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Maya Cave Art Survey at Nueve Cerros, Alta Verapaz, Guatemala

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MAYA CAVE ART SURVEY AT NUEVE CERROS, ALTA VERAPAZ, GUATEMALA

by

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MAYA CAVE ART SURVEY AT NUEVE CERROS, ALTA VERAPAZ, GUATEMALA

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This final paper is original research developed and executed as a thesis study for the degree of Master of Science in Cultural Resource Management Archaeology at Saint Cloud State University (SCSU). In addition to SCSU, this project operated in west-central Guatemala under the auspices of Proyecto Salinas de los Nueve Cerros [Salt Plain of the Nine Hills Project] from January until April of 2011. The purpose of this study was to record Nueve Cerros cave art, analyze its content, and go on to interpret its potential meanings and significance. Field survey recorded a significant cave art assemblage dispersed between three decorated caves, all located at a single hill in the Nueve Cerros karst ridge system. Scaled photographs of the 27 cave art portrayals were digitally enhanced and measured with Adobe Photoshop™. Measurements were exposed to statistics of variation, which facilitated interpretation along with a broad literature review. The majority of the cave art assemblage was interpreted as a single, cohesive component of a kind of symbolic behavior that has also been recorded elsewhere in the Maya culture area. This cultural cave practice was performed for non-material benefit.

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This thesis is dedicated in loving memory to Joseph S. Wynne. May his legacy live strongly in us all.

TABLE OF CONTENTS

		Page
LIST OF TABLES		ix
LIST OF FIGURES		x
Chapter		
I.	INTRODUCTION	1
	World Rock Art Analysis	3
	Mesoamerica and the Maya Culture Area	6
	Salinas de los Nueve Cerros	8
	Mesoamerican Cave Activity	9
	Nueve Cerros Rock Art	10
	Preliminary Interpretations of the 2010 Cave Discoveries	11
	TECHNICAL TERM DEFINITIONS	12
II.	LITERATURE REVIEW	14
	World Rock Art Analysis	14
	Preservation	14
	The Inefficacy of Rock Art Dating	15
	Cultural Cave Landforms	17
	Mesoamerica and the Maya Culture Area	20
	Mesoamerican Geography and Maya Chronologies	21
	Hieroglyphic Portrayals	23
	Climate	25
	Maya Cave Studies	27
	Maya Cave Art Studies	29

Chapter Page

Statistics and Methods 32

III. METHDOLOGY 34

Systematic Cave Survey and Preliminary Recordation 35

Cave Summary Form 36

Cave Mapping 38

Cave Mapping Terminology 38

Preparation for Excavation 39

Preliminary Cave Excavation Methodology 40

IV. DATA 42

CAVE DESCRIPTIONS 46

Cave 1: Cueva San Juan #1 46

Cave 1: Cave Art Data 50

Cave 1: Preliminary Excavation Data 69

Cave 2: Cueva San Juan #2 76

Cave 2: Cave Art Data 78

Cave 3: Cueva San Juan #3 80

Cave 3: Cave Art Data 82

DATA ANALYSIS 84

Ceramic Artifacts 85

Lithic Artifacts 85

Structure Feature 86

Cultural and Natural Disturbance 87

Eliminating Unauthentic Cave Art 88

Nueve Cerros Cave Art 89

Measurements and Statistics of the Carved Face Motif Typology 91

Cave Art Standardization 92

Chapter Page

Measurements and Statistics of the Negative Handprint Motif Typology 95

V. INTERPRETATIONS 96

Nueve Cerros Painted Hieroglyph 97

Nueve Cerros Etched Portrayal 100

Nueve Cerros Carved Petroglyphic Portrayals 103

Nueve Cerros Handprint Portrayals 107

Other Nueve Cerros Pictographic Portrayals 109

The Role of Precontact Maya Artisans 111

DISCUSSION 114

VI. CONCLUSIONS 117

The Infrequency and Variability of Maya Cave Art 119

Nueve Cerros Maya Cave Art Assemblage 120

The Inconsistency of Maya Cave Art 123

The Role of Cave Practice 124

The Meaning of the Nueve Cerros Cave Art 125

Future Research 128

Concluding Remarks 129

REFERENCES 131

LIST OF TABLES

Table		Page
1.	Number of Cave Landforms at Each Hill Landform	42
2.	Hill Distance from Surface Site Epicenter	44
3.	Alphanumeric Designation Chart for Nueve Cerros Cave Art Portrayals	45
4.	HILL 1: *15P E 1767608 N 0755346*	46
5.	Cave Art Portrayals	89
6.	Tier 1	91
7.	Tier 2	92
8.	Tier 3	92
9.	Negative Handprints	95

LIST OF FIGURES

Figure		Page
1.	Precontact Mesoamerica	2
2.	Highland and lowland regions of the Maya area	7
3.	Left frame: Two pictographic cave art portrayals recorded in 2010. View to north without scale. Right frame: Close up and rotated Maya hieroglyph (Credit: Matt Oliphant).	11
4.	Nueve Cerros 2010 cave discoveries	12
5.	Examples of *Ahaw* hieroglyphs from various contexts. Image taken from Bricker (1995: 217) with the permission of the publisher	24
6.	Map of the rivers that connect to the River Chixoy	26
7.	Ceramic tripod plate discovered at Ch'en Pix Cave in Belize (Colas *et al.* 2000:6). Image used with the permission of the National Speleological Society	28
8.	Field Study Timeline	34
9.	Cave Summary Form	37
10.	Cave Mapping Process	38
11.	Excavation Units	40
12.	Map with the positions of documented hills, cooperating villages, and salt dome	43
13.	Map illustrating the number of caves in each hill landform	44
14.	Hypothetical cave art designation	45
15.	Plan map of Cave 1 with labeled cave art designations	47
16.	Southern entrance of Cave 1. View to southwest (Credit: Matt Oliphant)	48
17.	Possible wallfall indicated by white arrows. View to southwest (Credit: Matt Oliphant)	48
18.	View through Cave 1 from southern dripline. View to north (Credit: Matt Oliphant)	49
19.	Entrance to the chimney from the aerie indicated by red arrow. View to east (Credit: Matt Oliphant)	49
20.	Upward view to aerie. View to west (Credit: Charley Savvas)	50

Figure Page

21. Upper frame: Cave Art 1A. View to north (Credit: Charley Savvas). Lower frame: Cave Art 1A pictured with digital enhancements and black lines where measurements were taken. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 51

22. Upper frame: Cave Art 2A. View to north (Credit: Matt Oliphant). Lower frame: Cave Art 2A pictured with digital enhancements and black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 52

23. Upper frame: Charley Savvas photographing Cave Art 3A. View to north (Credit: Matt Oliphant). Lower frame: Cave Art 3A pictured with digital enhancements. View to east without scale (Credit: Charley Savvas) 53

24. Upper left frame: Cave Art 4B pictured with black lines where measurements were taken. View to south with 20 centimeter scale bar. Lower left frame: Close-up of Cave Art 4B pictured with black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul). Right frame: Cave Art 4B pictured with etched lines highlighted in red and black. View to south (Credit: Matt Oliphant) 54

25. Upper frame: Cave Art 5B. View to south with 20 centimeter scale bar. Lower frame: Cave Art 5B pictured with digital enhancements and black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 55

26. Upper frame: Cave Art 6C. View to south with 20 centimeter scale bar. Lower frame: Cave Art 6C pictured with digital enhancements and black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 56

27. Upper frame: Cave Art 7C. View to east with 20 centimeter scale bar. Lower frame: Cave Art 7C pictured with digital enhancements and black lines where measurements were taken for data analysis. View to east with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 57

28. Upper frame: Cave Art 8C. View to northeast (Credit: Charley Savvas). Lower frame: Cave Art 8C pictured with black lines where measurements were taken. View to northeast with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 58

29. Upper frame: Cave Art 9C. View to north with 20 centimeter scale bar. Lower frame: Cave Art 9C pictured with digital enhancements and black lines where measurements were taken. Black arrows indicate areas of coloration. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 59

30. Upper frame: Cave Art 10D. View to north with 20 centimeter scale bar. Lower frame: Cave Art 10D pictured with digital enhancements and black lines where measurements were taken. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 60

Figure Page

31. Upper frame: Cave Art 11E. View to north. Lower frame: Cave Art 11E pictured with digital enhancements and black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 61

32. Left frame: Cave Art 12E with flash photography. View to east (Credit: Matt Oliphant). Right frame: Cave Art 12E pictured with black lines where measurements were taken for data analysis. View to east with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 62

33. Left frame: Cave Art 13F. View to west with 20 centimeter scale bar. Right frame: Cave Art 13F pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 63

34. Left frame: Cave Art 14F (wet). View to north with 20 centimeter scale bar. Right frame: Cave Art 14F (dry) pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 63

35. Left frame: Cave Art 15F. View to northeast without scale. Right frame: Cave Art 15F. View to north without scale (Credit: Charley Savvas) 64

36. Left frame: Cave Art 16G. Right frame: Cave Art 16G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 65

37. Left frame: Cave Art 17G with flash photography (Credit: Matt Oliphant). Right frame: Cave Art 17G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 66

38. Left frame: Superimposed Cave Art 18G and 19G. View to west with 20 centimeter scale bar. Right frame: Cave Art 18G pictured with black lines where measurements were taken for data analysis. Black circle indicates area of Cave Art 19G coloration (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 66

39. Left frame: Cave Art 20G with flash photography. View to west without scale (Credit: Matt Oliphant). Right frame: Cave Art 20G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale (Credit: Seleste Sanchez and Carlos Efrain Tox Tuil) 67

40. Left frame: Cave Art 21G with flash photography. View to west without scale (Credit: Matt Oliphant). Right frame: Cave Art 21G pictured with black lines where measurements were taken for data analysis. View to west with 5.05 centimeter AA battery scale (Credit: Charley Savvas) 67

41. Left frame: Cave Art 22G with flash photography (Credit: Matt Oliphant). Right frame: Cave Art 22G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 68

Figure Page

42. Left frame: Cave Art 23G. View to west without scale (Credit: Charley Savvas). Right frame: Cave Art 23G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 68

43. Line of rocks at the southern entrance of Cave 1. View to south (Credit: Matt Oliphant) 70

44. Plan maps and southern wall profiles of Excavation Units One, Two, and Three 71

45. Incised ceramic bead with metric scale 72

46. Four *in situ* human long bones in charcoal ash feature. View downward with 40 centimeter scale bar and white north arrow 72

47. Obsidian flakes and blades recovered from Unit 1 with metric scale bar. White arrows indicate blades 73

48. Obsidian flakes and blades recovered from Unit 2 with metric scale bar. White arrows indicate blade 73

49. Chalcedony flake with metric scale bar 74

50. Obsidian flakes and blades recovered from Unit 3 with metric scale bar. White arrows indicate blades 74

51. Engraved shell with metric scale bar 75

52. Molar tooth with metric scale bar 75

53. Plan map of Cave 2 with labeled cave art 77

54. Main entrance of Cave 2 from the back of main entrance chamber. View to southeast 78

55. Upper frame: Cave Art 1I. View to west with 20 centimeter scale bar. Lower frame: Cave Art 1I pictured with digital enhancements and black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 79

56. Left frame: Cave Art 2J. View to north with 20 centimeter scale bar. Right frame: Cave Art 2J pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul) 80

57. Plan map of Cave 3 with labeled cave art 81

58. Light inside a short narrow passage at Cave #3. View to northeast (Credit: Matt Oliphant) 82

59. Left frame: Cave Art 1K. View to north without scale. Right frame: Cave Art 1K. View to west without scale (Credit: Matt Oliphant) 83

Figure		Page
60.	Left frame: Cave Art 2K with flash photography. View to northwest (Credit: Matt Oliphant). Right frame: Cave Art 2K measurements. View to northwest with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul)	83
61.	Left frame: Cave Art 3K. View to north (Credit: Matt Oliphant). Right frame: Cave Art 3K measurements. View to north with 20 centimeter scale (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul)	84
62.	Examples of natural cave wall coloration that could be mistaken as cave art portrayals	87
63.	Example of natural cave erosion that could be mistaken as a cave art portrayal	88
64.	Coefficient of Variation Regression Lines of Mouth Attributes	93
65.	Coefficient of Variation Regression Lines of Average Eye Attributes	94
66.	Stela discovered at Nim Li Punit. Photographs provided by Wanyerka (pers. comm. 2012)	98
67.	Two 7 Ahaw Short Count portrayals recorded at Caracol. Images from Beetz and Satterthwaite (1981:165, 169) used with the permission of the publisher	99
68.	Left frame: Close-up of Cave Art 4B pictured with digital enhancements. View to south (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul). Right frame: Cave Art 4B pictured with digital enhancements and highlighted attributes. View to south (Credit: Matt Oliphant)	101
69.	One rendition of the Maize God hieroglyph. Drawn by the author, after Gates (1978:fig. 76.1)	102
70.	Cave Art 22G with flash photography. View to west (Credit: Matt Oliphant and Nancy Pistole)	104
71.	Hunahpu with skull headdress. Drawn by the author after Dresden Codex page 50: http://www.famsi.org/research/graz/dresdensis/img_page50.html	105
72.	Cave Art 2J View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul)	106
73.	Pigment paint processed with egg yolk and brick dust. Image provided by Lanier (pers. comm. 2012)	108
74.	Cave Art 10D pictured with digital enhancements. View to south (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul)	110
75.	Outdoor TV Paintings with 60.96 centimeter scale (Credit: Brooke Lanier)	112
76.	"The Little TV Glyph" by Brooke Lanier	113
77.	Average Coefficient of Variation Regression Lines for All Attributes of Each Cave Art Motif Typology at Nueve Cerros	115

Figure Page

78. One rendition of the "cave" hieroglyph. Drawn by the author after Vogt and Stuart (2005: 159) 118

Chapter I

INTRODUCTION

The looping of the path up and down the undulating topography must have something to do with why they've always called this place "Nine Hills," I thought. A crew of seven Q'eqchi' men and I had walked together in single-file for over 3 kilometers so far. The sizeable trek from the Q'eqchi' village of Las Tortugas went down a long access road, over several streams, and through a number of hilly cow pastures prior to reaching the uncleared jungle we were now approaching. These hikes had definitely become less challenging for me over the past three months, but I still breathed hard.

As the sweat trickled down into my eyes, I knew as well as the native Q'eqchi' Maya that the upcoming shade would provide some relief from the hot Guatemalan sun, but not from the unrelenting humidity that filled our nostrils. I celebrated inwardly as I thought of the cool dark face of our final destination, Cueva San Juan, just a little farther on through the steaming jungle. From my previous visits to that cave, I knew it was a place where representatives of the contemporary local Maya communities would periodically visit in order to conduct rituals meant to praise the earth and ensure a good harvest.

As we laced through the jungle, in and out from under of the shade of the enormous trees, I was second in line behind Santiago. A quiet man with a quick wit and angled facial features, Santiago was one of the owners of the land in this part of the Nueve Cerros ridge system. Like the rest of the crew, his back does not tire as long as there is still work to be done. He and I had unconsciously picked-up our pace when we had entered the main path through this part of the jungle, where I was being cautious to avoid tripping the tangles of roots and vines that I knew certain segments of this path were overgrown with.

We had broken away from the main group and were approaching an area of the path where we would be cutting down a few ferns to get through onto a smaller path, but Santiago stopped in mid-step. I looked up in silence and barely had time to gasp before an adult jaguar disappeared behind the deep and endless screen of green without a sound. A flick of her tail through the trees and she was gone. Santiago

turned back to me and chuckled politely when he saw my wide eyes. Without pausing, he shouted back to the rest of the men following us, "Un tigre!" As these men approached closer and I could more clearly see their smiling faces, something told me that this was going to be a wonderful day.

Salinas de los Nueve Cerros [Salt Plain of the Nine Hills] was a precontact salt production center along the River Chixoy. It was used by the ancient Maya from at least AD 300 to 600 (Figure 1). Just to the west of the site, a large number of natural cave landforms dot the hills of a karst ridge system. In 2010, two ancient cave art portrayals were discovered by archaeologists at one of these caves. The discovery of these portrayals prompted this 2011 cave survey and cave art study (Woodfill, pers. comm. 2010).

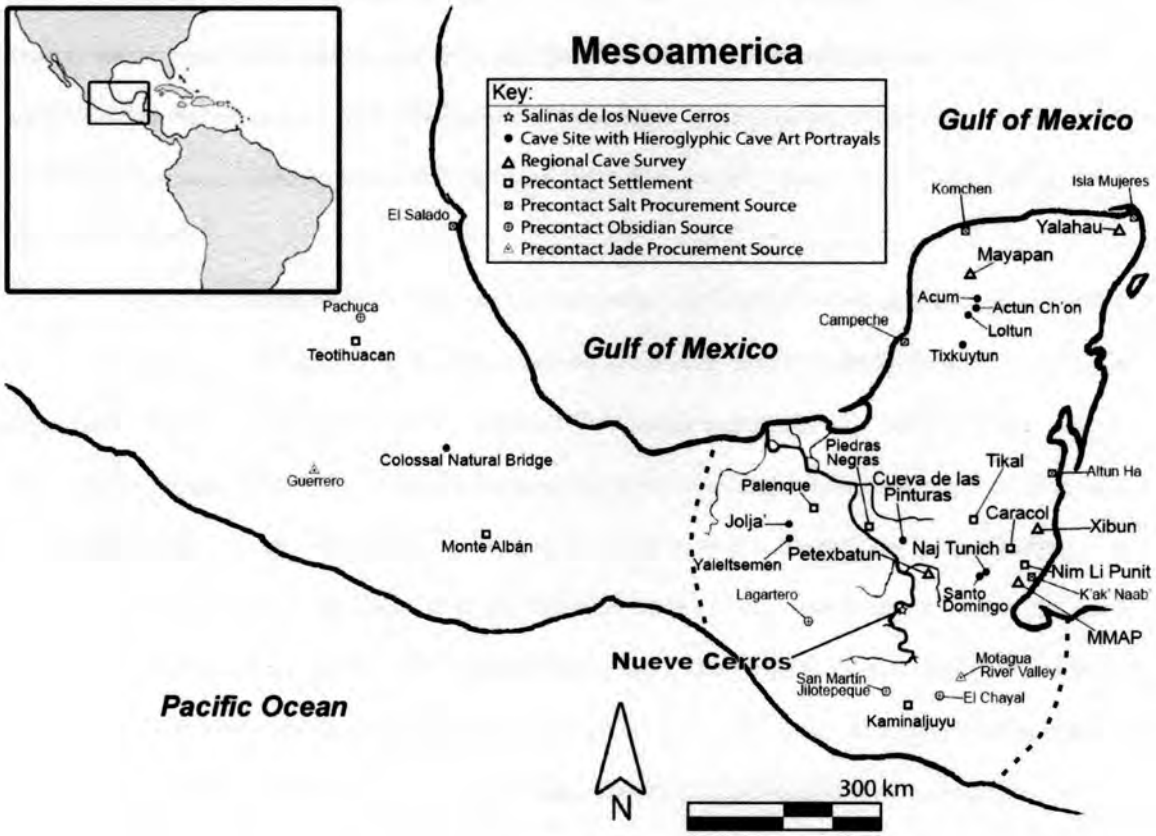

Figure 1

Precontact Mesoamerica

The chapter to follow will provide a general description of world rock art, its preservation capacity, and the inherent limitations of rock art analysis. A description of the Maya culture area, its

climate, the Salinas de los Nueve Cerros locality, the precontact importance that cave landforms had in the Maya culture area, and the Nueve Cerros cave discoveries of 2010 will then be discussed in that order. This introduction chapter will conclude with a list of technical terms whose definitions are especially relevant to the original cave art research developed and executed for this final thesis paper.

The cave landform has been used by various world cultures as one of the most effective metaphors in extant literature (Witzel 2006). The Rgveda, the Avesta, and Plato's Republic are three of the most well-known of the "Greek, Japanese, Ainu, Amerindian and South-East Asian sources" (Witzel 2006:3) that use the unique character of cave geology as a natural symbol to denote mystery, intrigue, and origin (Witzel 2006; Shim 2007). Decipherments of Mayan hieroglyphs and other well-founded archaeological interpretations based upon various materials throughout the Maya culture area have led to our general understanding that caves were of profound cultural importance to the precontact Maya (e.g., Brown 2005; Coe 2005; Demarest 2004; Peterson 2006; Recinos 1950; Rissolo 2003; Stone 1995; Tedlock 1996; Vogt and Stuart 2005).

Maya cave archaeologists usually regard cave art as one facet of the complex cultural assemblages recorded at these subterranean contexts, often going on to correctly determine that precontact Maya "cave art is clearly ritual in nature and . . . one of the most illuminating avenues of interpretation on the nature of these rituals" (Prufer 2002:127). However, because Maya cave studies rarely focus on cave art, no study has independently demonstrated that this statement is true. This final thesis paper will describe how quantitative analyses and comparisons were appropriately employed to scientifically determine that the Nueve Cerros cave art expresses specific symbolic meanings fundamental to the precontact Maya belief system. This paper will also go on to argue that, through symbolic expression, cave art played a unique cultural role that allowed the precontact Maya to place the observable world in relation to their unobservable beliefs.

World Rock Art Analysis

The creation of rock art is a world-wide convergent cultural tradition, independently developed by various cultures on all six inhabited continents at different times (e.g., Jackson 2010; Lymer 2004; Masson

2006; Morrison 2010; Pettitt 2008; Scheinsohn 2003; Wendt 1976). There is no evidence to support the widespread cultural diffusion of rock art (e.g., Straus *et al.* 2005). Although a small percentage of world rock art portrayals are portable (e.g., Masson 2006; Wendt 1976; Whitley 2011), rock art portrayals are most commonly found on non-portable rock surfaces outside of stable soil environments (Stone 1995; Whitley 2011). The term "rock art" is inclusive of "cave art." This latter term is used to identify rock art portrayals at cave landforms. This contextual distinction was seen as necessary, because of the fundamental role that cave landforms played in precontact Maya belief systems.

World rock art consists of two basic portrayal typologies, "petroglyphs" and "pictographs," both of which were created by the Maya at Nueve Cerros in accordance with a predetermined cultural pattern. Petroglyphs are created by breaking or scraping stone chips from a rock surface, while pictographs are created when pigment is applied to a rock surface. Throughout the world, these two basic portrayal typologies often coexist as components of the same assemblages (e.g., Stone 1995; Whitley 2011). Methods used to create them can often be determined through simple visual analysis. Petroglyphic portrayals can be deeply-carved or lightly-etched with hard tools made of stone, bone, or wood, while pictographic portrayals can be recognized by the presence of pigment on the rock, which is composed of organic or clay minerals often mixed with water. Drawn pictographic pigment is applied in a dry chalk-like form and appears less-consistent than painted pictographic pigment, which is applied with a higher water content. Alternatively, pictographic pigment can also applied by blowing it out in the form of dry powder from a tube-shaped instrument. This negative print form takes shape as it comes into contact with the rock (after being propelled by the breath of the artist), often to surround a hand or part of a hand pressed against the rock surface (Whitley 2011). "The result is a negative print of the hand in outline" (Whitley 2011:27). Negative print portrayals have been recorded surrounding hands, feet, and other objects, such as sticks. In caves throughout Mesoamerica, they are done "primarily in black and red" (Stone 1995:71).

Black and red is also prevalent among the various pigment colors in world rock art pictographs (e.g., Stone 1995; Montelle 2004; Whitley 2011). In his dissertation, Montelle (2004:98) discusses the five step "*chaîne opératoire* [operation chain] involved in the search, manufacture, and use of pigments," specifically mentioning the mineral content of certain pigment colors. The pigment of red pictographic

portrayals can be made from hematite (Fe_2O_3), from ochre clay containing iron (Fe) or silicon (Si), while black pigment can be made from manganese dioxide (MnO_2) or organic charcoal (C) (Montelle 2004). All of these natural substances could have been procured at or near precontact Nueve Cerros.

Petroglyphic and pictographic rock art portrayals are extremely susceptible to environmental disturbance, even when the rock art is present inside of a cave landform. Rainwater and groundwater can flow freely through a cave or filter through its porous rock walls, disturbing petroglyphic and pictographic portrayals as it does so by dissolving microscopic quantities of petroglyphs and pictographs that eventually dilute into the surrounding soil matrix. The rate at which mineral pigments dissolve is especially alarming (e.g., Straus 1990; Whitley 2011). Rock art's susceptibility to the natural elements makes it one of the fastest disappearing cultural traditions in the world. Along with its broad aesthetic appeal, this has helped to generate global interest in its preservation (e.g., Clottes 2008; Whitley 2011). On the other side of the same coin, the scarcity of world rock art has also severely-limited scientific interest in the development of analytical methods designed for the study of rock art (e.g., Clottes 2008). This poor level of development has also left the few archaeologists who attempt to address rock art assemblages largely without standardized interpretative strategies.

Perhaps the most significant deficiency of rock art analysis is our general inability to successfully determine associated chronologies. Rock art portrayals can sometimes be dated relatively to a broad date range when they contain certain types of content, when they superimpose (overlay or underlie) dateable features, or when other relative dating methods can be applied to them. The absolute (^{14}C) dating of rock art present in open-air environments is almost always very unreliable, because of its constant exposure to contamination (Pettitt and Pike 2007).

One hypothetical relative-dating scenario that would be likely to result in an accurate rock art date would consist of a portable rock art portrayal recorded *in situ* (i.e., contextually-intact and largely undisturbed), and also in direct-association with multiple, dateable carbon deposits. These carbon deposits could be sampled and subjected to absolute-dating by radiocarbon analysis. These absolute-dates would then be related to the original stratigraphic position of the portable rock art (e.g., Wendt 1976; Masson 2006). However, because of the very low probability of confidently recording dateable cave art deposits *in*

situ, this 2011 cave art study never intended to determine rock art chronologies. As the reader will find, these specialized analyses this will not play any part in the paper to follow.

The scarcity of prehistoric remnants of rock art throughout the world strongly suggests that it probably did not have a reliable, functional use to most prehistoric cultures (e.g. Straus 1990). However, Straus (1990:284) makes an excellent point by saying that all archaeological material is important in its own way, and by going on to say that the study of rock art "cannot be ignored" as an archaeological subdiscipline. After all, we may find that it is capable of teaching us something we do not already know or confirming something we do know.

Mesoamerica and the Maya Culture Area

"Mesoamerica" is a precontact culture area in the northernmost portion of Central America. Mesoamerica consists of southern Mexico, all of Guatemala, Belize, El Salvador, and western Honduras (Demarest 2004; Coe 2005). Throughout this geographic area, precontact sedentary populations with shared technological traditions interacted, developed into stratified societies, and succeeded one another in prominence over "several millennia" (Demarest 2004:8) prior to contact with Europeans. Many experts recognize that the Maya civilization was one of the most successful of Mesoamerican populations, inhabiting its eastern tropical rainforest environment from approximately 2000 BC until AD 900 (Demarest 2004). The approximate eastern and western boundaries of this geographic region, often referred to as "the Maya Area" (Demarest 2004; Coe 2005), are bounded in dashed lines in Figure 1.

The northern part of the Maya culture area consists of lowland karst topography that does not get much higher than five hundred meters above mean sea level, while the southern highland region, "with peaks over 12,000 feet [3,658 meters]" (Whiteside 1985:8) is one of several intermittent mountainous areas along the Pacific coastline of Central America (Whiteside 1988). Salinas de los Nueve Cerros is set at an intermediate elevation between these two regions, in the modern political department of Alta Verapaz (Figure 2).

Figure 2

Highland and lowland regions of the Maya area

For eons, storm systems have been forced upward from humid coastal areas into the interior lowlands, highlands, and intermediate elevations. The movement of these storm systems has been facilitated by "the consistent and persistent" (Whiteside 1985:4) northeast trade winds moving up from the equator (e.g., Puleston 1973; Whiteside 1985). As the moisture-laden storm clouds travel inland and cool on their ascent from sea level, precipitation falls at a very high rate at Nueve Cerros, averaging "3 to 4 meters per annum" (Dillon *et al.* 1988:41). Along with groundwater and wind, this rainfall has

undoubtedly contributed to the erosive formation of the large number of cave landforms at Nueve Cerros (e.g., Straus 1990). All of the Nueve Cerros caves are located within a 12 kilometer long, 2.5 kilometer wide karst ridge system. The highest of the many hills in this ridge system rise about two hundred meters above the Salinas de los Nueve Cerros epicenter, where archaeologists have identified various types of cultural evidence indicative of high-volume salt production (e.g., Dillon *et al.* 1988; Woodfill 2011b).

Salinas de los Nueve Cerros

Rainwater and groundwater also filter through a unique salt dome landform that, at 140 meters, is almost as high in peak elevation as the ridge system. The salt dome was formed to the east of the ridge system when an early geologic event forced "a large salt diapir or bubble" (Dillon *et al.* 1988:40) to move up from a mile-thick, geologic layer of salt and break through the limestone bedrock on its way to the surface. At the site today, water still takes on large quantities of salt as it filters through the salt dome. Some of this salt water emerges in the flow of a stream that runs from the western side of the salt dome. This stream serves as the environmental basis for the natural supply of super-salinized salt water, "some two to three times more saline than Central American sea water" (Dillon *et al.* 1988:41). It flows out onto a beach-like salt plain and evaporates under the burning sun (e.g., Dillon *et al.* 1988; Woodfill 2011b).

Scorched ceramic sherds and huge ceramic vessels "capable of holding hundreds of gallons" (Dillon *et al.* 1988:50) of water were identified near the Salinas de los Nueve Cerros salt plain. This ceramic evidence is some of the best evidence that the precontact Maya population at Salinas de los Nueve Cerros engaged in high-volume salt production (Dillon *et al.* 1988; Woodfill 2011b). While the precontact Maya at the surface site would have consumed some of the salt to satisfy their own nutritional requirements, local salt production and consumption estimates suggest that a large amount would have still been available for trade with other inland centers (Dillon *et al.* 1988; Woodfill 2011b). Trade with Salinas de los Nueve Cerros would have undoubtedly been the most efficient means for precontact inland centers along the river to access large quantities of salt (Dillon *et al.* 1988; Demarest 2006; Woodfill 2011b).

Adjacent to the River Chixoy, approximately one kilometer to the northeast of the salt plain, several large earthen platform features probably served as the basis for Salinas de los Nueve Cerros'

commercial center. Exotic raw materials (including several sourceable obsidian types) have been recorded at these large constructions. These allow for one to argue that the site's trade activity was centered there (Dillon *et al.* 1988; Woodfill 2011b). Trade activity at Salinas de los Nueve Cerros could have influenced the content of any precontact Maya cave art portrayals at or near the site by providing exotic pigments, tools, artisans, and new motif ideas.

Mesoamerican Cave Activity

Along with other precontact material types, interpretations of Maya iconographic portrayals indicate that the cave landform was important to most, if not all, Mesoamerican populations (e.g., Armitage *et al.* 2001; Bassie *et al.* 2002; Brady 1989; Coe 2005; Demarest 2004; Graham *et al.* 1980; Joyce 2004; Lucero 2007; Mercer 2005; A.E. Miller *et al.* 2002; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a, 2011b). While the Nueve Cerros ridge system , at the western edge of the Salinas de los Nueve Cerros site limits, does not bear any evidence of Archaic (8000-2000 BC) or Paleoindian (11,000-8000 BC) period cave habitation, these earlier populations *are* known for cave habitation elsewhere and may have inhabited Mesoamerican caves to some extent (e.g., Straus 1990). However, the kind of clear evidence that supports the idea of ancient cave habitation in other parts of the world is generally lacking in Mesoamerica, possibly due to the high level of environmental disturbance (e.g., Brady 1989). Instead of cave landforms serving as precontact Maya habitation sites, various types of evidence recorded at surface and cave sites in the Maya area have consistently pointed toward caves being a central aspect of Maya belief systems even into the modern period (e.g., Armitage *et al.* 2001; Bassie *et al.* 2002; Brady 1989; Coe 2005; Demarest 2004; Graham *et al.* 1980; Joyce 2004; Lucero 2007; Mercer 2005; A.E. Miller *et al.* 2002; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a, 2011b).

We can be certain that the Maya of Salinas de los Nueve Cerros incorporated cave landforms into their lifeways. This was first demonstrated by Proyecto Salinas de los Nueve Cerros (Proyecto SNC) when a cave speleothem (i.e., cave stalactite or stalagmite formation) stratigraphically-associated with Late Preclassic (400 BC – AD 300) ceramics (Castellanos 2013) was recorded within the lowest levels of an

area utilized by the Maya at Salinas de los Nueve Cerros, which eventually developed into an I-shaped, Classic period ballcourt area composed of three structures (Woodfill 2011b). The cave speleothem must have been extracted from an unknown cave landform before being deposited along with several other foundational deposits that raised a low, swampy area by about one meter. This foundational deposit may have been meant to mark the swampy area as an important precontact locality between the ridge system and the salt plain (Woodfill, pers. comm. 2010). While Lucero (2007:414) mentions that "the presence of exotic materials, such as speleothems and other items from caves . . . can signify temple purpose," the composition of the aforementioned deposit at Nueve Cerros is definitely indicative of a ballcourt area (Woodfill 2011b).

The systematic Nueve Cerros cave survey of 2011 operated in parallel with the surface excavations of Proyecto SNC, much like "a variety of archaeological projects" (Woodfill 2011a:214) have also done (e.g., Brown 2005; Demarest 2006; Peterson 2006; Prufer 2002; Rissolo 2003; Woodfill 2011a). Although it is painstaking-work to interpret prehistoric cognitive beliefs from archaeological evidence, this methodology of running cave survey subprojects in parallel with surface excavations appears to be making progress in reconstructing the central role that cave landforms had in the belief systems of the precontact Maya. The systematic Nueve Cerros cave survey and cave art study of 2011 contributes something new to this known methodology, as very few cave surveys have focused on recording and interpreting cave art portrayals (e.g., Rissolo 2003).

Nueve Cerros Rock Art

During a brief 2010 cave inspection, Proyecto SNC recorded Maya ceramic sherds on the natural floor surface of one of the many cave landforms in the Nueve Cerros ridge system (Spenard 2011). Dr. Brent Woodfill, the site director of Proyecto SNC, later returned to this same cave and discovered two very well-preserved pictographic cave art portrayals that had not been noticed previously. One of these two pictographic portrayals was immediately recognized as an irregularly-ordered Maya 7 *Ajaw* hieroglyph (Woodfill, pers. comm. 2010) (Figure 3).

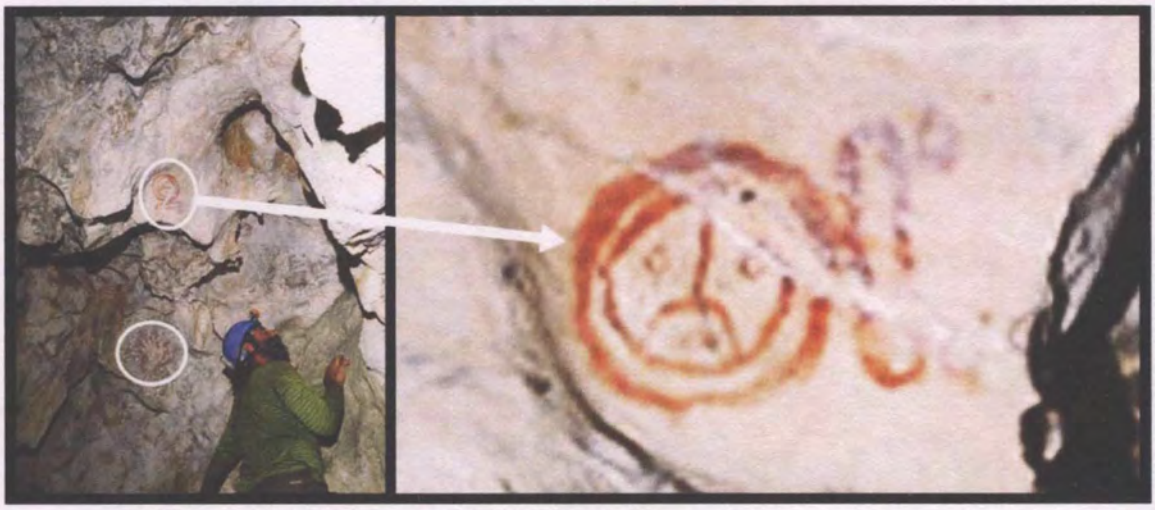

Figure 3

Left frame: Two pictographic cave art portrayals recorded in 2010. View to north without scale. Right frame: Close up and rotated Maya hieroglyph (Credit: Matt Oliphant)

Preliminary Interpretations of the 2010 Cave Discoveries

The cave speleothem recorded *in situ* at Salinas de los Nueve Cerros demonstrates that the inhabitants of the site were participating in cave activity, like speleothems recorded at other Maya surface sites that also demonstrate this (e.g., Demarest 2004; Lucero 2007; Peterson 2006; Rissolo 2003; Woodfill 2011a). The speleothem's provenience (Figure 4) strongly suggests that it was transported from a cave in the nearby Nueve Cerros karst ridge system, while the irregularly-ordered 7 *Ajaw* Maya hieroglyphic cave art portrayal was very likely painted by a precontact Maya artisan (Woodfill, pers. comm. 2010) (Figure 4). This final thesis paper's interpretations will address this issue further.

