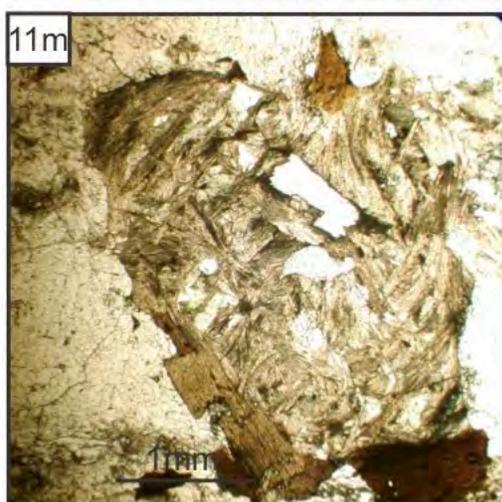
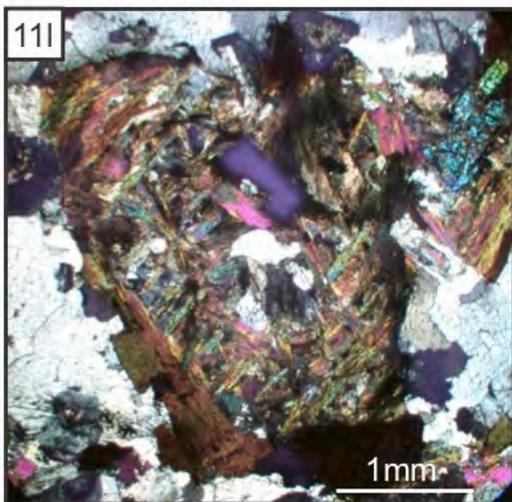
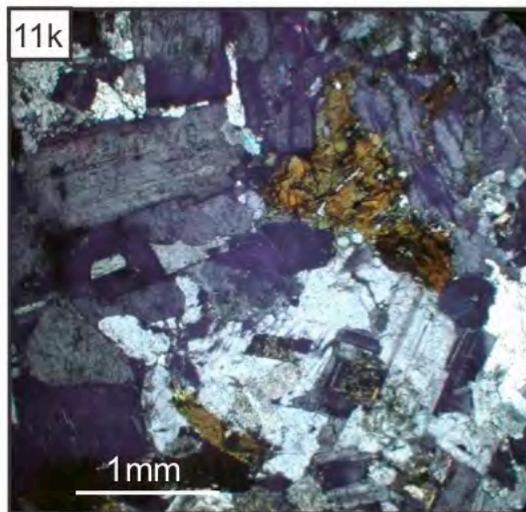
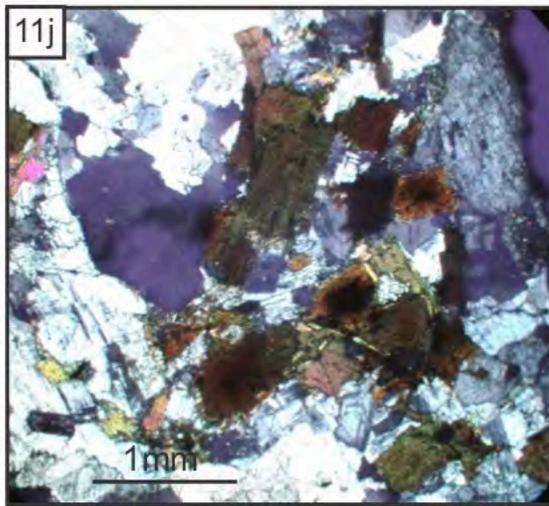
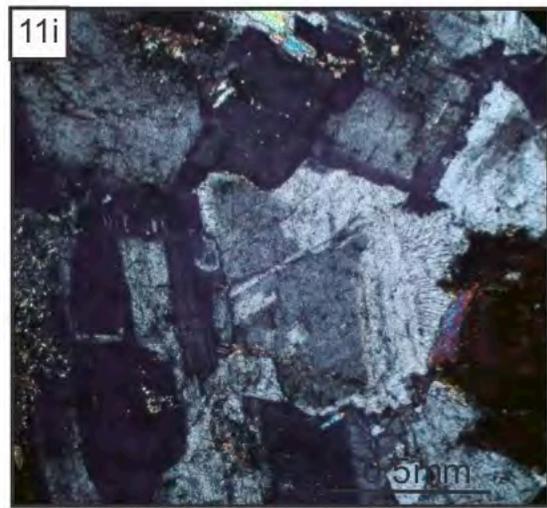
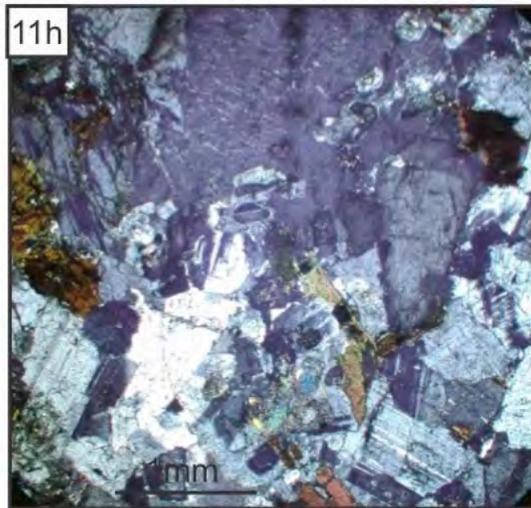


Figure 11: ALA-1 SCRAP 2015 (h) perthite + microcline + plagioclase, (i) perthitic exsolution rims on plagioclase-alkali feldspar, (j) Fe-rich biotite lathes, (k) rare brown hornblende, (l;m) chlorite vug with biotite rim (xpl;ppl).

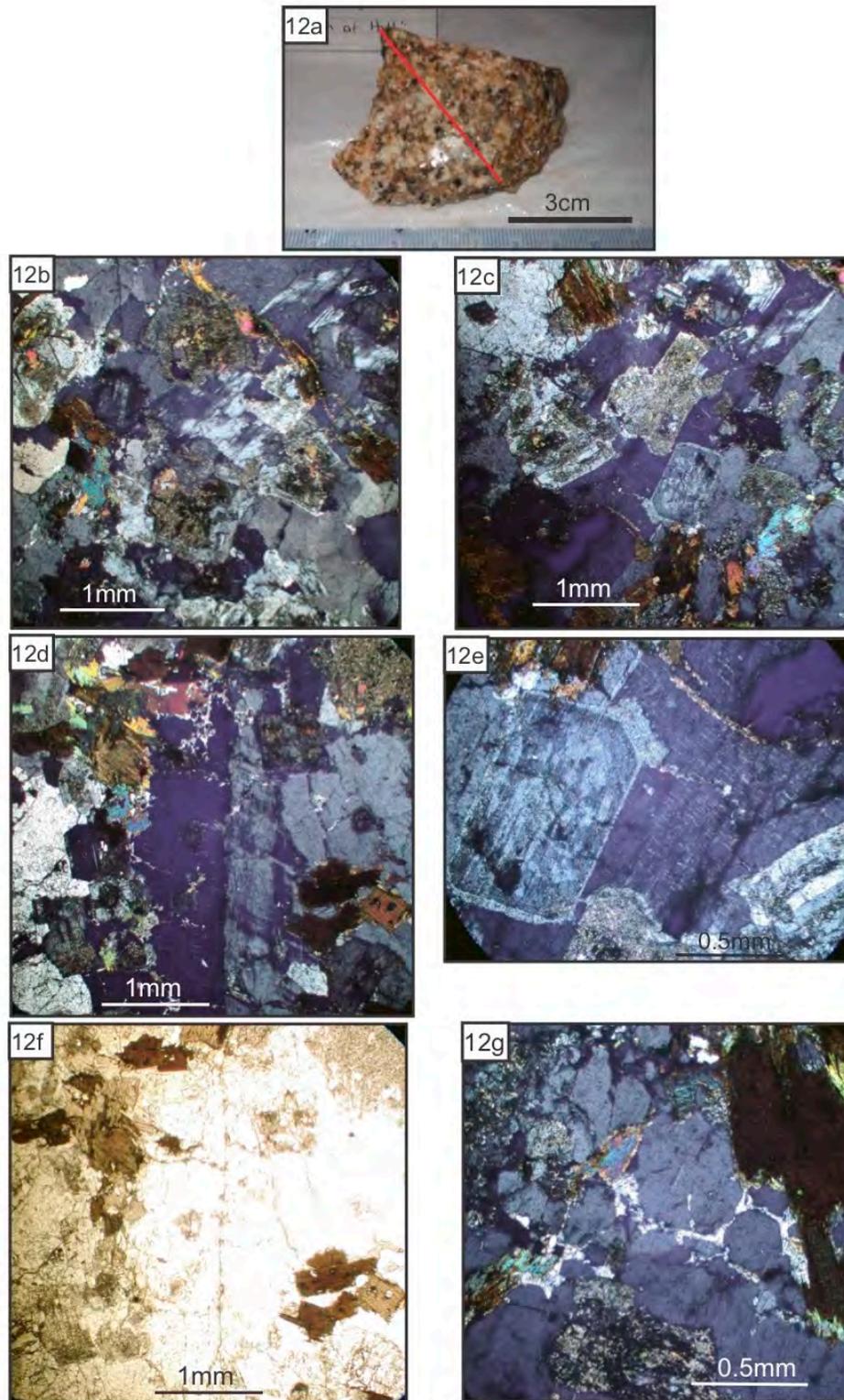


Figure 12: ALA-3 CG IV? (a) hand specimen of ALA-3 - red line indicates cut orientation for thin section, (b) euhedral, concentric zoned plagioclase with sercite cores + perthite, (c) concentric zoned plagioclase with albite-perthite exsolution rims enclosed by large perthite crystals, (d) simple twinned albite with perthite exsolution, (e) zoom of 12c showing perthite exsolution rim + perthite, (f) biotite with zircon haloes, (g) secondary interstitial quartz.

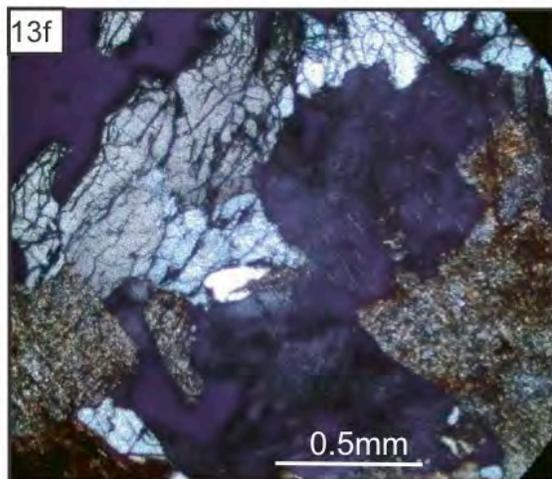
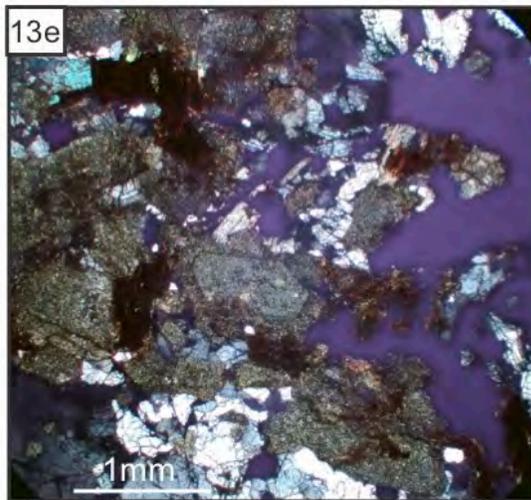
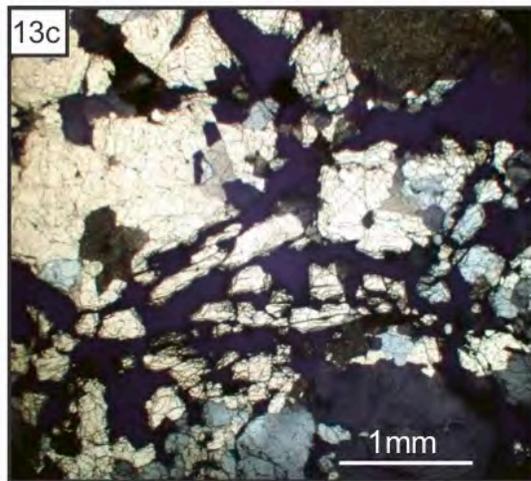


Figure 13: ALA-17 CG VIII? (a;b) hand specimen of ALA-17 - red line indicates cut orientation for thin section, (c) fractured quartz with abundant interstices, (d) plagioclase highly altered to sericite, (e) remnant concentric zoning in altered plagioclase with albite-perthitic rims ?, (f) remnant perthite + quartz + altered plagioclase.

