RURAL LANDSCAPE PRACTICES AND AUTHORITY: IRON AGE CYPRUS AND ASSYRIA

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Andrew John Behling Crocker

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ABSTRACT

Changes in rural landscape practices across time are increasingly attracting attention in archaeology. Though excavation of rural sites is becoming more common, the vast majority of rural sites in the ancient Mediterranean are still understood primarily through survey. This thesis asks how the organization of hinterland sites in Cyprus changed from the Late Bronze Age to the Iron Age and how these rural patterns fit within Cyprus's regional and political context. I consider the results from several survey projects in Cyprus and northern Mesopotamia. I pay special attention to the Maroni valley in Cyprus, where I apply an underutilized statistical measure, Moran's *I*. I argue that a cohesive pattern for Cyprus in the Iron Age can be identified, despite previous difficulties. I also argue that the changes observed in both the Cypriot and northern Mesopotamian rural landscape practices may be understood through the ideological and political lens of the Assyrian Empire.

BIOGRAPHICAL SKETCH

Andrew John Behling Crocker received a Bachelor of Arts in Classical Studies from Michigan State University in 2014 before studying archaeology at Cornell University, beginning in 2015. His research focuses on landscape archaeology, imperialism, and the application of geographic information systems to archaeological research in the eastern Mediterranean.

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Rural Landscape Practices and Authority: Iron Age Cyprus and Assyria

Introduction

This thesis examines the rural landscape practices of the Iron Age Cypriot city-kingdoms and the Assyrian empire. In order to do so, I deploy a statistical measure that has been under-utilized by archaeologists, Moran's *I*, to compare settlement patterns diachronically with data from a case site, Maroni Valley, on the south coast of Cyprus. By doing so, and connecting these results with contemporary data from other regions in Cyprus and in northern Mesopotamia, I seek to both re-evaluate the state of Iron Age research on rural sites on Cyprus as well as place the island in its regional context.

The study of Iron Age Cyprus has been dominated by narratives of the individual "city-kingdoms" that emerged on the island in this period. Such narratives typically focus on historical questions, such as when a given city was founded, identifying the population of the city (or its rulers) as Eteocypriot, Greek, or Phoenician, and understanding the role of the king in copper production. The neglect of pan-island phenomena is best expressed in Andres Reyes' influential critique of the archaeology of Iron Age Cyprus, where he called for both island-wide studies as well as the integration of Cypriot research into the rest of the Mediterranean and the Near East (Reyes 1997: 65). Although there has been an increase in pan-island and rural studies on Cyprus (e.g. Fourrier 2013; Kassianidou 2013; Iacovou 2013; Kearns 2015), the broader regional integration that Reyes called for is still largely absent, perhaps due to a reluctance to resume "long-standing (and tired) debates" (Counts & Iacovou 2013: 3) over internal and external actors on Cyprus.

Pan-island trends pertaining to the re-establishment of rural settlements and their relationships to neighboring regions and political structures have not yet been adequately addressed. Despite the increase in pan-island studies and rural studies of the Cypriot Iron Age, the bulk of this work focuses on extra-urban sanctuaries and graveyards (e.g. Fourrier 2013; Janes 2013). Rural settlements themselves tend to be absent from these analyses. Although some have addressed the rehabitation of the countryside after the Late Bronze Age collapse (e.g. Kearns 2015) and the political positioning of the island's kingdoms (Iacovou 2013), these studies still have not put rural Cyprus into dialogue with other hinterland patterns in the Near East.

The scholarly separation of rural Cyprus from its neighbors is a particular problem with respect to the Assyrian Empire. Although the Cypriot city-kingdoms were, at least nominally, client states of Assyria, the Assyrian state is generally absent from discussions of Iron Age Cyprus and vice versa. As such, questions of connectivity, especially ideological and political ties, remain unanswered despite their potentially vast significance for any investigation of the island in the Iron Age. This study addresses rural landscape practices of Iron Age Cyprus and Assyria through examining the spatial patterning of new settlements, seeking to understand pan-island trends on Cyprus and how they fit into their regional, political, context.

Surveys from the Assyrian heartland and Cyprus provide the data utilized in this thesis. Assyria, especially the Jazira area, has provided the dominant paradigm of re-established authority over hinterland sites. The Assyrian model sees imperialism, urbanism, and forced resettlement as central to this process (e.g. Wilkinson & Barbanes 2000; Wilkinson et al 2005; Rosenzweig 2016). The many survey projects conducted throughout the Assyrian heartland, the Land of Aššur, and the immediate hinterlands in what is now northern Syria and Iraq generally identify a pattern of expansive, low-density settlements throughout the Jazira as the presumed

result of forced resettlement of conquered peoples by the Assyrian state (Wilkinson & Barbanes 2000: 420; Wilkinson et al. 2005: 41; Ur 2010: 162-3). This pattern is then contrasted with the settlement dynamics of other areas of Syria beyond the heartland, where a tell-based pattern much like what has been observed for the Bronze Age continued throughout the Iron Age (Wilkinson et al. 2005: 45-7). The tell-based settlement patterns are thus identified as being typical of "client or so-called vassal states" (Wilkinson et al. 2005: 47). These client states were later incorporated into Assyria proper and its administrative system, though these cases still appear to retain preexisting settlement practices, and thus are said to maintain a dichotomy between core and periphery that is reified in rural settlement patterns.