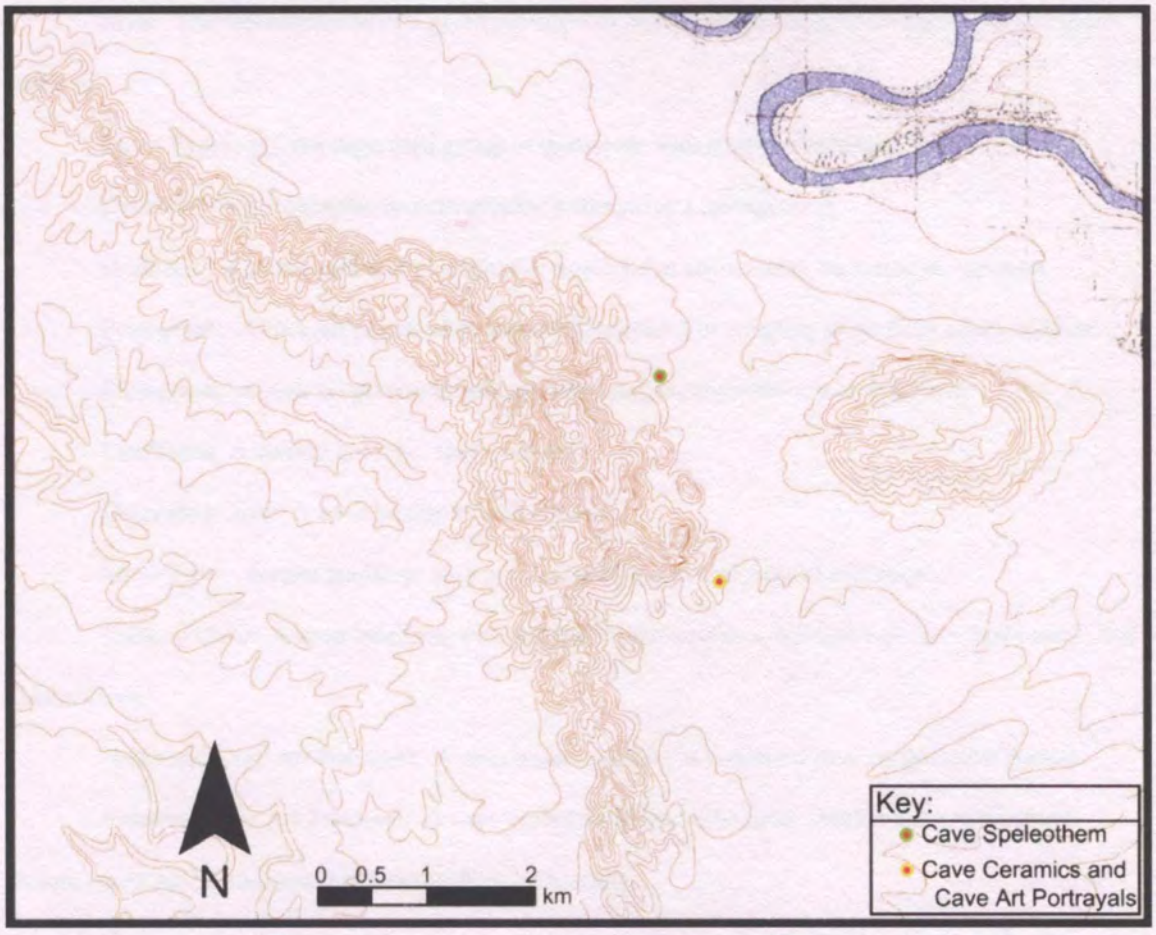

Figure 4

Nueve Cerros 2010 cave discoveries

TECHNICAL TERM DEFINITIONS

A number of technical terms in the following paper may be unfamiliar or otherwise appear unconventional to the reader. Some are listed below for referencing purposes. Other technical terms related to cave mapping methodology will be described in-text in Chapter III.

Feature: An "artificial yet nonportable aspect of a site, such as a storage pit, trash pit, hearth, [cave art portrayal, or] structure foundation" (Neumann and Sanford 2010:15 n. 16).

Portrayal: The physical depiction of a chosen or mandated iconographic or stylized feature.

Attribute: A portrayal characteristic that can be qualitatively described.

Style: The representation of a given portrayal or one of its attributes, often according to a given standard.

Motif Typology: An organized group of portrayals with similar attributes.

Cave Art: A pictographic or petroglyphic portrayal at a cave context.

Rock Art: A pictographic or petroglyphic portrayal at any context, inclusive of "cave art."

Petroglyph: A rock art portrayal fashioned by breaking or scraping stone from a rock surface.

Pictograph: A rock art portrayal fashioned by applying pigment to a rock surface.

Landform: A natural geologic characteristic.

Decorated Cave: A cave landform with cave art.

Maya Cave: A cave landform with precontact Maya archaeological evidence.

Cultural Cave: A cave landform with archaeological evidence, inclusive of "decorated cave" and "Maya Cave."

Authentic Cave Art Portrayal: A cave aspect verified as a cultural cave art portrayal feature.

Potential Cave Art Portrayal: A cave aspect recorded in the field. Authenticity as a cultural feature could not be confirmed without laboratory analysis.

Cave Art Assemblage: Any arrangement of pictographs and/or petroglyphs in a single cave context.

Chapter II

LITERATURE REVIEW

A large number of sources were utilized in the composition of this final thesis paper. A comprehensive review of these sources is detailed in the following chapter.

World Rock Art Analysis

Whitley's (2011:61) volume, entitled "Introduction to Rock Art Research" describes world rock art as a rare cultural tradition that should be analyzed as "only one component of a larger archaeological phenomenon." Examples of world rock art petroglyphs and pictographs, guidelines about rock art preservation, interpretations of rock art chronologies, and rock art dating methods are all included in the book. Several chapters on rock art analysis are also included, detailing means of analysis through excavation, photographic enhancement, the organization of motif typologies, methods that have been shown to provide empirical data, and the application of quantitative methods. This study's own data analysis benefitted from this source (Whitley 2011).

Preservation

Clottes' (2008) article, "Rock Art: An Endangered Heritage Worldwide," also speaks of the importance of rock art preservation, advocating public awareness of the infrequency of rock art. The naming of rock art sites onto the World Heritage List (WHL) "primarily for their rock art" (Clottes 2008:13) is just one example of global interest in rock art preservation. WHL sites are protected under the authority of international convention, established by the United Nations Educational, Scientific, and Cultural Organization (Clottes 2008).

One of the reasons why the public awareness of rock art's fragile nature is so important is because it is composed of soluble materials that can be easily eroded. One of these materials is pigment that can be

processed from clay minerals, charcoal, and other substances. Montelle's (2004) dissertation on prehistoric theatre-like cave performances (i.e., "paleoperformances") describes the processing and elemental composition of rock art pigments, simultaneously illustrating how dating analyses may be able to test the age of any carbon in the pigment. It is not uncommon for the age of unintelligible pigment traces to be tested (e.g., Pettitt and Pike 2007; Whitley 2011).

The Inefficacy of Rock Art Dating

Relative dating techniques (i.e., style conformity, dating of associated material, geologic landform studies) and absolute dating techniques (i.e., direct pigment chronometry, testing of amino acid residue) have been applied to world rock art analyses with similar levels of inadequacy (e.g., Armitage *et al.* 2001; A.E. Miller *et al.* 2002; Pettitt and Pike 2007; Pike 2008; Whitley 2011). With rock art's general fragility and complete exposure to the environment (e.g., Clottes 2008; Whitley 2011), petroglyphic portrayals are notoriously difficult to sample, while dateable pigments that can be sampled and dated absolutely are frequently contaminated (e.g., A.E. Miller *et al.* 2002; Pettitt and Pike 2007; Pike 2008; Whitley 2011). Rock art portrayals are more accommodating of relative dating techniques, but even those cannot be considered to be entirely reliable (e.g., Ware *et al.* 2000; Whitley 2011). In fact, rock art dating attempts are often so difficult to perform with accuracy, they are often not attempted by studies. In reference to the dating of petroglyphic portrayals recorded at a Maya cave, Rissolo (2003:71) writes, "as is often the case with rock art, many of the images at Pak Ch'en are difficult to date and could have been engraved into the cave walls at nearly any time in the past." Several sources were utilized by this study in order to understand why world rock art studies might attempt to assign a date to rock art, despite the clear detriments of the process.

The world's oldest dated rock art portrayals are located in Africa and Europe and will be discussed below. The oldest dated rock art on the four other continents has been dated through various techniques, some of which may be more reliable than others (e.g., Jackson 2010; Lymer 2004; Morrison 2010; Scheinsohn 2004). Located in Utah and Colorado of North America, the continent where this cave art study took place, the oldest dated North American rock art portrayals have been painted in the Barrier

Canyon Style (BCS). What is believed to be the earliest BCS rock art is located in Horseshoe Canyon of Canyonlands National Park (Jackson 2010). The earliest possible time when the wall surface could have been geologically-exposed at the Horseshoe Canyon landform was approximately 4,000 BC, bracketing the age of the pictographic portrayals "between about 4,000 BC and 1,100 AD" (Jackson, pers. comm. 2012). This age is significantly younger than the early Archaic age theorized elsewhere, but it is still the oldest dated rock art in North America. Cueva de los Manos in the mountains of northern Argentina contains content that allows for Scheinsohn (2004) to theorize that the oldest recorded South American rock art dates to the mid-Archaic (Scheinsohn 2004). Writing about Asian rock art portrayals, Lymer (2004) mentions Kazakhstani petroglyphs stratigraphically dated to "as early as the Middle Bronze Age (*c.* 1400 BC)" (Lymer 2004:159) that are often observed by contemporary cultures. Morrison (2010:126) writes that the poor preservation capacity of the oldest Australian rock art portrayals, dated as early as "a Pleistocene antiquity," is the major factor "behind the apparent increase in rock art since the mid-Holocene."

These early chronological determinations mentioned in such a large number of publications mislead readers by suggesting that rock art dating may not be problematic at all. However, the literature review employed during the writing of this paper learned enough about the complex process of dating rock art to definitively say that these dates should always be "viewed with caution" (Armitage *et al.* 2001:478). Specifically citing problematic issues with European rock art portrayal dates, Pettitt and Pike (2007) emphasize the need for archaeologists to develop more stable protocols for the sampling of rock art and the unbiased reporting of all chronometric results (Pettitt and Pike 2007). On one questionable example of cave art dating at Chauvet Cave in Southern France, Pettitt (2008:915) writes that the assigned date (*ca.* 30,000 BC) is based on several carbon assays that "were all produced by the same laboratory." Pettitt (2008:915) goes on to suggest that "the art of the cave [should be considered] undated," as the surrounding archaeology in the cave and the region do not begin to coincide with the date estimates produced by this laboratory.

One rare example of rock art dating that is likely to be accurate took place when several portable rock art portrayal slabs were recorded *in situ* at an African cave by Wendt (1976). Dating accuracy is echoed by Masson (2006). The dated portrayals consist of several portable, pictographic rock art slabs

recorded during a 1969 excavation at an African cave (Wendt 1976; Masson 2006). Archaeologists mapped the cave's stratigraphy to ensure the accurate recording of the "crucial spatial relations" (Wendt 1976:8) between the *in situ* portrayals and the 39 dateable *in situ* charcoal samples (Wendt 1976). Allowing for the dating of the entire stratigraphic sequence, these 39 samples were recovered from the "horizon in which the painted slabs had been discovered as well as from deeper and from higher horizons" (Wendt 1976:5). The testing of the *in situ* charcoal samples is described by Wendt (1976:8): they were "dated independently at two laboratories [providing] a confirmed and cross-crossed time-scale." Six years after the initial discovery of the rock art, scientists announced that it had been dated to approximately 25,000 BC, making it the oldest rock art in Africa at the time. Still today, it remains some of the world's oldest (Wendt 1976; Masson 2006).

The exposed nature, undeveloped analysis, and high degree of variation in rock art portrayals have made them very difficult to date reliably, especially when they are not clearly associated with a subsurface, dateable deposit (e.g., Armitage *et al.* 2001; A.E. Miller *et al.* 2002; Pettitt 2008; Pettitt and Pike 2007; Whitley 2011). At Nueve Cerros, the potentially destructive nature and general inaccuracy of rock art dating resulted in no attempt being made (e.g., Pettitt 2008; Pettitt and Pike 2007; Whitley 2011).

Cultural Cave Landforms

Straus, Meltzer, and Goebel's (2005:514) article, "Ice Age Atlantis? Exploring the Solutrean-Clovis 'Connection,'" discusses a questionable theory of early technological diffusion from Europe to the Americas. This is supported by the fact that there are no prehistoric art portrayals (inclusive of cave art and rock art) that have been dated anywhere in the Americas near as early as the very early art portrayals found in western Europe (*ca.* 20,000-14,500 BC).

Witzel's (2006) "Vala and Iwato: The Myth of the Hidden Sun in India, Japan, and beyond" speaks of various world cultures, including Mesoamerican cultures, that have featured cave landforms in their mythical reconstructions of the known universe. Shim's (2007) article, "A Philosophical Investigation of the Role of Teachers: A Synthesis of Plato, Confucius, Buber, and Freire" discusses the ancient Greek "allegory of the cave" (Shim 2006:517).

Straus' (1990) chapter, "Underground Archaeology: Perspectives on Caves and Rockshelters," speaks of the karstic formation of caves, the typical cave environment, and how archaeological deposits at caves are generally left subject to "ample opportunities for erosion" (Straus 1990:259). Straus (1990:256) also refers to cultural disturbance at caves, which mostly has taken place at the mouths of caves "used repeatedly by human groups for millennia, sometimes seasonally, semipermanently, or permanently for many years without interruption." Brady's (1989:6) dissertation on Maya cave use argues against the "practically inconceivable" idea of Mesoamerican cave interiors ever being inhabited by the Maya.

Instead, the dissertation emphasizes the cave landform's "important role in Maya and Mesoamerican mythology as the place of emergence" (Brady 1989:53), using the term "ritual" (Brady 1989:6) as a means of describing this function (Brady 1989). Graham and colleagues (1980:168) also mention earlier anthropological and archaeological investigations that "describe cave rituals, documenting the importance of caves among the ancient and modern Maya." This historic emphasis on ritual function is unrivaled in how it has set the tone for almost all precontact Maya cave research (e.g., Armitage *et al.* 2001; Brady 1989; Graham *et al.* 1980; A.E. Miller *et al.* 2002; Peterson 2006; Prufer 2002; Rissolo 2003; Stone 1995, 1997; Woodfill 2011a).

Brady's (1989) argument is supported by the Maya "Popol Vuh" myth, which was transcribed from K'iche' into Spanish during the first years of the 18th century by a missionary in the highlands (e.g., Recinos 1950; Tedlock 1996). This final paper consulted two different versions of that traditional story, one written by Recinos (1950) and the other by Tedlock (1996). Rock (2012), a science educator and linguist of Dakota ancestry, cited the indigenous text as one of the best-recorded examples of a traditional story that had "cosmic significance" to the Maya, as it and many other precontact American stories were based on the cyclical movements of stars and planets. The plot of the Popol Vuh story also highlights important aspects of Mesoamerican lifeways, such as subsistence activities and the central importance of natural cave landforms.

Woodfill's (2011a) "The Central Role of Cave Archaeology in the Reconstruction of Classic Maya Culture History and Highland-Lowland Interaction" begins by discussing the history of cave archaeology, specifically mentioning Brady's (1989) dissertation as an important contribution. Woodfill

(2011a:215) emphasizes the importance of Maya cave research as having a "utility in addressing a variety of issues beyond ritual." While discussing the differences between the depositional environments of caves and surface sites, the article also briefly states that caves served as "an economic resource for the local population, one that would have provided material, cultural, and symbolic capital" (Woodfill 2011a:222).

This concept of multiple types of capital was borrowed from Bourdieu (1997:210), who says that "measured by the yardstick of monetary profit, the most sacred activities find themselves constituted negatively as symbolic, that is, in a sense the word sometimes receives, as lacking concrete, material effect, in a word, gratuitous, that is, disinterested but also useless." The article provides a key description of the nature of non-economic cultural practices, performed as non-economic exchanges that have non-economic outcomes with *symbolic* value. Among other topics, excerpts from Deleuze and Guattari's (1977) philosophical volume also discuss the nature of emergent social practices with *symbolic* value (Deleuze and Guattari 1977).

Woodfill (2011a:214) mentions archaeological cave surveys "undertaken in all corners of Mesoamerica." Mercer's (2005) "The Hill-Caves of Yucatan," initially published in 1896, details what has been recognized as one of the very first Mesoamerican cave surveys. Mercer's (2005:100) antiquarian group recorded cave art portrayals "that marked the walls of the great room at four places [and] seemed rather symbols than pictures," some of which "reminded [them] of the work of North American Indians" (Mercer 2005). This may reference cave art portrayals like the four petroglyphs of snakes at "Wakan Tipi," a cave located along the Mississippi River in Minnesota (Rock 2012). The antiquated information in Mercer's (2005) book is made relevant to modern researchers by two forwards, one of which was written by Thompson in 1975 and the other by Brady in 2005. These forwards update readers on the book's significance. Mercer's (2005:145) antiquated publication includes many low-quality photographs, some of which capture petroglyphic cave art portrayals that have been eroded by the repetitive "rainy season" of the Maya culture area (Mercer 2005).

Mesoamerica and the Maya Culture Area

Joyce's (2004:24) article, "Unintended Consequences? Monumentality As a Novel Experience in Formative Mesoamerica," records and interprets large earthen platforms that often contain a high-proportion of clay. This clay mixture was probably meant to reduce the erosive effects of the rainy season. The article speaks of the functional role that the large platforms played, "acting within traditional structures of technical, ritual, and domestic productive and reproductive practices." In other words, these platforms were important in the daily lives of the precontact Maya. The preserved structures serve as examples for the way the precontact human populations of the Maya culture area probably developed their cultural traditions by observing past successes and failures (Joyce 2004). Lucero's (2007) article, entitled "Classic Maya Temples, Politics, and the Voice of the People," also emphasizes the composition and meaning of precontact Mesoamerican temple construction "by focusing on size, location, and construction patterns – including style, labor, materials, decorative features, and ritual deposits" (Lucero 2007:413), but approaches the topic of from a different tack than Joyce (2004). Lucero (2007:412) writes that "Mesoamerican elites brought the natural world into the cultural one by building topographic shrines that represented caves and mountains," which is a symbolic meaning interpreted from Maya "iconography and [hieroglyphic] inscriptions" and other veins of evidence (Lucero 2007).

Awe and Healy (1994) write about the long-distance precontact trade networks in the Maya culture area, focusing on the significance of obsidian procurement sources, prismatic blade technology, and its appearance "in the central Maya lowlands" between 650 and 350 BC. Awe and Healy (1994:198) write that "after their introduction, blades remained the predominant type of obsidian artifact throughout subsequent periods." Crabtree's (1968) article on "Mesoamerican Polyhedral Cores and Prismatic Blades" details a step-by-step prismatic blade reproduction sequence. The author bluntly associates this technology with craft specialization, writing "the making of the rectangular core is considerably more complicated than the making of a simple bifacial tool, and it represents a highly specialized industry" (Crabtree 1968:462).

Speaking of a different material class, Woodfill (2010:101) mentions that ceramic artifacts are "the most common material found at most sites in the Maya world and the most sensitive for establishing chronologies and examining interactions among different groups." Woodfill's (2010) comments were

taken to heart during the systematic cave survey at Nueve Cerros. With the key interpretive details that ceramics can provide, even a few ceramic sherds in a concentration were considered to be of value (Woodfill, pers. comm. 2011). Castellanos' (2013) ceramic analysis appeared in the most recent official Proyecto SNC report (Castellanos 2013). Demarest (2006:30) reiterates the interpretive power of ceramics, which allowed for "a series of insights into Late and Terminal Classic exchange systems, ceramic production, and domestic architecture" in the Petexbatun region. Only about 100 kilometers to the northeast of Nueve Cerros, "the Petexbatun project was the first to incorporate a subterranean [cave survey] subproject parallel to surface research" (Demarest 2006:110).

Mesoamerican Geography and Maya Chronologies

Demarest's (2004) "Ancient Maya: The Rise and Fall of a Rainforest Civilization" is a comprehensive volume on the Maya culture area of eastern Mesoamerica. The volume discusses a wide range of topics relevant to this paper, including the cultural importance of cave landforms to the Maya (Demarest 2004). The chronologic framework laid-out in Demarest's (2004) volume was used in this paper. It differs slightly from Coe (2005), which was another fairly comprehensive volume on the Maya culture area that was consulted, because Demarest (2004) suggests that the Preclassic period (2000 BC – AD 300) immediately followed the Archaic period, when changing weather patterns began to facilitate the development of sedentary subsistence strategies in Mesoamerica. This sets the age of the Early Preclassic Maya period (2000-1000 BC) several centuries further back than most other scholars maintain (e.g., Coe 2005; Rice 2008), although Demarest (2004:14) is careful to point out that "the events and processes of this Early Preclassic period are still very poorly understood, particularly in the southern Maya lowlands" (Demarest 2004:14). The book goes on to chronicle that archaeologists have recorded evidence, dated sometime between 1500 to 1200 BC, of

> "some Mesoamerican societies [developing] public constructions, long-distance exchange systems, . . . the beginnings of monumental art, iconography, and the calendric and writings systems used later by the Classic Maya and other Mesoamerican societies" (Demarest 2004:14),

which would have had to follow the development of reliable subsistence. Demarest (2004:14) fills out this chronological framework by specifying when the Middle Preclassic (1000-400 BC), the Late Preclassic

(400 BC – AD 300), and the Classic (AD 300-900) periods took place (Demarest 2004). The Classic period is most often split into the Early Classic (AD 300-600) and Late Classic (AD 600-900) (e.g., Coe 2005).

Rice's (2008) "Time, Power, and the Maya" discusses the development of calendric hieroglyphic portrayals. The author mentions all three of the major calendric systems used by the Maya, which includes the Calendar Round, Short Count, and Long Count. Rice (2008) further specifies that the most accurate of these is the Long Count, whose hieroglyphic portrayal can be converted into a date that can be placed on the modern Gregorian calendar. Coe (2005:87) writes that the Long Count was primarily used during the Classic period, "a kind of Golden Age . . . [for] Mesoamerican peoples." The oldest example of the Long Count, dating to 292 AD, was recorded at the lowland Maya population center of Tikal (Coe 2005).

The Long Count is written in a regimented sequence of five hieroglyphs, which each increase incrementally as time passes. If the Long Count were to be reeled back to its beginning (0.0.0.0.1), the hieroglyphic portrayal would be translated as a day in August of "3114 BC" (Rice 2008:282). Bringing the count forward to 13.0.0.0.0, we arrive at a day in December of 2012. Each of the translated numbers in the Long Count tells the reader how many times a particular time-span has passed. The first of the five incremental hieroglyphs represents a running-tally of 144,000 days (~444 years). This tally overshadows the following four hieroglyphs, which each represent the approximate vigesimal quotient of the hieroglyph before itself. From the fifth to the first hieroglyph, each of the portrayed time-spans increases in volume by a multiple of approximately 20. Only together do these five hieroglyphs form a meaningful Long Count date. As each day passes, the translated meaning of the fifth of the five incremental hieroglyphs increases by one. When one of the hieroglyphs hits 20, that hieroglyph resets back to zero, and the hieroglyph before it increases by one (e.g., Coe 2005; Demarest 2004; Rice 2008).

It is likely that period-ending dates (when one of the first three of the five Long Count hieroglyphs hits 20) were of special significance to populations in the Maya culture area, because a disproportionate amount of monumental hieroglyphic portrayals reference these period-ending dates (e.g., Coe 2005; Demarest 2004). Elaborating on how these and other Maya portrayals were probably associated with unobservable portents, Demarest (2004:117) theorizes that "the Maya deified numbers, periods in the

various calendars, geographical features, their deceased ancestors, and rulers, in addition to the specific 'deities' identified by the Spanish chroniclers." It is difficult to demonstrate this on a regional level, but researchers have definitely recorded evidence to support this theory in a variety of contexts (e.g., Bricker 1995; Coe 2005; Demarest 2004; Rice 2008; Vogt and Stuart 2005).

Taube's (1992) "The Major Gods of Ancient Yucatan" is a comprehensive summary of Maya figural portrayals that have been interpreted as specific deities in highland and lowland contexts (Taube 1992). Coe's (2005) "The Maya," mentioned above as another comprehensive volume on the Maya culture area consulted during the writing of this paper, does a especially nice job of detailing the probable roles of many Maya deities. This volume mentions that regional portrayals of hieroglyphs and deities often vary between contexts, but often retain certain consistent attributes (Coe (2005).

Hieroglyphic Portrayals

Maya hieroglyphic portrayals (i.e., inscriptions) was a major topic of research, for which this paper consulted sources dating from the 1970s until the present. Gates' (1978) "An Outline Dictionary of Maya Glyphs" details descriptions and translations of various hieroglyphic portrayals. Beetz and Satterthwaite's (1981:4) book, "The Monuments and Inscriptions of Caracol, Belize," reproduces and translates monumental hieroglyphic portrayals found at Caracol. All of these are read "from left to right in accordance with the Maya order of reading." The authors simplify the task of discerning the faded inscriptions by drawing instead of photographing them. Bricker (1995:216) describes hieroglyphic portrayals as being "composed of a mixture of logographic, syllabic, and semantic signs." The author uses the *Ajaw* hieroglyph as a means of demonstrating hieroglyphic variation (Figure 5). As mentioned in the introduction, an irregularly-ordered portrayal of this hieroglyphic symbol was discovered by archaeologists at a Nueve Cerros cave in 2010 (Woodfill, pers. comm. 2010).

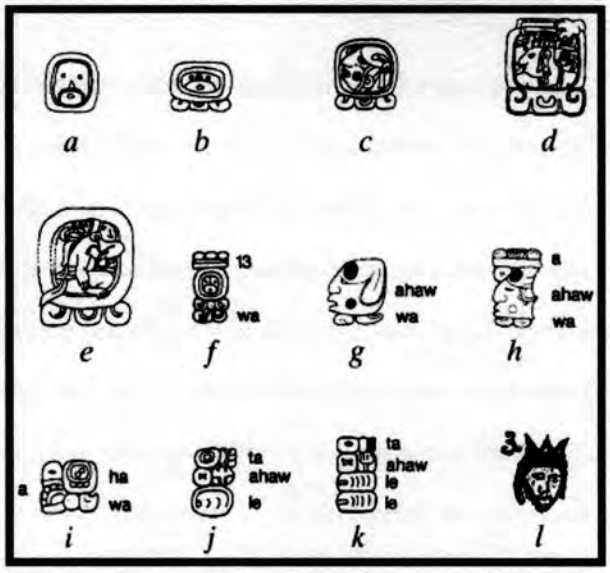

Figure 5

Examples of *Ajaw* hieroglyphs from various contexts. Image from Bricker (1995:217) used with the permission of the publisher.

Coe and Van Stone's (2005) "Reading the Maya Glyphs" is a recent, brief primer on how to read hieroglyphic portrayals (Coe and Van Stone 2005). A.G. Miller (1986) details the probable meanings of portrayals recorded at Tikal (A.G. Miller 1986). Wanyerka's (2009:504) dissertation on hieroglyphic portrayals from the southern Maya Mountains region of Belize speaks of the reading of "a lone hieroglyph . . . written in unusual reversed order," whicih is especially relevant to this final paper's interpretation of the irregularly-ordered Nueve Cerros 7 *Ajaw* hieroglyph (Wanyerka 2009). Watson's (2010) dissertation, "Assembling the Ancient: Public Science in the Decipherment of Maya Hieroglyphs," is the most current description of hieroglyphic portrayals consulted by this study (Watson 2010). Roman-Rangel and colleagues (2012) speak of some developing computer software that has the ability to recognize and translate Maya hieroglyphs without the need for human translation (Roman-Rangel *et al.* 2012). Ingold's (2007) article "Lines: A Brief History" discusses the evolution of the human use of the line. Ingold's (2007) lengthy article mentions the use of the line in iconographic portrayals, which is a discussion that is applied to the interpretation of the Nueve Cerros *Ajaw* hieroglyph, addressed in Chapter V (Ingold 2007).

Climate

Some climate and weather-related research was also thought appropriate. This was in consideration of the fragile nature of cave art, the karstic formation of caves, and the rainfall that serves as the basis for the natural production of salt water at the nearby precontact Maya population center.

Mesoamerica's high rate of evaporation and subsequent precipitation is due to it being surrounded by large bodies of water and the year-round warmth of its climate (e.g., Monteith 1965; Puleston 1973; Whiteside 1985). Monteith (1965:207) describes the exact physical equations behind "the [increased] rate of evaporation from a wet surface with temperature *T'* . . . calculated from the rate of increase in the latent heat content of surrounding air at temperature *T*." In other words, as temperatures get higher, rates of evaporation also go up (Monteith 1965).

Whiteside (1985:10) reports that the northeast Trade Winds take on a large amount of water vapor as they move over the "warm tropical waters of the Caribbean sea" from the Atlantic Ocean on their way to Mesoamerica (Puleston 1973; Whiteside 1985). Reported by Whiteside (1985:4) in his technical weather brief on Central America for the United States Air Force, the northeast Trade Winds are a force of nature, "averaging 7-9 knots [8.055-9.206 m.p.h.] year round," that follows the contours of ground topography once breaking inland. Acting together with the ground topography, Puleston (1973) illustrates how seasonal pressure systems force the storm systems carried by the equatorial Trades to rise, cool, and shed some of their rainwater as they are pushed inland.

Whiteside (1985:8) writes that the "mountains [of the southern highlands] . . . get some of the highest rainfall amounts in Central America (more than 120 inches [3.048 meters] a year) on their lower windward slopes." At other coastal areas, "the annual rainfall is more than 150 inches [3.81 meters]" (Whiteside 1985:8). By this measure, Nueve Cerros' annual rainfall of three to four meters is very high in relation to the rest of Central America (e.g., Dillon, *et al.* 1988). Along with groundwater, this feeds the natural production of salt water that flows out onto the salt plain and, when it is not raining, deposits salt precipitate after all the water has evaporated (Dillon *et al.* 1988).

In "An Ancient Extractive Industry: Maya Saltmaking at Salinas de los Nueve Cerros, Guatemala," Dillon and colleagues (1988) base a broad summary of the surface site on several years of

excavation and experimentation. The site's period of Maya occupation has most often been dated sometime between the Late Preclassic and Late Classic periods (e.g., Dillon *et al.* 1988; Woodfill 2011b). However, Woodfill and colleagues (N.d.) have recently written in an unpublished manuscript that we now know the site's period of Maya occupation began as early as the Middle Preclassic (1000-400 BC) and lasted until as late as AD 1100. This unpublished 2012 manuscript, entitled "Evidence for Elite Control of Basic Resource Production at Salinas de los Nueve Cerros, Guatemala," has been submitted for publication to Latin American Antiquity (Woodfill *et al.* n.d.).

The salt produced at Salinas de los Nueve Cerros would have been in demand by other inland population centers during much of this time period, although "in terms of sheer productivity Salinas de los Nueve Cerros was not in the same league" (Dillon *et al.* 1988:43) as the major coastal salt procurement sites (Dillon *et al.* 1988). The precontact salt trade would have flourished at Salinas de los Nueve Cerros, because the River Chixoy would have provided access to "the largest river system of the Maya area" (Dillon *et al.* 1988:37), amounting to over one thousand kilometers of inland waterway (Figure 6).

Figure 6

Map of the rivers that connect to the River Chixoy

Woodfill (2011b) gave a talk to the Maya Society of Minnesota on November 4th and 5th, 2012, where he reported on his three full dry seasons of work at Salinas de los Nueve Cerros. He noted that even though the elevation of Salinas de los Nueve Cerros should be classified as being located at a "transversal" elevation, which is an intermediate area between the highlands and lowlands. Detailing the history of Salinas de los Nueve Cerros, Woodfill (2011b) explained that the site probably began as a sedentary Preclassic community, stratifying and developing into an "Early Classic [Maya] epicenter." Exploding with Maya salt production during the Classic period, Woodfill (2011b) cited Dillon and colleagues' (1988) article to report that the site's annual salt production yield could have been as much as "24,000 tons."

Maya Cave Studies

Mesoamerican cave subprojects and surface projects have both demonstrated the cultural significance of caves in the Maya culture area (e.g., Armitage *et al.* 2001; Bassie *et al.* 2002; Coe 2005; Demarest 2004; Joyce 2004; Lucero 2007; Mercer 2005; A.E. Miller *et al.* 2002; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a, 2011b). Research for this final paper addressed a variety of cave study types, including two preliminary cave inspections that addressed a single Nueve Cerros cave (Spenard 2011). Spenard (2011:6) writes of the cave's geology and surface archaeology. No cave art was reported (Spenard 2011). Later in the 2010 field season, Woodfill (pers. comm. 2010) returned to the same cave and discovered two painted pictographs (Cave Art 1A and 2A). No other Nueve Cerros caves were recorded in 2010 (Woodfill, pers. comm. 2010).

After the antiquarian cave survey that addressed the Maya culture area in 1896, the Maya cave survey field procedure experienced a long hiatus that lasted until the 1970s (Mercer 2005). The systematic cave survey of the Nueve Cerros ridge system followed a series of other recent cave surveys (e.g., Brown 2005; Demarest 2006; Peterson 2006; Prufer 2002). The dramatic increase in recent cave surveys have largely demonstrated the same theory, after "Brady (1989) provided the first attempt to describe a ritual cave assemblage" (Peterson 2006:126).

Recent cave surveys include the Petexbatun Regional Cave Survey (Demarest 2006; Woodfill 2011a); the Maya Mountains Archaeological Project (MMAP) (Prufer 2002); the Xibun Archaeological

Research Project cave survey (Peterson 2006); the Yalahau Archaeological Cave Survey (Rissolo 2003); and a cave survey headed-up by the Mayápan Periphery Project (Brown 2005). With exceptions, few of them recorded any cave art (e.g., Mercer 2005; Rissolo 2003). This systematic cave survey employed a strategy of recording any evidence of cultural cave use at Nueve Cerros, and sought to apply its findings to the interpretation of any recorded cave art portrayals.

Peterson's (2006:122) cave survey of part of the Xibun River region mentions "the incorporation of speleothems in circular shrines at [the surface sites of] Oshon and Obispo," which "indicates the importance of caves in ritual activities." Colas and colleagues (2000:5) also observed "a number of cached speleothems," arranged in a linear concentration at a cave known as "Ch'en P'ix" [Cave of the Awakening]. These cached speleothems "form a kind of path" (Colas *et al.* 2000:5) that leads up to a cave platform feature, where a large number of *in situ* painted ceramic sherds were excavated. Colas and colleagues (2000:6) report that these could be reconstructed into a painted "polychrome Tripod plate" with a "Late Classic" figural portrayal (Figure 7). Colas and colleagues (2000:8) write that this portrayal could "represent a ritual autosacrificial bloodletting event" that was conducted at the platform, an interpretation that is "strengthened by the presence of obsidian blades adjacent to the platform."

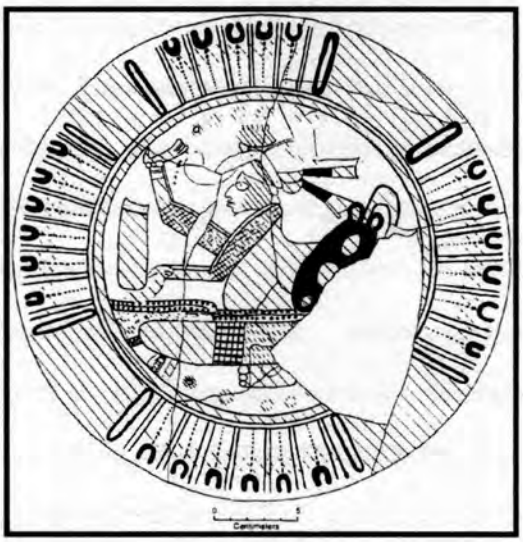

Figure 7

Ceramic tripod plate discovered at Ch'en Pix Cave in Belize (Colas *et al.* 2000:6).
Image used with the permission of the National Speleological Society.

Experts in the translation of Maya hieroglyphs Vogt and Stuart (2005:159) discovered the hieroglyphic portrayal of "cave" in their readings of surface site inscriptions. Based on associated iconographic portrayals and hieroglyphic inscriptions, the authors go on to write of the cultural significance that the cave landform may have had in the precontact Maya culture area. "Admittedly, other readings might exist, but the convergence of the evidence around 'cave' makes considerable sense in the numerous contexts [outside caves] in which we find the sign" (Vogt and Stuart 2005:160). Joyce (2004:22) further notes that "when Mesoamerican pyramids first enter the textual record in Classic Maya inscriptions (ca. A.D. 250-850), they are identified with mountains, permanent stone features on the landscape containing caves where ancestral spirits dwelled" (Joyce 2004).