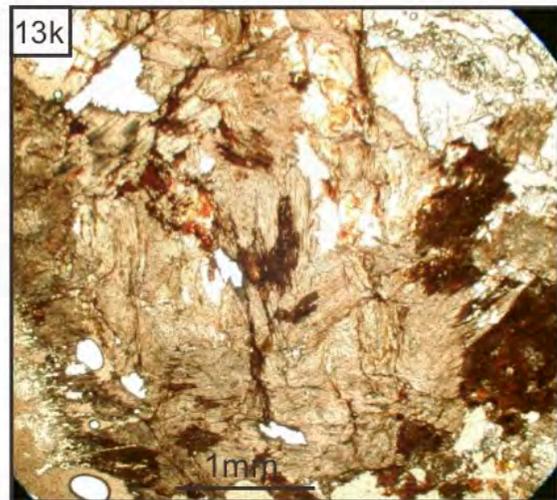
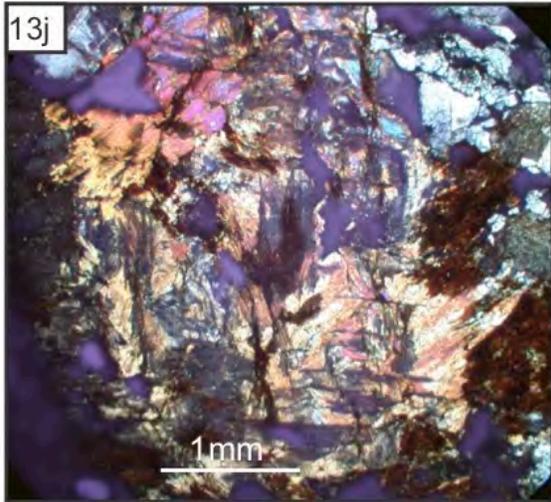
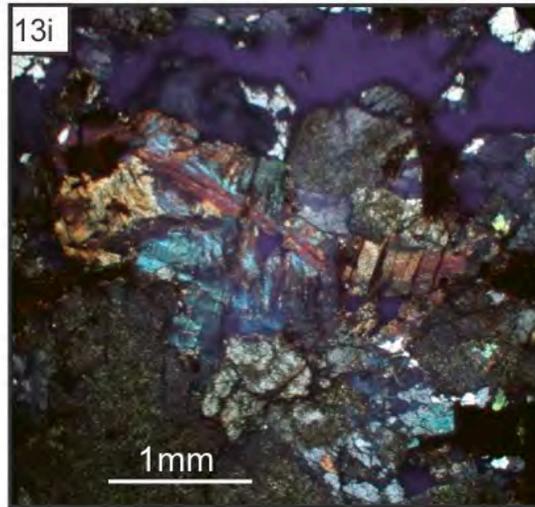
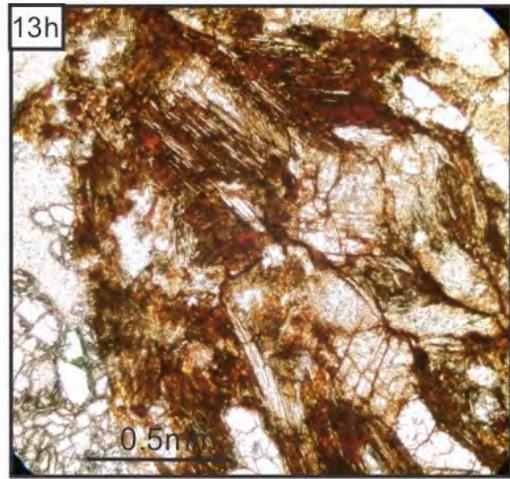
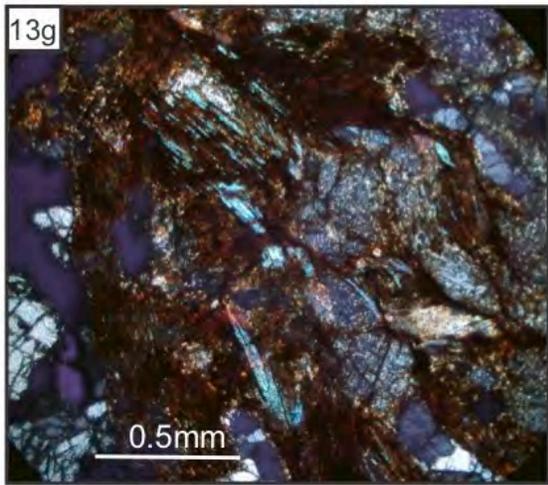


Figure 13: ALA-17 CG VIII? (g;h) chloritised biotite (xpl;ppl), (i) kinked muscovite, (j;k) chlorite-muscovite-biotite vug (xpl;ppl).

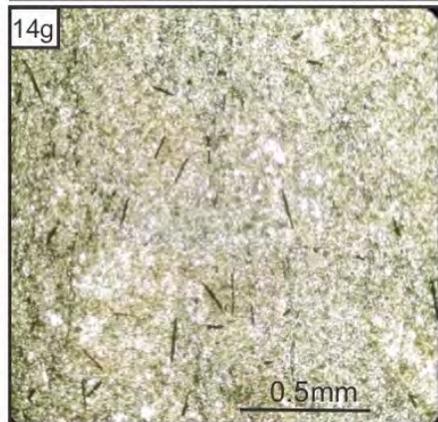
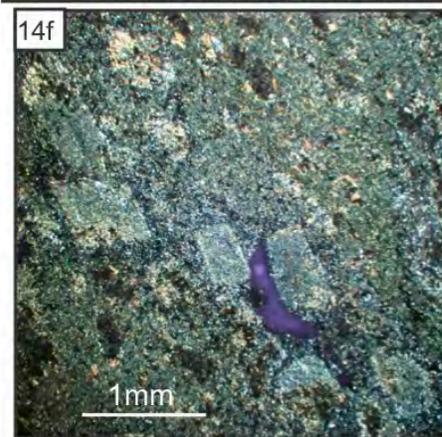
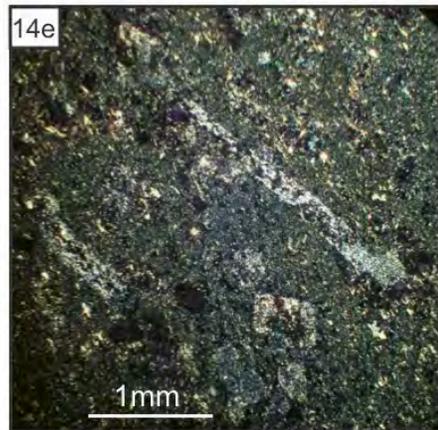
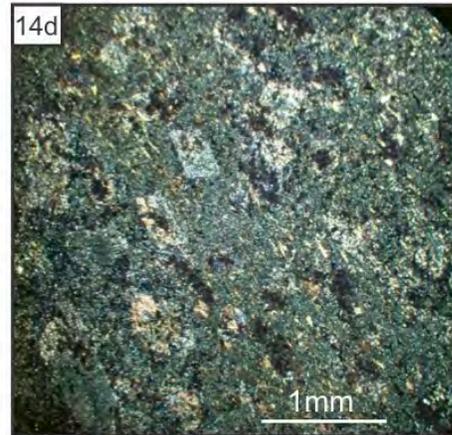
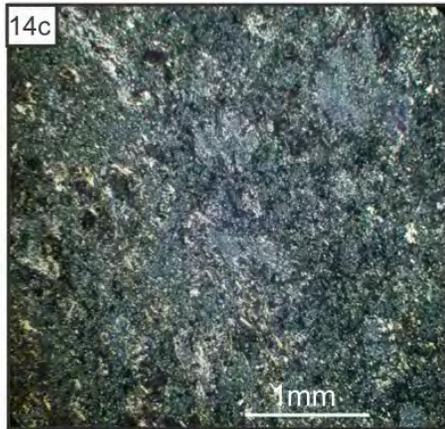


Figure 14: STR 4/S007 artifact (a;b) hand specimen of STR4S007 - red line indicates cut orientation for thin section, (c) matrix composed of quartz, feldspar and muscovite, (d;e) andalusite cross-sections and needles, (f) "ghost" feldspars, (g) opaque needles dispersed throughout matrix.

References Cited

Dickinson, William R., and Timothy F. Lawton

2001 Carboniferous to Cretaceous Assembly and Fragmentation of Mexico. *GSA Bulletin* 113(9):1142-1160.

Endo, S., S.R. Wallis, M. Tsuboi, R. Torres de Leon, and L.A. Solari

2011 Metamorphic Evolution of Lawsonite Eclogites from the Southern Motagua Fault Zone, Guatemala: Insights from Phase Equilibria and Raman Spectroscopy. *Journal of Metamorphic Petrology* 30:143-164

Martens, Uwe, Bodo Weber, and Victor A. Valencia

2010 U/Pb Geochronology of Devonian and Older Palaeozoic Beds in the Southeastern Maya Block, Central America: Its Affinity with Peri-Gondwanan Terranes. *GSA Bulletin* 122:815-829.

Weber, Bodo, Erik E. Scherer, Uwe K. Martens, and Klaus Mezger

2012 Where did the Lower Paleozoic Rocks of the Yucatan Come From? A U-Pb, Lu-Hf, and Sm-Nd Isotope Study. *Chemical Geology*, 312-313, 1-17.

Chapter 6. GPS Data Capture for GIS Data Integration in the Alabama Monumental Core

Dave Blaine (Creating Context Inc.)

An instrument survey of the monumental core (epicentre) of Alabama, using a Nikon Total Station DTM-322+, was conducted in 2015/2016 as part of the SCRAP Phase I Reconnaissance, (Morton 2015, 2016). One of the aims of this survey was to produce a digital dataset to update the previous mapping program undertaken in the 1980s by the Point Placencia Archaeological Project (PPAP). The product was a new and accurate site map of the Alabama monumental core (epicenter) that included topography, monument locations, structures (topographic representation and resulting rectilinear interpretation), and other features of interest (see Figure 1.2 in this volume).

Systematic field surveys are a fundamental part of archaeological projects. As survey instruments become more technologically advanced—either incorporating on-board Global Positioning Systems (GPS) or interfacing with independent GPS devices—and recording technologies become more widespread, robust, and affordable, archaeological project inventories of natural and cultural features necessarily shift from analogue to digital data formats. It is for this reason that the computer-based technologies and methods of Geographic Information Systems (GIS), which organize and integrate digital *spatial data* (i.e. data tied to a specific geographic location) for the purposes of analysing and visualizing the relationships between objects of interest and location, is an increasingly important tool for archaeological investigation. All spatial/tabular data referenced below are currently stored in the SCRAP ArcGIS desktop software Geodatabase; they are not made public due to concerns surrounding illicit access to the site.

The objectives for the 2018 season GPS data capture operation were to relocate the site's permanent survey monuments throughout the epicenter, and to acquire GPS coordinates for each using a more accurate mapping grade GPS unit (previously recorded using a hand-held Garmin GPSMAP® 64, with ± 5 m accuracy). These new coordinates would serve as control points to orient the survey dataset to a more precise geographic location: a process called *georeferencing*.

Methods

Best practices for collecting accurate GPS data involves four stages including, determining the best *time of day* to collect GPS data; selecting an appropriate *GPS unit grade*; specifying which *features and attributes* are to be collected; and *collecting* the data.

Time of Day

The first stage of any GPS data capture mission involves determining the configuration of the GPS system. While GPS may be accepted as a universal term for satellite-based positioning, the Navstar GPS system was first introduced by the United States government in 1978 (DoD 2008) and refers specifically to the American constellation of positioning satellites. Other positioning constellations include the Russian GLONASS system and the European Galileo system. Most GPS units available today are capable of receiving signals from each of these constellations.

The configuration of the GPS system refers to the orbits, angles, and lines of sight of the positioning satellites relative to the GPS unit's location on the ground. *Satellite availability* considers the number of satellites in the constellation(s) that will be able to provide signals to the desired area of interest. This is a critical consideration because a GPS receiver requires an unobstructed pathway between its antenna and the satellite to receive a reliable signal. Furthermore, minimum of three simultaneous satellite signals are required to achieve a two-dimensional (latitude/longitude) position, and no less than four satellites are required for a location to be determined with elevation (Wing 2011). *Satellite orientation* refers to the position of the satellites(s) in their orbits relative to the area of interest. These positions may be at steeper angles, approaching the zenith, or at shallower angles near the horizon.

Satellite availability and orientation are together referred to as *satellite geometry* and refers to the relative positions of the satellites at any given moment. Satellite geometry is critical to the collection of accurate GPS locations. Satellites will yield the most accurate results when they are ideally distributed at wide angles in relation to each other (Souterrain Archaeological Services Ltd. 2004). This gain or loss of positional accuracy caused by the relative position of the satellites is called Dilution of Precision (DOP). DOP is expressed as a series of increasing values, beginning at 1, and in which the lowest values represent the highest level of positional accuracy (Langley 2009).

It is important to consider the terrain of the survey area prior to a data capture operation. Mountainous country, deep canyons, and urban centers with tall buildings can obscure good satellite geometry and severely impede accurate data capture. Under such constraints, the best data will necessarily come from satellites directly overhead. Elevation masking is therefore used to rule out satellites that are expected to be close to the horizon or below a specified angle of view during the planned capture mission times. Elevation masking was not used as part of the satellite prediction process at Alabama as the site sits in a broad, shallow valley along the foothills of the Maya mountains, with unobstructed views from horizon to horizon.