Cyprus, as an understudied periphery of the Assyrian Empire, is home to data that can challenge or refine the Syria-centric narrative described above. The case studies developed in this thesis inform imperial contexts with very different political and administrative conditions. An estimated four million people were forcibly resettled in the Assyrian Empire, many or most of whom were moved to the Jazira (Oded 1979). On the other hand, it is unlikely that the Assyrian state resettled large numbers of people to its Cypriot client states. There is little direct evidence to support a strong Assyrian presence on Cyprus other than in scattered cuneiform texts. Nevertheless, at the same (or approximately the same) time the Iron Age city-kingdoms of Cyprus also invested heavily in their hinterlands, during what has been described as a "territorialization process" of the Cypro-Archaic period (Fourrier 2013). Thus, similarities with respect to changes in settlement patterning between the two regions would beg the question of whether such correspondences are coincidental or result from the same socio-political practices. Similarities would challenge the Assyrian model of state authority in rural areas, or at least the

importance of resettlement within it, while differences would lend additional weight to the existing core-periphery model and would point towards distinct, regional, landscape practices.

I begin this thesis with an overview of the spatial analysis methodology utilized in order to reevaluate legacy data from the Maroni Valley in southern Cyprus, which forms the backbone of the subsequent discussion. The Maroni Valley data will then be put into dialogue with the results of two other recent surveys on Cyprus, in the foot hills and surrounding inland areas along the north edge of the Troödos Mountains, in order to establish a picture of rural settlement dynamics for the island as a whole. I next review the Iron Age settlement patterns and the causes attributed to them in the Assyrian Empire, focusing on its heartland in and around the Jazira, before comparing the Cypriot and Assyrian data. I conclude by describing the implications of this study for the archaeology of Cyprus, Syria, and the broader region. In this thesis, I argue that distinctive rural settlement patterns occurring both in the Jazira and on Cyprus are indicative of efforts to establish authority over hinterland areas and to exploit their resources by both the Assyrian state and Cypriot city-kingdoms. In doing so, the city-kingdoms transferred and re-enacted Assyrian state ideology, thus demonstrating a reproduction of models of political economy between the elites of the Assyrian core and Cypriot city-kingdoms.

Methodology

In archaeology, traditional methods of spatial analysis and the interpretation of distribution data rely on density maps and nearest neighbor analysis (e.g. Kantner 2008; Runnels *et al.* 2009; Alhasanat *et al.* 2012). While these are both extremely useful tools, neither is able to produce consistent and comparable results for analyzing complex patterns of clusters. Density maps rely on the viewer to identify and compare patterns without a consistent or quantifiable

measure. Likewise, nearest neighbor analyses are limited with regards to complex datasets due to their focus on only one neighbor for each feature (Palmisano 2013: 349). The method taken in this study, utilizing the concept of spatial autocorrelation and a statistic used to measure it, Moran's *I*, addresses these problems. Moran's *I*, and the underlying concept of spatial autocorrelation, is a powerful tool for diachronic studies since it produces quantified analyses that are directly comparable to other analyses within the same study area. This allows for changing patterns to be consistently examined in the *longue durée*.

Spatial autocorrelation is the case of "a relationship between nearby spatial units of the same variable" resulting in a correlation of that variable and distribution in space (Getis 2007: 492). Many researchers outside of archaeology, and a few within the field (e.g. Williams 1993; Premo 2004), have applied spatial autocorrelation to a wide range of topics. However, these studies did not examine artifact distribution within sites, instead seeking to test specific hypotheses about the directionality of an observed phenomenon. Moran's *I* can be used much more broadly within archaeology. The basic concept, that like objects and events tend to cluster together, underlies much of archaeological thought. In particular, the identification of sites in survey rests on the assumption that most human activity occurs in clusters, often with discrete areas functioning as the location of specialized tasks. For example, this is often seen in the identification of areas of specific industrial practices through associated materials (e.g. Knapp 2013: 302 for copper production). Following calls to expand the use of spatial autocorrelation in archaeology (Williams 1993; Premo 2004), this concept is applied below to a case study from Iron Age Cyprus, the results of which inform the published results of other surveys.