Maya Cave Art Studies

The topic of Maya cave art portrayals is mentioned in the literature a fraction as often as most of the other study topics already covered in this literature review. There are many reasons for this. The most prominent of these is the general inconsistency of Maya cave art portrayals. The topic's infrequent appearance in the literature also seems to dissuade researchers from approaching the subject (e.g., Armitage 2001; Rissolo 2003; Brady and Stone 1986; Miller *et al.* 2002; Stone 1995, 1997; Ware *et al.* 2000).

Rissolo (2003) surveyed 20 cultural cave landforms between 1996 and 1999 in the Yalahau region of the northeast Yucatan Peninsula. This was the only recent cave survey reviewed by this study that recorded cave art portrayals in the field. The recorded portrayals are particularly discernible in this publication, because they are depicted with detailed drawings, as opposed to being depicted with calligraphy or photography, which is more common. Rissolo (2003:39) writes that the Yalahau cave art portrayals consist of a panel "of four circular frontal faces . . . and an additional skull-like image," all carved as petroglyphs into the wall of a single cave above a stairway feature in a sloping passage (Rissolo 2003). A patterned distribution of stairway and platform features in the caves of the Yalahau region further demonstrates that its precontact Maya population collected some of their fresh water from caves, "likely valued for its remote and sacred origin" (Rissolo 2003:129). While Rissolo (2003:71) is able to identify the function of the single decorated Maya cave recorded in the Yalahau region "as an [especially] important

and sacred water collection site during the Preclassic to Early Classic periods (hence the corresponding vessels)," he continues by saying simple comparisons between the cave art portrayals of this cave and "images from other caves might be more imagined than real," asserting that any "similarities might be more or less coincidental and not indicative of a specific set of ideas."

Brady and Stone (1986:23) "contrast the artwork of Naj Tunich [Stone House] with that of most other Maya caves," characterizing "most Maya non-portable cave art" portrayals as lacking "the formal vocabulary of elite art" found elsewhere. Although the Nueve Cerros cave art study did not invest a substantial amount of time into researching surface portrayals, various other studies also mention that cave art portrayals are more "crudely rendered" (Brady and Stone 1986:23) than the monumental portrayals at surface sites (e.g., Graham *et al.* 1980; Rissolo 2003; Stone 1995, 1997).

Numerous "petroglyphs of human faces were found on the walls" (Brady and Stone 1986:18) near the entrance of Naj Tunich cave. This common petroglyphic motif typology has been recorded at a large number of decorated Maya caves (e.g., Brady and Stone 1986; Graham *et al.* 1980; Rissolo 2003; Stone 1995, 1997). Graham, McNatt, and Gutchen (1980:166) speak of Siffre's 1978 Maya cave survey, which recorded "facial features . . . carved into rock along natural prominences or depressions to create simple but nonetheless grotesque faces." This descriptive word is probably derived from the Spanish "mascarones" [grotesque heads]. In her article on "Regional Variation in Maya Cave Art," Stone (1997) mentions still other Maya cave art portrayals in the form of petroglyphic faces. Stone (1997:37) interprets the low quality of the art as indicating that "the petroglyphs may represent a vernacular art practiced only by 'common folk,'" as opposed to elite (Stone 1997; Rissolo 2007). Echoed by Rissolo (2003:71), "the majority of rock art in the Maya area (and the northern lowlands in particular) can be described as vernacular in nature," although some of the Yalahau cave art "exhibits qualities that suggest the work of artists who were at least somewhat literate in the iconography of the elite" of no specific time period (Rissolo 2003). Bassie and colleagues (2002:19) mention that "different scribes appear to have produced each" of seven hieroglyphic groups at yet another Maya cave art assemblage (Bassie *et al.* 2002). Judging by these fairly-detailed interpretations, readers may be led to believe that the Maya cave art portrayal is an archaeological material class that is not extraordinarily difficult to interpret. However, due to a multitude of factors that will be

made clearer as this final thesis paper progresses, many other authors would probably agree that it could be one of the most difficult to interpret.

Mesoamerican petroglyphic and pictographic cave art portrayals are likely to be more common than cave art portrayals are in most other world regions of comparable size (e.g., Stone 1995, 1997). Stone (1997:34) writes of Maya cave art portrayals in her 1997 "Regional Variation in Maya Cave Art,"

> "A rigorous count of caves with sculpted art has not been conducted, but it is easy to imagine the total number of Maya caves [with] some form of wall art reaching, if not surpassing, 50 . . . there are over 250 Paleolithic cave art sites in Europe . . . in terms of our current understanding, cave art appears to be more abundant in the Maya area than any other part of Mesoamerica."

Stone (1995) interprets 25 of these Maya cave art assemblages in her earlier book, "Images from the Underworld: Naj Tunich and the Tradition of Maya Cave Painting," which includes a detailed description of the largest known Maya cave art assemblage, located at Naj Tunich. Stone (1995) estimates that all of the known Maya cave art assemblages date to the Classic period Stone (1995). Bassie and colleagues (2002:19) of "The Jolja' [At the Head of the Water] Cave Project," describe what is probably one of the earliest cave art portrayal assemblages, "the majority" of which "can be dated to the Early Classic Period based on style and calendar notations . . . although most of the dates cannot be securely assigned to [calendric] Long Count positions," because there are no hieroglyphic Long Count cave art portrayals at Jolja' (e.g., Bassie *et al.* 2002).

Despite the difficulty of dating rock art, the ages of several Maya cave art assemblages have been tested (e.g., Armitage *et al.* 2001; Miller *et al.* 2002). Armitage and colleagues (2001:474) radiocarbon-dated charcoal pigments from calendric hieroglyphs located at Naj Tunich, finding that the derived average "does not overlap with the Maya calendric dates" (Armitage *et al.* 2001). At Cueva de las Pinturas, Miller and colleagues (2002:80) tested the radiocarbon age of a fiber sample collected from pictographic cave art and found it to date to ">49,900 years before present . . . [which] indicated that the [sampled] fibers could not have been incorporated at the time of painting." To date, no Maya cave art has been accurately dated with an absolute dating method (Miller *et al.* 2002).

Statistics and Methods

Several sources guided the field and laboratory methods of the Nueve Cerros cave survey and Maya cave art study. From a rainforest ecology standpoint, Dominy and Duncan (2001:2) discuss the best field methodologies for "the mapping of individual trees" at the Kibale Forest Reserve in Tanzania. "In this regard, the spatial distribution of trees has long captivated ecologists . . . the mapping of individual trees is beginning to yield great insight into patterns of recruitment limitation, seed dispersal, and tropical tree diversity" (Dominy and Duncan 2001:2). The authors speak of the very high error range inherent in the "classic methods of ground-based mapping . . . but mapping accuracy and efficiency can be greatly improved today by utilizing Global Positioning System (GPS) and Geographic Information Systems (GIS) technologies." Dominy and Duncan (2001:8) go on to say that "a significant physical barrier to quality GPS signal reception" is "dense forest canopy," which was a serious issue that played a role in the laboratory methods of the systematic cave survey at Nueve Cerros when plotting GPS points on overview plan maps (Dominy and Duncan (2001).

Drennan's (1996) volume, "Statistics for Archaeologists: A Commonsense Approach" comprehensively describes several statistical operations of great use to archaeologists. These include the T-test, and the tripartite calculation of mean, standard deviation from the mean, and coefficient of variation. One of the most beneficial aspects of Drennan's (1996) descriptions of these statistics is their relevant application (in archaeological nomenclature) to hypothetical material assemblages (Drennan 1996).

Eerkens and Bettinger's (2001) "Techniques for Assessing Standardization in Artifact Assemblages: Can We Scale Material Variability?" was another source that was of great benefit to the statistical analysis of the recorded petroglyphic and pictographic cave art portrayals at Nueve Cerros. The authors mathematically demonstrate how size variation in archaeological material can be applied to specific equations meant to detect if their creators may have intended them to be standardized. In the mid-1800s, E.H. Weber used a set of lifting experiments to test the human perception of experienced craftsmen in standardizing their own craft without using measuring instruments. Weber's experiments indicated that the standardized "objects had to differ by more than about 2 percent (1/50) for a difference in weight to be detected" (Eerkens and Bettinger 2001:495). Following E.H. Weber's 19th century standardization

experiments, Eerkens and Bettinger (2001:496) describe that more recent standardization experiments have tested the "visual perception capabilities of most humans," finding that a "*CV* [Coefficient of Variation] of 1.7 percent derived for the Weber fraction should represent the *minimum* amount of variability attainable by humans for length measurements." This latter ratio, representative of the human ability to perceive variation and replicate visual phenomena without the use of measuring instruments, was useful during this study's analysis of the Nueve Cerros cave art measurements (Eerkens and Bettinger 2001).

Whitley (2011:50) speaks of the utility of "digital enhancement" in viewing rock art photographs, which "is now standard, especially for pictographs where motifs are faded" (Whitley 2011). In "Application of Digital Image Enhancement in Rock Art Recording," Mark and Billo (2002) give step-by-step instructions on the general application of Adobe Photoshop ™ software to rock art photographs (Mark and Billo 2002). This software was used by the Nueve Cerros cave art study. Ware and colleagues (2000:2490) use a similar method to record the presence of "overpainting" at the Late Classic cave art assemblage of Naj Tunich (Ware *et al.* 2000).

Along with a short discussion on the utility of statistics in archaeological predictive models, Neumann and Sanford (2010) discuss a wide-range of scientific, communicative, and ethical issues that must be considered in good archaeological practice. Exercised by this systematic cave survey and Maya cave art study, Neumann and Sanford (2010) discuss the best protocols for survey, preliminary excavation, and how to approach dealings with landowners and other stakeholders. Even though the book's content primarily focuses on providing the most up-to-date information for Cultural Resource Management professionals in the United States, the authors also mention that "archaeology in Ireland, Israel, Mexico, China, Japan, and many other counties is as much an exercise in historical and national identity as it is scientific research" (Neumann and Sanford 2010:6). This certainly proved to be true at Nueve Cerros, where the local Q'eqchi'-speaking Maya wanted to be, and almost always were, very involved with the archaeological undertakings of Proyecto SNC.

Chapter III

METHODOLOGY

A standardized field methodology was used to locate caves and record cave art portrayals during the 2011 systematic cave survey at Nueve Cerros. Field methods consisted of three operations: Cave survey, preparation for excavation, and preliminary excavation. The details and logistics of each will be outlined in the chapter to follow. The reliable collection of cave data was the study's number one priority during each operation.

Figure 8 is a timeline that illustrates the number of days devoted to each of the three field operations. The thick horizontal bar with 77 hash marks and month names written above represents the field study period, consisting of 77 days from January 22 until April 9 of 2011. Although not all were field days, 34 were. Field days are represented by 34 thin lines that extend downward to one of the three horizontal lines below the thick horizontal bar.

Figure 8

Field Study Timeline

Government permission for artifact collection was not granted until the end of March, around two weeks before the end of the field study period. This left just enough time for the preliminary cave excavation. Since it was not possible to collect any of the cave art portrayals anyway, the inconvenience of not having government permission did not hamper the present study much. Lack of permission to collect, however, did emphasize the importance of on-site recordation and data preservation.

Systematic Cave Survey and Preliminary Recordation

Survey depended upon the weather and the availability of transportation. Since the Nueve Cerros ridge system consists of land that is owned by various landowners with differing opinions of archaeologists, survey also depended on landowner wishes. This resulted in a total of 29 days being devoted to cave survey, with the size of the survey team ranging between three and seven individuals, depending on landowner wishes to accompany the archaeology team with representatives.

Preliminary cave recordation included the use of field notation, photography, cave mapping, and a standardized cave summary form. Waterproof containers were used to preserve this data. Field notes and photograph logs were regularly copied into secondary hard-copies that remained at camp in a locked, waterproof container. Much of the data was also transcribed and saved onto a field computer, saved onto a flash-drive, and periodically uploaded onto a cloud server.

Fourteen different landowners from six villages allowed the cave survey onto their land at some point during the field study period. Six of the 29 survey days were devoted to cave reconnaissance, which was when the survey team would venture into unexplored areas of the ridge. On the other 23 days of survey, the team was led to known cave openings by landowners. When a cave was found, recordation began with a landowner interview about the cave's known history. This interview included inquiries about contemporary uses and the cave's local name. All cave names preexisted or were given by landowners during survey, often naming the caves after the name of its hill. Any name that was repeated for more than one cave was associated with a sequential number (i.e., San Juan #1, San Juan #2, San Juan #3). In the paper to follow, caves will most often be referenced by their sequential number assigned during survey (i.e., Cave 1, Cave 2, Cave 3).

UTM coordinates were taken at each hill and not at each cave. Survey progress was tracked in the field with two handheld GPS devices referencing the North American Datum of 1983 (NAD-83). These were stored in portable, waterproof containers when not in use. Without a large, extendable antenna for the GPS devices that could break through the dense tree canopy (e.g., Dominy and Duncan 2001), the only way to successfully mark cave/hill positions was by systematically hiking around the steep hills until one or both of the GPS devices could make contact with enough satellites. Although this strategy did not result in

the recordation of a standardized position at the top of each hill or at the entrance of each cave, it did help to speed survey progress without endangering data reliability. One study has shown that GPS points taken from beneath dense forest canopies show spatial errors between ten and 30 meters, regardless of methodology (Dominy and Duncan 2001). Therefore, it would have been inefficient to take UTMs from a standardized position at each hill, since the recorded point would not have been much more precise.

Recordation of potential cave art portrayals included scaled photography and marking provenience locations on cave maps prepared on-site. Similar examples were searched for elsewhere in the same cave, because single caves often had more than one cave art portrayal of the same motif typology. The dimly-lit caves would characteristically have natural mineral colorations and eroded surfaces that made it difficult to identify cave art portrayals. Laboratory analyses addressed the authenticity of recorded cave art portrayals later on. Digital photograph enhancements with Adobe Photoshop™ software could make cave art portrayal attributes stand-out without compromising the original integrity of the images (e.g., Mark and Billo 2002; Ware *et al.* 2000; Whitley 2011). These kinds of digital enhancements are a regular practice in rock art studies, "especially for pictographs where motifs are faded" (Whitley 2011:50). The interpretations of the Nueve Cerros cave art portrayals relied on four analytical methods. These included cave mapping (e.g. Rissolo 2003), the digital enhancement of photographs with Adobe Photoshop™ software (e.g., Mark and Billo 2002; Ware *et al.* 2000; Whitley 2011), portrayal attribute measurements and statistics (e.g., Whitley 2011), and a preliminary excavation that sought to recognize the precontact human behavior in the vicinity of the cave art (e.g., Clottes 2008; Whitley 2011). No comprehensive Mesoamerican cave art portrayal reference collections could be consulted, because none exist at this time.

Cave Summary Form

Detailed field notes and photography were used as often as possible. A cave summary form (Figure 9) provided a template for recording all archaeological data, date of inspection, UTM coordinates, given hill and cave landform numbers, landform descriptions, cave names, any information about accessibility, descriptions of internal cave environment, any other cave information, and any important landowner information. This form was completed outside the cave and as the cave was explored.

Date:

Hill Number – Cave Number – Cave Name

1. Previous Investigations:
2. Cave Location:
   1) UTM: 15P E _____, N _____
   2) Village(s):
   3) Landowner(s):
   4) Other:
3. Description of landform:
   1) Cave:
   2) Hill:
4. Accessibility:
   1) Number of entrances:
   2) Size of entrance(s): Width _____, Height _____
   3) Orientation of entrance(s):
   4) Method(s) of access: Hike / Scramble / Crawl / Squirm / Climb / Downclimb / Swim
   5) Other observations:
5. Cave Environment:
   1) Water level:
   2) Light level:
   3) Vegetative content:
   4) Signs of erosion:
   5) Ceiling height: _____, _____, _____
   6) Ground cover and soil matrix:
   7) Other:
6. Archaeological Information:
   1) Cave art:
   2) Artifacts:
   3) Other features:
   4) Potential for excavation:
   5) Current use(s):
   6) Other:
7. Comments:

Figure 9

Cave Summary Form

Cave Mapping

Cave mapping began near the cave's entrance at an arbitrary datum. The angle and distance from the datum to a second point was then plotted onto the map. Additional points followed, and the walls of a full chamber were drawn in. The cave walls at the main level were drawn in solid lines, lower levels in dotted lines, and higher levels in dashed lines. Natural aspects and cultural features were added during the after the cave walls had been drawn in (Figure 10).

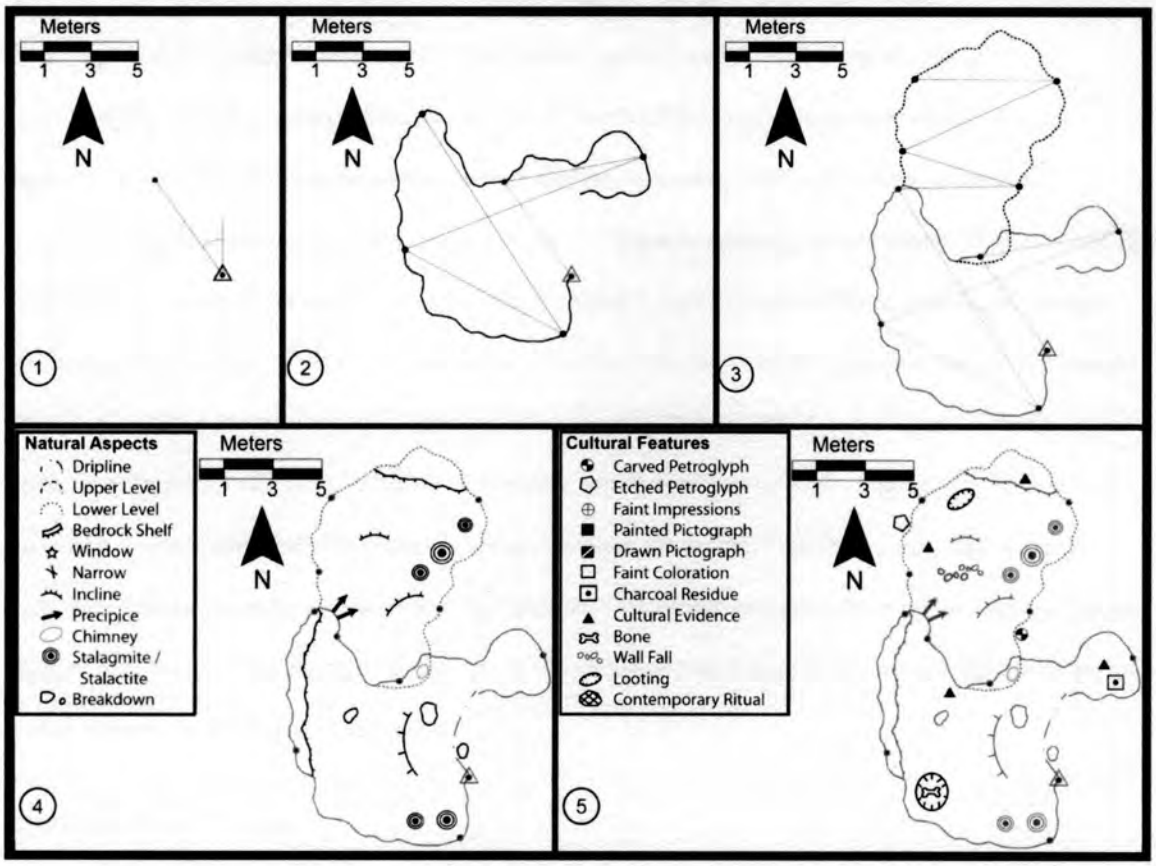

Figure 10

Cave Mapping Process

Cave Mapping Terminology

Terms referring to cultural features on maps and elsewhere in the paper include three different terms for potential petroglyphic portrayals, including "carved petroglyph," "etched petroglyph," and "faint

impressions." Three different terms were also used to refer to potential pictographic portrayals, including "painted pictograph," "drawn pictograph," and "faint coloration." It is important to note that potential cave art portrayals with charcoal residue were not labeled as "charcoal residue" on cave maps. This dot-within-a-square icon was always used to denote charcoal remains recorded *in situ* or on the floor of caves. Other technical mapping terms in this final paper include "wallfall," which is the archaeological evidence of a collapsed structure; "panel," which is a group of potential cave art portrayals distributed nearby one another; and "superimpose," which is when one portrayal overlays or underlies another. The specific meanings of all icons can be referenced in the cave art narratives of the following chapter.

Other than the walls of the upper and lower levels of the cave, natural cave aspects that are included in cave maps include driplines, bedrock shelves, windows, narrows, inclines, precipices, chimneys, stalagmites and stalactites, and breakdown. Technical mapping terms include "dripline," which is the entrance overhang of a cave; "bedrock shelf," which is a natural rise in the cave floor or a natural lowering in the ceiling; "window," which is a small hole in the cave wall that provides view to the outside; "narrow," which is the most restrictive kind of cave opening; "ramp," which is a cave slope that has narrow walls on both sides; "chimney," which is a climbable pitfall with narrow walls; "stalagmite," which is a cone-like, calcium carbonate formation on the cave's floor; "stalactite," which is a cone-like, calcium-carbonate formation on the cave's ceiling; "breakdown," which consists of rocks or fallen limestone on the floor of the cave; and "twilight chamber," which is a chamber where there is just enough light from outside to see without a supplemental light source.

Preparation for Excavation

Caves 1, 2, and 3 at Hill 1 were subjected to intensive cave recordation after being preliminarily recorded during systematic cave survey. Upon completion of intensive cave recordation, it was decided that a request would be submitted to the landowner for permission to conduct a preliminary excavation at Cave 1. The preliminary excavation was described to the landowner as an operation that would simply allow for the nature and depositional integrity of the site, its approximate horizontal extent, and its approximate vertical extent to be determined (Neumann and Sanford 2010).

Preliminary Cave Excavation Methodology

As the final part of the intensive cave recordation process, a comprehensive cave surface collection preceded preliminary excavation. Excavation broke ground just uphill of the wallfall rocks, since a structure is more likely to collapse downhill than uphill, which would have left any floor deposits uphill of the wallfall. In other words, the northern limits of the two northernmost units, Units 1 and 2, were aligned with the line of wallfall rocks. In total, three 2 x 2 meter units were oriented in cardinal directions. Units 2 and 3 were adjacent to Unit 1, forming an L-shape. Unit 2 was located to the west of Unit 1, and Unit 3 was located to the south of Unit 1 (Figure 11). Two datums were used to record elevations. Shared by Units 1 and 2, Datum A was located at the southwestern corner of Unit 1. Datum B was 8.5 centimeters higher than Datum A and located at the southwestern corner of Unit 3.

Figure 11

Excavation Units

Units were excavated in ten centimeter levels by full-time, two-man crews using hand tools. All soil was screened through quarter-inch mesh. Only Units 1 and 2 were excavated on the first day. All three units were excavated on the second and final day of the preliminary excavation. Artifacts were kept in separate bags that were labeled according to their unit number, level number, and artifact class. Charcoal samples were point-plotted and placed in tin foil. All rocks were pedestaled and left *in situ*. Recovered artifacts and depositional information are further described in the following chapter.

Chapter IV

DATA

Systematic cave survey documented 40 cave landforms at 23 hills after surveying approximately 70 percent of the Nueve Cerros karst ridge system. Table 1 depicts the number of cave landforms encountered at each hill. There were three instances where single GPS points were used to mark the approximate positions of two adjacent hill landforms. For this reason, there are a total of 20 points marking hill landforms on project maps.

Table 1

Number of Cave Landforms at Each Hill Landform

Hill	1	2	3 / 4	5	6	7	8	9	10	11
Cave Tally	3	2	2 / 1	2	1	1	3	3	1	2
Hill	12	13	14	15	16	17	18 / 19	20 / 21	22	23
Cave Tally	4	1	1	1	1	2	2 / 1	1 / 2	1	2

Of the 40 recorded cave landforms, 15 had archaeological deposits (Caves 1, 2, 3, 4, 7, 11, 12, 14, 15, 22, 26, 29, 32, 34, 39), and three had potential cave art portrayals (Caves 1, 2, 3). In Figure 12, the single hill landform where potential cave art portrayals were recorded is indicated by a white circle outlined with red and yellow, other cultural hills by blue circles within red, and the remaining eight non-cultural hills by red circles with no outline. The three cave landforms where potential cave art portrayals were recorded will be the only caves described in the data to follow. A data analysis section will address cave art portrayal authenticity after the three caves have been described individually. A quantitative analysis of authentic cave art portrayals will take place at the end of the data analysis section.

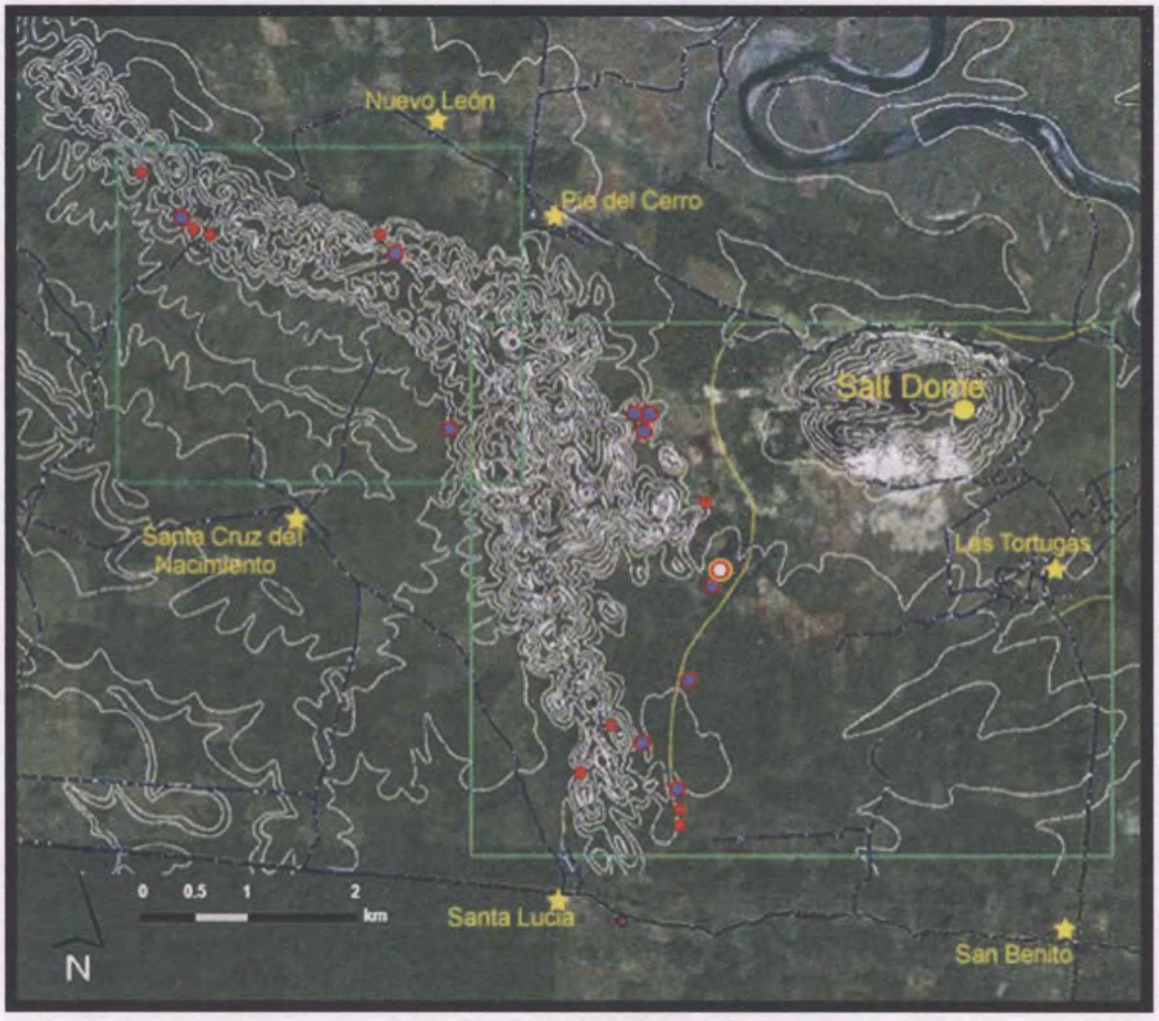

Figure 12

Map with positions of documented hills, cooperating villages, and salt dome

Figure 13 is a layered map that illustrates the scope of the systematic cave survey on a UTM map of the Nueve Cerros region. A site map of Salinas de los Nueve Cerros from Dillon (1979), modified by Woodfill for a preliminary report, shows the site extent in purple and epicenter in red. A yellow crosshair is centered over an arbitrary point at this site epicenter. The dark circle around the yellow crosshair indicates a two-kilometer radius from the arbitrary point, and the lighter circle indicates a five-kilometer radius. The varying sizes of the 23 black circles with hill numbers represent the number of cave landforms at each hill landform. Table 2 shows the distance from the arbitrary point at the site epicenter to each cave.

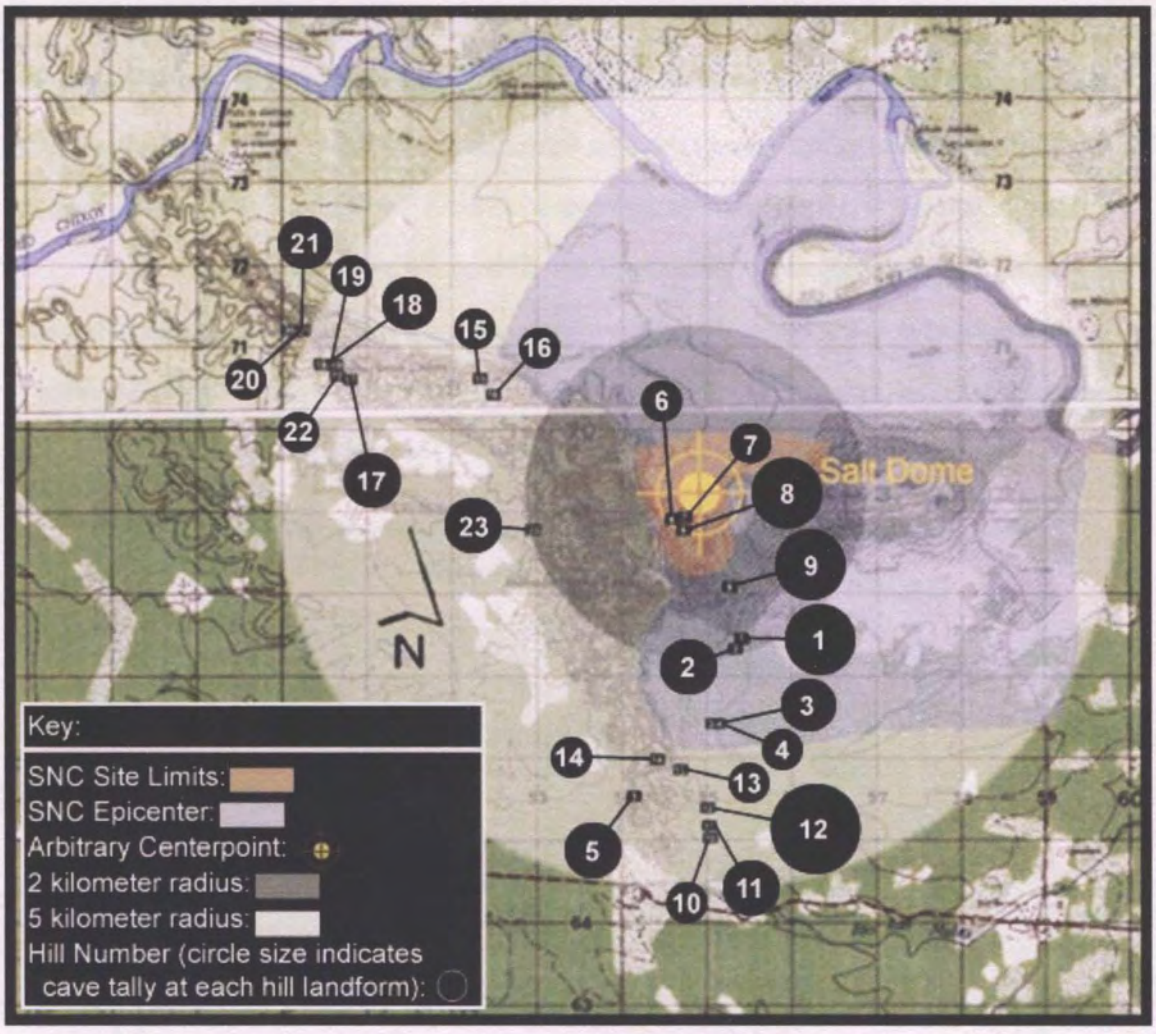

Figure 13

Map illustrating the number of caves at each hill landform

Table 2

Hill Distance from Surface Site Epicenter

Hill	1	2	3 / 4	5	6	7	8	9	10	11
Distance (kilometers)	1.8	1.9	2.8	3.7	0.5	0.4	0.5	1.2	4.1	4.0
Hill	12	13	14	15	16	17	18 / 19	20 / 21	22	23
Distance (kilometers)	3.7	3.3	3.2	2.9	2.7	4.3	4.6	5.1	4.5	2.0

The following three cave descriptions are grouped under a single hill heading that includes basic information: Hill number, UTM coordinates, and a hill table (Table 4). On the left side of the hill table is the cave tally, cave names, cave numbers, and Cuevas de Nueve Cerros (CNC) numbers. The right side indicates whether any of the caves had evidence of contemporary ritual, looting, or human remains.

Derived from the alphabetic designations of cave art panels and sequential numbers for individual portrayals at each cave, cave art portrayals were designated alphanumerically. Figure 14 illustrates a hypothetical example of this system. Cave 8, labeled below, has Cave Art 1A, 2A, and 3B; while Cave 13 has Cave Art 1C, 2C, 3C, 4D, 5D, and 6D. Actual portrayal designations are included in Table 3.

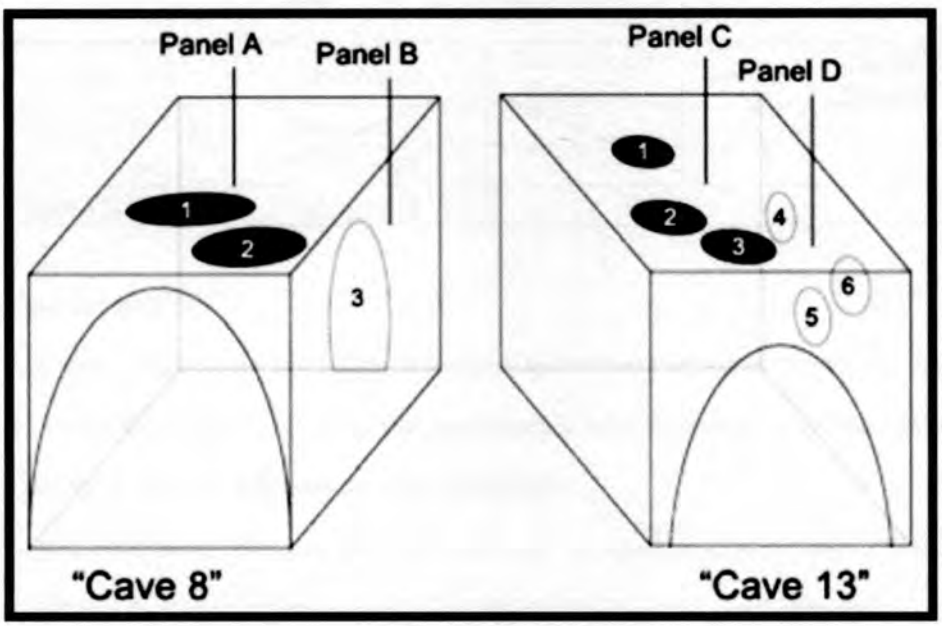

Figure 14

Hypothetical cave art designation

Table 3

Alphanumeric Designation Chart for 30 Potential Nueve Cerros Cave Art Portrayals

Cave	1								2		3
Panel	A	B	C	D	E	F	G	H	I	J	K
Cave Art	1-3	4-5	6-9	10	11-12	13-15	16-23	24	1	2-3	1-3

Cave maps are included in cave descriptions. Maps include cave art portrayal alphanumeric designations. Cave art data follows respective cave descriptions, with photographs introduced in text following each. The locations of electronic measurements are indicated in cave art photographs with black lines (e.g., Mark and Billo 2002). Much of the authentic measurement data is also included in data analysis charts. Cave 1 excavation photographs follow excavation data. No other caves underwent excavation.