Prediction of the GPS Satellite geometry can be accomplished using *Almanac* and *Ephemeris data*. These are the data that the constellation of satellites broadcast about their orbits, positions, and onboard clocks. Receiver stations are situated throughout the world to collect and update these data, which is then made freely available for download from several online sources.

The Almanac and Ephemeris can be downloaded manually to a dedicated desktop software—or is updated automatically by a web service—and are used to visualize the future configuration of the satellite constellation from a given location on a given day (Figure 6.1, left). Trimble's Planning Software¹ (Figure 6.1, right) is a free and easy to use GPS planning software package and provides constellation information applicable to all GPS devices, not just Trimble units.

¹ It should be noted that Trimble's Planning Software has been converted to an online web service available at <https://www.gnssplanning.com>; however, copies of the original Trimble Planning Software can still be acquired from online archives, allowing satellite prediction to continue regardless of connectivity issues.

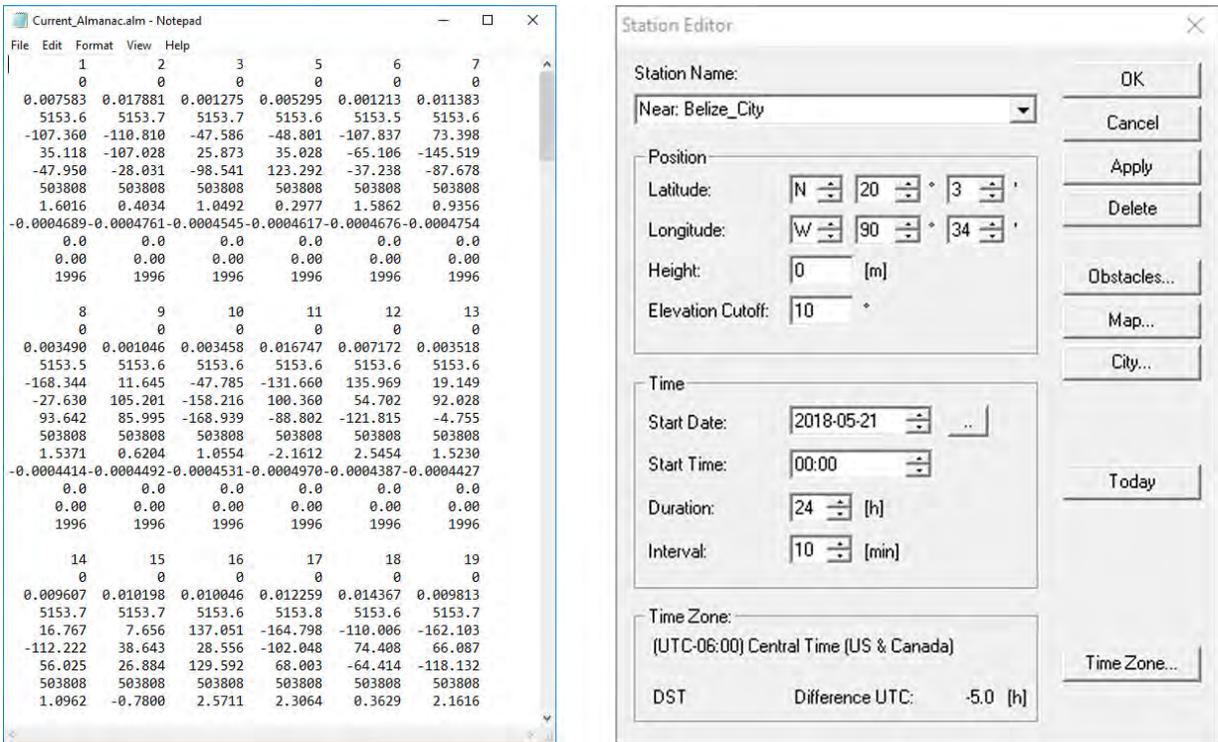


Figure 6.1: Downloaded text file of GPS Ephemeris Data (left), and Trimble Planning Software GPS Ground Station Input Table (right).

GPS Unit Grade

Generally speaking, there are three broad categories of GPS unit grades for data collection: consumer, mapping, and survey (Wing 2011). Survey grade units have multiple components, including a base station with a powerful radio transceiver and a roving unit for data collection. The base station is placed at a fixed, known position, and transmits positional corrections to the roving unit. This system eliminates many of the errors that can occur in GPS systems, achieving sub-centimeter to sub-millimeter accuracy, but is necessarily a more complex and expensive option (Souterrain Archaeological Services Ltd. 2004).

Mapping grade GPS units are hand-held single unit devices with powerful receivers capable of delivering meter-level accuracy. Although these systems are considerably less complex than survey units, they still offer functionalities with several levels of user-defined control with which to improve measurement accuracy; these include GIS software interoperability, DOP measurements, elevation masking, and real-time Differential GPS (DGPS) corrections (Wing 2011).

Consumer grade GPS units are by far the most affordable and widely used. Generally, these devices have limited user-defined control and few options for improving positional accuracy, which may vary between 2 and 10 m (Ransom et al, 2010). Previous GPS work at Alabama was done using a consumer grade unit (mentioned above).

Features and Attributes

In addition to the need for advance planning to ensure excellent satellite geometry at the field site, the spatial and attribute data that describe the site must be considered prior to data capture.

GIS data generally falls under two categories. The first is spatial data, which includes raster data such as elevation models, as well as imagery from satellites or aircraft. There is also vector data, which describes geometries in three types: points, lines, and polygons (Davis, 2001). Points refer to specific geographic locations at different scales; these may include sign posts, artifacts on the ground, or isolated features such as lone hills or trees. Lines are continuous linear features such as roads, waterways, walls, or fences. Polygons describe enclosed features or areas such as water bodies, perimeters, lots or properties, and park boundaries. The second GIS data category is attribute data. Attributes are arranged in tabular format and are used to provide descriptions of the spatial data (Davis 2001). Feature descriptions may include the type of signpost; material of manufacture; gravel, dirt or paved road; stream, creek, river; pond, lake, sea; commercial or residential property.

Before data collection begins, it is prudent to produce a *data dictionary*. This is a tabular list of the specific types of data (both spatial and attribute) that should be collected for a project and the format in which the data will be collected. These parameters are usually created in a GIS software such as ArcGIS, and then downloaded to a GPS device. As described above, a mapping grade GPS is usually needed for this level of functionality. ArcGIS software allows data dictionaries to take the form of drop-down menus. This simplifies data collection in the field as it allows the user to select from an appropriate choice of features on the GPS unit's input screen.

Data Collection.

As a general rule, one might expect that data collection would be the most straightforward element of the data capture mission, if it has been well planned. However, the conditions at the epicenter at Alabama presented several particular challenges for data capture.

Mission planning began prior to departure, which was scheduled for May 19th, 2018. Ephemeris and Almanac data were downloaded from Trimble's GPS Data Resources Archive (https://www.trimble.com/Support/GPD_Data_Resources.aspx) on May 11th, 2018. Satellite positions computed from the almanac and ephemeris are assumed to be correct for no more than 30 days (Specht, 2017), therefore this almanac would remain current well past the expected data capture mission dates: planned for the last week of May (prior to the Author's scheduled departure), and having taken place on May 29th and June 1st, 2018.

Visualization of the almanac and ephemeris was completed using the desktop software version of Trimble Planning Software version 2.90. The best times for data capture were determined based on maximum satellite visibility and distribution throughout the sky for optimal satellite geometry; the exact number of satellites visible and available to the receiver indicated in the skyplot; and ideal Dilution of Precision (DOP) for greatest positional accuracy. By these data, the optimal data capture time on site was determined to fall between 13:00-14:00 hours, local time (Figure 6.2).

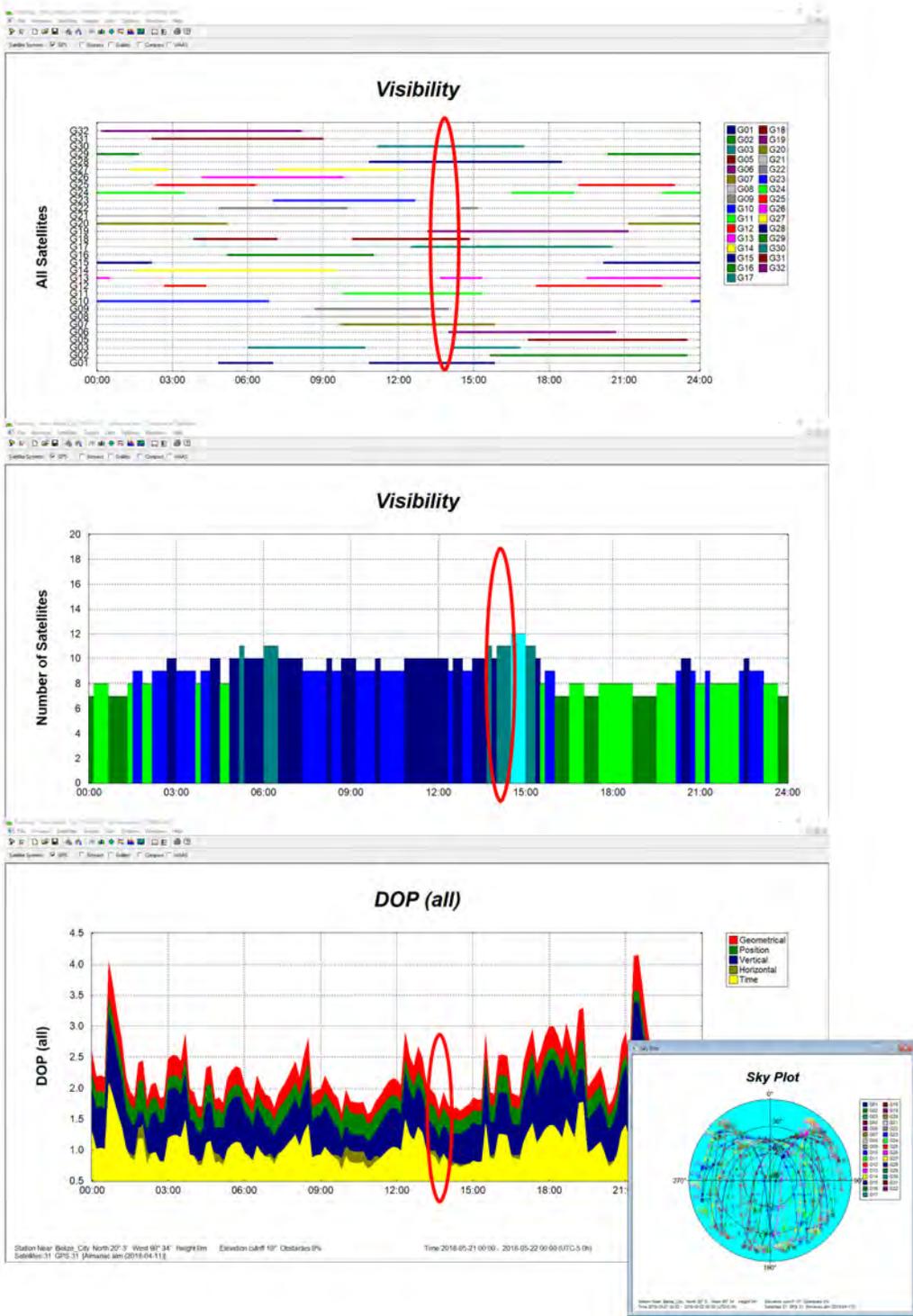


Figure 6.2: Best predicted times for GPS Data Capture for the Alabama site was determined to be between 13:00-14:00 hours, local time.

SCRAP 2018 GPS Data Capture Operation

The GPS device used in for the 2018 season was a Trimble Juno SC mapping grade GPS equipped with Esri ArcPad 10 Field Mapping and Data Collection Software. As described above, this mapping grade GPS unit offered several features for enhanced positional accuracy, as well as interoperability with Esri's ArcGIS desktop software.

Using ArcGIS, a simple map was created for the Alabama epicenter, which included georeferenced satellite imagery of the site as a base layer; the digital survey dataset from the 2015/2016 survey as a CAD (Computer-Aided Drafting (Davis 2001) point layer; and, finally, the survey monument locations overlain as a second point layer. These three map layers were exported from ArcGIS to ArcPad and transferred to the GPS unit, providing a mobile version of the current GIS dataset for the epicenter.

The aim of this mobile dataset was to delineate our area of interest and to aid in the relocation of the original survey monuments, whose exact locations on the ground were only roughly known (within 3 m in secondary regrowth). This would prove to be a challenge, as it is evident from the maps (Figures 6.3 and 6.4) that the CAD survey dataset is slightly out of alignment with the georeferenced satellite imagery.