CAVE DESCRIPTIONS

Table 4

HILL 1: *15P E 1767608 N 0755346*

Caves: 3	Cave Name	Contemporary Ritual Use	Looting	Human Remains
Cave 1 (*CNC-7*)	San Juan #1	✓		✓
Cave 2 (*CNC-5*)	San Juan #2			
Cave 3 (*CNC-6*)	San Juan #3		✓	

Cave 1: Cueva San Juan #1

Light shines throughout Cave 1 from its southern and northern entrances (Figure 15). It is the only Nueve Cerros cave visited by two brief cave inspections in 2010 (Woodfill, pers. comm. 2010). Cave 1 provided this Maya cave art study with the most useable data.

Located at the top of Hill 1 and opening to the south, the main entrance of Cave 1 (19 meters high by 8 meters tall) was the widest of any surveyed cave (Figure 16). A surface rock alignment was recorded as potential wallfall just inside this southern entrance (Figure 17). The floor of the cave slopes downward through the cave from the southern entrance, leveling-off again at the northern entrance. Several shallow subchambers are located on both sides of the downward-sloping, central passage (Figure 18). A short chimney leads up to a culturally-sterile, dark subchamber at the eastern end of the northern entrance (Figure 19). The cave's soil matrix consists of dark brown soil, covered in certain areas by a significant amount of cave breakdown. A narrow ledge leads from the middle of the cave along the western wall to an aerie high above the western side of the northern entrance (Figure 20). Contemporary ritual practitioners have utilized a nook at the western side of the southern entrance and are known to continue to do so.

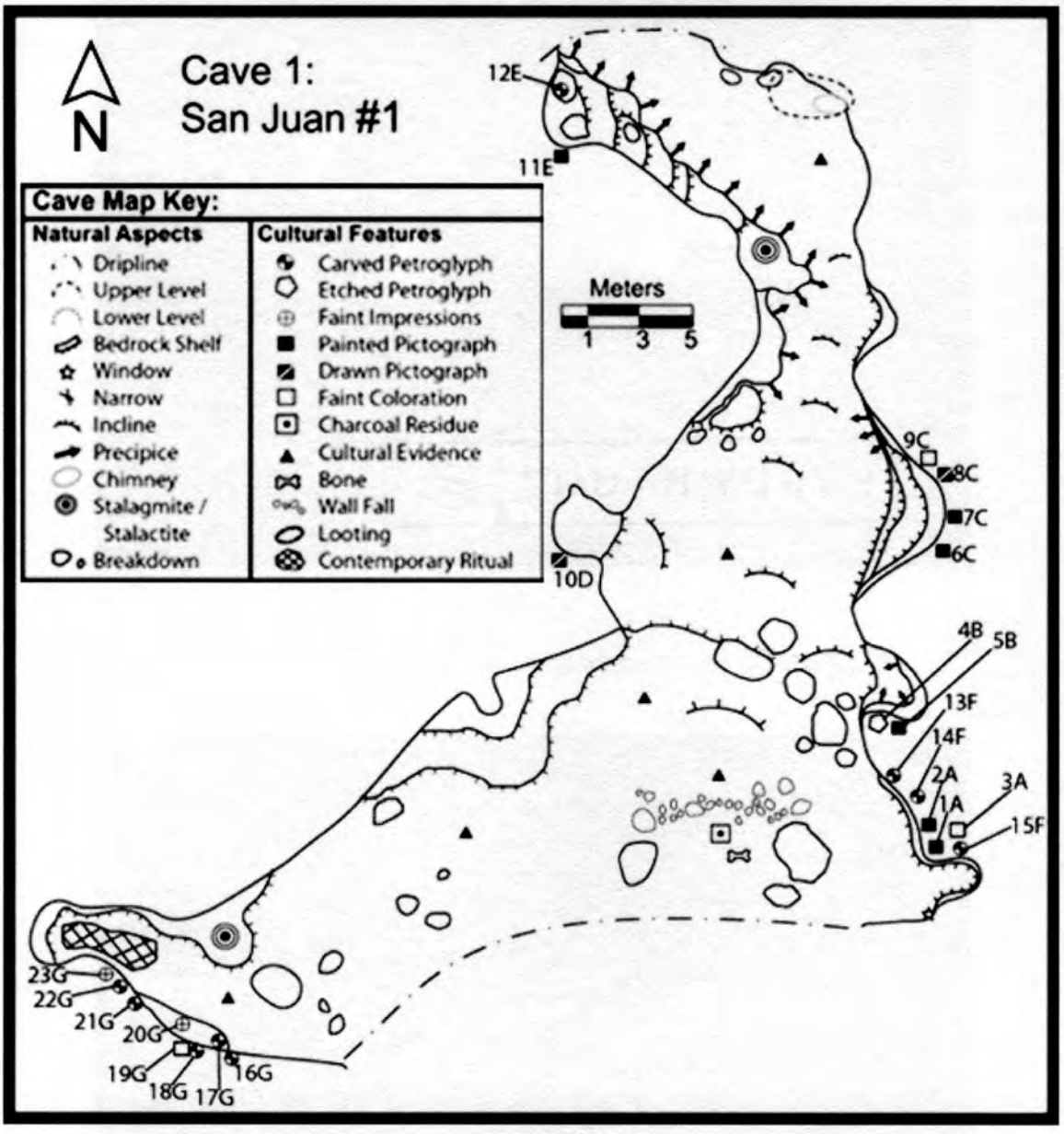

Figure 15

Plan map of Cave 1 with labeled cave art designations. What are the numbers?

Figure 16

Southern entrance of Cave 1. View to southwest (Credit: Matt Oliphant).

Figure 17

Possible wallfall indicated by white arrows. View to southwest (Credit: Matt Oliphant).

Figure 18

View through Cave 1 from southern dripline. View to north (Credit: Matt Oliphant).

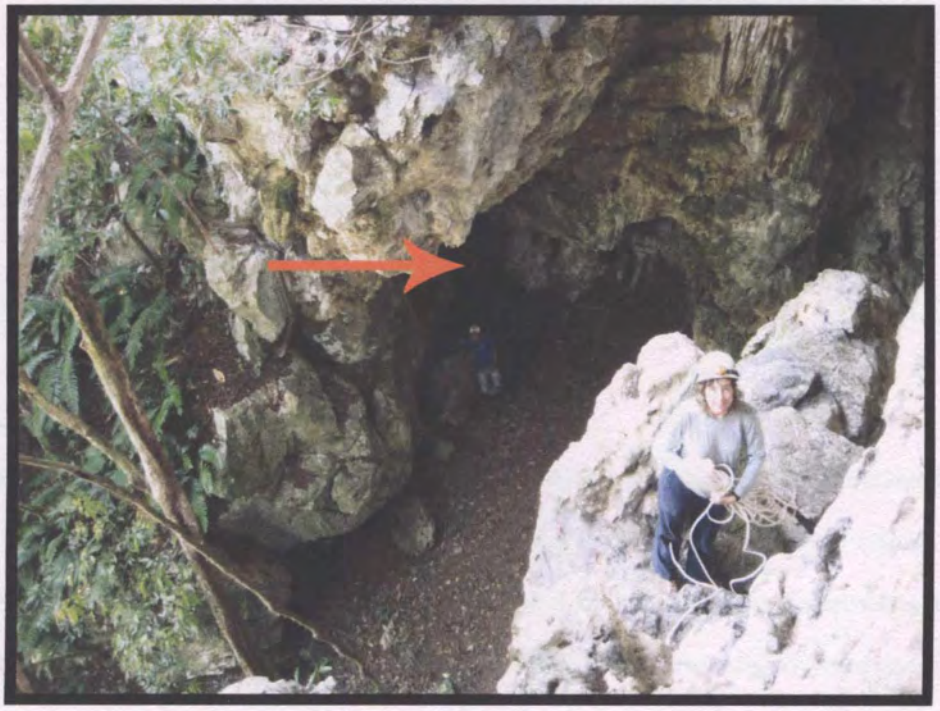

Figure 19

Entrance to the chimney from the aerie indicated by red arrow. View to east (Credit: Matt Oliphant).

Figure 20

Upward view to aerie. View to west (Credit: Charley Savvas).

Cave 1: Cave Art Data

With three potential cave art portrayals, Panel A is located at the eastern side of the southern entrance. Cave Art 1A (Figure 21) is a 21.5 by 14.2 centimeter red pictograph of a Maya 7 *Ajaw* hieroglyph. It has a single line of calcium carbonate through it, but no other major disturbance. About one meter to the northwest, Cave Art 2A (Figure 22) is a 20.2 by 18.4 centimeter, slightly faded negative handprint composed of red pigment. About two meters down the wall from Cave Art 1A, Cave Art 3A (Figure 23) is an unscaled, faint coloration in red that is similar in size to Cave Art 1A.

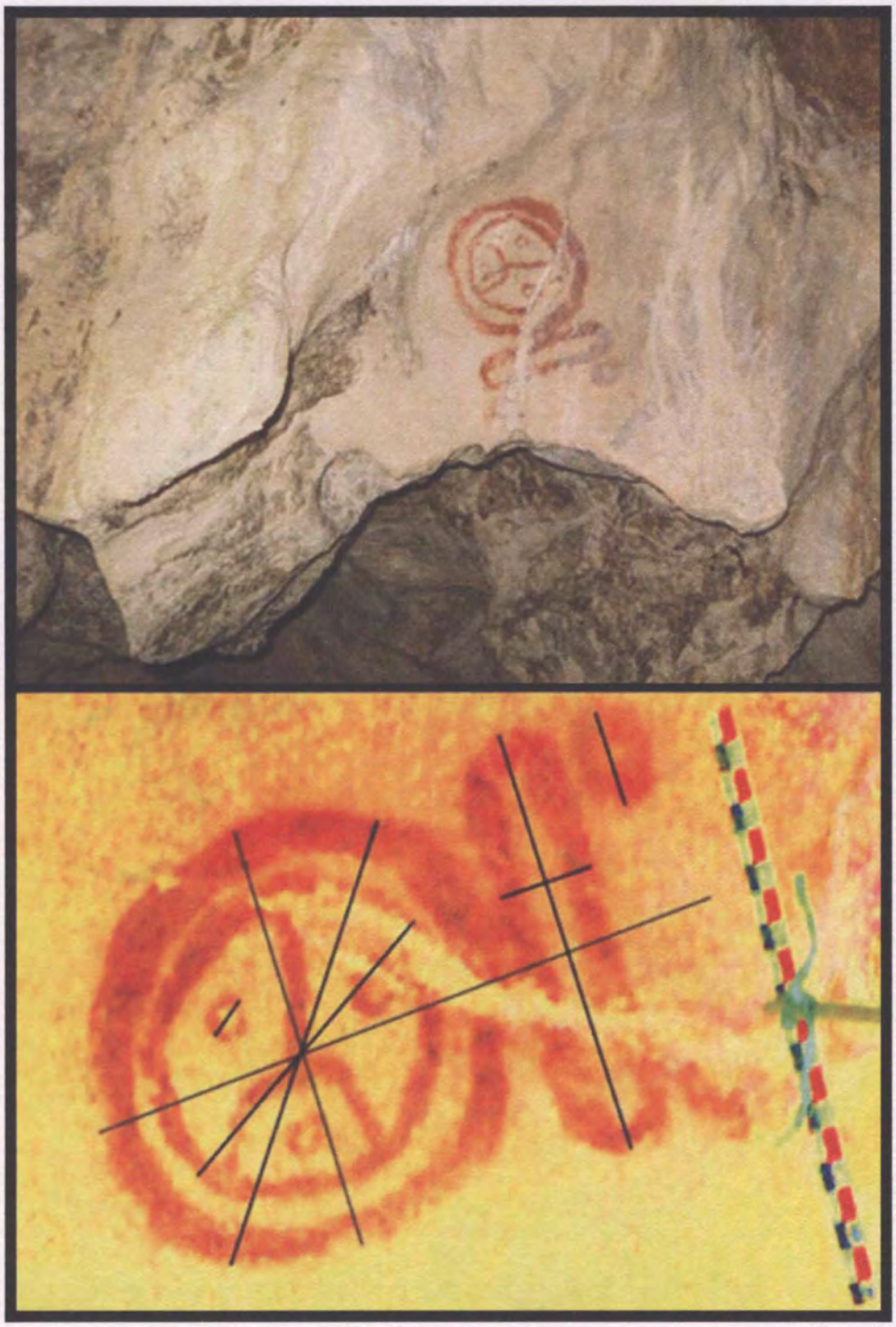

Figure 21

Upper frame: Cave Art 1A. View to north (Credit: Charley Savvas). Lower frame: Cave Art 1A pictured with digital enhancements and black lines where measurements were taken. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 22

Upper frame: Cave Art 2A. View to north (Credit: Matt Oliphant). Lower frame: Cave Art 2A pictured with digital enhancements and black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

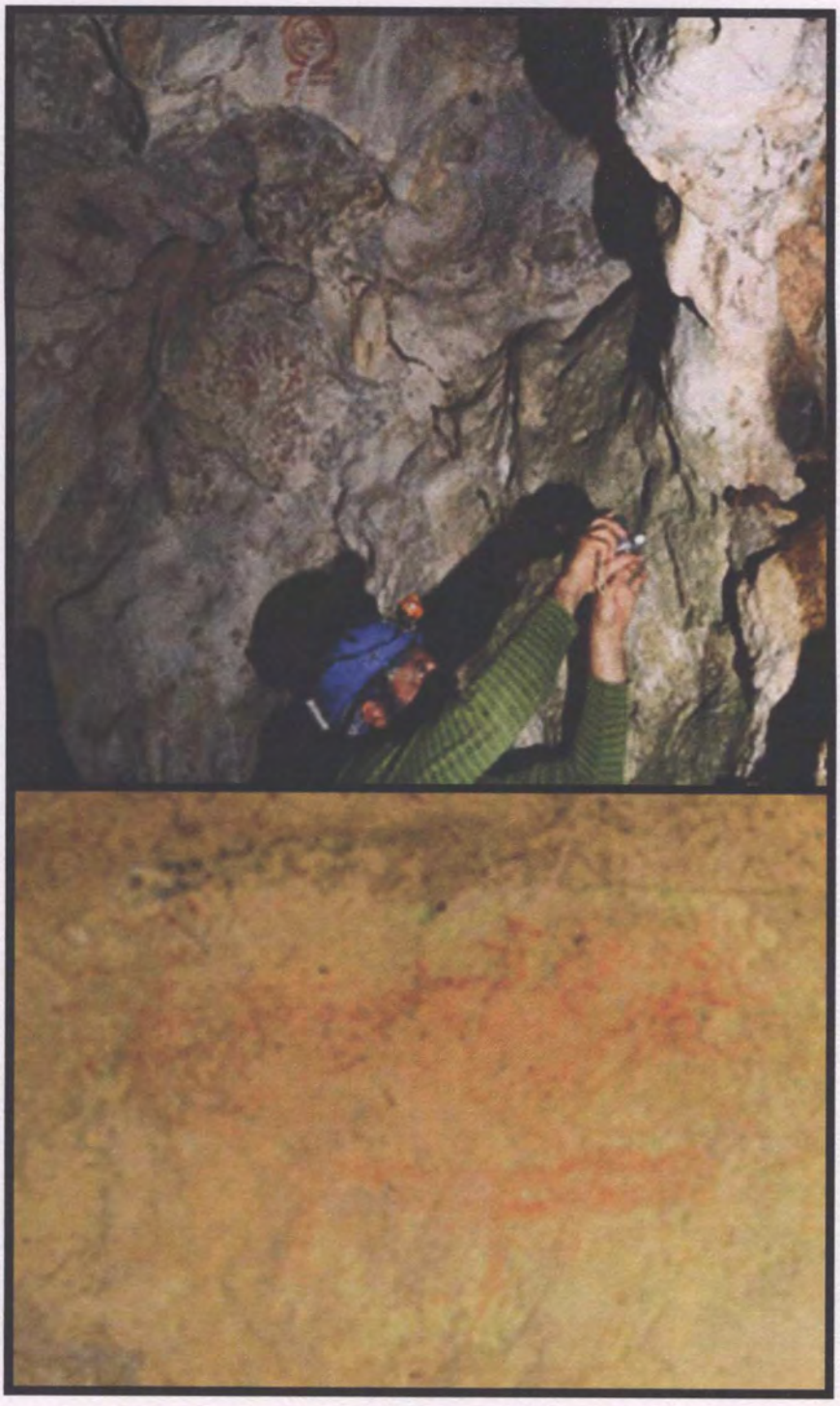

Figure 23

Upper frame: Charley Savvas photographing Cave Art 3A. View to north (Credit: Matt Oliphant). Lower frame: Cave Art 3A pictured with digital enhancements. View to east without scale (Credit: Charley Savvas).

With two potential cave art portrayals, Panel B is located at a shallow eastern subchamber, elevated about 3 meters from the central passage, further to the north than Panel A. In the lower portion of Panel B, Cave Art 4B (Figure 24) is a faint, 29.6 by 51.4 centimeter etched petroglyphic portrayal of the profile of an anthropomorphic figure wearing a head ornament. The petroglyph is disturbed by calcium carbonate and scratch marks. Less than a meter above the petroglyphic etching, Cave Art 5B (Figure 25) is a 19.0 by 7.5 centimeter faint coloration in red with a possible finger outline in the upper right.

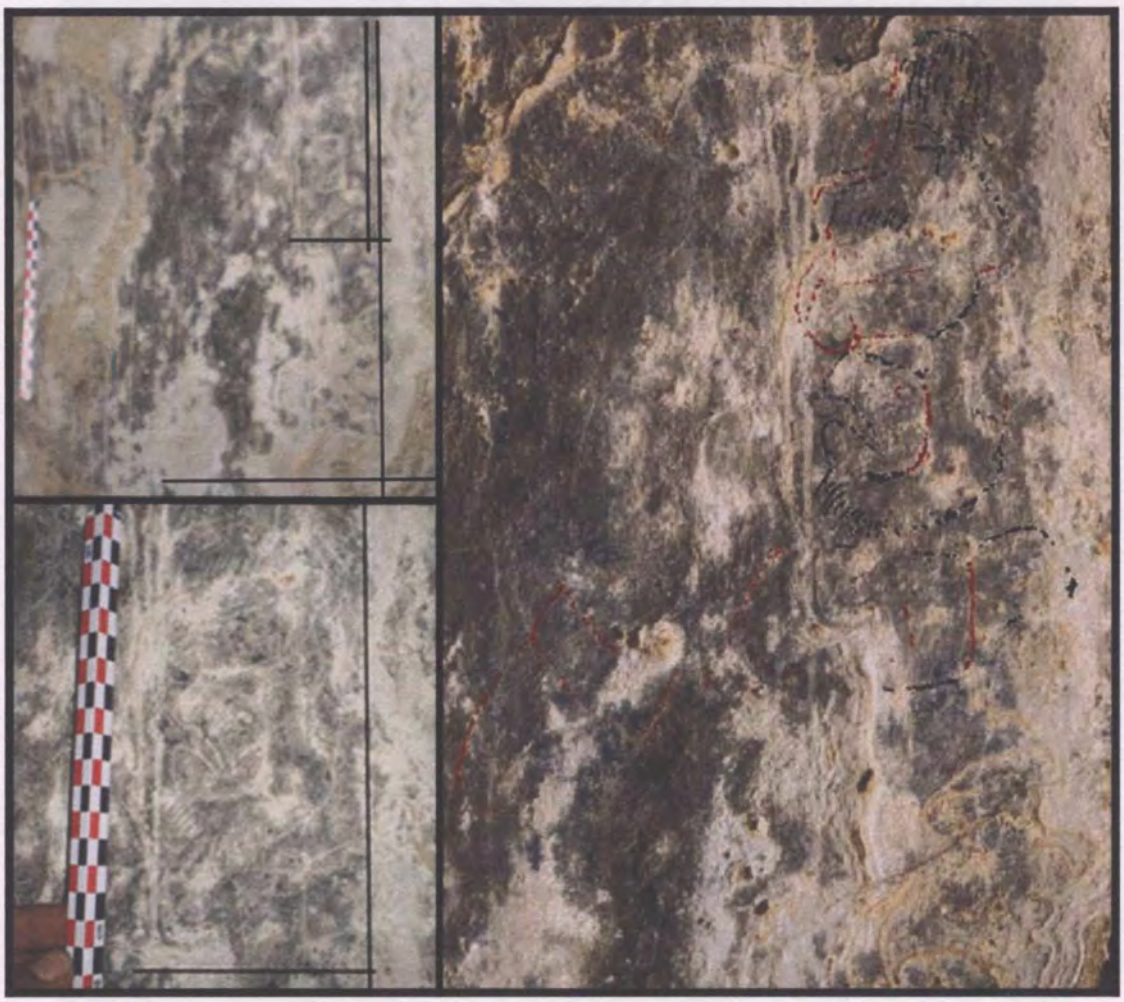

Figure 24

Upper left frame: Cave Art 4B pictured with black lines where measurements were taken. View to south with 20 centimeter scale bar. Lower left frame: Close-up of Cave Art 4B pictured with black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul). Right frame: Cave Art 4B pictured with etched lines highlighted in red and black. View to south (Credit: Matt Oliphant).

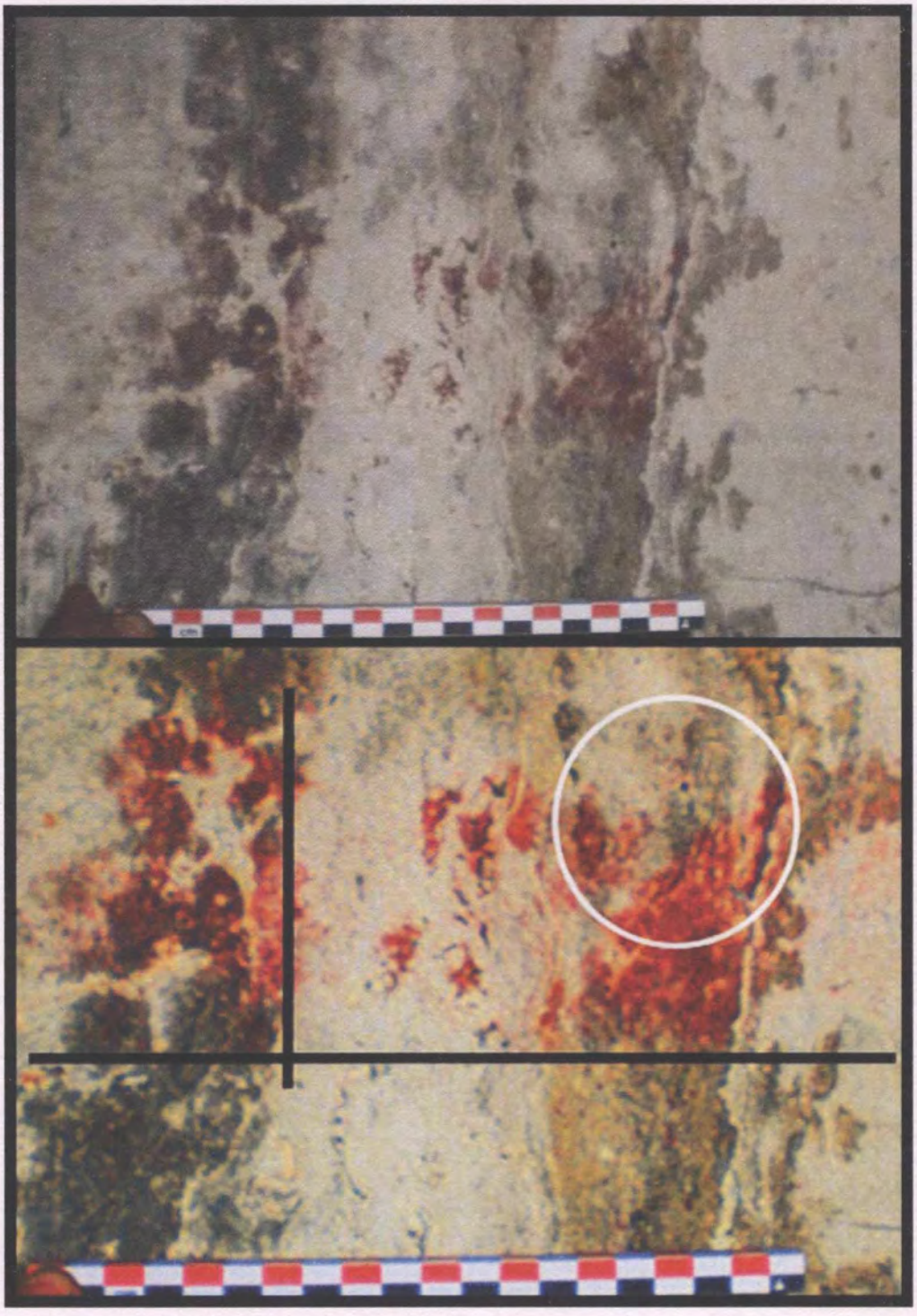

Figure 25

Upper frame: Cave Art 5B. View to south with 20 centimeter scale bar. Lower frame: Cave Art 5B pictured with digital enhancements and black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

With four potential cave art portrayals, Panel C is located midway through the cave, along the eastern wall at the top of a limestone slope. Located at the southern side of Panel C, Cave Art 6C (Figure 26) is an 11.3 by 9.8 centimeter pictographic portrayal of a negative print of a single digit composed of red pigment. One-and-a-half meters to the northeast, Cave Art 7C (Figure 27) is a 15.6 by 15.4 centimeter faded, negative handprint composed of red pigment. Two meters to the north, Cave Art 8C (Figure 28) is a 34.3 by 25.2 centimeter drawn pictograph composed of roughly-symmetrical black finger outlines. One half meter to the northwest, Cave Art 9C (Figure 29) is a 16.1 by 12.5 centimeter faint coloration in black that might depict an anthropomorphic figure.

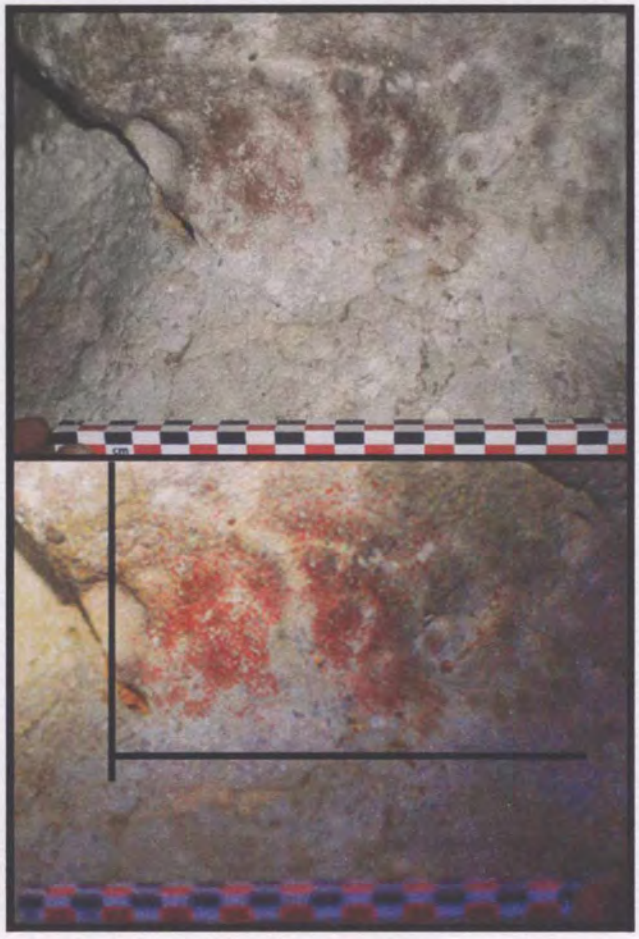

Figure 26

Upper frame: Cave Art 6C. View to south with 20 centimeter scale bar. Lower frame: Cave Art 6C pictured with digital enhancements and black lines where measurements were taken. View to south with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

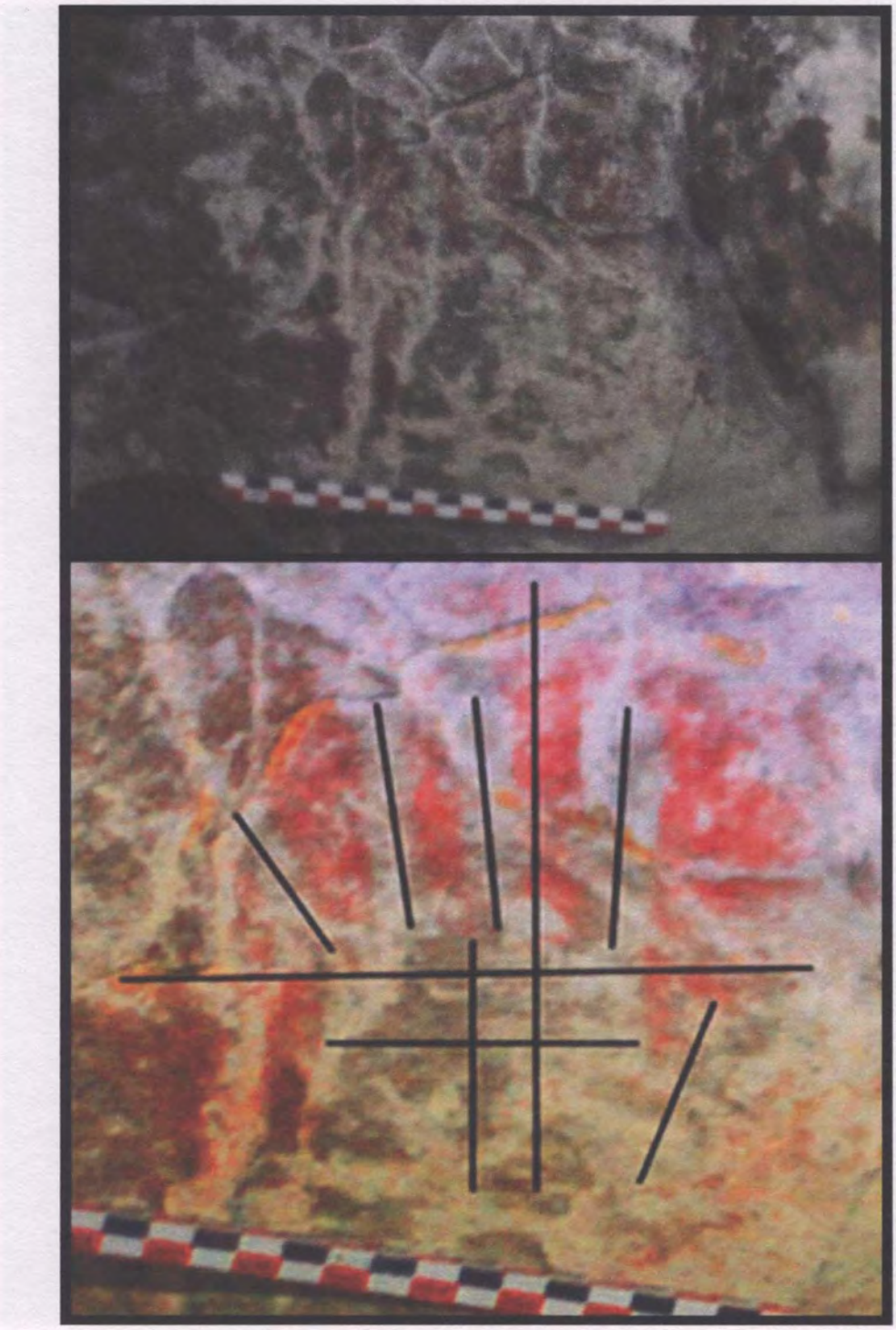

Figure 27

Upper frame: Cave Art 7C. View to east with 20 centimeter scale bar. Lower frame: Cave Art 7C pictured with digital enhancements and black lines where measurements were taken for data analysis. View to east with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 28

Upper frame: Cave Art 8C. View to northeast (Credit: Charley Savvas). Lower frame: Cave Art 8C pictured with black lines where measurements were taken. View to northeast with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 29

Upper frame: Cave Art 9C. View to north with 20 centimeter scale bar. Lower frame: Cave Art 9C pictured with digital enhancements and black lines where measurements were taken. Black arrows indicate areas of coloration. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

With one potential cave art portrayal, Panel D is located at a subchamber midway through the cave on the west side, elevated about 1 meter from the central passage. Located on the southern wall of the subchamber, Cave Art 10D (Figure 30) is a 24.7 by 23.4 centimeter pictographic portrayal of an anthropomorphic figure in profile composed of red and black pigment.

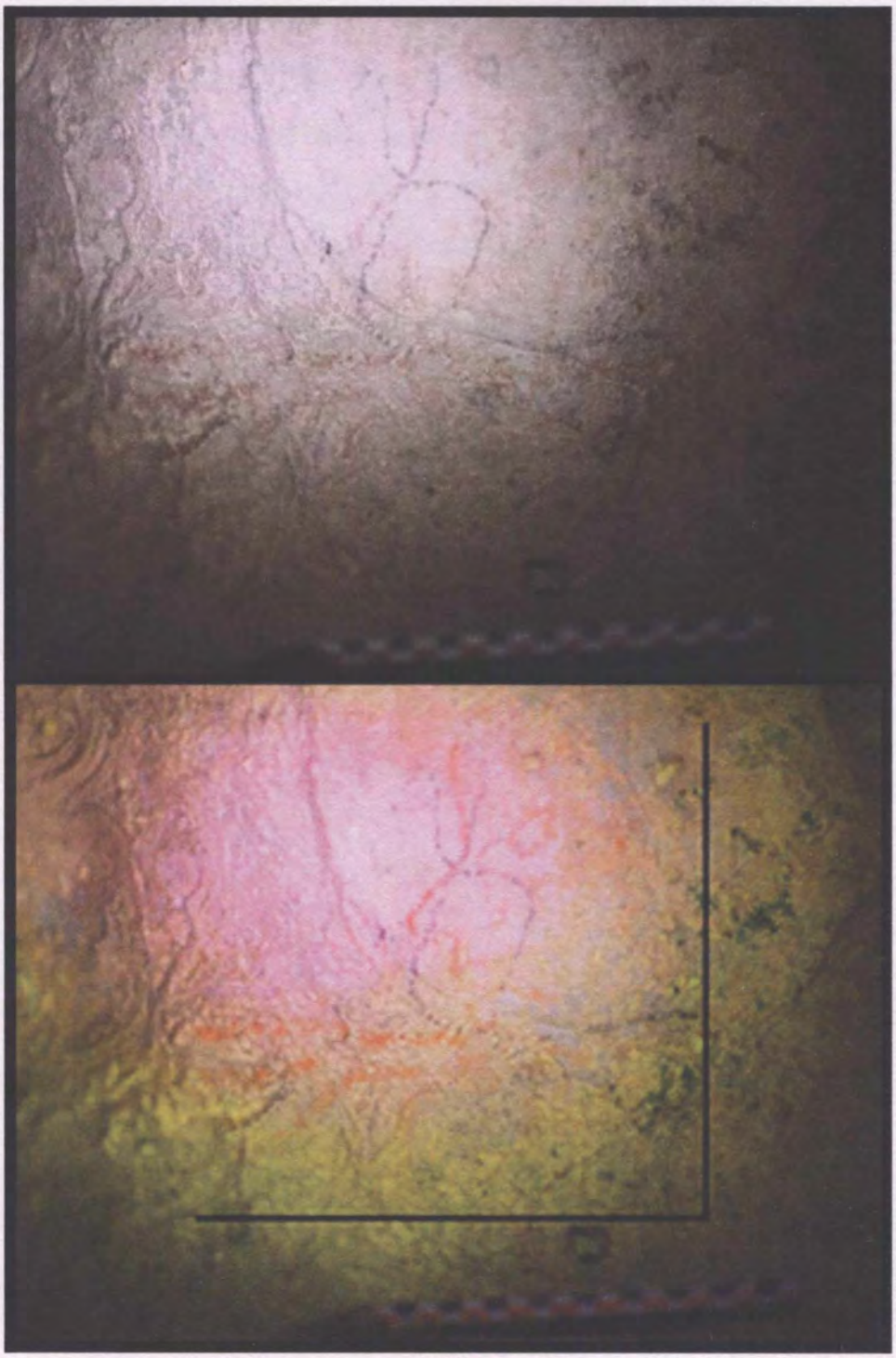

Figure 30

Upper frame: Cave Art 10D. View to north with 20 centimeter scale bar. Lower frame: Cave Art 10D pictured with digital enhancements and black lines where measurements were taken. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

With two potential cave art portrayals, Panel E is located at the aerie above the northern entrance of the cave. Cave Art 11E (Figure 31) is a 17.9 by 18.1 centimeter faded negative handprint composed of red pigment on the southern wall of the aerie. To the north of this, on a rock surface that protrudes from the cave floor surface, Cave Art 12E (Figure 32) is a 14.3 by 17.8 centimeter carved petroglyphic portrayal that makes the cave protuberance resemble a face. There is damage to the southern side of Cave Art 12E.

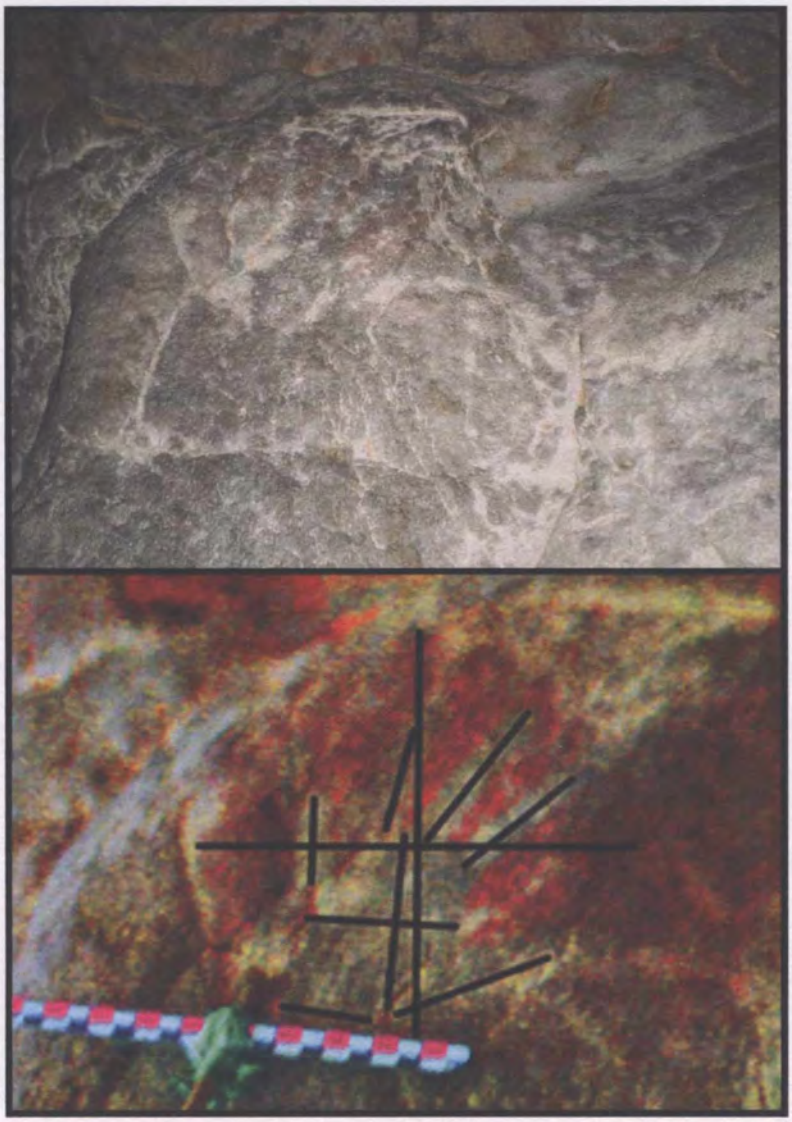

Figure 31

Upper frame: Cave Art 11E. View to north. Lower frame: Cave Art 11E pictured with digital enhancements and black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 32

Left frame: Cave Art 12E with flash photography. View to east (Credit: Matt Oliphant). Right frame: Cave Art 12E pictured with black lines where measurements were taken for data analysis. View to east with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

With three potential cave art portrayals, Panel F is located on the eastern side of the cave's southern entrance. On the western side of Panel F, Cave Art 13F (Figure 33) is an 8.8 by 16.0 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. About one meter higher, Cave Art 14F (Figure 34) is a 29.1 by 28.4 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. This carved petroglyph is heavily disturbed by erosion. About two meters further to the east, Cave Art 15F (Figure 35) is an unscaled, carved petroglyphic portrayal that again makes a cave protuberance resemble an anthropomorphic face. Distributed between all three of the cave landforms at Hill 1, there are a number of other potential petroglyphic portrayals that have anthropomorphic facial attributes similar to the four already mentioned.

Figure 33

Left frame: Cave Art 13F. View to west with 20 centimeter scale bar. Right frame: Cave Art 13F pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

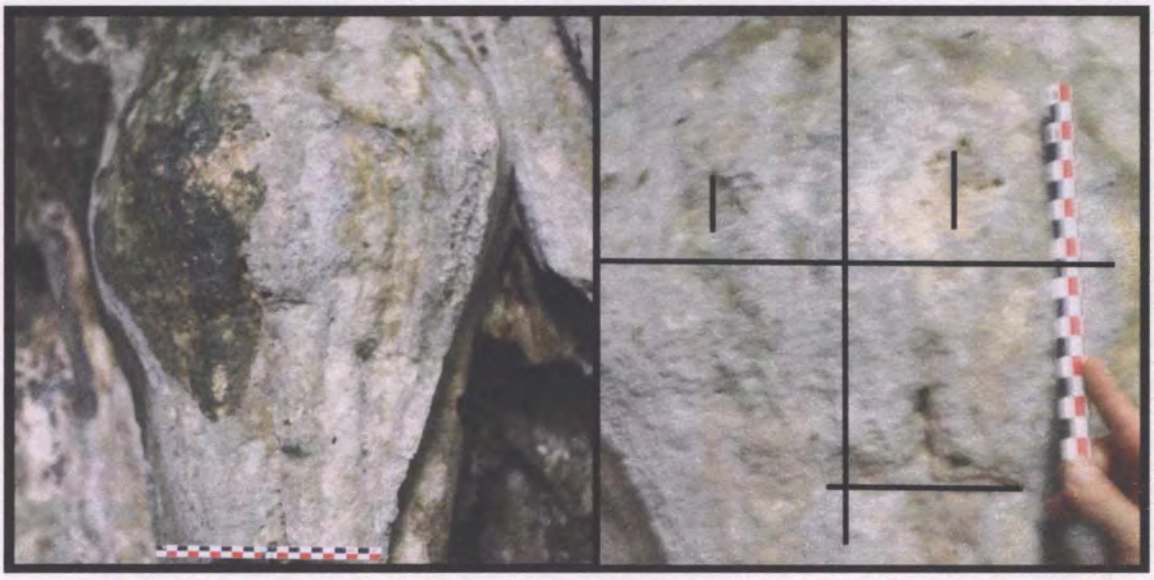

Figure 34

Left frame: Cave Art 14F (wet). View to north with 20 centimeter scale bar. Right frame: Cave Art 14F (dry) pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 35

Left frame: Cave Art 15F. View to northeast without scale. Right frame: Cave Art 15F. View to north without scale (Credit: Charley Savvas).

With eight potential cave art portrayals, Panel G is located on the west side of the southern entrance. At the southern end of Panel G, Cave Art 16G (Figure 36) is a 13.3 by 14.1 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. Much of Cave Art 16G is coated in calcium carbonate. Less than a meter to the north, Cave Art 17G (Figure 37) is a 14.8 by 13.0 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. Near the ceiling, about a meter further up the cave wall, Cave Art 18G (Figure 38) is a 14.4 by 18.1 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. Cave Art 18G is the only petroglyphic portrayal that has a superimposing portrayal overlaying it at Nueve Cerros. The superimposing faint coloration in red, designated Cave Art 19G, is 5.3 by 4.8 centimeters in dimensions. About one meter down and to the north of the superimposing portrayals, Cave Art 20G (Figure 40) is a 28.0 by 30.0 centimeter set of faint impressions that makes a cave

protuberance resemble a face when viewed from a particular angle. About a meter and a half further to the north, Cave Art 21G (Figure 41) is a 12.8 by 19.3 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. This petroglyph's southern side has been disturbed by erosion. About a meter further to the north along the western wall of the southern entrance, Cave Art 22G (Figure 42) is a 14.6 by 35.0 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble a pair of carved faces stacked on top of one another. Cave Art 23G (Figure 43) is a 9.1 by 7.0 centimeter set of faint impressions that makes a cave protuberance resemble a face when viewed from a particular angle.

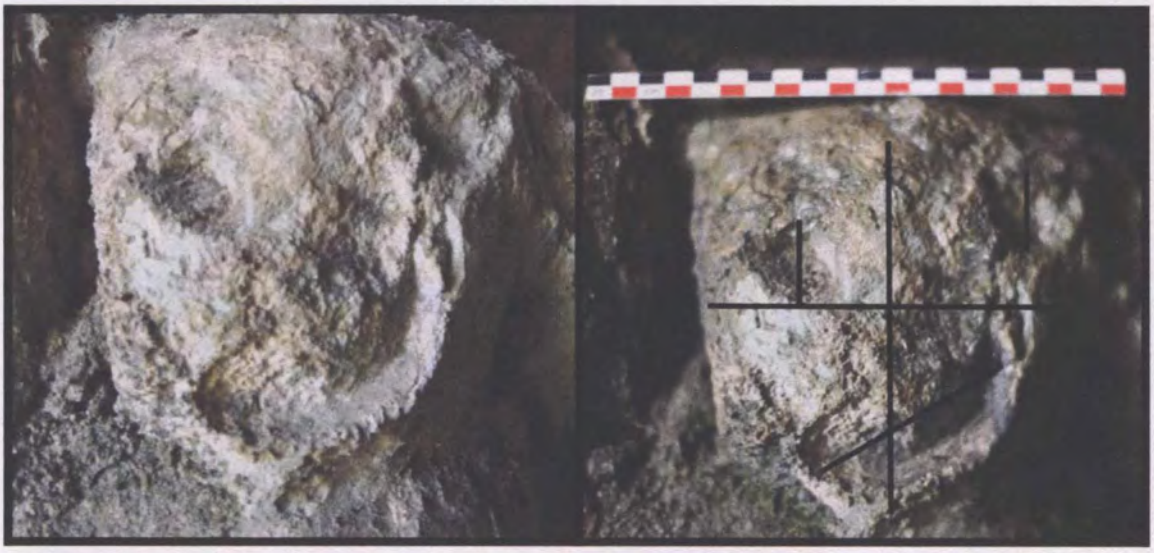

Figure 36

Left frame: Cave Art 16G. Right frame: Cave Art 16G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Figure 37

Left frame: Cave Art 17G with flash photography (Credit: Matt Oliphant). Right frame: Cave Art 17G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

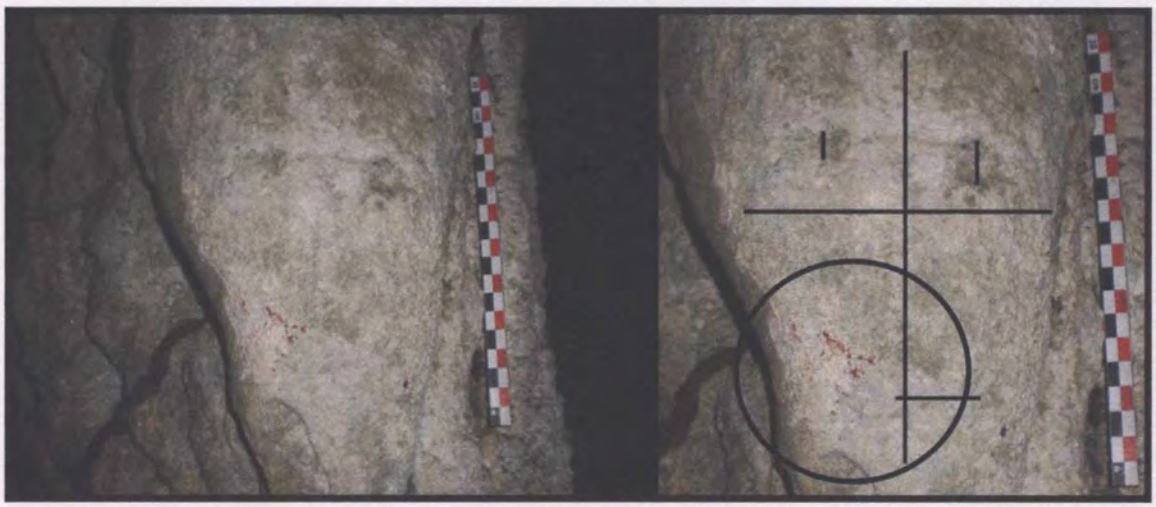

Figure 38

Left frame: Superimposed Cave Art 18G and 19G. View to west with 20 centimeter scale bar. Right frame: Cave Art 18G pictured with black lines where measurements were taken for data analysis. Black circle indicates area of Cave Art 19G coloration (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

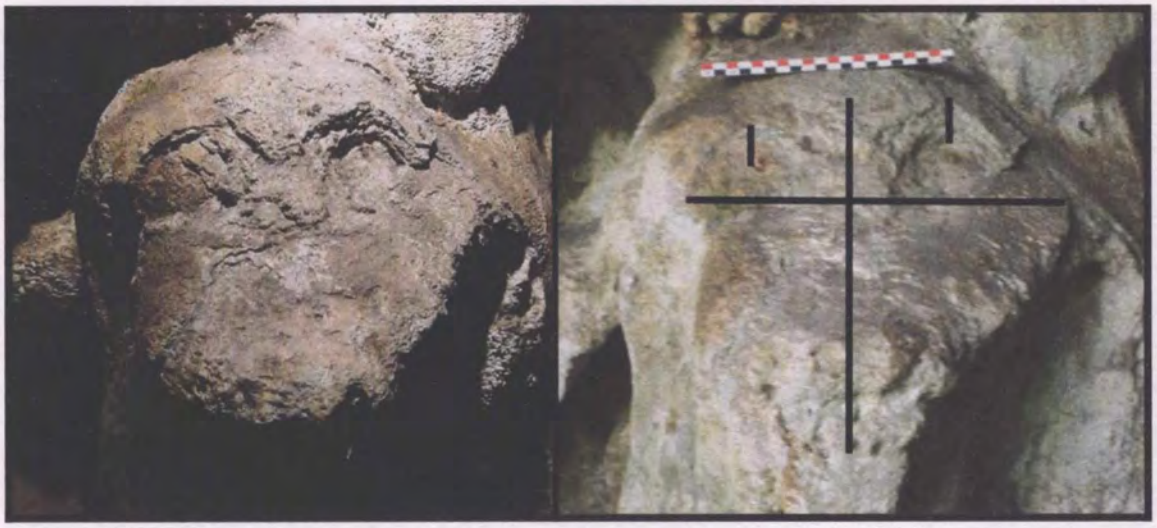

Figure 39

Left frame: Cave Art 20G with flash photography. View to west without scale (Credit: Matt Oliphant). Right frame: Cave Art 20G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale (Credit: Seleste Sanchez and Carlos Efrain Tox Tuil).

Figure 40

Left frame: Cave Art 21G with flash photography. View to west without scale (Credit: Matt Oliphant). Right frame: Cave Art 21G pictured with black lines where measurements were taken for data analysis. View to west with 5.05 centimeter AA battery scale (Credit: Charley Savvas).

Figure 41

Left frame: Cave Art 22G with flash photography (Credit: Matt Oliphant). Right frame: Cave Art 22G pictured with black lines where measurements were taken for data analysis View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

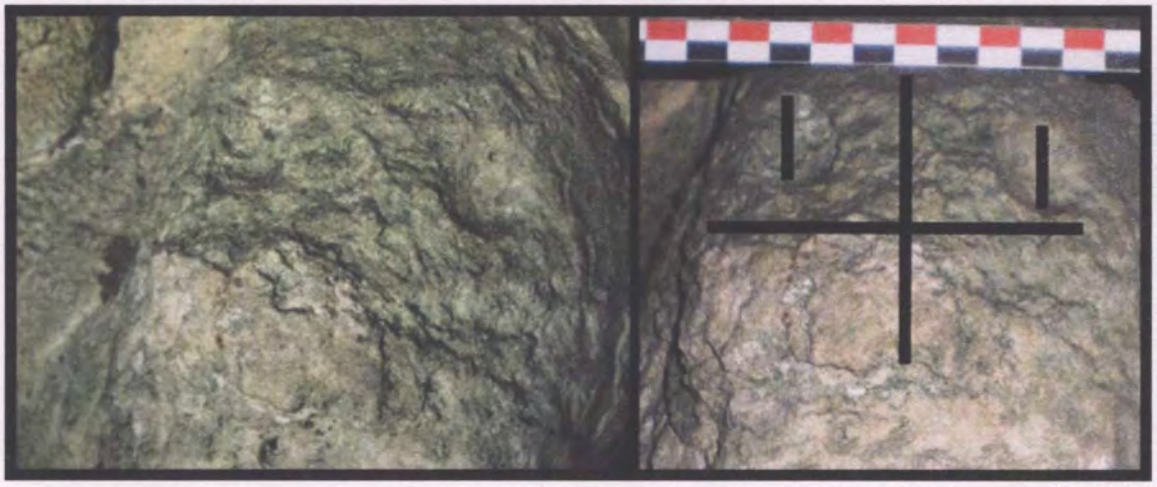

Figure 42

Left frame: Cave Art 23G. View to west without scale (Credit: Charley Savvas). Right frame: Cave Art 23G pictured with black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Cave 1: Preliminary Excavation Data

The survey team identified a line of potential wallfall rocks on the floor surface near the center of Cave 1's southern entrance (Figure 43). This feature was subjected to a preliminary excavation, with the expectation that greater understanding of the fallen structure could contribute to this study's understandings of the surrounding cave art portrayals by answering questions about the cave art's cultural association, chronology, and method of manufacture (e.g., Neumann and Sanford 2012; Whitley 2011) (Figure 44). At a later time, a full excavation may be able to record additional data that also contribute to answering these and other lines of questioning.

A surface collection that preceded excavation recovered hundreds of utilitarian ceramic sherds and a three centimeter long, incised ceramic bead (Figure 45). Excavation began after surface collection. Within the first twenty centimeters, a subsurface rock alignment that matched up with the surface rock alignment confirmed that the initially identified wallfall was, indeed, the surface remains of a fallen structure.

The continued excavation of Unit 1 revealed a layer of white ash at 13 centimeters below Datum A (cmba). Four unarticulated human long bones were directly associated with this charcoal feature (Figure 46). These were pedestaled and eventually collected. Three charcoal samples were collected from the ash at 13, 15, and 22 cmba, and placed in tin foil. The south wall profile of Unit 1 indicates that the white charcoal feature continues below the depth where excavation ended, at 40 cmba. Discontinuous charcoal samples were also collected from Unit 2 at 15 and 33 cmba.

Excavated artifacts included a large amount of Maya ceramic sherds, lithic evidence, and modified faunal remains. In addition to the hundreds collected during surface collection, dozens of ceramic artifacts were also encountered during excavation. All excavated ceramics were utilitarian in style (Woodfill, pers. comm. 2011). Other artifacts from Unit 1 included 12 obsidian flakes and six obsidian prismatic blades (Figure 47). Excavated artifacts from Unit 2 included two obsidian flakes, one obsidian prismatic blade (Figure 48), and one chalcedony flake (Figure 49). Excavated artifacts from Unit 3 included six obsidian flakes, two obsidian prismatic blades (Figure 50), and a two centimeter long engraved shell (Figure 51). An unidentified molar was also collected from Unit 3 (Figure 52).

Figure 43

Line of rocks at the southern entrance of Cave 1. View to south (Credit: Matt Oliphant).

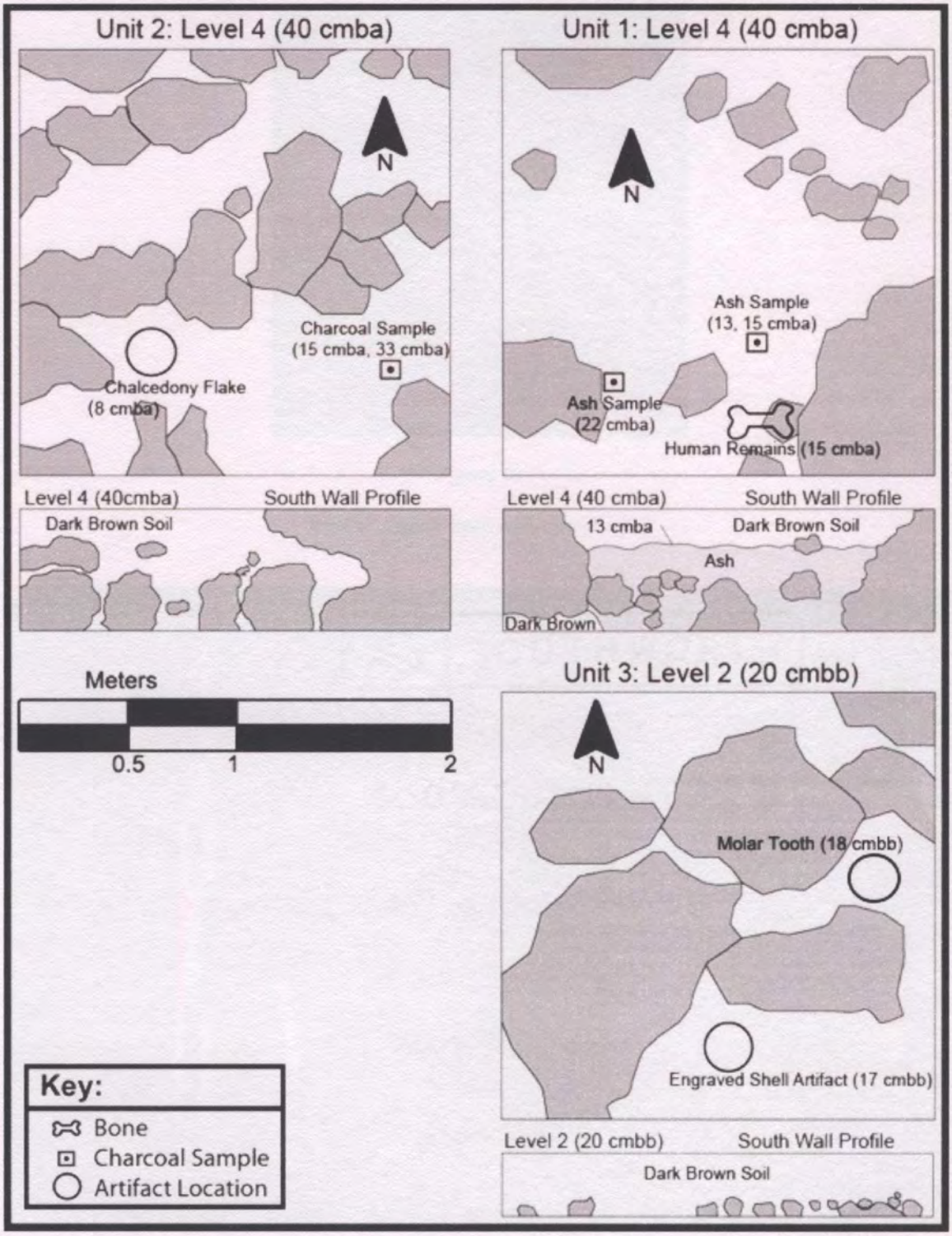

Figure 44

Plan maps and southern wall profiles of Excavation Units 1, 2, and 3.

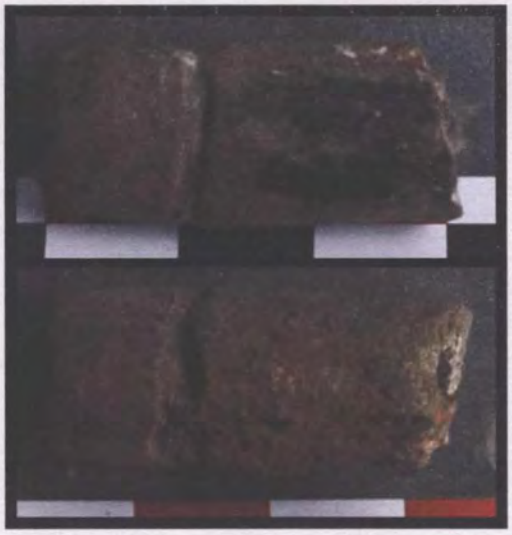

Figure 45

Incised ceramic bead with metric scale.

Figure 46

Four *in situ* human long bones in charcoal ash feature. View downward with 40 centimeter scale bar and white north arrow.

Figure 47

Obsidian flakes and blades recovered from Unit 1 with metric scale bar. White arrows indicate blades.

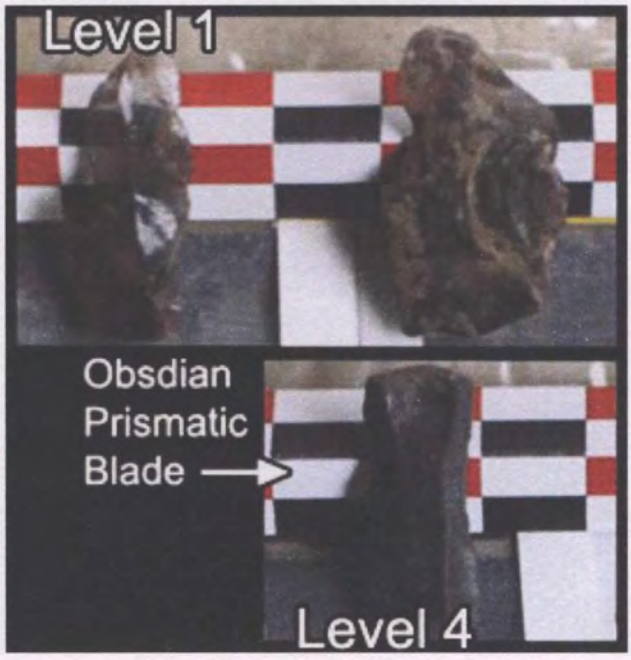

Figure 48

Obsidian flakes and blades recovered from Unit 2 with metric scale bar. White arrows indicate blades.

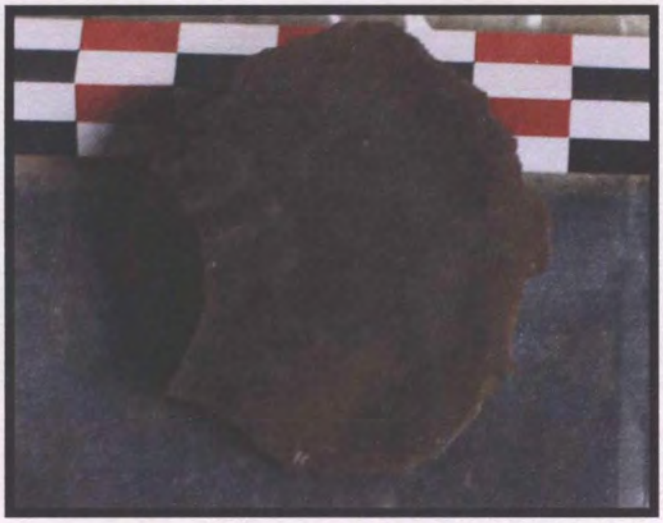

Figure 49

Chalcedony flake with metric scale bar.

Figure 50

Obsidian flakes and blades recovered from Unit 3 with metric scale bar. White arrows indicate blades.

Figure 51

Engraved shell with metric scale bar.

Figure 52

Molar with metric scale bar.

Cave 2: Cueva San Juan #2

Opening to the south, the main entrance of Cave 2 (11 meters wide by 7 meters tall) was the third widest and second tallest entrance of the 40 surveyed caves. Cave 2 is located at the top of Hill 1 only about a dozen meters to the east of the southern entrance of Cave 1 (Figure 53). There is a slight upward slope from the entrance of Cave 2 that levels-off at the back of the entrance chamber (Figure 54).

A western passage leads from the back of the entrance chamber to a narrow passage. The narrow passage opens back up after three meters and leads to a secondary northwestern entrance. This secondary entrance opens to the north and is smaller in height and width than the main entrance. A short downward slope from the entrance ends at a precipice. The precipice sits several dozen meters above and immediately to the east of the northern entrance of Cave 1. One can look to the west from this northwestern entrance of Cave 2 for a clear view of the northern aerie of Cave 1. The northwestern precipice and westernmost portions of Cave 2 are culturally-sterile.

There are two passages that branch to the east from the back of Cave 2's entrance chamber. The northernmost of these leads through a narrow passage, passes through a small chamber, and then converges with the southernmost passage that also branches to the east from the entrance chamber. This passage continues to the southeast, down a slight slope to a secondary southeastern entrance. The height of this secondary entrance to Cave 2 is very similar to that of the main entrance, but is much more narrow. Utilitarian ceramic sherds are scattered throughout the two eastern passages and the entrance chamber of Cave 2.

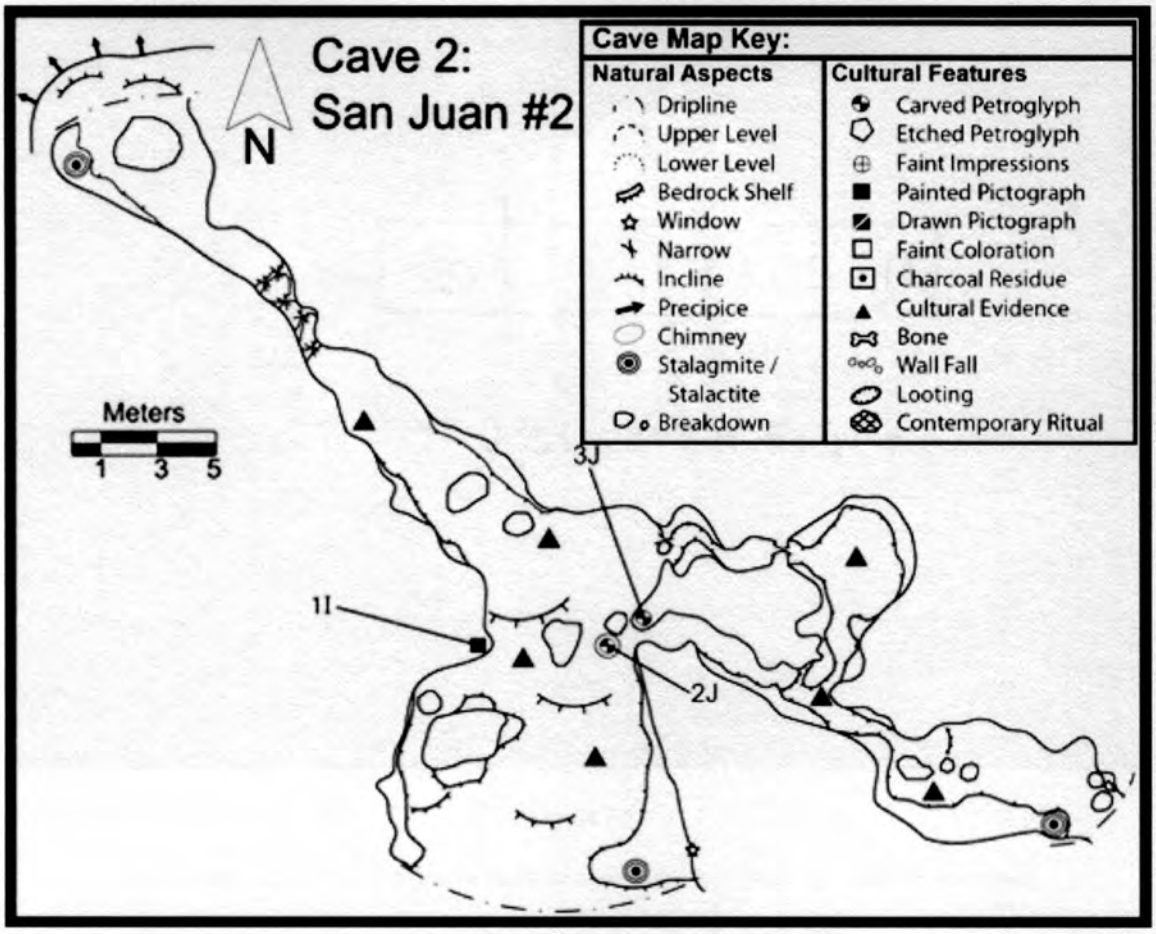

Figure 53

Plan map of Cave 2 with labeled cave art.

Figure 54

Main entrance of Cave 2 from the back of main entrance chamber. View to southeast.

Cave 2: Cave Art Data

With one potential cave art portrayal, Panel I is located on the western wall of the entrance chamber. Cave Art 1I (Figure 55) is a 12.2 by 14.8 centimeter faded negative handprint composed of red pigment.

With two potential cave art portrayals, Panel J is located on the eastern side of the entrance chamber. Cave Art 2J (Figure 56) is a 14.9 by 14.0 petroglyphic portrayal that makes a cave protuberance resemble a zoomorphic face. It appears zoomorphic, as opposed to anthropomorphic, because an attribute at the top of the stalagmite resembles an upright ear as only an animal would have. The petroglyph is disturbed by erosion. About two meters to the northeast near the ceiling of the cave, Cave Art 3J is 12.0 by 8.9 centimeter carved portrayal that makes a cave protuberance resemble an anthropomorphic face. No satisfactory photographs were captured of this piece, because of its hard-to-reach location.

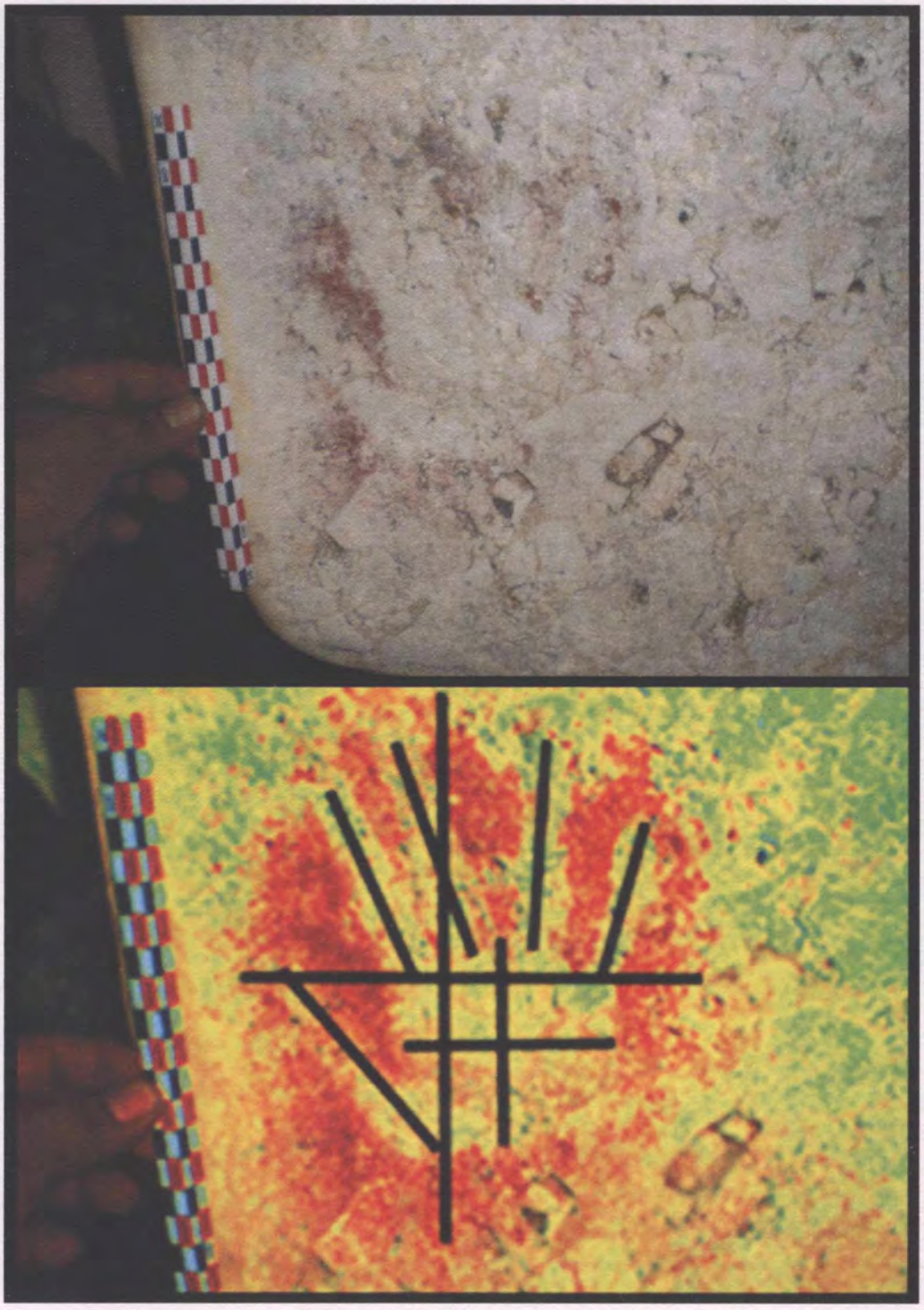

Figure 55

Upper frame: Cave Art 1I. View to west with 20 centimeter scale bar. Lower frame: Cave Art 1I pictured with digital enhancements and black lines where measurements were taken for data analysis. View to west with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

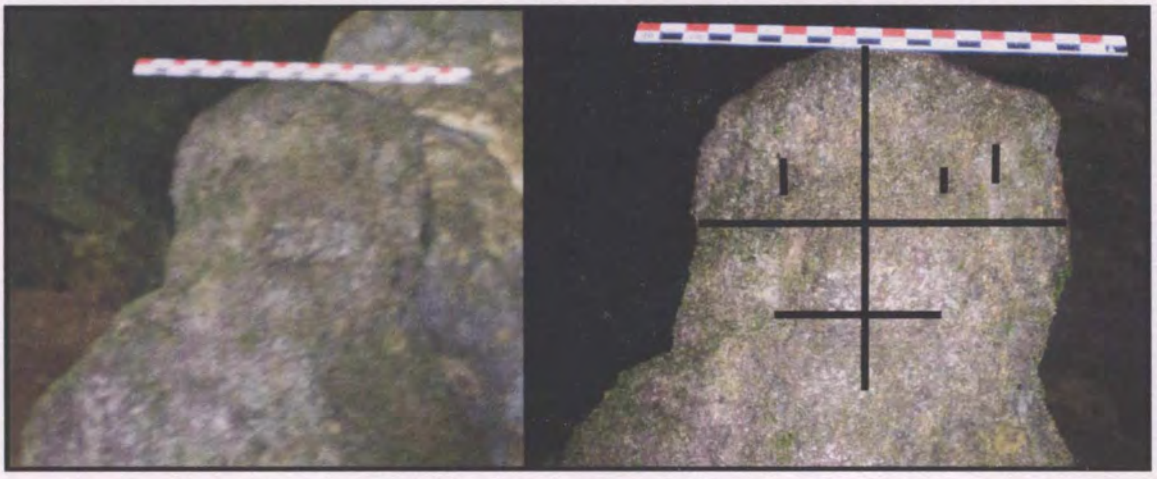

Figure 56

Left frame: Cave Art 2J. View to north with 20 centimeter scale bar. Right frame: Cave Art 2J pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Cave 3: Cueva San Juan #3

Cave 3 is located at the base of Hill 1 along the route that one follows up to the southern entrances of Caves 1 and 2. Opening to the southeast, the entrance of Cave 3 (17 meters wide by 5 meters tall) was the second widest of the 40 main cave entrances encountered during systematic survey , and one of the four tallest caves entrances. With a depth of only 4 meters, it was also one of the shallowest. Several stalactites grow down from the ceiling at the cave's dripline. At the top of the eastern wall of Cave 3 is a small ledge with a short, narrow passage (Figure 58). Several boulders sit just underneath the dripline, many of them stacked on top of one another.