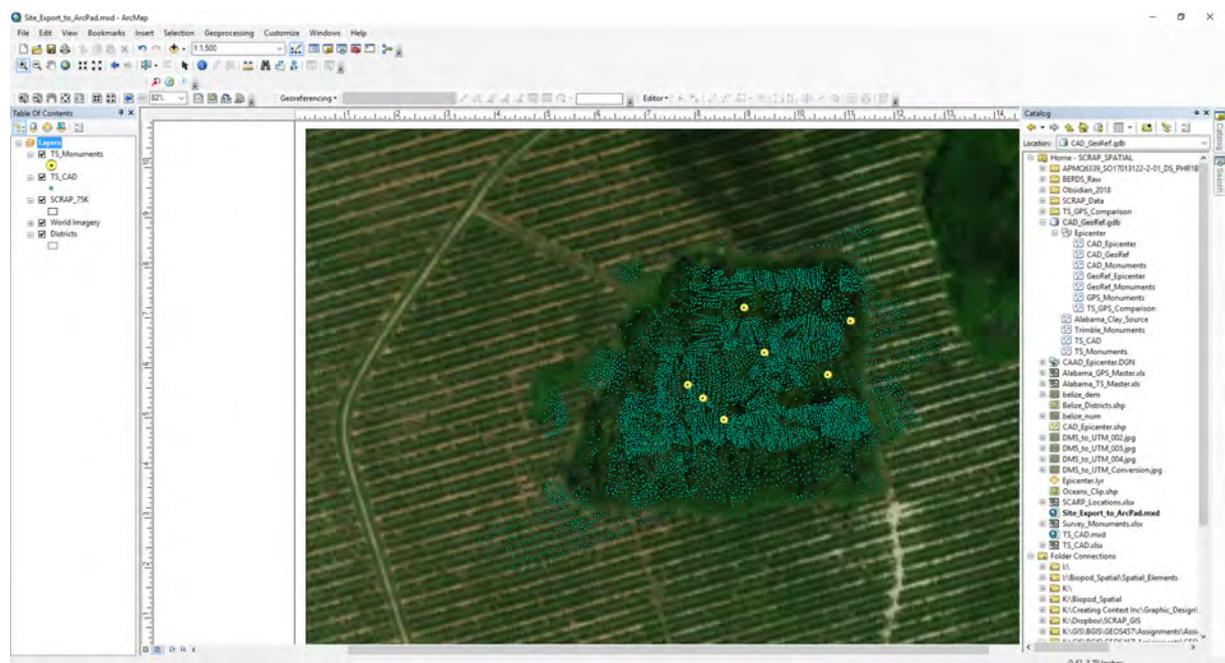


Figure 6.3: Mobile map of the Alabama epicenter as exported to ArcPad. The CAD dataset (TS for Total Station) is shown in green points, with the survey monuments overlaid as yellow targets.



Figure 6.4: Mobile map of the Alabama epicenter with the 4 relocated survey monuments highlighted as red targets.

Although the Alabama site is located amid rural, agricultural land, and fairly unobstructed in terms of sky visibility, the valley is heavily cultivated while the monumental core is densely forested. This presented a concern as to the quality of GPS signals that could be reliably received while under the forest canopy; therefore, during the excavation and prior to the planned data capture mission, several opportunities were taken to test the quality and strength of signal acquisition throughout the epicenter. These tests confirmed that the GPS unit was capable of receiving strong and augmented GPS signals through the forest canopy (Figure 6.5).



Figure 6.5: Trimble Juno signal testing within the epicenter: skyplot showing satellite geometry (left), and GPS signal data (right).

The following table provides an explanation of Trimble Juno SC ArcPad Signal Data (Esri Press 2013).

GPS	The Trimble Juno, equipped with ArcPad can resolve signals from the Russian GLONASS constellation of satellites, but <i>only</i> GPS signals were collected.
Coordinates	The GPS location is by default presented in Degrees, Minutes, Seconds (DMS) format.
Altitude	The GPS altitude is calculated when it receives signal from at least 4 satellites.
SOG	Velocity – indicated as Speed Over Ground – shows the apparent velocity of the GPS based on the difference between the current position relative to the previous one.
TCOG	True North Course Over Ground indicates the direction the GPS is oriented relative to True North.
DST	The distance from the current GPS position to a selected destination.
BRG	The bearing from the current GPS position to the selected destination.
3D	Both Horizontal and Vertical position has been computed.
PDOP	Position Dilution of Precision: indicates the strength of the satellite constellation for general position accuracy.
DGPS	Indicates Differential GPS: that real-time differential correction is being used to calculate the x, y, and z position coordinates.

The GPS Mode value DGPS indicated on the Signal Data screen indicates that the GPS unit is receiving real-time position corrections as broadcasted from a base station and applied instantly by the ArcPad software for more accurate GPS positions; this is called real-time Differential GPS (Chivers 2012) and many higher grade GPS units, including the Trimble Juno, come equipped with receivers capable of resolving these augmented GPS signals (Trimble Navigation Ltd. 2008).

Currently, the United States Federal Aviation Administration provides free GPS signal augmentation through a satellite-based system called the Wide Area Augmentation System (WAAS)(Esri Press 2013), whose coverage extends throughout North America and as far south as Belize; however, the signal appears to be intermittent, as DGPS augmentation was achieved for data capture at all but one of the epicenter survey monuments (a marked decrease in the location confidence of the coordinates for Monument 02 was noted, as compared to the remaining monuments).

Georeferencing

Merging the 2015/2016 total station survey dataset with the 2018 GPS data capture required the data to be georeferenced. Georeferencing involves defining that dataset’s location using known map coordinates (*control points*) and then aligning it to those coordinates. This is commonly used with satellite imagery, air photos, or scans of printed and even historic maps. This process tends to distort the dataset (stretching or compressing it to conform to the control points), in the same way that the earth’s surface is distorted when its three-dimensional curve is represented on a two-dimensional map (ArcGIS Desktop 2018).

Georeferencing of CAD datasets imposes significant constraints on this alignment process. CAD datasets are precisely measured point, line, and/or polygon features that describe construction, layouts, and/or designs; therefore, georeferencing transformations of CAD

datasets must be limited in order to maintain the dataset's aspect ratios and prevent distortions. CAD datasets are restricted to a two-point transformation process, which aligns the dataset to two control points: moving, rotating, and/or scaling the dataset uniformly (ArcGIS Desktop 2018).

The 2015/2016 dataset is saved in tabular format as a Microsoft Excel spreadsheet. As noted by Morton (2016), point data collected during the instrument survey were referenced relative to the position of Monument 01, set to an arbitrary coordinate system centered on coordinates 5000 meters East, 5000 meters North, and 5000 meters Elevation. Prior to the 2018 field season, Morton performed a mathematical conversion of the tabular dataset in order to reference it to the consumer grade GPS coordinates previously collected for Monument 01. Monument 01 is established as a Pivot Point, and using calculated fields in Excel, linear distances and bearings are calculated for every other point in the survey relative to the pivot point. From these calculations, Easting and Northing positions in Decimal Degrees (Corrected Easting/Northing for Position) for all survey points were produced.

Using ArcGIS desktop software, the Corrected Easting/Northing for Position coordinates were added to the SCRAP Geodatabase using the Add XY Data function. Once the survey dataset was added to the geodatabase, it was then exported as a CAD dataset using the Export to CAD tool. This tool converts the ArcGIS point feature layer to a CAD point feature with an AutoCAD recognizable file extension, ensuring that this new CAD version of the dataset could be georeferenced without creating shape or scale distortions. The control points captured with the GPS unit were then imported into ArcGIS as a new GPS_Monuments point feature. The positions for the monument points from the CAD dataset and their corresponding GPS coordinates were then overlain for comparison (Figure 6.6). Monument 03 was disregarded because its GPS location accuracy was not enhanced with DGPS signal augmentation, and Monument 06 was disregarded in favour of the greater distance between Monuments 01 and 05. Ideally, control points are best distributed over a dataset rather than concentrated.

Using the CAD Georeferencing toolset in ArcGIS, two monuments in the CAD dataset were selected for alignment with two of the GPS located points. The points selected for georeferencing were Monuments 01 and 05. Monument 01 was selected because it was the established reference point for the entire survey dataset, and Monument 05 was selected because its CAD location and GPS location were found to be almost aligned, requiring the least amount of manipulation by the software (Figure 6.7).

The newly georeferenced epicenter survey shows a marked improvement in the positional accuracy of the dataset, and while not improved to the sub-centimetre accuracy that one might expect from a survey grade GPS system, should become a valuable asset for future spatial analysis of the site. Furthermore, the techniques and hardware for data capture that were tested during the 2018 season will provide workflows for more spatially accurate instrument surveys and GIS data integration in future field seasons. Accurate GPS data capture can provide coordinates for survey monuments and excavation datums, which can be input to the survey instrument at the time of survey, rather than corrected for afterward.

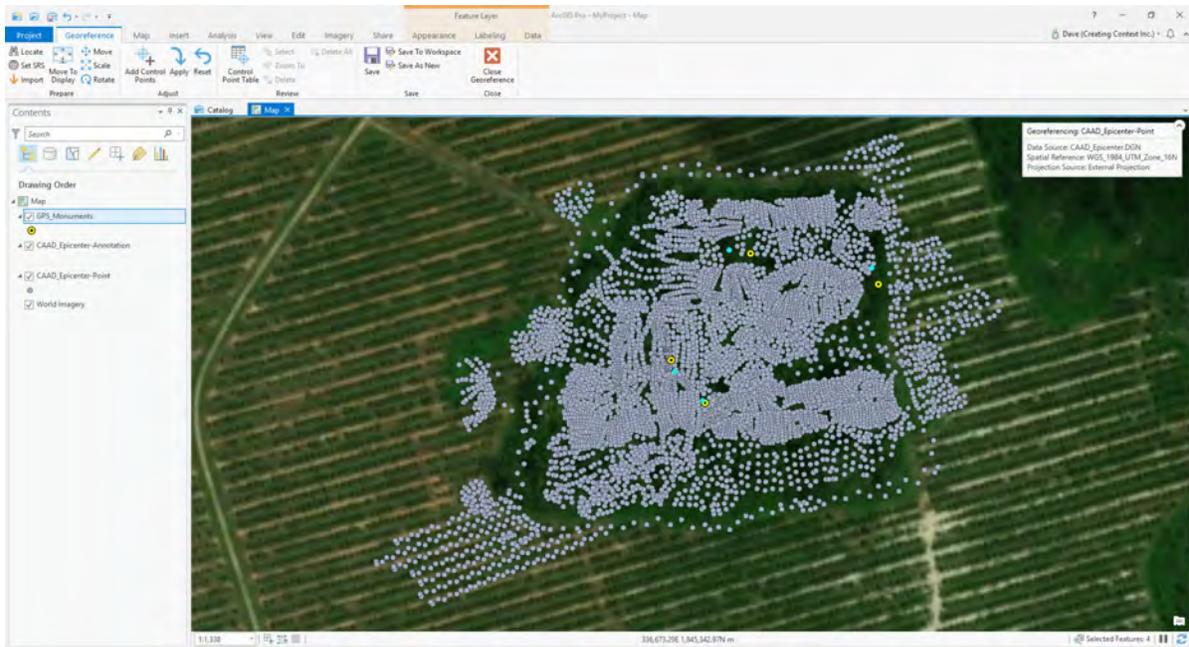


Figure 6.6: CAD monument locations (highlighted in blue) with GPS located monuments as yellow targets.

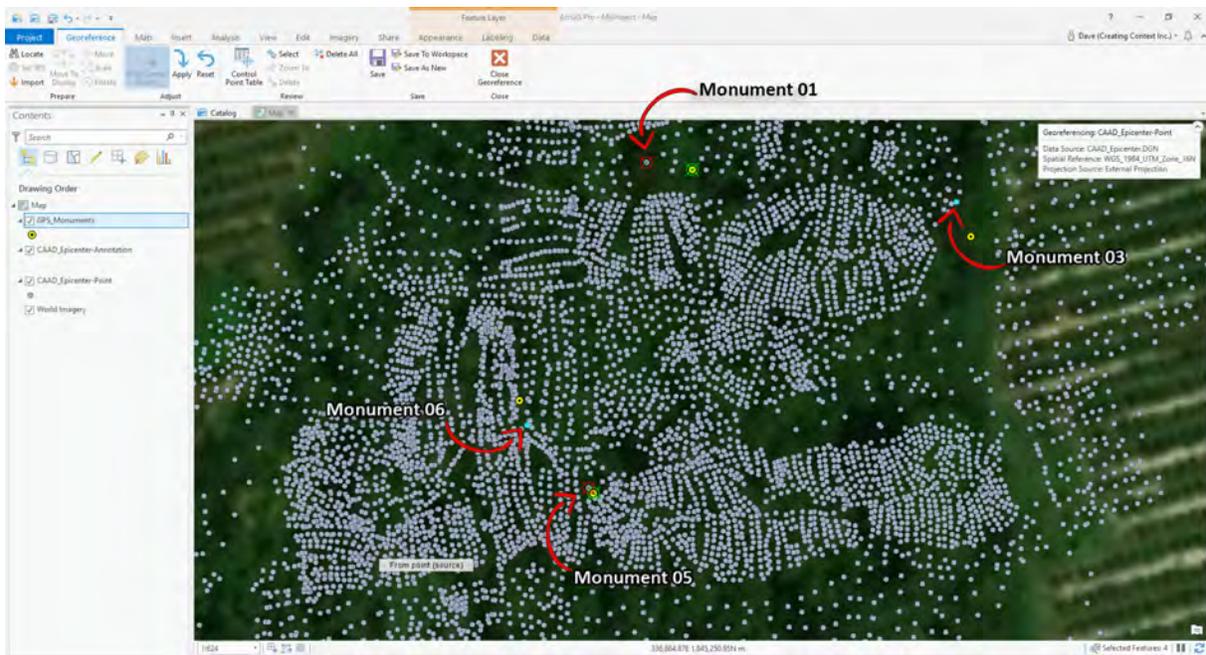


Figure 6.7: CAD monuments identified for alignment with GPS located control points.