Utilitarian ceramic sherds are scattered throughout the floor of the shallow cave and inside the short, narrow passage at the top of the eastern wall. Many of these sherds are concentrated around a looter's pit at the center of the cave.

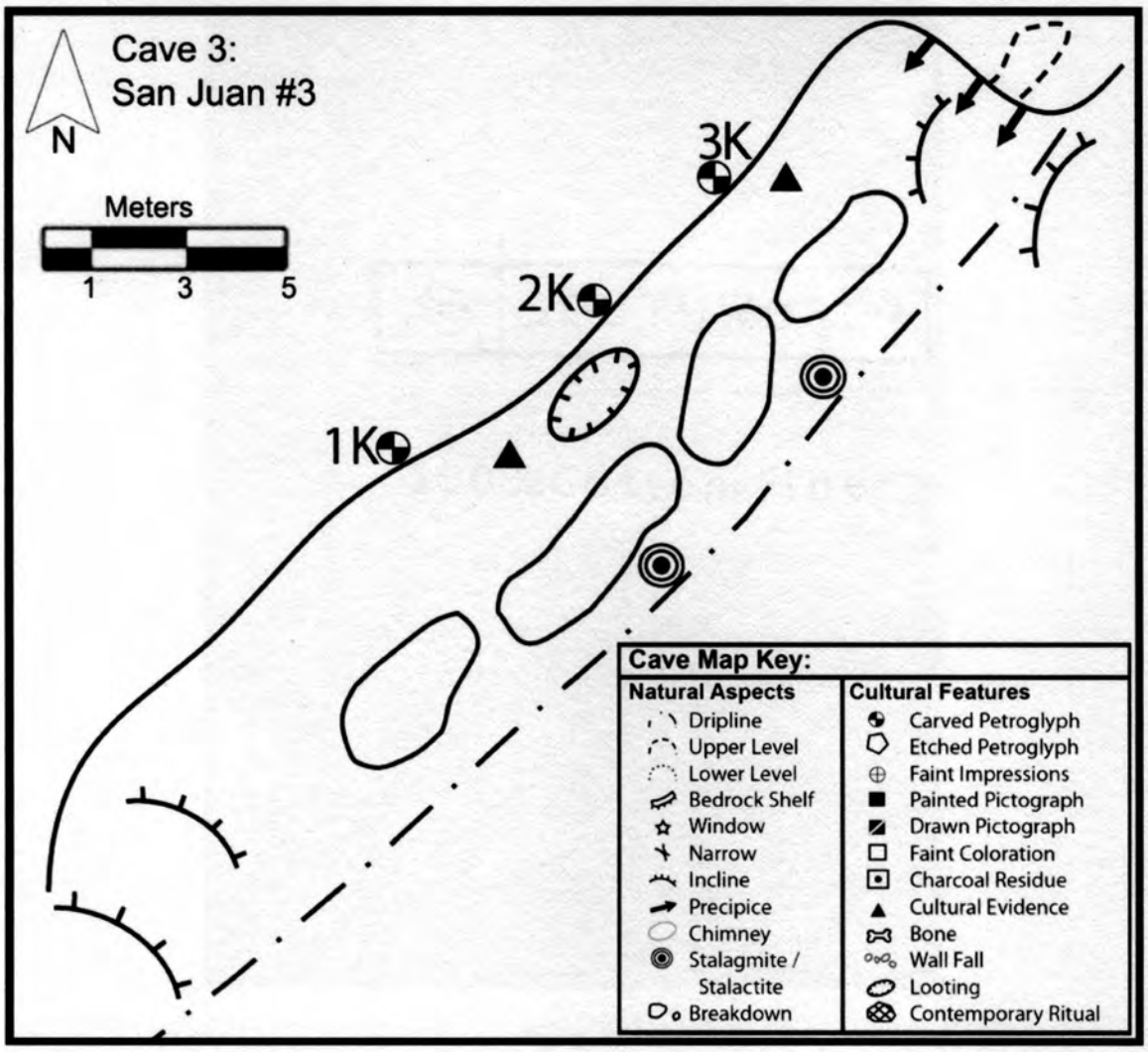

Figure 57

Plan map of Cave 3 with labeled cave art.

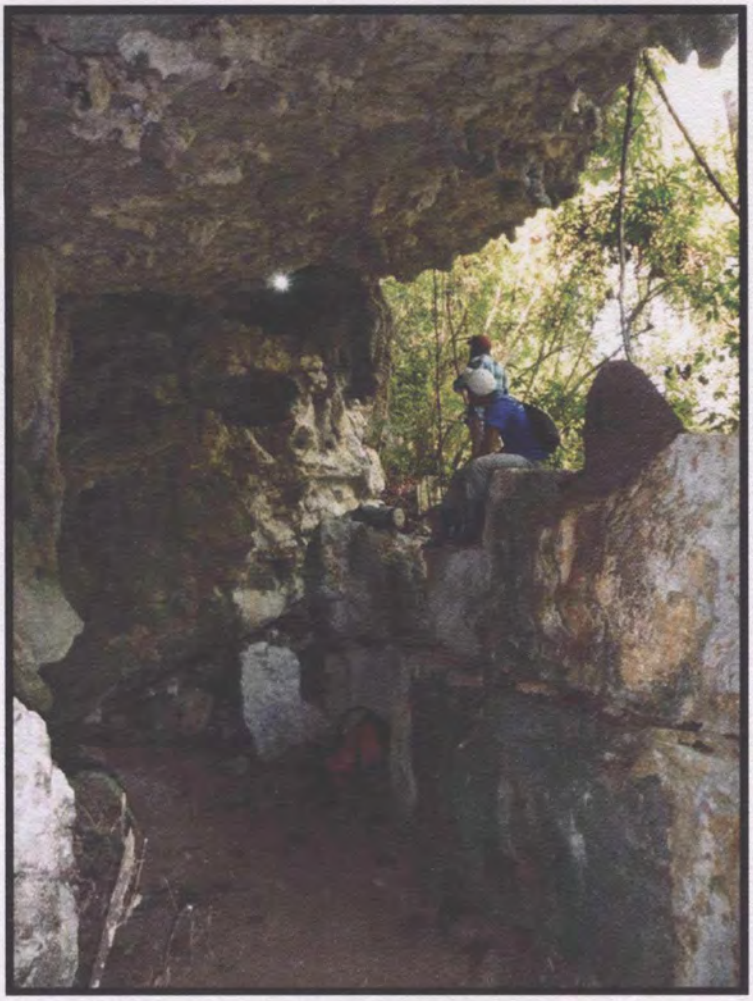

Figure 58

Light inside a short narrow passage at Cave #3. View to northeast (Credit: Matt Oliphant).

Cave 3: Cave Art Data

With three potential cave art portrayals, Panel K is located along the back wall of the cave. At the southwest end of Panel K, Cave Art 1K (Figure 58) is an unscaled petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. This petroglyph has been disturbed by erosion. Five meters to the northeast, Cave Art 2K (Figure 59) is an 11.2 by 13.5 centimeter carved petroglyphic portrayal that makes a cave protuberance resemble an anthropomorphic face. Four meters further northeast, Cave Art 3K (Figure 60) is a 10.0 by 19.1 centimeter carved petroglyphic portrayal that also makes a cave protuberance resemble an anthropomorphic face.

Figure 59

Left frame: Cave Art 1K. View to west without scale. Right frame: Cave Art 1K. View to northwest without scale (Credit: Matt Oliphant).

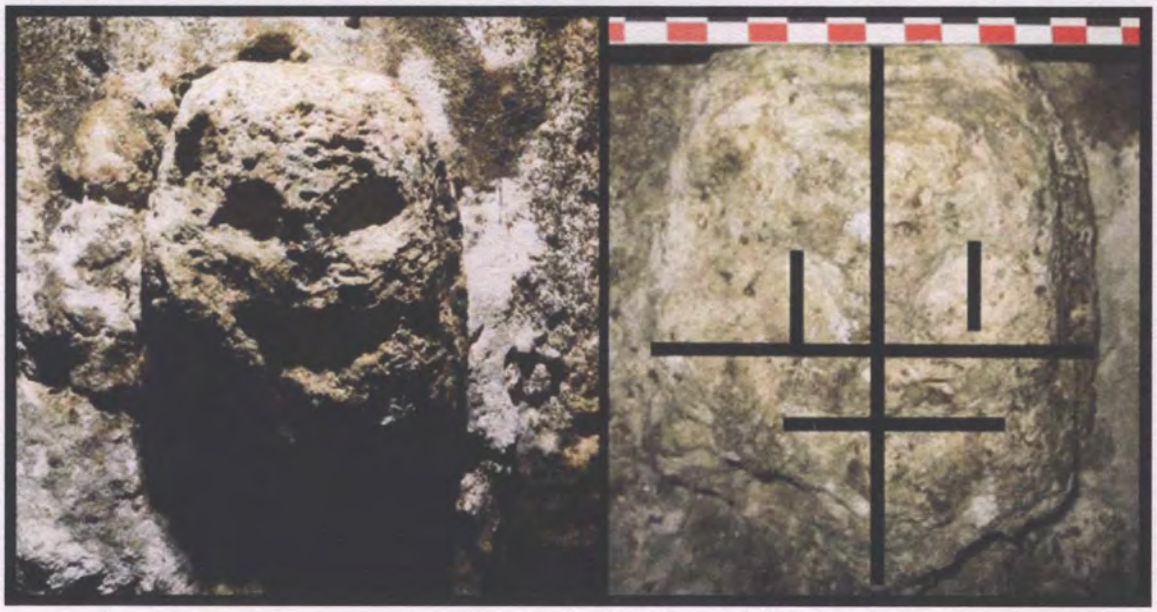

Figure 60

Left frame: Cave Art 2K with flash photography. View to northwest without scale (Credit: Matt Oliphant). Right frame: Cave Art 2K pictured with black lines where measurements were taken for data analysis. View to northwest with 20 centimeter scale bar (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

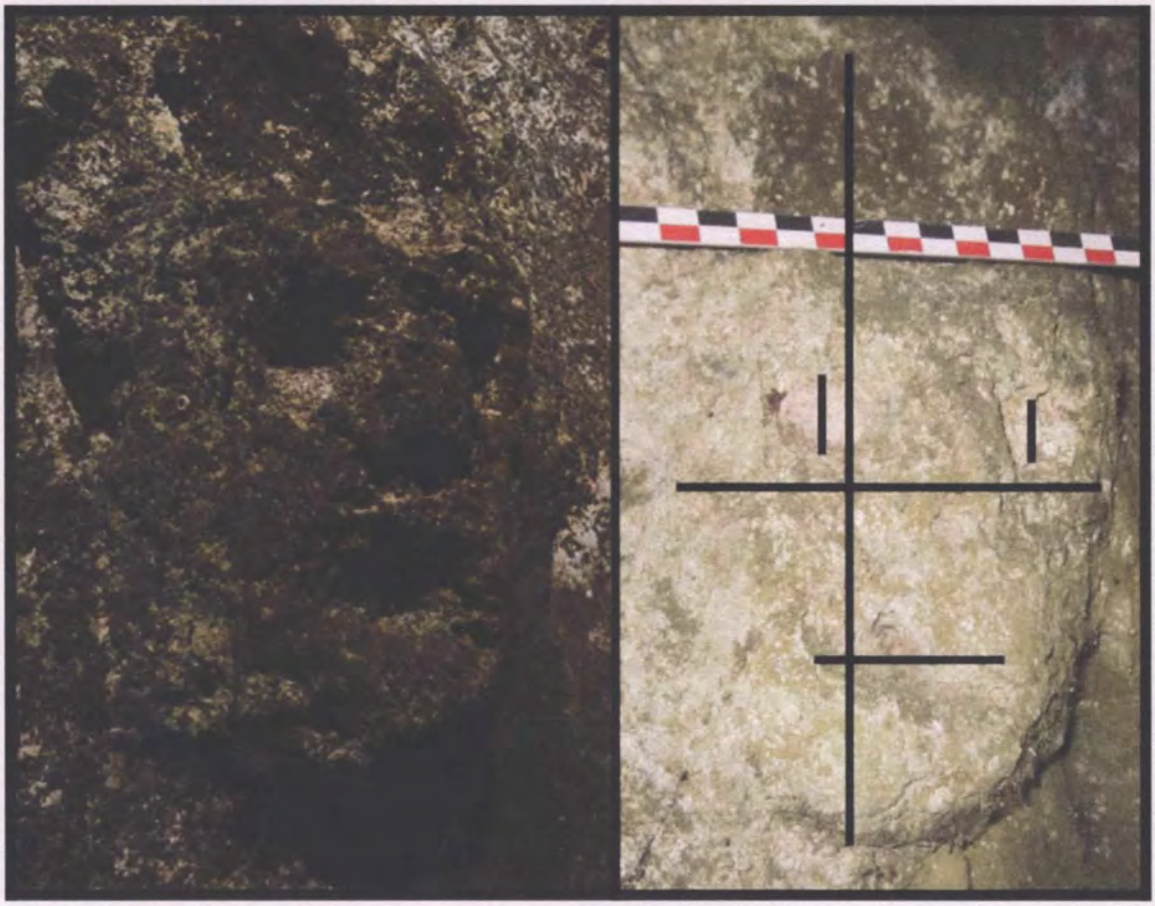

Figure 61

Left frame: Cave Art 3K. View to north without scale (Credit: Matt Oliphant). Right frame: Cave Art 3K pictured with black lines where measurements were taken for data analysis. View to north with 20 centimeter scale (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

DATA ANALYSIS

In addition to petroglyphic and pictographic cave art portrayals, Maya ceramic artifacts, lithic artifacts, and a single structure feature were recorded at the three Hill 1 cave landforms. Maya archaeological material was also recorded at 12 of the other 40 cave landforms (Caves 4, 7, 11, 12, 14, 15, 22, 26, 29, 32, 34, 39), amounting to 15 cultural cave landforms being recorded during the 2011 systematic cave survey of 70 percent of the Nueve Cerros karst ridge system.

Following these short discussions on ceramic and lithic artifacts, and a short discussion on the structure feature excavated at Cave 1, this section on data analysis section will discuss how cave art data

was streamlined, demonstrating that several of the 29 potential cave art portrayals recorded in the field are unauthentic and eliminated from the data set. More than half the authentic portrayals will then be grouped and subjected to analyses of variation that will facilitate interpretation in Chapter V.

Ceramic Artifacts

Ceramics are the most common artifact type found at sites in the Maya culture area (Demarest 2006; Woodfill 2010). This also proved true during the 2011 Nueve Cerros cave survey, during which utilitarian Maya ceramic artifacts were recorded at all 15 cultural caves. Some of these ceramics were recorded *in situ* during the preliminary excavation conducted at Cave 1. Due to their ambiguous utilitarian nature, none of the ceramic artifacts could be fit into a specific date range (Woodfill, pers. comm. 2011).

Lithic Artifacts

Lithic materials would have been used by ancient peoples, including those that populated Mesoamerica, long before ceramics were ever developed. With no access to iron or bronze, lithic materials would have been the primary material type that ancient Mesoamerican cultures would have used to craft blades, projectile points, choppers, and other tools. Lithic materials are also very durable and can withstand the test of time. In his discussion of the resilient nature of lithic tools recovered from a rockshelter just to the west of the Maya area, Coe (2005:45) speaks of how the wet environment has

> "destroyed any perishables which may have been left by the ancient inhabitants of the shelter, but nut-cracking stones with pecked depressions, and pebble *manos* and *metates* tell us that seeds and other plant foods were well exploited."

Lithic artifacts were recorded at five Nueve Cerros caves (Caves 1, 11, 12, 14, 29), including chalcedony and obsidian flakes and tools. The most interpretable of the lithic tool types recorded at Nueve Cerros is the obsidian prismatic blade, recorded at four caves (Caves 1, 11, 14, 29). Awe and Healy (1994:202) found the production of obsidian prismatic blades "was not fully adopted [in the Maya area] until communities had reached [the] relatively high level of cultural complexity" associated with trade activity and craft specialization (e.g., Awe and Healy 1994; Crabtree 1968). This is because long-distance trade would have been necessary to import the raw obsidian from a volcanic source (e.g., Awe and Healy 1994). Evidence of obsidian prismatic blades has been recorded at Late Preclassic (400 BC – AD 300)

Maya population centers less than one hundred kilometers upriver of Nueve Cerros (Awe and Healy 1994). This roughly-corresponds with some of the earliest estimates of Maya salt production and trade activity at Salinas de los Nueve Cerros (e.g., Dillon *et al.* 1988; Woodfill 2011b).

Structure Feature

A collapsed structure feature composed of cobble-sized rocks was identified during preliminary excavation at Cave 1's southern entrance. The recovery of *in situ* Maya ceramics and obsidian prismatic blades from the collapsed structure feature establish that the feature can be associated with the precontact Maya. The construction materials and *in situ* artifacts are similar to those recorded at other structure features recorded elsewhere as Maya cave platforms (e.g., Brady 1989; Brady and Stone 1986; Colas et al. 2000; Rissolo 2003; Stone 1995).

Among other *in situ* evidence, Brady (1989:94) recorded "sherds of a large number of types" during his excavation of an earthen cave platform at the Maya cave of Naj Tunich in eastern Guatemala. He also recorded "an obsidian blade, two pendants (one shell and one ceramic), and several flakes of chert" (Brady 1989:94). At a different cave platform, this one constructed of cobble-sized rocks at the Maya cave of Ch'en P'ix in western Belize, Colas and colleagues (2000:5) excavated *in situ* obsidian prismatic blades, ceramic sherds, and other artifacts, including "a nearly complete Dichrome Tripod plate." They interpreted this *in situ* evidence as part of a "pattern of ceremonial destruction" (Colas *et al.* 2000:5) at the cave (Colas *et al.* 2000). The similar artifact content and contextual information between the collapsed structure feature at Nueve Cerros and these other Maya cave platforms indicate that the Nueve Cerros feature was built and used by the Maya in a similar way as cave platforms were elsewhere in the Maya culture area (e.g., Brady 1989; Brady and Stone 1986; Colas et al. 2000; Rissolo 2003; Stone 1995). In addition to the earthen cave platform structure feature, a very large number of petroglyphic and pictographic cave art portrayals were also discovered at Naj Tunich (e.g., Brady 1989; Brady and Stone 1986).

Although *in situ* human remains were not encountered during either cave platform excavation, human remains were recorded elsewhere at both Naj Tunich and Ch'en P'ix (e.g., Brady 1989; Colas *et al.* 2000). Natural caves being used for precontact Mesoamerican human burials demonstrates the important

precontact role of natural caves in a way that few other material types can match (e.g., Brady 1989; Colas *et al.* 2000; Joyce 2004). The precontact use of cave settings by precontact Maya populations for human burials is also supported by Joyce (2004:16) in an article where she writes of the repeated burial of "multiple individuals" at caves in the far eastern part of the Maya culture area "away from villages" in western Honduras. Joyce (2004:16) goes on to write that this practice preceded the cultural tradition of "more exclusive burial of selected individuals" at "inaccessible spaces within village sites" (Joyce 2004).

Cultural and Natural Disturbance

The same erosive processes that slowly formed the large number of caves in the Maya culture area must have also had a gradual impact on cave art portrayals (e.g., Puleston 1973; Straus 1990). The high precipitation rate at Nueve Cerros was detrimental to the efforts of this cave art study (e.g., Dillon *et al.* 1988; Puleston 1973; Whiteside 1985). In fact, all potential cave art portrayals at Nueve Cerros were noted as being negatively affected by natural processes. Petroglyphs and pictographs were often eroded, while areas of natural mineral coloration (Figure 62) or erosion (Figure 63) often mimicked cave art portrayals.

Figure 62

Examples of natural cave wall coloration that could be mistaken as cave art portrayals.

Figure 63

Example of natural cave erosion that could be mistaken as a cave art portrayal.

Eliminating Unauthentic Cave Art

A total of 29 potential cave art portrayals were identified at 10 panels between the three cave landforms at Hill 1. Examination of digital enhancements, comparisons with other portrayals, and review of field notes provided enough evidence to demonstrate that Cave Art 20G and 23G were not authentic cave art portrayals. Removal of these from the data set resulted in a total of 27 portrayals being recorded at Nueve Cerros as authentic cave art (Table 5).

Table 5

Cave Art Portrayals

Cave	1	2	3
Pictographs	7	1	
Carved Petroglyphs	9	2	3
Etched Petroglyphs	1		
Faint Colorations	4		

Nueve Cerros Cave Art

Whitley (2011:66) writes that it is a common practice in cave art research to organize similar portrayals into sample groups known as "motif typologies" that share a "design, pattern, or element that is repeated." The greatest challenge in classifying a motif typology "lies in distinguishing between inconsequential [attribute] variations . . . and variations consciously introduced by the creator" (Whitley (2011:66). Among other factors, motif typology attribute variation can also be a result of multiple artisans who have ranging skill levels or who are using different methods of manufacture at the site (e.g., Whitley 2011). It is important to note here that organizing motif typologies and sample groups is not a fool-proof procedure, as "archaeologists may unknowingly group artifacts that were considered distinct by their makers, thereby artificially increasing [CV] values" (Eerkens and Bettinger 2001:500) which is one way that archaeologists can express material variation in a given motif typology sample. "In other words, elevated [CV values] may be a product of" (Eerkens and Bettinger 2001:500) archaeological categorization, as opposed to the makers' original intentions for the assemblage (Eerkens and Bettinger 2001). This factor of subjectivity may be especially true for a cave art portrayal assemblage.

Eerkens and Bettinger (2001:494) explain that "when people attempt to make an object from a mental image or model, they make mistakes that increase in absolute size as template size increases . . . people make larger absolute errors when making larger objects" and, therefore, "the rate at which error and intended size are correlated is linear." Eerkens and Bettinger (2001:495) go on to explain that "the ability [for] humans to perceive a difference [between] the size of two objects, or between a mental image of an object and the object itself, is limited by our sensory system," elaborating that the difference "must be at least 3 percent" in order to be detected by the perception of experienced workers without measuring

instruments. This is also known as the Weber fraction. Eerkens and Bettinger (2001:495) emphasize that "this [statement] does not apply when a physical standard, such as a ruler, is used as the method of measurement," as the use of a ruler simply measures the worker's "ability to differentiate between marks on the ruler" (Eerkens and Bettinger 2001). Applying the Weber fraction to the equation for uniform distribution (a mathematical formula that expresses theoretical variation in a range of equally-probable values), Eerkens and Bettinger (2001:495) translates the theoretical limit into a CV value (1.7 percent).

When a given culture's tolerance for size variation in archaeological material goes up, it is reflected by a rising CV value. The Weber fraction is reflected by a CV value of 1.7 percent, representing the maximum level of standardization attainable through human perception alone, and a CV value of 57.7 percent is representative of material attribute measurements with a random distribution, suggesting the makers of the material made no effort toward standardization (Eerkens and Bettinger 2001). In the context of this study, the CV value calculated for a given attribute will increase as the Maya tolerance for variation in given cave art portrayal attribute increases (Eerkens and Bettinger 2001).

This study used two motif typologies, "carved face" petroglyphic and "negative handprint" pictographic portrayals (e.g., Whitley 2011). The carved face motif typology was further organized into three analyzable groups consisting of three to six petroglyphic portrayals based upon their quality. This was done in order to increase the possibility that the analyzable portrayals had been created by similar artisans with similar skill levels and methods of manufacture. Although these very small sample sizes are not ideal for statistical analysis (e.g., Drennan 1996), the sample mean, standard deviation (s), and coefficient of variation (CV) were calculated for each. The sample mean is another word for the average, the standard deviation (s) is the average variation from the sample mean, and the coefficient of variation (CV) is the quotient of the standard deviation over the sample mean (Drennan 1996). As stated above, CV values are very useful for quantifying variation, cultural tolerance for such, and the intent for the culture to standardize a given archaeological material (Eerkens and Bettinger 2001). Calculated CV values were then compared to the known CV values of a random distribution (a CV $\geq$ 57.7 percent), and of the smallest

possible variation that a given worker can deliver to a standardized material assemblage based upon human perception derived from experience alone (CV = 1.7 percent) (e.g., Eerkens and Bettinger 2001).

Measurements and Statistics of the Carved Face Motif Typology

Anatomical terms are used in this paper to refer to the motif attributes of the 15 carved face portrayals. Two similarly-sized circular impressions, or "eyes," are always set above a larger, horizontal impression, or "mouth." The low frequency of "nose" and "chin" attributes disqualified them from statistics. Even though the disuse of a scale in photographs of Cave Art 15F and 1K made them impossible to measure, the carved face motif typology (N = 13) still had the most portrayals of any motif typology. Cave Art 22G was designated as being composed of two portrayals for the sake of statistics.

The quality of the carved face portrayals suggests that they were carved by artisans of differing skill levels. Tier 1 carved faces (n = 6) can be distinguished from most angles; Tier 2 carved face portrayals (n = 4) are more difficult to discern; and Tier 3 carved faces (n = 3) are very weathered and require close inspection to distinguish them from natural cave erosion. Table 6 presents all metric measurements and calculated statistics for Tier 1, Table 7 presents all for Tier 2, and Table 8 presents all for Tier 3. Extent (V) refers to the vertical extent of portrayals, Extent (H) refers to the horizontal extent, Av. Eyes is the average of both eye measurements, and Mouth records the mouth measurements.

Table 6

Tier 1

	Extent (V)	Extent (H)	Av. Eyes	Mouth
Cave Art 12E	17.8	14.3	3.1	4.0
Cave Art 17G	14.8	13.0	3.9	5.3
Cave Art 22Ga	15.1	15.6	3.4	5.7
Cave Art 3J	8.9	12	2.1	3.7
Cave Art 2K	13.5	11.2	2.4	5.6
Cave Art 3K	19.1	10.0	1.9	4.8
Mean	14.86	12.68	2.80	4.85
s	3.58	2.05	0.79	0.84
CV	24.1%	16.2%	28.2%	17.3%

Table 7

Tier 2

	Extent (V)	Extent (H)	Av. Eyes	Mouth
Cave Art 13F	16.0	8.8	2.1	4.1
Cave Art 20G	19.3	12.8	3.5	8.0
Cave Art 22Gb	20.9	14.9	3.1	9.1
Cave Art 2J	14.0	14.9	1.2	6.7
Mean	17.55	17.67	2.48	6.98
s	3.12	9.14	1.03	2.15
CV	17.8%	51.7%	41.5%	30.8%

Table 8

Tier 3

	Extent (V)	Extent (H)	Av. Eyes	Mouth
Cave Art 14F	29.1	28.4	3.6	10.7
Cave Art 16G	14.1	13.3	3.1	7.9
Cave Art 18G	18.1	14.4	1.5	4.1
Mean	20.43	18.70	2.75	7.57
s	9.01	9.14	1.04	3.31
CV	44.1%	48.9%	37.8%	43.7%

T-tests were applied to the Tier 3 data in order to determine if Tier 3 was a part of the same population as Tier 1 and Tier 2 (Drennan 1996). T-tests returned probability (p) values of 0.917 that the Tier 3 average eye attributes belonged to the same portrayal assemblage as the rest of the carved face motif typology, and 0.435 that the Tier 3 mouth attributes did. These high p values indicate that the Tier 3 portrayals are part of the portrayal assemblage. To reiterate, the small sample sizes can increase the likelihood of high p values when they generate high variance as they did in this case (Drennan 1996).

Cave Art Standardization

CV (coefficient of variation) was mentioned earlier as being the most useful statistic to measure cultural tolerance for variation, or population diversity (Drennan 1996; Eerkens and Bettinger 2001). In this study of cave art variation, there is no clear pattern until all four of the CV values for each tier are

averaged. This returns values that demonstrate the Tier 1 portrayals are the most consistent (average CV of 21.48 percent); the Tier 2 portrayals are less consistent (average CV of 35.45 percent); and the Tier 3 portrayals are the least consistent (average CV of 43.63 percent). Simple math demonstrates that the difference between the Tier 1 and 3 CV values (22.15 percent) is more than double that of Tier 1, that the difference between Tiers 1 and 2 is more than 13 percent, and that the difference between Tiers 2 and 3 is only 8 percent. This suggests that all of the artisans who created the anthropomorphic faces were trying to follow the same template, but that only the Tier 1 faces were created by the most skilled artisans, while Tiers 2 and 3 were created by artisans who were generally less skilled.

Bearing all this in mind, the two graphs below highlight the CV values of the Nueve Cerros carved face motif typology's mouth attributes (Figure 64) and averaged eye attributes (Figure 65). The regression lines in each graph are straddled by the regression lines for random distribution (f[x] = .577x) and Weber fraction (f[x] = .017x) CV regression lines.

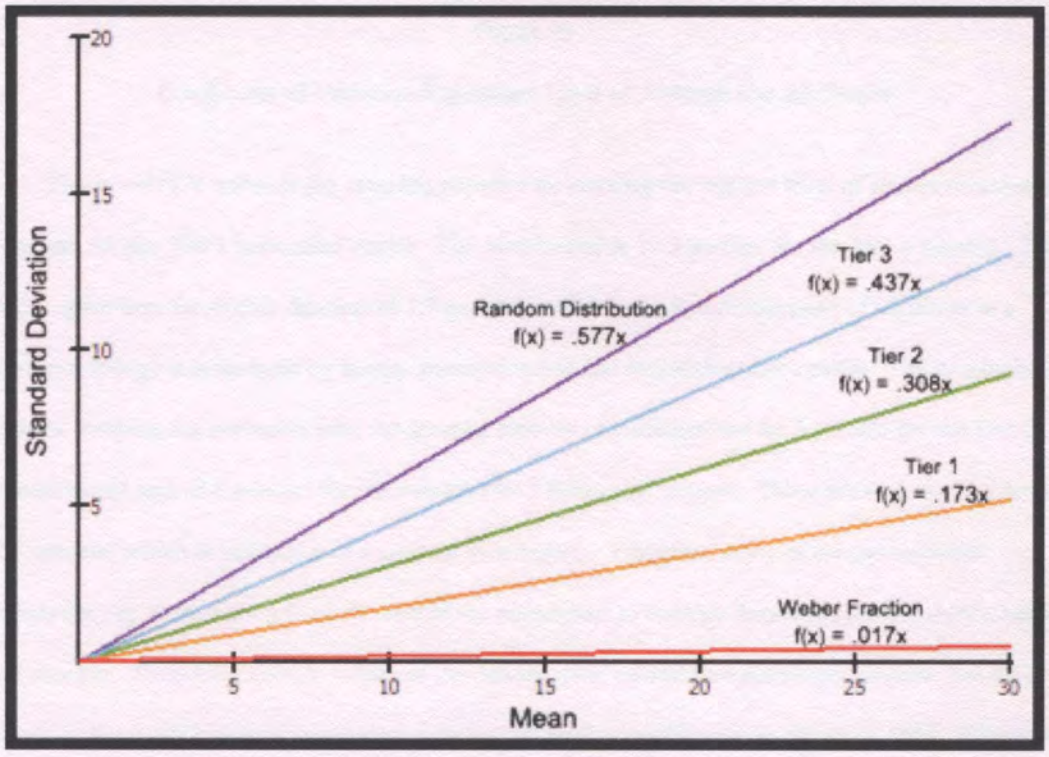

Figure 64

Coefficient of Variation Regression Lines of Mouth Attributes

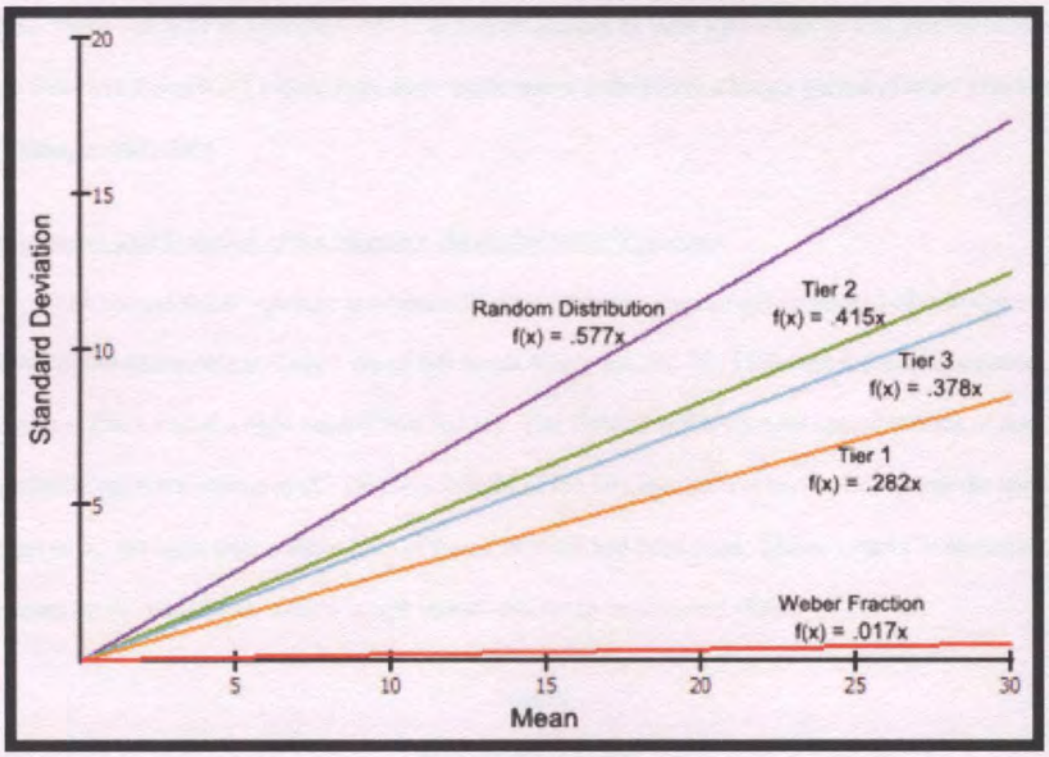

Figure 65

Coefficient of Variation Regression Lines of Average Eye Attributes

The lowest CV value in the sampled population, marking the highest level of standardization, is 16.2 percent for the Tier 1 horizontal extent. The next lowest is 17.3 percent for the Tier 1 mouths. These are both higher than the Weber fraction of 1.7 percent, which is the theoretical limit of variation in a cultural assemblage standardized by human perception without measuring instruments. The two highest CV values, marking the attributes with the greatest amount of variation, are 51.7 percent for the Tier 2 horizontal extent and 48.9 percent for the overall Tier 3 horizontal extents. These are both well under a CV of 57.7 percent, which is indicative of a random distribution. Therefore, none of the petroglyphic portrayals vary so dramatically from the rest of the population to indicate they were produced by a random natural process. Therefore, the CV values of the petroglyphic carved face portrayals indicate that all 13 portrayals in the motif typology compose a coherent cultural assemblage (e.g., Drennan 1996; Eerkens and Bettinger 2001). Furthermore, the highest CV values could be due to the fact that the carved faces recorded at Hill 1 were made by distinct artisans, possibly using distinct methods, over an extended period of time,

because "large numbers of artifacts made over a short amount of time with a similar and well-remembered image will have lower [CV] values than those made one at a time over a longer period of time" (Eerkens and Bettinger 2001:500).