Results

Once completed, the georeferenced CAD dataset was realigned to the control points for Monuments 01 and 05 (Figure 6.8). According to the ArcGIS Measure tool, Monument 06 is 7.5 meters to the southeast of its GPS location, and Monument 03 is 8.9 meters east southeast of its GPS location. Nevertheless, the CAD dataset appears to be well aligned with the features (forest perimeter and orchard lanes) visible in the satellite imagery base layer, though slightly shifted to the east.

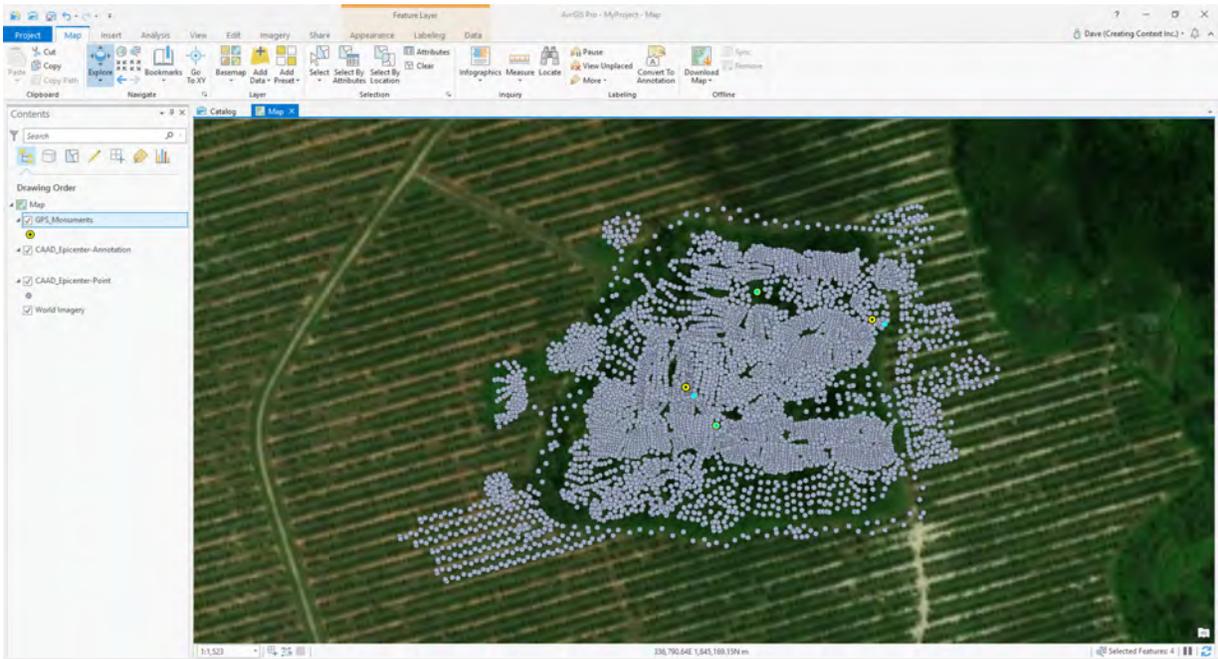


Figure 6.8: CAD dataset realigned to GPS control points for Monuments 01 and 05.

References Cited

ArcGIS Desktop

2016 Fundamentals of Georeferencing. Electronic Document, retrieved from <http://desktop.arcgis.com/en/arcmap/10.3/manage-data/raster-and-images/fundamentals-for-georeferencing-a-raster-dataset.htm>, October 20th, 2018

ArcGIS Desktop

2018 Georeferencing CAD. Electronic Document, retrieved from <http://pro.arcgis.com/en/pro-app/help/data/cad/about-georeferencing-cad-data.htm>, October 20th, 2018

ArcGIS Desktop

2018 Georeferencing Overview. Electronic Document, retrieved from <http://pro.arcgis.com/en/pro-app/help/data/imagery/overview-of-georeferencing.htm>, October 20th, 2018

Chivers, Morag

2012 Differential GPS. *ArcUser Online* (blog), retrieved from <https://www.esri.com/news/arcuser/0103/differential1of2.html>, April 20th, 2018

Davis, Bruce E.

2001 *GIS: A Visual Approach*. OnWord Press, New York.

DoD

2008 *Global Positioning System Standard Positioning Service Performance Standard*. DoD Positioning, Navigation, and Timing Executive Committee, 4th ed. Washington. Retrieved from <https://www.gps.gov/technical/ps/2008-SPS-performance-standard.pdf>, April 18th, 2018

Esri Press

2013 *Arcpad 10.2 Help*. Esri Press, Redlands, retrieved from <https://www.arcgis.com/home/item.html?id=62f2e517656d4cb09423c03552cfe449>

Morton, Shawn G.

2015 The 2015 Epicentre Investigations at Alabama. In *The Stann Creek Regional Archaeology Project: Report of the Second (2015) Field Season*, edited by M. Peuramaki-Brown, pp. 19-28. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

2016 The 2016 Epicentre Investigations at Alabama. In *The Stann Creek Regional Archaeology Project: Report of the Third (2016) Field Season*, edited by M. Peuramaki-Brown, pp. 21-26. Report presented to the Belize Institute of Archaeology, Belmopan, Belize.

Langley, Richard B.

2009 Innovation: Improving Dilution of Precision. *GPS World* (blog), retrieved from <https://www.gpsworld.com/gnss-systemalgorithms-methodsinnovation-improving-dilution-precision-9100/>, March 17th, 2018

Ransom, Michael D., James Rhynold, and Pete Bettinger

2010 Performance of Mapping-Grade GPS Receivers in Southeastern Forest Conditions. *RURALS: Review of Undergraduate Research in Agricultural and Life Sciences* 5(1): 1-12.

Specht, Cezary, and Paweł Dąbrowski

2017 Runaway PRN11 GPS satellite. *Proceedings of the 10th International Conference "Environmental Engineering 2017" At: Vilnius*. Retrived from https://www.researchgate.net/publication/316923164_Runaway_PRN11_GPS_satellite, March 15th, 2018

Souterrain Archaeological Services Ltd.

2004 BAJR A Short Guide to GPS. Electronic Document, retrieved from <http://www.bajr.org/BAJRGuides/9.%20A%20Short%20Guide%20to%20GPS/AShortGuidetoGPS.pdf>, February 20th, 2018.

Trimble Navigation Ltd.

2008 *User Guide: Juno Series*. Trimble Navigation Ltd., Westminster, retrieved from http://trl.trimble.com/docushare/dsweb/Get/Document-437119/JunoSeries_UserGuide_v1_RevB_USGU5239_ENG.pdf

Wing Michael G.

2011 Consumer-Grade GPS Receiver Measurement Accuracy in Varying Forest Conditions.
Research Journal of Forestry 5: 78-88.

Chapter 7. Maya Archaeology in Belize Field School Program

Meaghan M. Peuramaki-Brown (Athabasca University)

Johana Delos Reyes (University of Calgary)

Kristine Hubenig (University of Calgary)

From May 19-June 15, 2018, the Stann Creek Regional Archaeology Project (SCRAP) hosted its first undergraduate archaeological field school at the site of Alabama in the Stann Creek District of Belize—certified by the Register of Professional Archaeologists. A total of nine (9) Canadian students took part in the full 4-week program, while two (2) Belizean university students took part in one week of the program, and one (1) Belizean high school student participated over two weeks. Four supervisors led the program at all times, including the primary instructors, Dr. Meaghan Peuramaki-Brown (4 weeks) and Dr. Kathryn Reese-Taylor (2 weeks), and program assistants Dr. Shawn Morton (4 weeks), Ms. A. Megan Williams (4 weeks), and Mr. Dave Blaine (2 weeks), plus additional SCRAP team members; eight (8) local field assistants also worked, learned, and taught alongside the students and staff (Figure 7.1). Primary course offerings included ARKY 306 Field Course in Archaeological Techniques and ARKY 506 Advanced Archaeological Field Techniques, credited through the University of Calgary. A series of independent reading courses were also made available to students.



Figure 7.1: Field school students and staff on final day.

Over the four-week program, students completed two full days of introductory lectures and workshops (survey, unit set up, mapping, etc.; Figure 7.2a) and 17 full days of field methods training at the archaeological site of Alabama. Additionally, late afternoons/early evenings during weekdays were spent completing workshops related to laboratory analysis (washing/sorting, cataloguing, preliminary analysis, photography, illustration, photogrammetry/3D scanning, etc.) or additional lectures in Maya prehistory, Belizean history, archaeological methods, etc. (Figure 7.2b). A final full day was dedicated to community outreach/engagement, for which students helped plan, set up, and deliver a presentation on results from the season; artifact viewing/handling stations; and two pamphlets for distribution in the Maya Mopan community relating basic information about archaeology and Alabama (Figure 7.2c).

At site, two groups of students took part in excavations of Structures 10 and 1/2 in the monumental core of the site, where we have been attempting to confirm chronological and architectural information reported from excavations in the 1980s by the Point Placencia Archaeological Project (PPAP), which suggested rapid construction and a relatively short occupation span for the site (Chapter 2, this volume). Excavations focused on the centerline of the Str 10 north stair (8 m x 3 m excavation trench), and the interstice between Strs 1 and 2 (8 m x 3 m excavation trench) where project directors hypothesized an alternate entry way into the site and the possible location of the earliest activity in the monumental core (based on structure location and orientation). Both excavations served to clarify questionable results mentioned in the PPAP reports and revealed previously undocumented phases of the North Plaza, East Plaza, Str 10, and Str 1-2 architecture (to be further investigated over future seasons). This will serve to further refine our understanding of site core development and likewise refine (or refute) our hypothesis regarding ‘boomtown’ development at Alabama. A third group of students excavated at a residential site (ALA-045A) in the settlement zone (Figure 7.2d), focused on investigating a curved stone alignment/feature encountered at the end of the 2016 season that was believed to be a possible burial cyst—which in the end proved to be an unknown architectural feature, providing additional insight into the unusual architectural techniques in use at Alabama (see Chapter 3, this volume).



Figure 7.2: Learning to operate a total station (a), evening lectures (b), local outreach event (c), excavations at ALA-045A (d)



Figure 7.3: Touring Gulisi Garifuna Museum

Results of this student-generated data were communicated in a preliminary report to the Belize Institute of Archaeology, and are further communicated in this volume, which will be made available on our project website and distributed in hard copy to members of the Maya Mopan community as well as the property owner. Additionally, this data will play an important role in upcoming conference presentations and resulting publications. Preliminary results, and general commentary on field school experiences, were also communicated by students via our project blog on a weekly basis (www.scraparchaeology.com).

Students were evaluated based on their participation in field, lab, and lecture/workshop; daily field notes; and the final examination group challenge (outreach/engagement initiatives mentioned above). Appendix B includes copies of associated course outlines, final examination guidelines, and the winning pamphlets produced for distribution in Maya Mopan.

On weekends, students took part in planned field trips to cultural and natural attractions throughout the country, including trips to the Gulisi Garifuna Museum (Figure 7.3), Mayflower-Bocawina National Park, a chocolate tour, the Serpon Sugar Mill, Placencia, Hopkins, Lubaantun, Nim Li Punit, Xunantunich, Cahal Pech, and Blue Hole-St. Hermann's Cave National Park. Additional tours/workshops were provided as part of our stay at Nuuk Che'il Cottages in Maya Centre where students learned about the history of the community and neighbouring Cockscomb Basin Wildlife Sanctuary, Maya spirituality, cuisine, traditional healing, and craft production from our hosts.

Successes & Challenges

The Instructors' Perspective

Overall, the field school instructors/supervisors were content with the balance of readings assigned to the students—in terms of both archaeological method and 'cultural' readings about Belizean prehistory and history. Students were also satisfied, based on verbal feedback and formal evaluation surveys through the University of Calgary.

In terms of methodological training, we have decided that instead of afternoon/evening lab work and training, in future iterations of our program we will assign each excavation group a day in lab to focus completely on these methods with their unit supervisor and our newly appointed lab director.

The 2018 season also marked our first time using a paperless, mobile, relational database system (iPad-based Codifi system). This worked well for the supervisors, but we feel that maintaining the paper lot form system for students will be best for training purposes (with supervisors still recording on the iPad system).

We will also plan fewer weekend trips, allowing the students more free time to independently explore the Maya village of Maya Centre and the nearby Cockscomb Basin Wildlife Reserve.

The Students' Perspective

The following section—written by the two student co-authors of this chapter—is taken from their conference presentation at the 2018 Chacmool Archaeological Conference in Calgary (Figure 7.4a). It is written in their-own words (with minor grammar and terminology editing by the lead author) and discusses their experiences with the field school program.



Figure 7.4: presenting at Chacmool Conference (a), team signs (b), excavating at Str 10 (c), afternoon lab (d).