Measurements and Statistics of the Negative Handprint Motif Typology

The second motif typology is composed of four negative handprints composed of red pigment. All three of the handprints at Cave 1 are of left hands (Cave Art 2A, 7C, 11E), and the single negative handprint at Cave 2 is of a right hand (Cave Art 1I). The vertical and horizontal spatial extents of the pigmented areas were disregarded. This was in light of the fact that there is no way to control the spread of pigment along the wall, unless some kind of frame or mold had been used. Mean, *s*, and CV statistics were calculated for the population's eight length measurements in centimeters (Table 9).

Table 9

Negative Handprints

	Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Palm (V)	Palm (H)	Wrist
Cave Art 2A	9.4	6	5.9	5.8	5.3	10.6	8.8	5
Cave Art 7C	5.4	6.5	6.9	6.6	5.7	9.1	7.5	4.4
Cave Art 11E	7.8	6.7	8	5.2	4.3	8.3	7.1	4.3
Cave Art 1I	6.5	5.5	6.1	5.6	4.5	5.6	5.7	4.1
Mean	7.28	6.18	6.73	5.80	4.95	8.40	7.28	4.45
s	1.72	0.54	0.95	0.59	0.66	2.10	1.28	0.39
CV	23.63%	8.74%	14.12%	10.17%	13.33%	25.00%	17.58%	8.76%

Statistics demonstrate that the four prints are almost certainly part of the same cultural assemblage, as they are extremely similar in size and shape, although they may have been created at different times, separated by considerable periods of time. This is made clearest by their low standard deviation values and by their CV values ranging from a low of 8.74 percent to a maximum of 25.00 percent (e.g., Drennan 1996; Eerkens and Bettinger 2001). Additional evidence to support the idea of the handprints being individual components of a cohesive cultural assemblage will be presented in Chapter V to follow.

Chapter V

INTERPRETATIONS

Hieroglyphic writings would have definitely required a special kind of knowledge and literacy among the Maya. Based upon the epigraphic content of precontact Maya writings, there was probably once a precontact Maya scribal class who composed most of the iconographic images and hieroglyphic inscriptions in the Maya culture area (Stone 1995; Coe 2005; Rice 2008). In light of certain natural aspects of cave landforms sometimes being confused with cultural cave art portrayals today, as noted above in the data analysis, it is conceivable that these individuals may have drawn some degree of equivocality between the natural cave processes that resulted in cave wall erosion and the petroglyphic/pictographic cave art portrayals they created on cave walls. In other words, it is possible that natural cave characteristics resembling cave art could have served as part of their inspiration to create cave art.

There are 27 authentic cave art portrayals dispersed between the three Hill 1 caves (Caves 1, 2, 3) at Nueve Cerros. These portrayals include carved petroglyphs, etched petroglyphs, drawn pictographs, and painted pictographs. Seventeen of these authentic portrayals were placed into two different motif typologies. One typology consisted of 13 carved face petroglyphic portrayals and the other consisted of four negative handprint pictographic portrayals. Portrayal attributes of each motif typology were measured and applied to statistics. These statistics were found to demonstrate that each typology composes a coherent cultural assemblage created in the likeness of a mental template or a physical example (e.g., Eerkens and Bettinger 2001).

Material data recorded during the preliminary excavation of the collapsed Maya cave platform structure at the southern entrance of Cave 1 was also analyzed. This data coincides closely with *in situ* evidence excavated from other Maya cave platform structures found elsewhere in the Maya culture area (e.g., Brady 1989; Brady and Stone 1986; Colas et al. 2000; Joyce 2004; Rissolo 2003; Stone 1995). Like

many other caves in the Maya culture area, this appears to demonstrate that Cave 1 served an important symbolic function to the precontact Maya (e.g., Armitage et al. 2001; Brady 1989; Graham et al. 1980; A.E. Miller et al. 2002; Peterson 2006; Prufer 2002; Rissolo 2003; Stone 1995, 1997; Woodfill 2011a). Although only a small percentage of the Maya cave platforms recorded elsewhere have been recorded at decorated caves (e.g., Brady 1989), this does not mean that the Nueve Cerros portrayals are not associated with the same precontact Maya cave activity that resulted in the platform.

The interpretations to follow will establish that many of the Nueve Cerros cave art portrayals can be concretely associated with the precontact Maya. Their suggested cultural significance will be explained, along with a replicative rock art experiment performed for this study by Brooke Lanier (pers. comm. 2012).

Nueve Cerros Painted Hieroglyph

The Cave Art 1A painted pictograph is a precontact Maya hieroglyph (e.g., Bricker 1995; Coe 2005; Rice 2008). The hieroglyph was first discovered by archaeologists in 2010, and its discovery led Woodfill to the rationale that additional cave investigations would be necessary in later years (Woodfill, pers. comm. 2010). The hieroglyph can be pronounced "7 *Ajaw* [ə'haʊ]," but *Ajaw* [lord, ruler] is considered a fairly archaic term to modern speakers of Mayan tongues. This is very much like the terms "viceroy" and "landgrave" that are rarely used in modern English (e.g., Woodfill, pers. comm. 2012). With the *Ajaw* symbol painted to the left instead of the right of the precontact Maya bar-dot notation for "seven," this hieroglyph is definitely painted in reverse from the typical hieroglyphic order that appears elsewhere in the Maya culture area.

In addition to *Ajaw* having a significant political meaning by designating leadership positions in precontact Maya epigraphic writings, the human face-like *Ajaw* hieroglyph also had a significant calendric meaning to the precontact Maya. It is one of the 20 hieroglyphic images representing days on their cyclical calendar (Bricker 1995), which are each "drawn from natural phenomena, including plants, animals, and weather" (Rice 2008:282). *Ajaw* appears to have been especially important in a calendric context, since it served as the 20th day of the calendric cycle, when all period-ending dates were celebrated, and is the only

day name that depicts the human form (e.g., Recinos 1950; Bricker 1995; Tedlock 1996). With its multiple meanings, the interpretation of the Nueve Cerros 7 *Ajaw* portrayal is more complicated than it first appears.

Ingold's (2007:125) anthropological study of the line elaborates on how world cultures used lines of colored pigment to create meaningful portrayals, "though context dependent." Problematic issues, however, can arise during the interpretation of ambiguous portrayals that have multiple potential meanings, like the 7 *Ajaw* does at Nueve Cerros. Ingold (2007:125) goes on to say that portrayals containing "elements of a notation are clearly also depictions . . . drawing[s] of something other than" what they represent, "even though [they have been] incorporated into a script" (Ingold 2007).

There is one other example of a solitary 7 *Ajaw* hieroglyphic portrayal done "in unusual reversed order" (Wanyerka 2009:504), recorded at the Stela Plaza of a surface site known as Nim Li Punit in the Maya Mountains region of southern Belize, 200 kilometers to the east of Nueve Cerros (Wanyerka 2009) (Figure 66). The archaeologist who recorded it also recorded a solitary 12 *Ajaw* hieroglyph in reverse hieroglyphic order on an eroded stela 10.5 kilometers north of Nim Li Punit. Both portrayals were interpreted as hieroglyphic Short Counts (Wanyerka 2009). Neither were discovered in cave contexts.

Figure 66

Stela discovered at Nim Li Punit. Images provided by Wanyerka (pers. comm. 2012).

The Nueve Cerros 7 *Ajaw* was originally translated as a Short Count date painted in reverse (Woodfill, pers. comm. 2010). This interpretation becomes complicated when one considers that the three major Maya calendric systems are known to always organize hieroglyphic portrayals with their numerical coefficients either above or to the left of the symbol (e.g., Beetz and Satterthwaite 1981; Coe 2005; Coe and Van Stone 2005; Demarest 2004; A.G. Miller 1986; Rice 2008; Watson 2010; Wanyerka 2009). Even the Short Count was always written in this customary way (e.g., Coe 2005; Coe and Van Stone 2005; Demarest 2004; A.G. Miller 1986; Rice 2008; Watson 2010; Wanyerka 2009).

This basic tenet of Maya hieroglyphic portrayals is mentioned by Beetz and Satterthwaite (1981), who recorded two petroglyphic 7 *Ajaw* Short Count portrayals at the Classic Maya site of Caracol, which flourished just a few dozen kilometers to the northwest of Nim Li Punit (Beetz and Satterthwaite 1981) (Figure 67). Beetz and Satterthwaite (1981:4) write that all of the Short Count portrayals at Caracol, including the two 7 *Ajaw*, could be read "from left to right in accordance with the Maya order of reading."

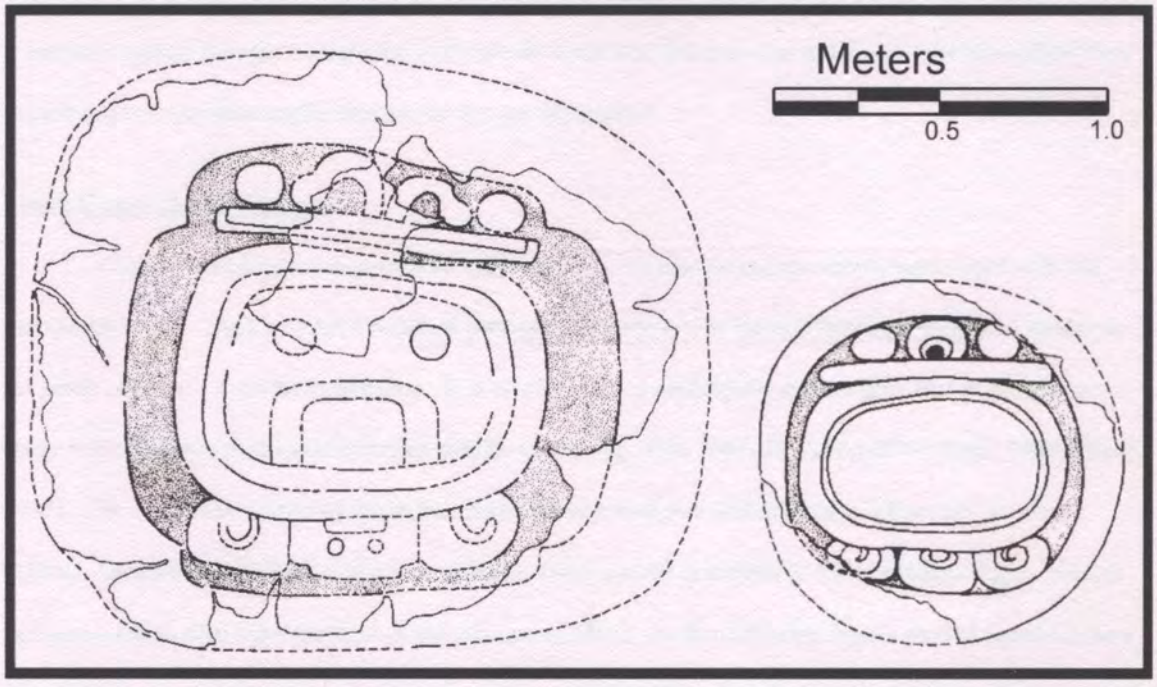

Figure 67

Two 7 Ajaw Short Count portrayals recorded at Caracol. Images from Beetz and Satterthwaite (1981:165, 169) used with the permission of the publisher.

All attributes of the Nueve Cerros 7 *Ajaw* pictographic portrayal at Cave 1, outside of its irregular ordering, coincide with the Short Count portrayals recorded at Caracol by Beetz and Satterthwaite (1981). The irregular ordering of the Nueve Cerros hieroglyph is a crucial difference that renders it uninterpretable at this time. This is because, in the opinion of this study, customary hieroglyphic ordering is a critical attribute of a Short Count date. Even if the 7 *Ajaw* hieroglyph can eventually be interpreted as a Short Count, additional evidence will still be necessary before it can be set firmly in time. This is because the same precontact Maya Short Count inscription repeated once every 13 katuns (~260 years) over the course of several centuries (e.g., Beetz and Satterthwaite 1981; Demarest 2004; A.G. Miller 1986; Rice 2008).

Most important to note about the 7 *Ajaw* for the purposes of these interpretations, because the precontact Maya venerated cave landforms (e.g., Armitage *et al.* 2001; Bassie *et al.* 2002; Brady 1989; Coe 2005; Demarest 2004; Graham *et al.* 1980; Joyce 2004; Lucero 2007; Mercer 2005; A.E. Miller *et al.* 2002; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a, 2011b), and this backward hieroglyph is located in a prominent location within a cave landform associated with the precontact culture though multiple lines of material evidence, the irregular ordering of the hieroglyph may indicate something meaningful that we do not yet understand.

Nueve Cerros Etched Portrayal

Other Nueve Cerros cave art portrayals at Hill 1 can also be independently associated with the precontact Maya. The Cave Art 4B etched petroglyphic portrayal is located approximately five meters to the south of Cave 1's southern entrance. It is of a left-facing anthropomorphic figure that is similar in many ways to Maya portrayals recorded outside caves (e.g., Coe 2005; Demarest 2004; Stone 1995; Taube 1992). The deteriorated state of the etched portrayal suggests that additional attributes may have once existed. Despite its drawbacks, this also indicates Cave Art 4B is definitely not of modern origin and can be considered to date from the time of the precontact Maya. In the following figure, the left panel features a magnified view of the main part of the engraving, and the right panel features the digital enhancement of the engraving's characteristics from a wider view (Figure 66).

Figure 68

Left frame: Close-up of Cave Art 4B pictured with digital enhancements. View to south (Credit: Seleste Sanchez and Carlos Efrain Tox Tiul). Right frame: Cave Art 4B pictured with digital enhancements and highlighted attributes. View to south (Credit: Matt Oliphant).

The surviving characteristics of Cave Art 4B depict the frame of a face with a single eye and a downward-curving mouth. Above these facial characteristics, there is a conical shape with vertical striations, which can be safely interpreted as the corncob headdress of the Maya Maize God (e.g., Coe 2005; Recinos 1950; Taube 1992; Tedlock 1996). Various headdresses are associated with figures of authority and divinity in Maya art (e.g., Demarest 2004; Lucero 2007; Stone 1995; Taube 1992), but only the Maize (Corn) God wears a conical headdress with vertical striations like the one at Cave Art 4B (e.g., Taube 1992). This distinctive attribute of the etched portrayal makes it possible to identify the figure with a high level of confidence. The presence of this headdress is so convincing that it is almost as if the Maize God's own name hieroglyph is present (Figure 67).

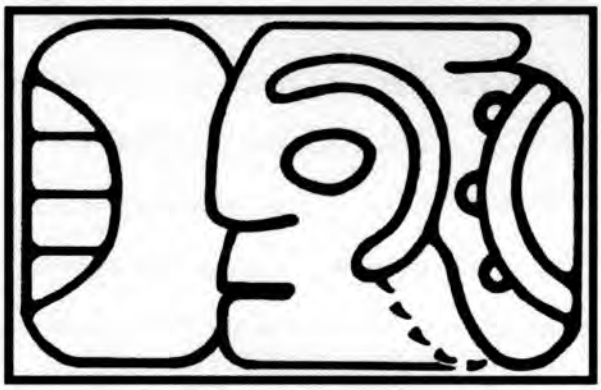

Figure 69

One rendition of the Maize God hieroglyph. Drawn by the author after Gates (1978:fig. 76.1).

Dating from the Preclassic to the Colonial periods, the Maize God has been found to be one of the most commonly depicted figures in the Maya culture area (e.g. Coe 2005; Gates 1978; Recinos 1950; Taube 1992; Tedlock 1996). In their general mythology, the Maize God is the son of the original creator gods, the father of many lesser deities (e.g., Coe 2005; Recinos 1950; Taube 1992; Tedlock 1996), and is most often identified as a deity of vitality and fertility (e.g., Coe 2005; Taube 1992). The Maize God is featured as a main character in the Popol Vuh, where he is decapitated by the lords of the Underworld. His divine sons, the Hero Twins, go to place his head back onto his shoulders, and it is only then that the god's "jewels and headgear" (Coe 2005:66) can gradually be returned to him during his journey back to the surface (Coe 2005). This decapitation, restoration, and journey sequence are interpreted as "a metaphor for the agricultural cycle and the annual rebirth of the crops" (Demarest 2004:182).

Another common feature in Maize God portrayals is etched above the eye at Cave Art 4B, tracing down to its right side. Translated from the Quiché Mayan language as "*vachzot*[mask, rim of the face]" (Recinos 1950:111 n. 20), this feature appears to represent the corn's protective husk (e.g., Coe 2005; Gates 1978; Recinos 1950; Taube 1992). Further suggesting that Cave Art 4B is the Maya Maize God, just below its corncob headdress are several short, vertical lines that form a horizontal band. These appear to depict the deity's distinctive, tonsured hairstyle (e.g., Coe 2005; Taube 1992). Similar lines are also etched below the figure's downward-curving mouth and may depict facial hair. Several researchers have suggested that this hair represents the pollen tassel and silk of the ears on a corn stalk (e.g., Coe 2005; Demarest 2004;

Stone 1995; Taube 1992; Tedlock 1996). These natural features gradually change from a creamy-white when the corn is growing to a golden-brown color when it is ready for harvest.

In his reading of the precontact poetry of the Popol Vuh, Recinos (1950:111) mentions that the Maize God wore a "*yachvach*, crown, or adornment . . . on the head," while Tedlock's (1996:96) adaptation of the same precontact K'iche' Maya myth also invokes the image of a dark-yellow tassel spewing from the top of a mature corn stalk, mentioning the Maize God as he held a burning "torch, already lit." This implies that the Maya, who we know cultivated corn for several millennia prior to contact, were aware of the significance of the color changes to the corn tassel and the silks (e.g., Coe 2005; Demarest 2004).

Nueve Cerros Carved Petroglyphic Portrayals

A total of 15 carved petroglyphic portrayals (Cave Art 12E, 13F, 14F, 15F, 16G, 17G, 18G, 21G, 22Ga, 22Gb, 2J, 3J, 1K, 2K, 3K) that resemble anthropomorphic faces were recorded at the three Hill 1 caves. Ten of the 15 are located at Cave 1 (Cave Art 12E, 13F, 14F, 15F, 16G, 17G, 18G, 21G, 22Ga, 22Gb), two at Cave 2 (Cave Art 2J, 3J), and three at Cave 3 (Cave Art 1K, 2K, 3K). In the data analysis section at the end of Chapter IV, 13 of the cave petroglyphic portrayals were divided into three qualitative tiers. Without including Cave Art 15F and 1K in the statistical analysis of variation, the 13 petroglyphic portrayals were found to compose a coherent assemblage and grouped into a single motif typology.

Thirty-two meters to the southwest of the Cave Art 4B Maize God etching, Cave Art 22G is composed of two carved petroglyphic portrayals (Cave Art 22Ga, 22Gb). The upper portrayal (Cave Art 22Ga) depicts an anthropomorphic skull and the lower portrayal (Cave Art 22Gb) depicts a deeply-carved anthropomorphic face. These vertically-stacked portrayals were analyzed as distinct portrayals in the data analysis section. However, they compose an anthropomorphic figure who is wearing a skull headdress when interpreted as a single portrayal (Figure 70).

Figure 70

Cave Art 22G with flash photography. View to west (Credit: Matt Oliphant and Nancy Pistole).

In the context of Maya mythology, the carved petroglyph at Cave Art 22G portrayal fits the description of Hunahpu, who is the son of the Maize God and the dominant Hero Twin in the precontact

Maya Popol Vuh epic (e.g., Recinos 1950; Rock 2012; Taube 1992; Tedlock 1996). This Hero Twin was sometimes depicted by the precontact Maya as wearing a skull headdress (e.g., Rock 2012; Taube 1992; Tedlock 1996), just like he "wears a skull headdress" (Taube 1992:116) on page 50 of the Dresden Codex (Figure 71). Recinos (1950:130 n. 11) writes that the Hero Twins were worshipped as "not gods but divine men" by the "painters and carvers of Yucatán," many of whom were of Maya ancestry (Recinos 1950).

Figure 71

Hunahpu with skull headdress. Drawn by the author after Dresden Codex page 50: http://www.famsi.org/research/graz/dresdensis/img_page50.html

At the major site of Tikal, a precontact Maya portrayal of a skull has been interpreted as representing the Maya connection to their ancestors (e.g., A.G. Miller 1986). This kind of symbolism would be especially relevant at a cave, because the precontact Maya viewed the cave as a natural landform that could serve as a conduit to the mythical Underworld, where deities and ancestors dwelt (e.g., Brown 2005; Coe 2005; Demarest 2004; Stone 1995; Vogt and Stuart 2005).

Another carved face portrayal that would have had special significance to the precontact Maya is Rock Art 2J, carved at the top of a prominent stalagmite at Cave 2. A possible upright ear attribute at the top of Cave Art 2J makes the portrayal resemble the face of an animal (Figure 72). Indigenous to the

Americas, jaguars were of special significance to the precontact Maya, because they used iconographic jaguar portrayals as "symbols of elite power" (Peterson 2006:127). In fact, the original creator god of the Maya, Itzamna, served as the embodiment of the sun during the day and resided in the Underworld as a jaguar-like humanoid at night (e.g., Demarest 2004; A.G. Miller 1986; Recinos 1950; Stone 1995; Taube 1992). Although it is possible that this Tier 2 portrayal has been misidentified, if the precontact Maya did mean to create a jaguar portrayal at this cave, it is likely to represent this deity.

Figure 72

Cave Art 2J View to north with 20 centimeter scale bar
(Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

These three carved petroglyphic face portrayals (Cave Art 22Ga, 22Gb, 2J) establish a strong link between the precontact Maya and the carved face assemblage. Since all of the carved face portrayals have already been statistically demonstrated to compose a coherent assemblage, all of the carved faces can be considered to be associated with the precontact Maya at Nueve Cerros. In fact, the same kind of carved petroglyphic face portrayals also appear at caves elsewhere in the Maya culture area, where they have been interpreted by archaeologists as being Maya (e.g., Graham *et al.* 1980; Rissolo 2003; Stone 1995, 1997).

Nueve Cerros Handprint Portrayals

Four negative handprint portrayals were identified at Hill 1 (Cave Art 2A, 7C, 11E, 1I). The first three of these are located at Cave 1, and the fourth (Cave Art 1I) at Cave 2. "[P]ositive and negative handprints in red" (Stone 1995:52) have been recorded at a large number of Maya caves throughout the Maya culture area (e.g., Stone 1995, 1997). The best-preserved of the four negative handprints is definitely Cave Art 2A, although none of the negative handprint portrayals were as well-preserved as the irregularly-ordered 7 *Ajaw* hieroglyphic portrayal painted at Cave Art 1A. Cave Art 2A was recorded only about 1 meter away from Cave Art 1A. The difference in color between the handprint and the hieroglyph is probably due to a similar red ochre source material being processed in two different ways, which is a theory that could be confirmed by a professional artist (Lanier, pers. comm. 2012). Their proximity does not necessarily mean that the two portrayals were created at the same time from a single batch of ground red ochre, but their pigment could have been procured from one or several different Mesoamerican quarries, and then heated and ground into pigment dust as needed (e.g., Montelle 2004).

The pigment dust of the painted pictograph would have required "liquefying techniques" (e.g., Montelle 2004) with lard or some other substance that would have acted as "a binder, but also intensified colors" (Lanier, pers. comm. 2012). Lanier (pers. comm. 2012) found that her hand-ground brick dust had to be "ground very finely and mixed well with egg yolk to achieve superior [paint] opacity," with a consistency "similar to egg tempura paint used in . . . work pre-dating oil painting" (Figure 73).

Figure 73

Pigment paint processed with egg yolk and brick dust. Image provided by Lanier (pers. comm. 2012).

The professional artist that assisted this study found that no binding agents were necessary during the preparation of pigment for the creation of a negative handprint (e.g., Whitley 2011). Instead, Lanier (pers. comm. 2012) ground a clay brick into dust, applied a thin layer of margarine to a rock surface as a "primer for the negative hand prints," loaded a rolled-up newspaper tube with some of the pigment dust, pressed her hand against the rock surface, and breathed forcefully through the rolled-up newspaper tube, which propelled the pigment dust toward her hand. Much of the pigment dust clung to the layer of margarine that the artist had applied as it came into contact with the greasy rock surface. Lanier (pers. comm. 2012) reported that this process took "between 15-18 minutes" and that the "dust on top [of the margarine] was lighter in color" than the liquid paint prepared from the same red brick (e.g., Lanier, pers. comm. 2012). The spatial distribution, color, and similar levels of preservation between Cave Art 2A and 1A suggests that Cave Art 2A was also created by the precontact Maya.

All four handprint portrayals (Cave Art 2A, 7C, 11E, 1I) share a common form, are all located at Hill 1, and are all composed of the same red color. Data analysis demonstrated that the handprint portrayals are extremely similar in size, resulting in an average CV of only 15.16 percent. Since the first negative handprint (Cave Art 2A) has been associated with the Maya 7 *Ajaw* glyph, and all four compose a coherent assemblage, all four negative handprints are likely to be associated with the precontact Maya.

Other Nueve Cerros Pictographic Portrayals

Cave Art 6C is located only 1.5 meters away from one of four handprint portrayals (Cave Art 7C), and appears to be the negative print of a single digit composed of red pigment. Along with their similar coloring and close spatial distribution, this thematic similarity between Cave Art 6C and Cave Art 7C suggests that Cave Art 6C shares Cave Art 7C's precontact Maya cultural association. Nearby, Cave Art 8C is a drawn pictographic portrayal composed of traced outlines in black pigment. The symmetrical outlines appear to have been traced around single digits. Their thematic similarities and close spatial distribution suggest Cave Art 8C, Cave Art 6C, and Cave Art 7C also share the precontact Maya cultural association demonstrated for Cave Art 6C and 7C. Cave Art 9C is a fourth pictographic portrayal at Panel C, but a very high-degree of disturbance has affected it and made it nearly invisible to the naked eye. If this faded portrayal can be demonstrated as anthropomorphic in nature, which was suggested earlier (in the data section), then it may be possible to associate it with the precontact Maya at a later date.

Another portrayal that may consist of additional hand imagery in red pigment is Cave Art 5B. It is located just above the Cave Art 4B precontact Maya Maize God etching. Although it could not be associated with the precontact Maya through other means, Cave Art 5B's spatial proximity to Cave Art 4B and to similarly-colored pictographic portrayals associated with the precontact Maya at Panels A and C suggest that the Cave Art 5B may also be of precontact Maya origin.

Details of Cave Art 10D were digitally enhance to reveal an anthropomorphic profile (Figure 74). The black arrow in Figure 74points to the top of the forehead, the green arrow to the eye, the yellow arrow to the tip of the nose, and the blue arrow to the mouth. This mouth is curves downward just like the Maya Maize God etching at Cave Art 4B.

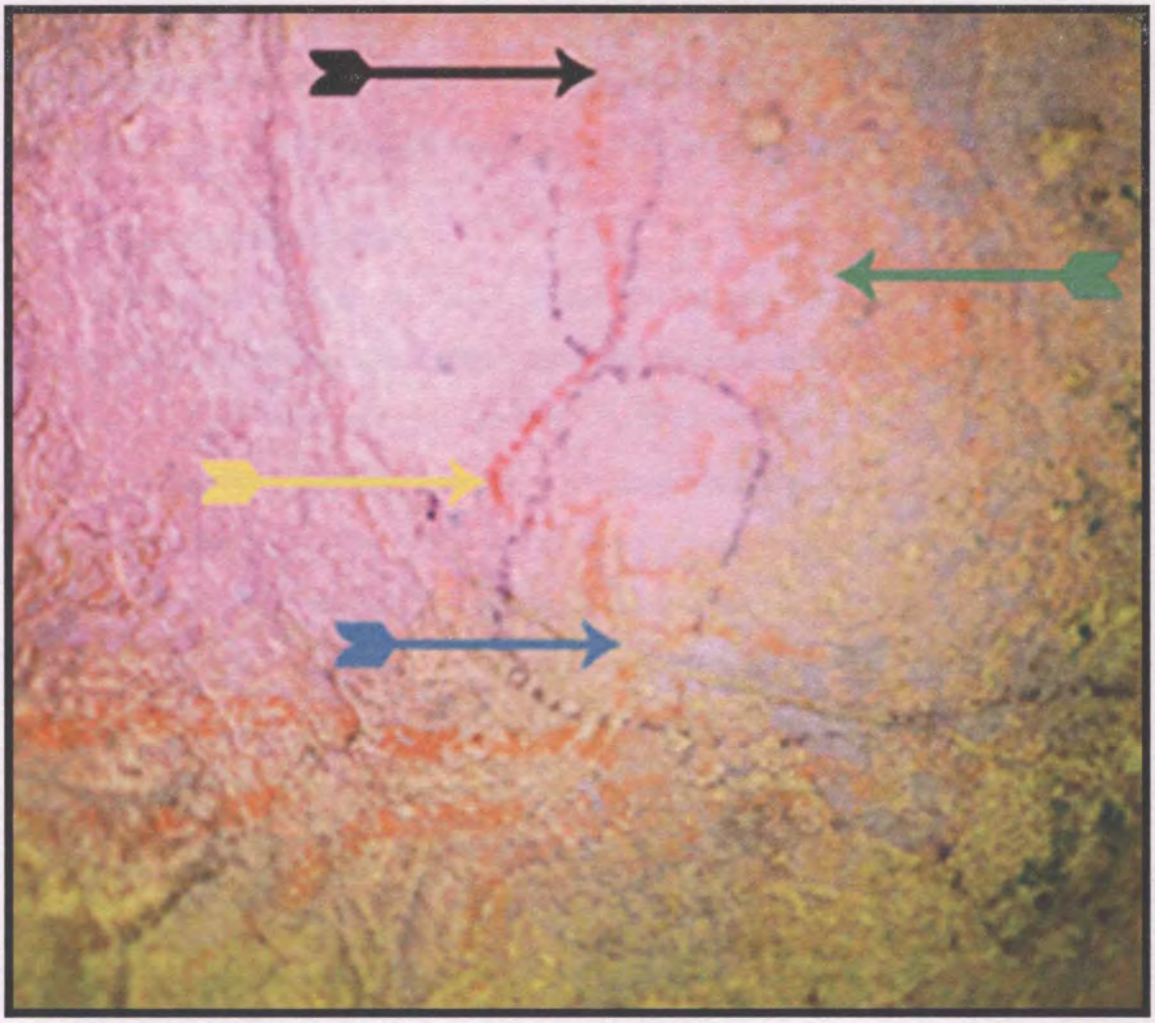

Figure 74

Cave Art 10D pictured with digital enhancements. View to south
(Credit: Seleste Sanchez and Carlos Efrain Tox Tiul).

Cave Art 10D might even depict the process of creating a negative handprint, as the red horizontal lines on the left side of the portrayal suggest that the figure is either extending an arm forward from its shoulder, or is blowing something out of its downward-curving mouth. Whatever the black pigment of Cave Art 10D depicts is unidentifiable. Ware and colleagues (2000:2490) recorded a similar pictographic portrayal of "a profile human face" at Naj Tunich cave composed of "two different pigments . . . [which] suggests that the profile was over-painted at the time of creation or, more likely, touched up at a later date." The black pigment at Cave Art 10D could be an associated element of the anthropomorphic face in red

pigment, or it could be a superimposed portrayal (e.g., Ware *et al.* 2000). Either way, the chromatic and thematic similarities that Cave Art 10D has with many of the other portrayals at Nueve Cerros appear to demonstrate that Cave Art 10D was also very likely created by the precontact Maya.

The Role of Precontact Maya Artisans

There is evidence of precontact Maya craft specialization at Hill 1 in the form of *in situ* obsidian prismatic blades and flakes, although, especially because no obsidian cores were recovered, this does not necessarily imply they were created at the cave. While the blades are definitely evidence that would have required a specific kind of knowledge associated with craft production (e.g., Awe and Healy 1994; Crabtree 1968), the blades could have very easily been brought in from the outside along with the hundreds of ceramic sherds that were collected from the surface and encountered during the preliminary excavation at Cave 1. The level of statistical variation in the portrayals suggests that they were created by individual specialists who served as artisans (e.g., Coe 2005; Demarest 2004; Rice 2008; Stone 1995).

In order to further explore this possibility, a professional artist with experience in experimental art forms and an MFA in Painting was contacted with a request to conduct a replicative rock art experiment. Lanier (pers. comm. 2012) applied paint to concrete rock in a style and with instruments she is trained in. This experiment sought to estimate the amount of time a trained artisan would have required to create individual portrayals at Nueve Cerros (Lanier, pers. comm. 2012).

Lanier (pers. comm. 2012) began by grinding clay bricks into peppercorn-sized fragments, gradually grinding these fragments into a "really fine dust."

> "One hour yielded roughly one-third cup of mid-toned [red] dust, and one-quarter cup of dark, which is harder [to crush]. It [then] took 80 minutes to process the mid-toned dust by grinding it more finely with ceramic mortar and pestle . . . unfired clays and ochre are probably easier to grind and blend into a smooth paint" (Lanier, pers. comm. 2012).

She went on by blending some of the ground brick dust into one egg yolk (3 minutes) to create a liquid paint. Providing a reference for the amount of time it can take for a visible layer of paint to adhere to rock, Lanier (pers. comm. 2012) then applied the resulting "2-3 oz of paint" onto a 15 square centimeter "chunk of concrete." "It took 5 minutes to paint [the chunk of concrete] solidly with one color using a one-half inch round brush" (Lanier, pers. comm. 2012).

After being sent several pictures of the Maya pictographic portrayals from Nueve Cerros, the modern artist described her attempt to create a painted pictographic portrayal similar to Cave Art 1A.

> "I included a 24 inch [60.96 centimeter] t-square ruler in the photographs of the more complex tv painting . . . outside [on a horizontal surface]. It took me about an hour, approximately 15 minutes per tv. The large [red] brick-color tv plus the frame of the smallest tv of the same color uses exactly the amount of paint produced by one egg yolk . . . applied in a thin layer. It takes about an hour for each layer to dry" (Lanier, pers. comm. 2012) (Figure 75).

Figure 75

Outdoor TV Paintings with 60.96 centimeter scale (Credit: Brooke Lanier).

Lanier (pers. comm. 2012) went on to create another pictographic portrayal of a "little tv glyph." She painted this "on another [approximately 15 square centimeter] chunk of concrete." It "took about 10-15 minutes and was painted with a quarter-inch flat brush" (Lanier, pers. comm. 2012) (Figure 76). The

modern artist's total time investment toward the pictographic rock art portrayal was approximately three hours, 91 percent of which was devoted to the processing of pigment (Lanier, pers. comm. 2012).