This year, there were three different excavations going on at the site and a total of 9 field school students spread out over these sites. We got to decide our group names as a team building exercise: The Plumb Bobbettes, Ixtuculil, and Team Chulche (Figure 7.4b). One of the excavation sites, designated Operation 3 at mound ALA-045A, was located in the settlement area in the middle of the modern orange orchard. The other two excavation sites were located in the monumental core: one set up between Strs. 1 & 2 (Operation 6) facing Str. 10, and the second set up on the north side of Str. 10 (Operation 5).

The goal of ALA-045A excavations was to expand the 2016 excavations. An interesting stone alignment was encountered in 2016 and we were to uncover more of the feature to get a better understanding of what it was (we had hoped for a burial to shed additional light on the occupants of the house). The excavation at Str. 10 was intended to determine if archaeologists in the 1980's had already excavated in that location. Earlier reports stated their intent to dig at Str. 10 but then the reports stopped and there was no indication if they had already worked there or not (Figure 7.4c). The third excavation location at the join between Str. 1 and 2 was excavated to determine the purpose of the gap between the two buildings, which was hypothesized to have been an entrance into the core.

The field school lasted for 4 weeks and we excavated from Monday to Friday and then labs and lectures were held after our excavations. Lab work was done on Mondays, Wednesdays, and Fridays while lectures were held on Tuesdays and Thursdays. In the lab, we learned skills such as cleaning and washing the artifacts, how to properly catalogue, drawing, and learning how to photograph the artifacts. Washing the artifacts was a group activity, and we washed our artifacts we excavated from our sites (Figure 7.4d). If we finished washing ours early, we would help the other groups get theirs done too. Due to the acidity of the soil at Alabama, our ceramics were very fragile and we had to be careful washing them, we made sure to avoid submerging them into the water or brushing too hard. We were taught which types of artifacts needed to be washed and which ones we shouldn't, depending on the type of further analysis needed to be done. We were always dirty, and after the field, our instructors made sure to tell us not to change out of our work clothes because we would get dirty again in lab. Once we finished our lab, if we finished early, we would all try and head to the showers before dinner, which was typically a race since we only had three working showers. Not many people wanted to shower at night due to all the creepy crawlies, and sometimes the water would run out mid shampoo, and one of the showers didn't have a light bulb. For the lectures, we learned about the Alabama site itself, the Maya in general, and various methods and techniques employed in archaeological research. Lectures were held after dinner and on Friday nights we had a movie night! We learned quickly in the first couple of days that it's better to wear pants and sweat, than wearing shorts to be cool but be eaten alive by bugs. Sometimes during the movies or lectures the rain would get the best of us, pounding on the metal roof; sometimes it would pass, sometimes we just got to skip the lecture!

The weekends were reserved for excursions. During these weekend excursions we visited a number of archaeological sites including the Mayflower Site, Lubaantun, Nim Li Punit, Cahal Pech, Xunantunich, and the historical site of Serpon Sugar Mill. In addition to these, we were also given the opportunity to enjoy some of the other tourist attractions of Belize such as Placencia, Hopkins, St. Hermann's Cave-Blue Hole, the Gusili Garifuna Museum, and we also had a chocolate farm tour. One unfortunate weekend at the Placencia beach we were all looking forward to getting burgers and drink piña coladas on the beach. But the day did not turn out so great. The first person got sick in the morning (one of the co-authors), so they basically slept on the beach trying not to be sick while everyone else was playing in the water. Other people started to be sick as the afternoon went on and so we ended up leaving early that day. What was supposed to be a 40-minute drive turned into at least an hour and a half, making constant stops for people to puke. Almost everyone except three people got sick that day and it wasn't pretty. We then named our project van "The Vomit Comet." We aren't too sure why everyone got sick but we did get a sick day from the field! Since everyone was still recovering on Sunday we had that as our sick day and went on our weekend excursion on Monday instead when everyone was feeling better. The last weekend there we overnighted in Cayo and everyone was so excited to have good internet and air conditioning in our rooms, which was a plus since for a week we did not have internet access due to a bad storm. It was nice to be able to get away from the Internet but once it came back on we were all checking our phones and uploading to our Instagrams instantly. Going on the weekend excursions was a nice break from the excavation; we got to wake up at 6am instead of 5am, which was nice. It was also lots of fun to go visit these breathtaking sites, or go relax on the beach. Our first weekend excursion we were at Hopkins beach for a couple hours before dinner and we spent the whole time in the water just floating and relaxing. All of the sites we visited were so

brehtaking, we would not be able to pick a favourite but without a doubt we'll go back to Belize to see them all again, it really was an experience.

We spent the first week in Belize getting used to the hot and humid environment. We were given a lecture by the Maya couple that hosted us about the community and the wildlife sanctuary nearby and then they toured us around the place where we stayed (Figure 7.5a). We also learned practical skills in workshops before going into the field, such as setting up excavations units. We were taught mapping skills, how to set up and use total stations, all important skills in the archaeology field.

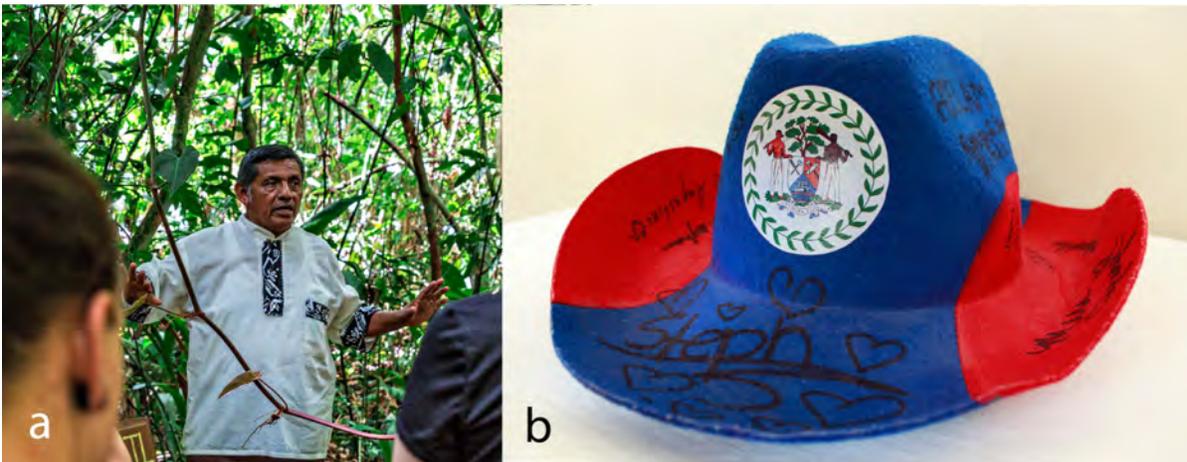


Figure 7.5: Mr. E. Saqui giving a Maya forest tour (a), cowboy hat, signed by students (b).

After the second week we got into the rainy season and had to deal with our excavations getting flooded. In the orange orchard the one time our site got rained on it made the soil a bit softer so it wasn't as dry and easier to dig. But the sites in the monumental core weren't so lucky, they had to go in most mornings and bail out their site, the soil there already was very muddy so the water would just sit on top and not be absorbed. One unfortunate Monday when we went in, excavations at Str. 1-2 were flooded over the weekend and frogs actually laid their eggs in the puddle at the bottom of the unit, and then when we got there, we soon found the tadpoles swimming around in the puddle! One student tried to scoop up most of the tadpoles and moved them into a nearby pond. They also had to be careful when screening because sometimes frogs would end up in the screening buckets, so they had to be careful not to put the frogs through the screen. At that same location, when they were removing some of the fallen granite facing blocks, they found a tarantula and her egg sack living in the excavation area.

Some of our favourite times were lunch, where we'd get an hour break to eat lunch at a local Maya restaurant close to the site and to share what we found at our sites with each other. After lunch, everyone bought Freezies to cool off just before heading back to the site for the rest of the day. Over at the orange orchard settlement site we had orange breaks at 10 am, where we would all go hunting for the juiciest oranges to snack on and sometimes we even got to eat coconuts during those breaks.

Every night when we returned from the field, the supervisors would talk about what discoveries were made that day and at dinner one lucky person got to wear a special cowboy hat for the best discovery (Figure 7.b). It was a privilege to get the hat, even though the hat was an ugly red and blue felt cowboy hat. Some things that won the hat included a granite slab, pieces of

'amber' (melted copal), the plaster-like flooring found at Str. 1-2, a metate (grinding stone) fragment, and a large portion of a pottery vessel. At the settlement site we also found a large number of obsidian blades.

Throughout our time in the field school, we got to eat different kinds of Belizean dishes. We were served different kinds of food each day. Some of our favourites were chicken tamales, empanadas, tortillas, fry jacks and more. The food was fresh in Belize and it just wasn't the same when we got back home. Most days it was always something different, which was great for us to try all these new foods but it was also exciting when we got pancakes or spaghetti—something to remind us of home.

All students had the responsibility of keeping track of our work in field notebooks that the project provided for us. In the notebook, we had to record as much information on what we did for the day and also any of our own interpretations about our site. For the ARKY 506 (Advanced Archaeological Field Techniques) student in the group, what was done over the course of the field school was a little different from the ARKY 306 students. In addition to the material covered by beginner students, the advanced student had the opportunity to learn about the permitting process in Belize, assist in planning the excavation, and help supervise an excavation. By the end of the field school, the student also had to help write up the final excavation report [see Chapter 3, this volume].

Overall the trip was amazing. We gained so much experience, made so many new friends, and we would do this again in a heartbeat. Getting that hands-on experience, such as getting to excavate and screen materials, keeping a field book to record our own interpretations and thoughts about our site, were very important experiences since not all field schools allow as much hands-on experience in the excavation. No matter how many bug bites we got it was an experience we would never take back. Although it did take a while to get used to all the different bugs, we eventually became indifferent to them. We were always told to do a field school before finishing our degree to see if we would actually enjoy being an archaeologist (since being in the field is a completely different experience from sitting in lectures all week), and now some of us can say with 100% certainty that this is something we would want to do for the rest of our lives. The field school was a life-changing experience. We learned a lot, not only about Maya culture of the past but also about the Maya of the region today. We were able to experience what it's like to excavate in the Maya region, and became familiar with how research projects run. All of the practical experiences we gained from going into the field school cannot be accounted for by sitting in the lecture theatre at a university, or by reading textbooks. For many of us, the field school made us even more intrigued about the ancient Maya, and the research around them as well.

Appendix A. Classification Guides, Recording Sheets & Codifi

SCRAP investigations follow a number of existing classification schemes as closely as possible when appropriate.

Matrix Colour Descriptions: Munsell Soil Colour Chart

Architecture: Loten, S., and D. Pendergast (1984). *A Lexicon of Maya Architecture*. Royal Ontario Museum, Toronto, ON.

Burials: Welsh, W.B.M. (1988). *An Analysis of Classic Lowland Maya Burials*. BAR International Series 409. British Archaeological Reports, Oxford.

Settlement Site Types: Ashmore, W., S.V. Connell, J.J. Ehret, C.H. Gifford, T. Neff, and J.C. VandenBosch (1994). The Xunantunich Settlement Survey. In *Xunantunich Archaeological Project, 1994 Field Report*, edited by R.M. Leventhal and W. Ashmore, pp. 248-289. Report submitted to the Belize Institute of Archaeology, Belmopan.

Other Materials:

Additionally, we have many of our own recording forms and additional classification guides, which were adopted or developed based on a number of sources and inspired by many other research projects (see below). Not included in this appendix are our basic artifact analysis protocols. The primary recording form—the lot form—has now been incorporated into our new mobile relational database system, developed for use in the field by Codifi, Inc. (Figure A.1).



Figure A.1: Piloting new mobile relational database system during SCRAP 2018 excavations at Alabama.

Temporal Designations (working version)

Postclassic Period	(PC)	ca. AD 900 to 1525
Late Postclassic	(LPC)	ca. AD 1200 to 1525
Early Postclassic	(EPC)	ca. AD 900 to 1200
Classic Period	(CP)	ca. AD 250 to 900
Terminal Classic	(TC or LCIII)	ca. AD 800 to 900
Late Classic	(LC)	ca. AD 600 to 800
<i>Late facet</i>	(LCII)	ca. AD 700 to 800
<i>Early facet</i>	(LCI)	ca. AD 600 to 700
Early Classic	(EC)	ca. AD 250 to 600
Formative Period	(FP)	ca. 1200 BC to AD 250

Context Designations (adjusted as required)

Context Types	Deposit Type	Lot Type
Ploughzone	Primary	Natural
Humus	Secondary	Cultural
Colluvium	De Facto	Arbitrary
Fall		
Habitation Debris		
Slump		
On Floor		
Floor Cap		
Floor Ballast		
Floor Fill		
Construction Fill		
Occupation Horizon		
Buried Horizon		
Bedrock		

Matrix Inclusions Designations

	Diameter (mm)
boulders	>300
cobbles	75-300
coarse gravel (lg pebbles)	75-19
fine gravel (sm pebbles)	19-4.8
coarse sand	4.8-2.0
medium sand	2.0-0.43
fine sand	0.43-0.08
fine silt & clay	<0.08

Settlement Survey Form

Stann Creek Regional Archaeology Project

**SETTLEMENT SURVEY
FORM**

Date: _____ / _____ / _____ Recorder: _____
 YYYY / MM / DD Archaeo. Site: _____ Accession # _____

1. Settlement site designation: ALA- _____ (3-digit number) or _____
2. Property Block: _____ (see property map).
3. Classify using classification below: _____
4. Identify the feature: mound _____ artefact scatter _____ borrow pit _____
 other (describe) _____
5. Photograph number(s): _____
6. Record a GPS (WGS84) point (note location, ideally at the centre/datum of each feature):
 Device # _____ Point # _____ Location description: _____
 UTM Quadrant _____ Easting _____ / Northing _____
7. Surface collection (label bags with ss designation number)? Yes ___ No ___
 If yes, describe contents: _____
8. Provide a more complete description of the site (e.g. area, height, material, associated mounds, etc.) on the back of this form and in your notebook
9. If mound is greater than 0.5m high, draw a tape-and-compass map on the back of this form (noting location of GPS point). Label map with ss designation number.