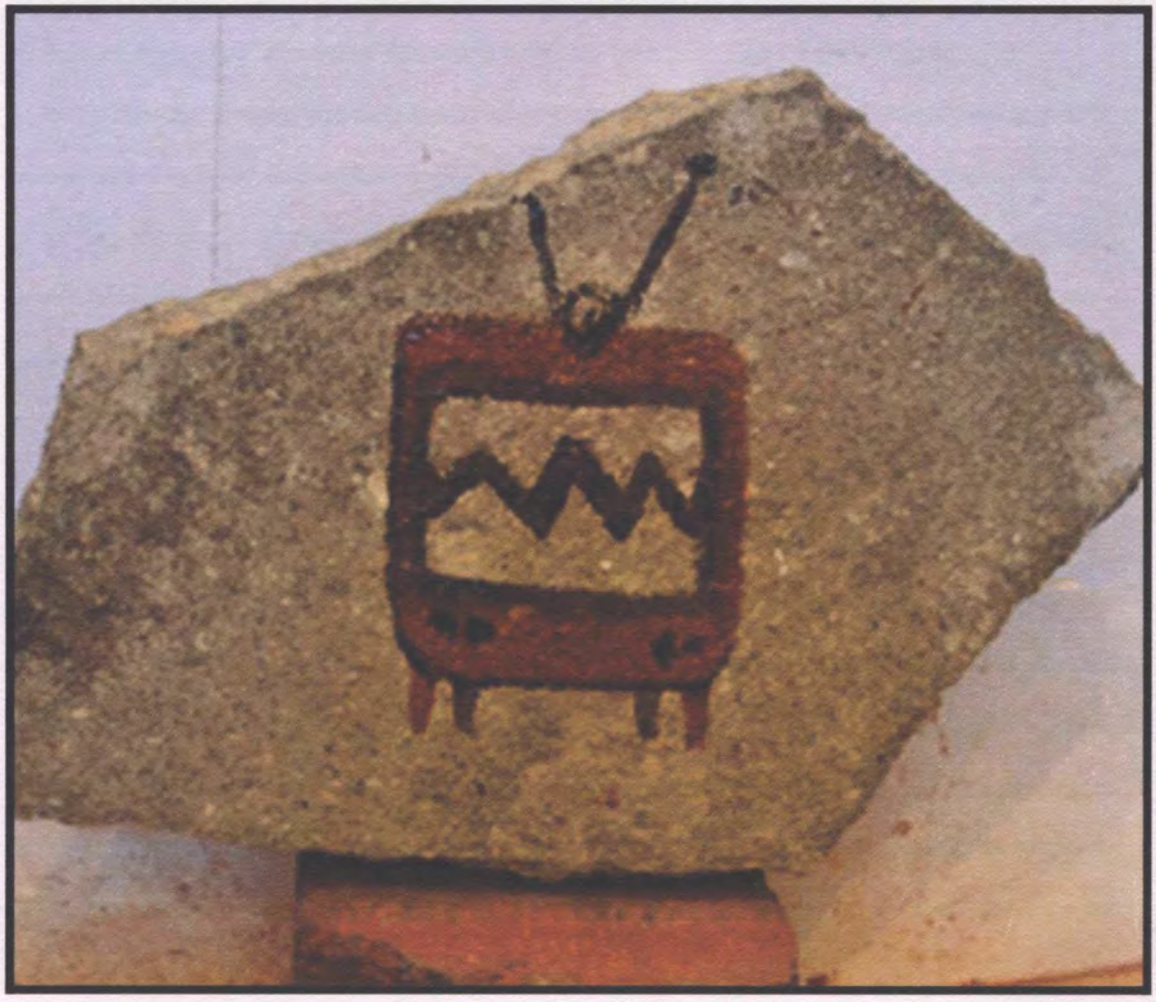

Figure 76

"The Little TV Glyph" by Brooke Lanier (2012)

In order to approximate the short-term time investment of the precontact Maya artisans responsible for the eight pictographic portrayals (Cave Art 1A, 2A, 6C, 7C, 8C, 10D, 11E, 1I), we must assume that they made similar time investments for each pictograph (including the preparation of eight separate pigment batches). With the data provided by Lanier's (pers. comm. 2012) replicative experimentation, we can see that the artisans would have had to invest about three hours for each

pictograph, which would have resulted in a total time investment of at least 24 hours for the pictographic portrayal assemblage associated with the precontact Maya. No experiments attempted to approximate the short-term time investment required for the petroglyphic portrayal assemblage. However, a significant time investment from artists of varying skill would have also been important for their creation.

The time invested into each cave art portrayal, pictograph or petroglyph, would have also been supplemented by other short-term time expenditures (i.e., the conceptualization of each portrayal, fashioning of tools, travel-time, other special preparations integral to belief). Long-term time investments prior to (i.e., artisan training) and subsequent to (i.e., observation of the cave art) to the creation of the precontact Maya cave art portrayals would have also been important to the creation of the portrayals.

DISCUSSION

Interpretations have absolutely associated a significant percentage (13 percent) of the Nueve Cerros cave art portrayals with the precontact Maya, based upon their content. As discussed in the interpretations above, the number of cave art portrayals that could be associated with the Maya was greatly amplified when 17 additional petroglyphic and pictographic cave art portrayals were classified as belonging to one of the two coherent assemblages of "carved faces" and "negative handprints." The "carved face" motif typology was found to have an average attribute CV of 33.51 percent, and the "negative handprint" motif typology an average attribute CV of 15.16 percent (e.g., Drennan 1996; Eerkens and Bettinger 2001) (Figure 77).

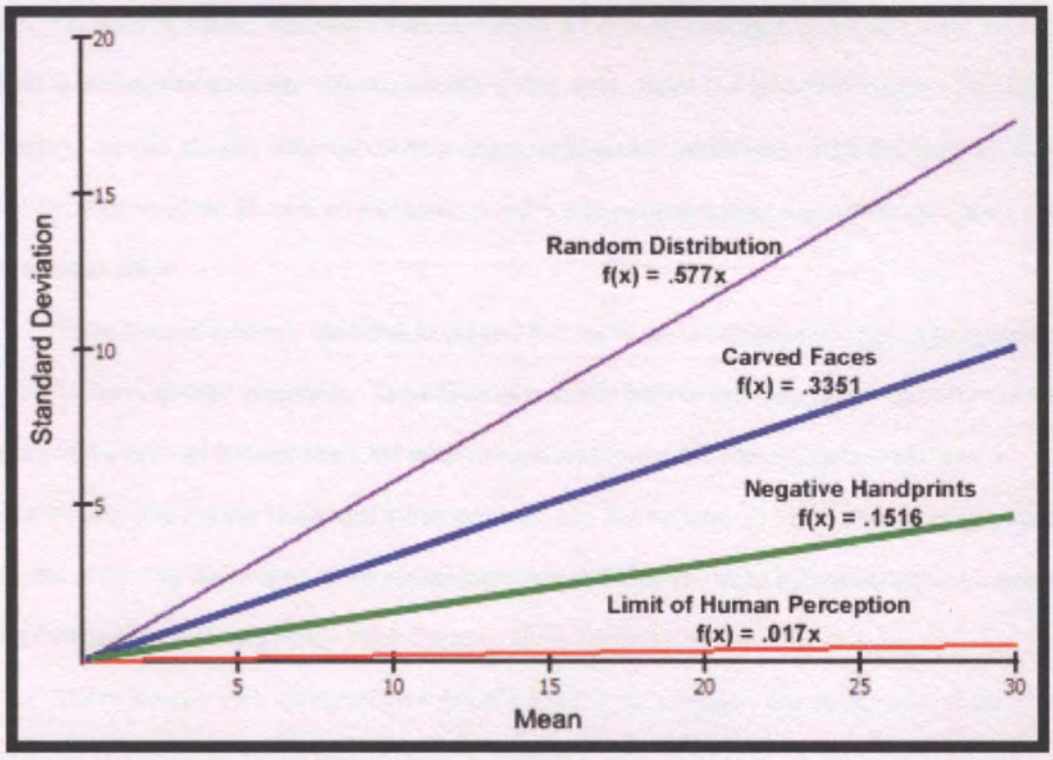

Figure 77

Average Coefficient of Variation Regression Lines for All Attributes
of Each Cave Art Motif Typology at Nueve Cerros

The 15 petroglyphic carved faces may have a higher degree of variation than the four negative handprints, but the average CV of the carved face attributes is still well under 57.7 percent, which is the cut-off signifying a random distribution (Eerkens and Bettinger 2001). In other words, the CV values of the two cave art motif typologies identified at Nueve Cerros are indicative of a pattern and very likely were standardized by precontact Maya artisans without any formal measuring instruments. This suggests that the precontact Maya population responsible for the Nueve Cerros cave art intended for these petroglyphic and pictographic portrayals to be standardized, but that they were also tolerant of attribute variation.

At the same time, it should also be noted that the CVs for each of the two cave art portrayal assemblages would probably be considered fairly high for a coherent assemblage of a different material type, because most other archaeological material types (i.e., lithic points, ceramic vessels) are generally not as likely to exhibit the kind of artistic variation that the subject matter of the Nueve Cerros cave art does.

In fact, their level of artistic variation would have made the cave art portrayals at Nueve Cerros very difficult to statistically associate with one another if they were, instead, dispersed throughout the ridge system (i.e., located at many different caves on many different hill landforms). With this in mind, the close spatial distribution of the 23 cave art portrayals at Hill 1 was integral to their successful association with the precontact Maya.

Three lines of evidence converge to suggest that the Maya cave platform assemblage is associated with the 23 Maya cave art portrayals. These lines of evidence include that both the platform feature and majority of the cave art features share the same cultural association; that the Maya cave platform is, physically, very close to the Maya cave art assemblage; and that both the 23 Maya cave art portrayals and the *in situ* artifacts in the cave platform assemblage were probably produced by precontact Maya artisans at Nueve Cerros (e.g., Awe and Healy 1994; Crabtree 1968; Woodfill 2010).

The replicative rock art experiment described earlier demonstrates that the creation of the Nueve Cerros cave art portrayals would have required a significant time investment. As opposed to creating all 23 of the cave art portrayals at one time with a large number of different artisans, the 23 precontact Maya cave art portrayals were very likely created at distinct times during the course of a cultural practice that could have spanned over several generations. In other words, precontact Maya artisans probably returned to the cave on multiple occasions over a time episode of unknown length to engage in activities that included creating cave art.

Chapter VI

CONCLUSIONS

The 12 kilometer long, 2.5 kilometer wide, boomerang-shaped Nueve Cerros ridge system is located at a major bend in the River Chixoy in west-central Guatemala, just to the west of a precontact Maya salt production site. Systematic survey of 70 percent of this ridge system found that it is composed of at least 23 hill landforms with at least 40 cave landforms. The present study recorded 27 cave art portrayals at only three of these caves, which were all located at the same hill landform, Hill 1. Of the 27 recorded cave art portrayals at these three caves, 23 were successfully associated with the precontact Maya.

Other than the 23 cave art portrayals, independent lines of *in situ* evidence also substantiate a Maya cultural association at Hill 1. These include Maya ceramic sherds (Woodfill, pers. comm. 2011), obsidian blades (e.g., Awe and Healy 1994), and the collapsed remains of a structural feature identified as a precontact Maya cave platform (e.g., Brady and Stone 1986; Brady 1989; Brown 2005; Colas *et al.* 2000; Rissolo 2003; Stone 1995). A preliminary excavation of this collapsed cave platform identified the *in situ* evidence of unarticulated human remains stratigraphically associated with one obsidian flake within a charcoal ash feature. This evidence was interpreted as at least one act of ceremonial destruction. Colas and colleagues (2000:5) chronicle that "this pattern of ceremonial destruction is widely known" as a defining aspect of precontact Maya cave activity (e.g., Colas et al. 2000; Peterson 2006). Similar evidence has also been discovered at a number of other caves throughout the Maya culture area (e.g., Brady 1989, 2005; Brady and Stone 1986; Brown 2005; Coe 2005; Colas et al. 2000; Demarest 2004; Peterson 2006; Rissolo 2003; Stone 1995). This similar evidence suggests that the precontact Maya cultural material recorded at Nueve Cerros, including the cave art portrayals, may be reflective of a Maya cave activity that was practiced on a regional level in accordance with an established cultural belief.

Additional material types recorded within the Maya culture area outside Nueve Cerros also support that the precontact Maya commonly practiced cave activity (e.g., Brady 1989, 2005; Brady and Stone 1986; Brown 2005; Coe 2005; Colas et al. 2000; Demarest 2004; Peterson 2006; Rissolo 2003; Stone 1995). Hieroglyphic inscriptions are often recorded at Maya surface sites (e.g., Armitage *et al.* 2001; Bassie *et al.*2002; Brady 1989; Brady and Stone 1986; Brown 2005; Coe 2005; Colas et al. 2000; Demarest 2004; Joyce 2004; Lucero 2007; Mercer 2005; A.E. Miller *et al.* 2002; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a). These inscriptions have been translated as describing that cave landforms were "sacred to the Maya as portals to the underworld" (Lucero 2007:414) and natural places "where ancestral spirits dwelled" (Joyce 2004:22) (Figure 78). This research also indicates that the precontact Maya practiced cultural cave activity in recognition of their belief in a connection between natural cave landforms and an unobservable mythical realm (e.g., Bassie *et al.* 2002; Brady 1989; Brady and Stone 1986; Brown 2005; Coe 2005; Colas et al. 2000; Demarest 2004; Joyce 2004; Lucero 2007; Mercer 2005; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a).

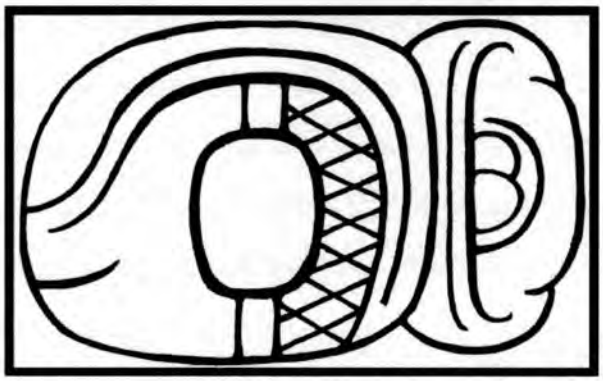

Figure 78

One rendition of the hieroglyph translated as "cave." Drawn by the author after Vogt and Stuart (2005:159).

By incorporating our knowledge of Maya cave activity into sociocultural discussions, we can interpret the known pattern of ceremonial destruction as the remains of a regional cultural activity whose principle aim was symbolic in nature (e.g., Colas *et al.* 2000; Peterson 2006). Destruction of otherwise functional or important items could have been intended to bring about "the transformation of objects into

offerings" (Peterson 2006:127). The amount of precontact material evidence at the three Hill 1 caves indicates that the precontact Maya cave activity at Nueve Cerros did not take place only once, but, rather, it was practiced there over the course of an episode of unknown length. The significance of these symbolic acts and how they relate to Maya cave art will be further explained as these conclusions continue.

The Infrequency and Variability of Maya Cave Art

Despite the past studies that have addressed it, our academic understanding of Maya cave art is still fairly murky (e.g., Rissolo 2003). One reason for this is because cave art portrayals are almost always located in open-air environments, where factors of disturbance seriously impede its interpretation (e.g., Clottes 2008; Straus 1990; Whitley 2011). Often following a limited number of themes, factors of disturbance are also why cave art is not known for its regional consistency (e.g., Brady and Stone 1986; Graham *et al.* 1980; Rissolo 2003; Stone 1995, 1997; Ware *et al.* 2000). The predominant factor of disturbance in Mesoamerica is weather erosion, but other factors also cause cave art portrayals to fade away and eventually disappear from cave walls at a relatively fast rate (e.g., Clottes 2008; Whitley 2011). The ease at which cave art can be disturbed makes it much less frequent than most other precontact cultural material types. When it is present, the same disturbance makes cave art difficult to interpret. A common remedy for some faded portrayals is digital enhancement, although this method is often unable to recover "details of elements or pigments" (Mark and Billo 2002:121) from the most faded portrayals (e.g., Mark and Billo 2002; Whitley 2011). At Nueve Cerros, four portrayals (Cave Art 3A, 5B, 9C, 19G) were so faded that they could not be associated with the Maya.

Specifically referring to an anthropomorphic cave art assemblage of five petroglyphic carved faces in the Yalahau region, Rissolo (2003:71) also comments on the variable nature of precontact Maya cave art portrayals, mentioning the "idiosyncratic, multivariant, yet highly patterned nature of Maya cave art in general" (Rissolo 2003). At Nueve Cerros, the standardized cave art portrayals were probably created by several precontact Maya artisans who framed each motif typology after a set of culturally-preferred dimensions that were preserved in a mental template or a physical example (Eerkens and Bettinger 2001). The symbolic nature of cave art portrayals would have probably allowed for precontact artisans to

purposefully incorporate a certain degree of attribute variation into individual portrayals as a form of expression.

Nueve Cerros Maya Cave Art Assemblage

The precontact Maya cave art assemblage at Hill 1, despite being significant in size, is not nearly as extensive as the enormous cave art assemblages of certain other Maya caves (e.g., Bassie *et al.* 2002; Stone 1995). Nevertheless, in combination with the replicative cave art experiment described in the interpretations chapter of this final thesis paper, the presence of 23 Maya cave art portrayals at Nueve Cerros signifies that the Maya must have reallocated a substantial amount of work away from their daily tasks. The attributes of many of the portrayals are consistent enough for them to be considered parts of coherent assemblages, even though many are so eroded that their attributes are difficult to distinguish.

The attribute at the top of Cave Art 2J appears to be an animal's upright ear, which make Cave Art 2J resemble a zoomorphic face instead of one that is anthropomorphic. However, with the Maya cave context in mind, the portrayal at Cave Art 2J is no exception to the idea that all the carved faces are anthropomorphic. It is probably meant to represent the divine jaguar form of Itzamna, who served as the chief Maya deity. In iconographic contexts, Itzamna is shown to represent the embodiment of the sun during the day. When he traveled below the horizon into the Underworld during the night, the same chief Maya deity was depicted as an anthropomorph with black spots, a tail, and other jaguar-like characteristics (e.g., Demarest 2004; Taube 1992).

Other Maya deities were also depicted as supernatural anthropomorphs with characteristics inspired by the natural world (e.g., Coe 2005; Demarest 2004; Taube 1992). A second example of this at Nueve Cerros is the Maya Maize God etching at Cave Art 4B. The portrayal's attributes include a corncob headdress and other characteristics that probably meant to represent natural features of the corn plant. These other features include a mask representing the protective corn husk, facial hair representing the silks protruding from the ears of corn, and a hair style that may represent the pollen tassel at the top of the stalk (e.g., Coe 2005; Demarest 2004; Recinos 1950; Stone 1995; Taube 1992; Tedlock 1996). The Maize God is one of the most commonly-depicted figures in the precontact Maya culture area, and the Cave Art 4B

etched portrayal is definitely the clearest indicator that the Maya intended for at least part of the cave art assemblage at Hill 1 to represent divine figures in precontact Maya mythology (e.g., Taube 1992; Coe 2005). The very existence of the Maya Maize God and its presence as an etching at Nueve Cerros appears to illustrate the central importance of corn to precontact Maya subsistence.

The divine figures depicted in the Nueve Cerros Maya cave art portrayals also appear to indicate that the precontact Maya intended to illustrate parts of their belief system through the assemblage. In addition to the deities of the Underworld, the Maya appear to have also believed that their ancestors used cave landforms as conduits to the Underworld after death (e.g., Brown 2005; Coe 2005; Demarest 2004; Stone 1995; Vogt and Stuart 2005). These precontact beliefs, which describe cave landforms as being somehow connected to the unobservable realm of the Underworld, have come to be understood by historians and archaeologists, alike, as they have been examined in the iconographies of numerous contexts throughout the Maya culture area (e.g., Brown 2005; Coe 2005; Demarest 2004; Recinos 1950; Tedlock 1996; Vogt and Stuart 2005).

The skull-headdress of Cave Art 22G may have been meant to emphasize the ancestro-divine theme of the Underworld on the western side of the southern entrance of Cave 1. Cave Art 22G appears to depict a particular guise of Hunahpu, who acted as the dominant Hero Twin in the Popol Vuh epic (e.g., Recinos 1950; Rock 2012; Taube 1992). The Hero Twins appear in iconographies as sons of the Maize God, but they were worshipped by the Maya as "not gods but divine men" (Recinos 1950:130 n. 11). Although modern interpretations of precontact Maya mythologies definitely recognize divine lines of descent, the birth and rearing of these divine figures should be understood as having occurred at a time *immemorium* (e.g., Coe 2005; Demarest 2004; Taube 1992). The Cave Art 22G Hunahpu portrayal on the western wall of Cave 1 may have been meant to emphasize the importance of ancestors by appearing so close to the etched portrayal of his father on the eastern wall of the same cave at Cave Art 4B (e.g., Brown 2005; Coe 2005; Demarest 2004; Recinos 1950; Tedlock 1996). Reaffirming this interpretation, iconographic skull images that date to the Maya Classic period (AD 300-900) at some of the most prominent surface sites have also been suggested as representing the strong connection that the precontact

Maya had with their ancestors (e.g., A.G. Miller 1986). It is possible that the Maya intended for the skull-headdressed portrayal at Cave Art 22G to represent this same connection.

The anthropomorphic attributes of the other 12 carved faces (Cave Art 12E, 13F, 14F, 16G, 17G, 18G, 20G, 3J, 2K, 3K) suggest they were also meant to represent divine figures or ancestors in their underworld forms. However, it is unclear exactly what, or who, each was meant to represent. Even five of the Tier 1 petroglyphs depict unknown figures (Cave Art 12E, 17G, 3J, 2K, 3K). At a later date, it may also be possible to establish that they are meant to represent the Underworld mythology of the Maya.

Not only are the most eroded petroglyphs uninterpretable, many of the pictographic portrayals are washed away to the point that they could also not be interpreted with much specificity. While the pictograph at Cave Art 10D was interpreted as possibly being meant to depict the process of creating a negative handprint, the meaning of the strikingly-familiar negative handprint portrayals (Cave Art 2A, 7C, 11E, 1I) are too ambiguous to be interpreted at this time. When the details of the pictographic portrayal at Cave Art 10D can be examined more closely, additional evidence may be discovered that leads future investigations to a greater understanding of negative handprints.

A great deal of what we understand about Maya cave use has been gleaned from the precontact Maya hieroglyphic written language (e.g., Lucero 2007; Vogt and Stuart 2005). Still in near-perfect condition, the Maya 7 *Ajaw* hieroglyphic portrayal at Cave Art 1A is painted in reverse hieroglyphic order at a prominent position just inside the large southern entrance of Cave 1. A deliberate search of the modern literature found that there is at least one other reversed 7 *Ajaw* hieroglyph carved into a stela at Nim Li Punit in southern Belize, approximately 200 kilometers to the east of Nueve Cerros. It was interpreted as a Short Count date at Nim Li Punit (Wanyerka 2009).

Although this study decided that the Nueve Cerros hieroglyph could not be interpreted like the Nim Li Punit hieroglyph was, the presence of the hieroglyph at Cave 1 does suggest that an important event took place at Hill 1 at least once. With the written Maya language being composed of over one thousand different hieroglyphs, almost 80 percent of which have been interpreted as being standardized at a number of different contexts (Roman-Rangel *et al.* 2012), the 7 *Ajaw* hieroglyph at Nueve Cerros is definitely the most tantalizing of the uninterpretable cave art portrayals at Nueve Cerros. Since Maya hieroglyphs are

one of the best examples of Maya portrayals being customarily standardized between contexts, Cave Art 1A provides this study with the single best example of the symbolic inconsistency of Maya cave art at Nueve Cerros (e.g., Coe 2005; Demarest 2004; A.G. Miller 1986; Rice 2008).

The Inconsistency of Maya Cave Art

The symbolic inconsistency of Maya cave art in general is epitomized by the fact that no calendric Long Count sequences, important to the recordation of time in the precontact Maya culture area, have ever been discovered at cave contexts (e.g., Armitage *et al.* 2001; Bassie *et al.* 2002; A.E. Miller *et al.* 2002; Rice 2008; Stone 1995; Ware *et al.* 2000). Composed of five hieroglyphs, usually "positioned within a grid pattern and read from left to right, top to bottom, in vertical double columns" (Watson 2010:151), a Maya Long Count can be deciphered to an exact day in a time span of approximately 7,890 solar years (20 baktuns) on the modern calendar. The Long Count was, by far, the most precise calendric recordation method in use by the precontact Maya (e.g., Demarest 2004; Coe 2005; Rice 2008). Furthermore, it is known to have been very common outside cave contexts throughout the Classic period (e.g., A.G. Miller 1986; Coe 2005; Demarest 2004; Rice 2008).

Since we know that caves played such a central role in the Maya culture area, it is not logical to interpret the absence of Long Count portrayals from caves as being a result of cave landform not being used by the Maya during their six-hundred-year Classic period, when they were at their best. Reaffirming this, the Jolja' cave art assemblage has been dated to the Early Classic (AD 300-600) and has seven hieroglyphic texts composed of multiple hieroglyphs, but no Long Counts (Bassie *et al.* 2002). On the other side of this date range is the Late Classic (AD 600-900) cave art portrayal assemblage of Naj Tunich, where "the cave's inscriptions [also] do not record a single Long Count date, which presents obvious problems in trying to establish absolute dates" (Stone 1995:157). This paucity of Long Count inscriptions at Naj Tunich is unbelievable to some archaeologists, but Ware and colleagues (2000:2490) also write that "although there are Maya calendar dates in the Naj Tunich inscriptions," the large number of calendric hieroglyphs at Naj Tunich are depicted with either "the Calendar Round or Short Count as opposed to the Long Count." Stone (1995:155) places this absence of Long Counts in perspective by detailing that Naj

Tunich is "home to over forty hieroglyphic texts . . . the largest collection of Maya texts ever found in a cave and one of the largest collections of painted inscriptions to come from a single Maya site." This Nueve Cerros study submits that the Classic Maya did not use the Long Count at cave contexts because of their strongly-held beliefs about the cave landform. In other words, the complete absence of the Long Count from decorated caves may have been related to a cultural prohibition.

The Role of Cave Practice

Interpreting the cognitive specifics of the cultural cave practice at Nueve Cerros is probably not within the capabilities of archaeological science at this time. Researchers have also not been able to draw these details from Maya hieroglyphs, cave art, or other Maya portrayals. At this time, however, a general discussion about trends that have been recognized by sociocultural researchers may shed some light on the formation of the Nueve Cerros cave art. In the context about to be discussed, a "cultural dualism" is a system of classification where a culture explains all observable existence as a product (i.e., condition) of an unobservable (i.e., emergent, *a priori*) mythical realm that has always existed. Thinking about the unobservable mythical realm makes everyday (i.e., observable) existence seem almost inadequate. Everyday life can be considered provisional, yet unpredictable (e.g., Deleuze and Guattari 1977).

The culture dedicates its existence to the unobservable mythical realm by repeatedly practicing acts that have no material benefit. While the practice itself can potentially take different forms, these practiced acts are dedicated over and over to the same unobservable idea that is beyond the horizon of observable experience. Practice *places* the observable in relation to the unobservable, while not making the unobservable any more tangible. That is, although the given culture is fully-aware of the inadequacy of its observable experience in the cultural dualism, it chooses to engrain this undeniable fact into their cultural identity by engaging in practice. This engenders a kind of *symbolic* profit, or non-material benefit (e.g., Bourdieu 1997).

An analogy to the repetitive recognition of the inadequacy of observable existence can be related to the act of counting in increments of whole-numbers while keeping the idea of infinity in mind. Although the counter is fully-aware that they will never reach infinity, no matter what the size or number of their

incremental increases are, they choose to continue counting to remind themselves of the unattainability of infinity (Song, pers. comm. 2011). In this analogy, the *symbolic* value of observable existence and the unobservable mythical realm can be compared to even an enormous number being held up next to infinity. If even fifty cave art portrayals had been depicted in recognition of the unobservable belief during cave practice at Nueve Cerros, or five hundred functional objects had been destroyed, the unobservable would have still remained just so. The counting itself, the practice itself, the depiction of cave art portrayals themselves, are only the means of achieving a level of consistency that can eventually be held up in comparison to the unattainable.

The Meaning of the Nueve Cerros Cave Art

This study argues that the Nueve Cerros Maya cave art assemblage was created as a result of practiced behavior in the pursuit of *symbolic* benefit, as opposed to material benefit. The abundance, distribution, and quality of the eroded Maya cave art portrayals suggest that the portrayals were somehow important to, facilitated, or enhanced the efficacy of the Maya practice at the cave platform by bestowing the cave's natural characteristics with cultural significance. With this same logic, we can argue that the Hill 1 cave platform assemblage and cave art assemblage are also associated with one another because neither of them seem to have any clear material purpose, but, instead, both seem to have been meant to garner a *symbolic* benefit through non-functional acts.

To the precontact Maya practitioners, cave art portrayals may have served as observable depictions of particular characteristics of their unobservable belief system. They and their ancestors would have recognized these beliefs at the three Hill 1 caves and other cave landforms, because caves have been found by multiple researchers as being "so highly regarded in the Maya belief system" (Stone 1995:239). As lasting portrayals, the 23 precontact Maya cave art portrayals at Hill 1 would have been able to serve this purpose on a continuous basis after their creation, if subsequent precontact Maya cave practitioners chose to utilize the same cave landforms.

Also supporting this interpretation, the largest concentration of Maya cave art portrayals survives on the walls and formations of Cave 1's southern entrance, roughly in the center of which the cave platform

assemblage was found. It proved to contain the largest concentrations of surface and *in situ* cultural material recorded during cave survey. Totaling 11, portrayals surrounding the southern entrance of Cave 1 include the Nueve Cerros hieroglyph, one handprint, and nine of the 14 carved petroglyphic portrayals. In addition to these portrayals, two of the four faint colorations and an unknown amount of eroded portrayals may have, at one time, been additional evidence of the precontact Maya cave practice.

While all 23 of the Hill 1 cave art portrayals fit comfortably into an anthropomorphic theme and have been associated with the precontact Maya by this study, only the meanings of the etched petroglyphic portrayal (Cave Art 4B) and two of the 14 carved petroglyphic portrayals (Cave Art 22G, 2J) have been interpreted as representing particular attributes of divine characters (e.g., Coe 2005; Demarest 2004; Taube 1992). Despite the interpretability of the majority of the portrayals, these three fluidly coincide with a large number of past interpretations of the unobservable mythical realm of the Maya, the Underworld (e.g., Bassie *et al.* 2002; Coe 2005; Demarest 2004; Graham *et al.* 1980; Lucero 2007; Mercer 2005; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a, 2011b).

Even without the cave art, the natural aspects of Cave 1 are awe-inspiring. This probably would have been even more true for precontact Maya populations, to whom cave landforms were of great spiritual significance (e.g., Bassie *et al.* 2002; Brady 1989; Brady and Stone 1986; Brown 2005; Coe 2005; Colas et al. 2000; Demarest 2004; Lucero 2007; Mercer 2005; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a). To those that could understand them in precontact times, the specific meanings of the cave art portrayals probably would have substantiated the profound nature of the natural cave characteristics of the three decorated Nueve Cerros caves at Hill 1.

It is definitely possible that some of the cave art portrayals were also meant to represent particular observable activities, like subsistence. This may have been done as a means of highlighting important observable activities during practice, so that these particular activities would be granted favorable material results. Ensuing events that affected these particular observable activities may have resulted in the reaffirmation of the precontact Maya beliefs that led to the creation of the cave art in the first place. While favorable events would have definitely solidified beliefs, unfavorable events may have called for some kind

of reformation, variation in practice (i.e., a different cave art position), or for an increase in the potency of future action.

None of the walls or formations in the three Hill 1 caves bear clear evidence of earlier petroglyphs being chipped-away or smoothed-over. We can, therefore, assume that the petroglyphs (and quite possibly the pictographs) were intended to be permanent cultural features until they eroded-away. Their positions probably also had some kind of significance to the precontact Maya. Joyce (2004:25) discusses another precontact Maya practice, where large platforms were built as "points of reference for future action" at village contexts (Joyce 2004). The placement of the large number of portrayals around the southern entrance of Cave 1 suggests that the cave art portrayals may have served a similar purpose. It may have even been possible for people to come to Hill 1 to observe the cave art and fulfill a purpose in the absence of the kind of *symbolic* activity that can be observed in findings of the preliminary excavation of the cave platform, and would have probably accompanied official cave practice. The cave art portrayals can, instead, be thought of as optional enhancements at special caves.

I can relate to the importance of this *symbolic* meaning by mentioning one of my own recent personal experiences. In late January of 2013, I was diagnosed with an operable brain tumor on the surface of my brain. I was told that this tumor could be removed completely with surgery, but that there was a significant chance of recurrence. After undergoing brain surgery to have the tumor successfully resected, I did a significant amount of research and found out that my best chances to not get another tumor would be if I underwent radiotherapy (RT), which would eliminate the replicative ability of any microscopic tumor cells missed by the surgeons. If I didn't do this, these residual traces would otherwise be able to replicate and grow into another tumor, possibly one that was inoperable. Opting to choose permanent partial hair loss and temporary fatigue over possible death, I visited the Mayo Clinic for RT every weekday for the next six-and-a-half weeks. As I completed the last of my 33 treatments, I walked into a part of the waiting area where a bell had been hung for patients to ring upon their full-completion of RT treatments. At the sounding of the three loud knells I put much of my strength into, members of my family and other loved ones applauded with enthusiasm. In the midst of this moment, I felt a curious kind of emotion I did not entirely expect to feel, but this emotion definitely added something intangible to my accomplishment. I

may not have felt as strongly about my completion of RT and my future plans to lead a great and fulfilling life if that bell had not been there for me to sound. I am certain that this bell was also of special significance to many of my fellow patients and their families. There were multiple occasions when patients with broad smiles would, upon ringing this symbolic bell, turn to tearfully embrace their family members with joy.

Future Research

Future investigations should be able to build off of the interpretations of this study. The following paragraphs will outline some of the most promising avenues for future research.

A comprehensive excavation can address the Maya platform feature. This should be done in five centimeter levels. A detailed map of the structure's horizontal and vertical limits will be an important source of data in this project. The platform could be associated with the surrounding cave art if a comprehensive cave excavation recovered evidence of cave art tools (i.e., hammerstones, globs of pigment). Methods used to create the petroglyphic portrayals could be understood through microwear analysis of any carving or etching tools that may have been used (i.e., celts, recycled cores, oval bifaces, bifacial picks). In addition to excavating the platform, trench-like excavations of the areas below the carved face portrayals at Panels E, F, G, J, and K may also be able to recover *in situ* rock spall.

A future survey for cultural caves should complete the cave survey of the Nueve Cerros karst ridge system that this 2011 study began. This can be done by addressing all or part of the remaining 30 percent of the ridge system. A future cave survey should also return to Hill 1 and attempt to identify additional cave art portrayals. Photographic and physical methods that were not used during this field study should be employed in order to identify additional cave art attributes and compositions. Exposing the recorded portrayals and other areas of the caves to ultraviolet light with a portable black light would be one inexpensive and effective method to identify additional pigment traces (e.g., Whitley 2011). Future investigations can also use complementary-color light filters attached to LED lights to accentuate certain colors (i.e., a cyan filter will bring out red pigment). More sophisticated methods of digital enhancement can also be employed to accentuate cave art attributes.

Chemical analyses may allow for the mineral sourcing of the Nueve Cerros cave art. It is important to note that the mismanagement of any sampling procedures would be destructive to this irreplaceable cultural evidence (e.g., Clottes 2008; Whitley 2011). Whitley (2011:173) elaborates on some non-destructive possibilities that could be used by future studies,

> "Until recently, pigment analyses were problematic in the sense that they required destructive research: minimally, the removal of a flake of paint for subsequent laboratory study. Portable X-ray fluorescence machines have become available in the last few years, however, allowing for nondestructive chemical analyses in the field. This promises to make pigment studies an increasingly common component of future rock art research."

Possibly leading to their greater understanding, a fine-scaled comparison of the Nueve Cerros cave art portrayals to other unrefined examples in the Maya culture area can be pursued through literature review. If analogues or even similar examples are identified in the literature, additional photographic documentation may be necessary. Examples outside caves may also provide future studies with insight, although the similar portrayals at cave landforms probably have distinct meanings.

On a regional level, Maya cave art was executed in such an inconsistent manner that regional stylistic indicators are very rarely recognized. In fact, no regional stylistic indicators were identified during the literature review of this study. A significant but manageable project could make major headway by compiling one or a series of major reference volumes that consist of hand-drawn reproductions of a large percentage of the known cave art portrayals in the Maya culture area. Drawn reproductions of cave art portrayals, which are remarkably infrequent at this time (e.g., Rissolo 2003), may ease the ability for investigators to recognize, analyze, and interpret any potential stylistic indicators. This project would undoubtedly ease the task of future Mesoamerican cave art studies, which must otherwise comb through dozens, if not hundreds, of unpublished volumes in order to understand the details of the perplexing nature of Maya cave art portrayals.

Concluding Remarks

When precontact populations in the Maya culture area created lasting cave art portrayals, specifically at Nueve Cerros, the portrayals probably had no functional utility except "as visually omnipresent and stable points of reference" (Joyce 2004:23). In the absence of a cultural practice to

contextualize the precontact points of reference, it is logical to deduce that they would have only been recognized as simple acts of craft specialization done by artisans and, therefore, would have been of relatively-minimal value to the acting culture.

However, if the Nueve Cerros cave art portrayals were created in concert with a cultural cave practice as it appears they *were*, the portrayals may have served as consistent reminders to practitioners about the ideals of their unobservable cultural belief, which would have been why the cave practice would have been taking place at all. *Symbolic* value would not have resulted from the acts themselves, but rather from the consistent performance of the cave practice, in the context of which each cave art portrayal would have been valued in its own way (e.g., Bourdieu 1997; Woodfill 2011a). Maya archaeology's understanding of cave art portrayals is based upon the understanding that the Maya cave landform was, and in many places still is, considered to be a sacred locale (e.g., Bassie *et al.* 2002; Coe 2005; Demarest 2004; Mercer 2005; Peterson 2006; Rissolo 2003; Stone 1995, 1997; Vogt and Stuart 2005; Woodfill 2011a).

The promising results of this cave art study demonstrate that the 23 surviving cave art portrayals at Hill 1 served as reminders of unobservable beliefs, the consistent recognition of which probably generated symbolic value, in turn leading to the persistence of the cave practice. The decorative-nature of cave art portrayals may provide false-hope to investigators that think they can interpret cave art portrayals with greater specificity than most other material classes, but even a cave art assemblage as well-preserved as Nueve Cerros is almost impossible to interpret with guaranteed accuracy. The confident interpretation of a well-preserved portrayal's intended meaning requires archaeologists to recognize a kind of code whose creators are long-dead and gone. This conundrum is compounded an infinite number of times by the incompleteness of the erosive portrayals. The study of Maya cave art needs to be more-fully developed through regional typological comparison and in the context of cave practice, if it is to be understood at all.

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