Settlement Survey Unit Classification (modified from Ashmore et al. 1994)

Type	Description
0	Non-mounded feature (e.g. scatters, borrow pits, quarries/sources, water management features).
I	Isolated mound less than 2m high.
II	2-4 mounds, informally arranged, all less than 2m high.
III	2-4 mounds, orthogonally arranged, all less than 2m high.
IV	5 or more mounds, informally arranged, all less than 2m high.
V	5 or more mounds, at least 2 arranged orthogonally, all less than 2m high.
VI	1 or more mounds, at least 1 being 2-5m high.
VII	1 or more mounds, at least 1 being higher than 5m.

Excavation Lot Form (now entered directly into mobile relational database)

Stann Creek Regional Archaeology Project

LOT FORM

Acc#		Site/Str.:		Date:
Op:	Investigators			
Subop:	Dimensions (m): ___ N/S x ___ E/W		Break: Arbitrary ___ Cultural ___ Natural ___	
Lot:	Orientation (degrees):		Location in Subop:	
Context:			Associated Lots:	
Physically Above:			Physically Below:	
Goals:				
LOT DEPTHS (centimeters)			SKETCH OF BASE OF LOT (incl. scale, north arrow)	
Datum name:				
Datum elevation:				
<i>Corner</i>	<i>Top</i>	<i>Bottom</i>		
NW				
NE				
SE				
SW				
Centre				
MATRIX DESCRIPTION				
Colour (Munsell):				
Texture:				
Inclusions:			ADDITIONAL COMMENTS (use back of form if required)	
MATERIALS (estimate numbers)			RECORDS: photos ___ top plan ___ profiles ___ other ___	
Ceramic:			Photo numbers:	
Lithic:				
Groundstone:			Drawing numbers:	
Faunal:				
Other:				
SAMPLES (types and numbers)			Other numbers:	

Artifact Card & Artifact Classification Guide

STANN CREEK REGIONAL ARCHAEOLOGY PROJECT

ACC.#: _____ Date: (dd) ____/(mm)____/(yyyy)_____

Site/Str.: _____ Supervisor: _____

Operation: _____ Excavators: _____

Suboperation: _____

Lot: _____

Context: _____ Sealed? Y N

Location in lot: _____

CONTENTS:

Bulk: CR _____ LT _____ GS _____ DB _____ FN _____ HU _____ OTHER _____

Small: CR _____ LT _____ GS _____ OB _____

FN _____ Other Special (SP) _____

Cat. #: _____ Bag (x) _____ of (n) _____

SCRAP Artifact Classification Guide
(add new types where necessary)

Cat.	code	ARTEFACT TYPE	Cat.	code	ARTEFACT TYPE	Cat.	code	ARTEFACT TYPE	Cat.	code	ARTEFACT TYPE
Ceramic	CS	bulk lot	Lithic	LT	bulk lot	Ground stone	GS	bulk lot	Faunal	FN	bulk lot
		bead			awl			adorno			pendant
		cylinder seal			adorno			adze			adorno
		ear ornament			blade			anchor			awl
		figurine			burin			barkbeater			bead
		figurine whistle			chopper			baton			cut piece
		flat stamp			crystal (quartz)			bead			drilled piece
		glyph-iconography			drill			celt			fishhook
		ladle censer			eccentric			doughnut stone			incised piece
		mask			graver/scrapper			ear ornament			pin
		musical instrument			hammerstone			grooved sphere			punch
		net weight (butterfly)			knife			incised stone			spatula
		pendant			macroblade			mano (fragment)			spindle whorl
		perforated potsherd			notched flake			mano (preform)			stingray spine
		potsherd disk (perfor.)			perforator			mano (whole)			tinkler
		spindle whorl			pounding stone			metate (fragment)			unclassified
		unclassified			projectile point			metate (preform)			worked piece
		potsherd disk (unperf.)			scraper			metate (whole)	Obsidian	OB	NO bulk lots
		vessel			thick biface			mirror			blade
		vessel (partial)			thin biface			mortar			blade core (fragment)
		worked potsherd			unclassified			mosaic piece			blade core (whole)
Historic	HT	glass			utilized flake			painted slate			core (fragment)
		coins	Daub	DB	bulk lot			patolli board			core (whole)
		composite			special			pendant			eccentric
		faunal			corner piece			perforated facing stone			flake
		human			painted			pestle			projectile point
		metal			unclassified			portable sculpture			shatter
		plastic	Human	HU	bulk lot			pounding stone			thin biface
		pottery			carved piece			ring-stone			
Special Finds	SP	raw hematite			inlayed teeth			rubbing stone			
		raw jadeite			painted piece			spindle whorl			
		speleothem			unclassified			unclassified			
								wrench			

Sample (carbon, soil, etc.) Record Form

Stann Creek Regional Archaeology Project

SAMPLE RECORD FORM

THE BASICS:

Site/Structure: _____ Date: _____
Operation: _____ Accession #: _____
Suboperation: _____ Supervisor: _____
Lot: _____ Sample #: _____
Context: _____

THE SAMPLE

1. Sample Type:

carbon _____ soil _____ flotation _____ plaster _____ other (specify) _____

2. Location in lot:

_____ cm from _____
_____ cm from _____
_____ cm below suboperation datum (_____)

**show location of sample on your lot form 'base of lot' sketch or provide additional sketch on backside of this form*

3. Purpose & Description of Sample:

4. Factors Affecting Validity or Context:

5. Recording:

Photo #:

Drawing #:

6. Other Comments and Observations:

*****Use backside of this form if necessary for further description/recording purposes*****

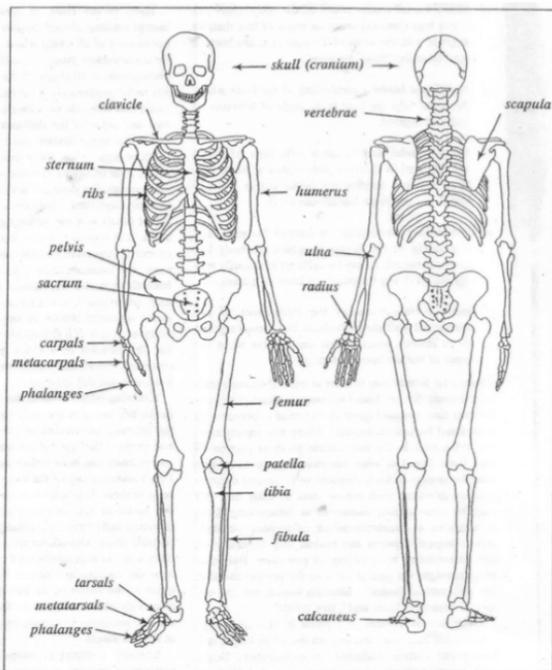
Stann Creek Regional Archaeology Project

BURIAL FORM

THE BASICS:

Site/Structure: _____ Date: _____
 Operation: _____ Accession #: _____
 Suboperation: _____ Supervisor: _____
 Associated Lots: _____ Burial #: _____
 Burial Context: _____

THE BURIAL & GRAVE (shade in bones present on figure)



1. Preservation:

Good _____ Fair _____ Poor _____

2. Completeness:

SKULL	POST-CRANIAL
_____	100% _____
_____	> 75% _____
_____	50-75% _____
_____	25-50% _____
_____	< 25% _____
_____	0% _____

3. Burial Type:

Extended _____ Flexed _____
 Semi-Flexed _____ Seated _____
 Primary _____ Second. _____
 Cremated _____ Partial. Crem. _____
 Articulated _____ Not Articulated _____

4. Burial Dimensions:

Maximum length (cm) _____ Orientation _____
 Maximum width (cm) _____ Orientation _____
 Overall orientation of burial _____ Orientation of face _____

5. Specific Measurements (cm):

Humerus _____ Radius _____ Femur _____ Tibia _____ Crown to Heel _____

1/2

****FILL OUT THIS FORM IN ADDITION TO ASSOCIATED LOT FORMS AND ALL REQUIRED ILLUSTRATIONS****

Burial Record Form – Reverse

Stann Creek Regional Archaeology Project

BURIAL FORM

6. Grave Type (Welsh 1988):

Simple _____ Chultun _____ Cist _____ Crypt _____ Tomb _____ Unknown _____

7. Associated Artefacts:

8. Further Description/Observations:

9. Sketch (indicate scale):

10. Documentation & Samples:

Photo number(s):

Soil samples:

Drawing numbers:

Flotation samples:

Other:

****FILL OUT THIS FORM IN ADDITION TO ASSOCIATED LOT FORMS
AND ALL REQUIRED ILLUSTRATIONS****

2/2

Appendix B. Field School Program Documents

ARKY 306
FIELD COURSE IN ARCHAEOLOGICAL TECHNIQUES
Maya Archaeology in Belize Field Program

Department of Anthropology and Archaeology
University of Calgary
Spring 2018
19 May-15 June

Instructor: Meaghan Peuramaki-Brown
Office: NA
Phone: NA
Email: mmpeuram@ucalgary.ca

Lecture/Practical: 4-week international field course (6-CREDITS)

PLEASE NOTE: As this is part of an off-campus field program, we will be engaged in field work (“class”) in Belize. Field and lab work will be conducted Monday to Friday, 7:00 am to 5:00pm. Mandatory field trips to various locations in Belize will be conducted on the weekends.

PREREQUISITE(S)

ARKY 201 (or equivalent) and Consent of the Department

COURSE DESCRIPTION

Students will gain experience in all aspects of archaeological excavation, which is a team effort. Students will work in teams as they practice site excavation techniques; land navigation using map, compass, and global positioning instruments; total station and transit data recording and mapping; excavation photography; plan view and profile recording; note taking and form recording; artifact and sediment processing; and cataloguing/processing of artifacts.

Lecture topics: (1) excavation techniques; (2) general site recording; (3) journal note-taking, floor plans, and site photograph; (4) soils, sediments, stratigraphy, and profile drawing; (5) basic lithic, ceramic, zooarchaeological, paleoethnobotanical, and residue collection and analysis; (6) cataloguing; (7) basic Maya archaeological history; (8) basic mapping and simple topographic mapping. ***these topics will be covered during the first few days of the field program, as well as at regular intervals throughout the 4-week program.*

LEARNING OUTCOMES

By the end of ANTH 306, students will have:

- Started and completed an archaeological excavation unit with their assigned team.
- Performed basic archaeological survey, excavation, and mapping techniques.

- Performed basic artifact cataloguing and recording techniques.
- Engaged in the group as a full participant to the program.
- Navigated the multiple challenges associated with conducting fieldwork in a small community, in a small group, in a new environment, with a heavy workload.
- Participated in a community outreach event in a small Maya village.
- Considered Maya prehistory as they are recorded in Belizean archaeology.
- Visited multiple archaeology sites and reflected critically on their role in Belize today

TEXTS & EXAM

There is no textbook required for this course. Any assigned readings will be provided in advance by the instructor.

There is no Registrar’s scheduled final exam for this course. The only exam will be written during the final week in the field.

ATTENDANCE

Archaeological excavation instruction and practice is a team effort; absence from class (lectures, fieldwork, and lab work) negatively affects the work of the remaining students, who must do the work of the absent students in addition to their own. Class attendance—lecture, field, lab—is therefore required.

EVALUATION

Participation		
Field	35%	
Lecture/Lab	20%	
Field Notes	30%	
Final Exam	15%	

All components must be completed/submitted. Passing grades on the field and lecture/lab participation components are required to pass the course.

GRADING

Final course grades will be calculated as follows:

A+	100 - 94.9%
A	94.8 - 89.9%
A-	89.8 - 84.9%
B+	84.8 – 79.9%
B	79.8 - 74.9%
B-	74.8 – 70.9%
C+	70.8– 66.9%
C	66.8 – 62.9%

C-	62.8 – 58.9%
D+	58.8 – 54.9%
D	54.8 – 49.9%
F	49.8% and below

ELECTRONIC COMMUNICATION

As there are no formal meetings for this course, students are encouraged to communicate with the instructor via email to either set up appointments as needed, or to ask clarifications.

ACADEMIC ACCOMMODATIONS

<http://www.ucalgary.ca/access/accommodations/policy>

Students needing an Accommodation because of a Disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities

Students needing an Accommodation based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the instructor of this course, Meaghan Peuramaki-Brown.

ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Calgary is a strong signal of each student's individual academic achievements. As a result, the University treats cases of cheating and plagiarism very seriously. Non-academic integrity also constitutes an important component of this program.

For detailed information on what constitutes academic and non-academic misconduct, please refer to the following link: <http://www.ucalgary.ca/pubs/calendar/current/k-2-1.html>

All suspected cases of academic and non-academic misconduct will be investigated following procedures outlined in the University Calendar. If you have questions or concerns about what constitutes appropriate academic behavior or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources.

Where there is a criminal act involved in plagiarism, cheating or other academic misconduct, e.g., theft (taking another student's paper from their possession, or from the possession of a faculty member without permission), breaking and entering (forcibly entering an office to gain access to papers, grades or records), forgery, personation and conspiracy (impersonating another student by agreement and writing their paper) and other such offences under the Criminal Code of Canada, the University may take legal advice on the appropriate response and, where appropriate, refer the matter to the police, in addition to or in substitution for any action taken under these regulations by the University

ARKY 506
ADVANCED ARCHAEOLOGICAL FIELD TECHNIQUES
Maya Archaeology in Belize Field Program

Department of Anthropology and Archaeology
University of Calgary
Spring 2018
19 May-15 June

Instructor: Kathryn Reese-Taylor
Office: NA
Phone: NA
Email: kreeseta@ucalgary.ca

Lecture/Practical: 4-week international field course (6-CREDITS)

PLEASE NOTE: As this is part of an off-campus field program, we will be engaged in field work (“class”) in Belize. Field and lab work will be conducted Monday to Friday, 7:00am to 5:00pm. Mandatory field trips to various locations in Belize will be conducted on the weekends.

PREREQUISITE

ARKY 201 and ARKY 306 (or equivalents), and Consent of the Department

COURSE DESCRIPTION

Students will work to build on their previous knowledge of the theory and practice of archaeological field research and field work management. Course emphasis is on student acquisition of the advanced skills and knowledge required to work as senior members of academic and resource management archaeological crews, particularly as field supervisors/ crew chiefs.

LEARNING OUTCOMES

By the end of ANTH 506, students will have:

- Supervised one aspect of the daily field program (field management project), and all associated activity and personnel.
- Started and completed an archaeological excavation unit with their assigned team.
- Performed advanced archaeological survey, mapping, and excavation techniques
- Performed advanced artifact cataloguing and recording techniques
- Be able to use primary literature in archaeology to design a small research project.
- Formulate research hypotheses to guide their data collection
- Engaged in the group as a full participant to the program.

- Navigated the multiple challenges associated with conducting fieldwork in a small community, in a small group, in a new environment, with a heavy workload.
- Participated in a community outreach event in a small Maya village.
- Considered Maya prehistory as they are recorded in Belizean archaeology.
- Visited multiple archaeology sites and reflected critically on their role in Belize today

TERM PROJECTS

Each student will complete two term projects: a field management project and a site-based research project. The field management project will be assigned on the first day of class. Students will submit a site-based research project proposal by the end of the first week of classes for instructor approval. Students who do not have an approved project by the beginning of the second week of class will be assigned a field report project based on the work of their assigned crews/teams.

TEXTS & EXAMS

There is no textbook required for this course. Any assigned readings will be provided in advance by the instructor.

There is no Registrar’s scheduled final exam for this course. Write-up of Site-based Research Project will be submitted upon return to Canada.

ATTENDANCE

Archaeological excavation instruction and practice is a team effort; absence from class (lectures, fieldwork, and lab work) negatively affects the work of the remaining students, who must do the work of the absent students in addition to their own. Class attendance—lecture, field, lab—is therefore required.

EVALUATION

Participation	
Field	25%
Lecture/Lab	25%
Field Management Project	25%
Site-based Research Project	25%

All components must be completed/submitted. Passing grades on the field and lecture/lab participation components are required to pass the course.

GRADING SCHEME

Final course grades will be calculated as follows:

A+ 100 - 94.9%

A	94.8 - 89.9%
A-	89.8 - 84.9%
B+	84.8 - 79.9%
B	79.8 - 74.9%
B-	74.8 - 70.9%
C+	70.8 - 66.9%
C	66.8 - 62.9%
C-	62.8 - 58.9%
D+	58.8 - 54.9%
D	54.8 - 49.9%
F	49.8% and below

ELECTRONIC COMMUNICATION

As there are no formal meetings for this course, students are encouraged to communicate with the instructor via email to either set up appointments as needed, or to ask clarifications.

ACADEMIC ACCOMMODATIONS

<http://www.ucalgary.ca/access/accommodations/policy>

Students needing an Accommodation because of a Disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities

Students needing an Accommodation based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the instructor of this course, Kathryn Reese-Taylor.

ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Calgary is a strong signal of each student's individual academic achievements. As a result, the University treats cases of cheating and plagiarism very seriously. Non-academic integrity also constitutes an important component of this program.

For detailed information on what constitutes academic and non-academic misconduct, please refer to the following link: <http://www.ucalgary.ca/pubs/calendar/current/k-2-1.html>

All suspected cases of academic and non-academic misconduct will be investigated following procedures outlined in the University Calendar. If you have questions or concerns about what constitutes appropriate academic behavior or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources.

Where there is a criminal act involved in plagiarism, cheating or other academic misconduct,

ARKY 306 Field Course in Archaeological Techniques
Maya Archaeology in Belize Program, Spring 2018, University of Calgary
Instructor: Dr. Meaghan Peuramaki-Brown

Final Examination/Challenge

Due: Monday, June 11, 2018

Increasingly, public outreach and community engagement is becoming a critical aspect of archaeological research in Belize, and throughout the world. Instead of having you write a standard exam about archaeological methods, etc., I have decided to challenge you to apply the knowledge gained from this season to create useful, informative outreach publications (this has also come at the request of the village alcalde). You must work together in your team to produce these documents and have three weeks to do so. You should be producing something that you would be proud to have others read, so do not leave this until the last second. I (Dr. Meaghan Peuramaki-Brown) will evaluate your products based on the criteria listed below; however, we will also vote as a group (staff and students) for the best of each topic, and these will be reproduced for distribution within the Maya Mopan community—and beyond!

Instructions: Working in your excavation crew (2-3 students), you will prepare two (2) public outreach booklets/pamphlets, one introducing the archaeological site of Alabama and the other about archaeology in general. Your final product will be evaluated using the formatting and evaluation criteria listed below.

Audience: The residents—young adult to adult—of Maya Mopan village. Note: the literacy rate of this community, and Maya communities in general in Belize, is very high, so this is not an issue.

Formatting:

- Must be printable on 8.5” x 11” piece of paper—set this up so it can be printed as either a 4-page booklet (single page folded in half) or 6-paged tri-fold pamphlet.
- Must be formatted for black and white printing—so consider this with your image choice.
- Consider size of print for elderly audience or those with poor vision. Minimum 10-point font.
- Submit as an MS Word (.doc) or Pages (.pages) document via data stick or email to meaghanp@athabascau.ca

Evaluation Criteria:

- Consider a balance of text and image. We can give you access to formal maps—or you can create your own—and you can use your own photos, drawings, etc. Make sure any text is in your own words, and not direct copies of existing publications.
- Avoid extremely technical/academic ‘jargon’ or make sure to clearly explain terms/concepts.
- Alabama publication should include at least the following information:
 - General location (do not give exact details)
 - General dates of occupation
 - Special features that make the site interesting and unique
 - Why it should be considered important (make relevant to audience)
 - SCRAP logo

- Archaeology publication should include at least the following information:
 - What is archaeology? How is it different from illicit looting activity?
 - What are some examples in Belize?
 - How is it done?
 - Why it should be considered important (make relevant to audience)
 - SCRAP logo

What is SCRAP?

SCRAP stands for Stann Creek Regional Archaeology Project, and it focuses on preserving the culture and history of the ancient Maya of the Stann Creek District. The project team has been studying the Alabama site since 2014, led by Dr. Meaghan Peuramaki-Brown.

Where is the Alabama site?

Alabama is located at the Stann Creek District, along the eastern foothills of the Maya mountains in the East-Central Belize within an orange orchard, and it is close to the community of Maya Mopan.



Ball court for the Mesoamerican ballgame at Alabama

Why should you care about Alabama?

The Alabama site represents an important part of Belizean history and culture. Looking into the past can help us understand how the Maya dealt with urban planning, rapid population growth, and resource management. This information can help us address current issues in Belize and around the world.

What can you do to help preserve the Alabama site?

- Don't Loot! Help protect the site for future research & education
- Share information about SCRAP
- Get involved with future excavations

Contact Information:

E-mail: scrap.arky@gmail.com

Website: scraparchaeology.com

Telephone: +1 403-457-6061

ALABAMA ARCHAEOLOGICAL SITE

Stann Creek Regional
Archaeology Project



Part of the foundation of an ancient house with a garbage pile to the back

Who lived at the Alabama site?

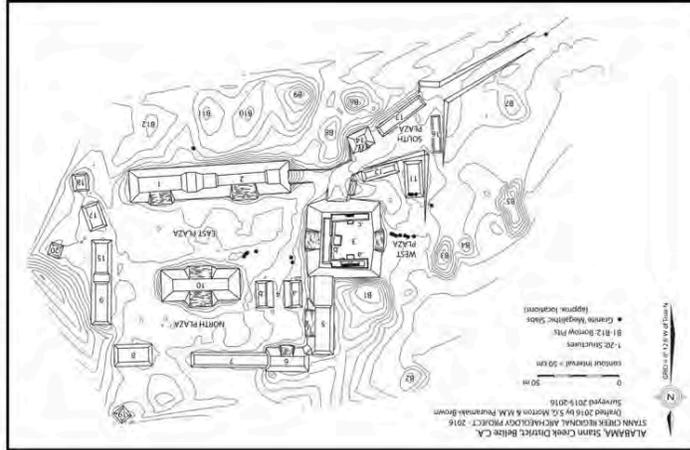
The Alabama site was occupied between at least 700AD and 900AD by ancient Maya people. It has been called a 'boom town' because of the relatively short period of time that people lived there. SCRAP's goal is to understand more about the daily life of Alabama citizens and why it was occupied for such a short time.

What is at the Alabama site?

Alabama is unique because of its monumental architecture, which is uncommon for a smaller population center. The Alabama epicentre consists of 20 main structures made primarily of granite, organized around four plazas. Some of the structures include a ballcourt, a ceremonial causeway, and several platforms which may have housed temples, palaces, and elite residences. The Alabama site also includes a settlement area surrounding the epicentre where common people lived.



Map of Alabama monumental core



What types of artifacts have been found at Alabama?

SCRAP has found a variety of pottery fragments, building material (daub), and different stone tools. These artifacts can tell us a lot about the people who lived at Alabama, for example:

- They lived in and around the monumental core from at least 700AD to 900AD.
- They had perishable houses made of wattle, daub, and thatch.
- They imported materials from far away, including obsidian (volcanic glass) from southern Guatemala (Ixtepeque & El Chayal)



Chert stemmed, straight base, side-notched biface (Terminal Classic to Early Postclassic)



How is it done?

For archaeology in Belize, project directors need the right qualifications and first need to get the proper approval from the government, and land owner. This comes in the form of a permit.

Once on site, archaeologists set up excavation units in the area(s) of interest. These have square corners and are kept neat at all times.

After units are set up, excavation begins! Archaeologists use trowels, picks and shovels to slowly remove the dirt layer by layer. They keep careful records and measurements of everything, in hopes to preserve the knowledge. Each artifact that is found is cleaned, analyzed and shared with the community.

Extensive studies are done about the site and any special artifacts, depending on the research question(s). Research papers and news are then written about any findings.

2

Learn more at:

www.scraparchaeology.com

Or like our Facebook page:

*Stann Creek Regional
Archaeology Project*

Follow our adventures on
Instagram:

@scraparky

Pamphlet designed by:

J. Delos Reyes, K. Hubenig, G. Taylor



6

ARCHAEOLOGY



What is archaeology?

Archaeology is a combination of arts and science, used to help us better understand our past. Archaeologists study past cultures through the placement of artifacts (human-made or not) in a certain area at a given time.

1

How is archaeology different than looting?

Looters take artifacts from sites and destroy the archaeological record for their own profit. Archaeologists, however, aim to learn about the past while working with descendants of that culture, to preserve the knowledge for future generations. The artifacts found in a site will be studied and tested, and then often stay in the country of origin or in museums for everyone to enjoy.



Mano & metate found at Lubaantun

3



Why is archaeology important?

Archaeology is important because it helps people learn more about their past.

We can learn the differences and similarities between us and our ancestors, as well as traditions and practices that they used. It can give us insight into the rise and fall of civilizations.

We can find smaller artifacts (such as manos and metates) that people still use today, or uncover large monuments that were used for hundreds of years.

Uncovering these ancient cities allows the public to visit these sites and learn from them.

4

Examples of Archaeological Sites in Belize:

Alabama (not yet open to public)

Mayflower
Caracol
Cahal Pech
Xunantunich
Nim Li Punit
Lubaantun
Altun Ha
Lamanai
Cerro
Uxbenka



Ballcourt at Nim Li Punit

5