The use of GIS on Cyprus is, of course, not new. Recent work on the Iron Age has dealt with issues of change and continuity in rural landscapes through GIS and has greatly benefitted

from the tools it provides (e.g. Fourrier 2013, Janes 2013, Kearns 2015). In particular, an increasing interest in off-site dynamics like small, seasonally used agricultural structures is associated with innovative uses of GIS. However, many of these investigations have focused on sacred and ritual landscapes, viewing such landscapes as an effort to control territory, in keeping with older research and thus have not paid serious enough attention to hinterland settlement dynamics (Kearns 2015: 64). Kearns criticized this direction of scholarship, identifying it as constructing a history of political and social development to the exclusion of the interactions between communities and landscapes (Kearns 2015: 68). Kearns' approach and the issues highlighted by Reyes can be addressed with underutilized GIS applications like Moran's *I*, by investigating the spatial organization and artifact distribution patterns of a particular area diachronically, and incorporating the results into broader debates of re-emergent authority and regional connectivity.

Moran's *I* is a statistical measure of spatial autocorrelation that compares the difference in values of a particular attribute between features within a defined neighborhood to the mean of the studied attribute within the entire study area (Moran 1950; Clark 2013: 84-9). This produces a coefficient between -1 and 1, where -1 is extremely dispersed and 1 is extremely clustered, as compared to a random distribution, which would appear as 0. Though this is a measure of density, much like traditional distribution maps, the way of defining density is different. Instead of counting and averaging the number of objects in a unit of space, Moran's *I* is used to examine how close similar objects or values are to each other and assess the likelihood of that proximity resulting from random chance. Thus, the coefficient produced by Moran's *I* shows the average clustering throughout the whole dataset. However, not all points have a similar number of neighbors, resulting in points around the edge of a study area having less contextual information.

This problem can be recognized and mitigated through row standardization, which gives different weights to data points with fewer neighbors. The results of Moran's *I* analyses are comparable within a dataset, even in cases where the number of objects being compared differs wildly. Because Moran's I measures the chance that similar objects appear near each other, rather than the sheer number of objects in a space, classes of objects that differ by an order of magnitude can produce the same Moran's *I* coefficient in the same study area.

Since the initial publication of Moran's *I*, a local version of the test was developed to identify precisely what areas show evidence for clustering or dispersal as well as the location of outliers, indicating the features within both statistically significant clusters as well as outliers (Anselin 1995). Utilizing both the global and local measures allows for distribution patterns in a dataset to be identified, quantified, and compared within a study area.

With regard to archaeological studies, Moran's *I* allows for comparisons of distributions of any class of artifact or of any variable (including date) for artifacts, and multiple iterations of these analyses can identify the size of the neighborhood where spatial autocorrelation is strongest. Archaeologists working with diverse bodies of material have advocated and demonstrated the utility of Moran's *I* (e.g. Hodder & Orton 1976; Williams 1993; Premo 2004; Casto 2015). However, archaeological studies utilizing spatial autocorrelation are few and far between and thus the full potential of this concept has not been realized. In particular, the interpretation of diachronic survey findings and the identification of site clusters within survey areas can benefit from incorporating Moran's *I* due to survey archaeology's emphasis on the *longue dureé* and the need to compare multiple classes of material within the same study area.

This measure is not without faults that must be carefully considered. Moran's *I* can and should be used along with more traditional maps, as it, like many other simple measures of distance, assumes that space is homogenous. This means that maps showing soil types, natural and man-made features in the landscape, as well as other environmental concerns can be useful tools for interpreting the results of Moran's *I* analyses. This is a particular problem for analyses limited to one study area, where specific taphonomic or environmental conditions may greatly impact results. Additionally, the vague use of the term 'neighborhood' thus far may cause concern. Neighborhood has been left purposefully undefined because there are many ways of defining a neighborhood in Moran's *I* analyses. Arriving at the most useful definition of a neighborhood is best addressed through exploratory spatial data analysis, with multiple conceptualizations of how space and distance between objects or events should be treated (e.g. the relationship between objects decreases as the distance between them increases or everything within a certain distance is treated the same) and for many different distance bounds to be tested. Using all or some of these options in multiple iterations of the same analysis allows for the same data to be tested in many different ways, and helps identify the spatial relationship that best fits the data. The process of running multiple analyses allows for any patterns detected to be better understood, as seen below.

Another measure of spatial autocorrelation useful for archaeology has been proposed recently: Ripley's *k* (Ripley 1976; Palmisano 2013). However, this measure is less appropriate for survey data, where artifacts are treated as values of a grid square, than it is for data where individual points exist for each artifact or feature, such as the location of settlements in a region, as in Palmisano's study demonstrating Ripley's *k*. This difference is due to the fact that Ripley's *k* does not take differences between individual points into account, meaning that large clusters of

artifacts represented as one point are treated the same as a single artifact. Another statistical measure of clustering, Getis-Ord Gi* Hotspot Analysis, is similar to Moran's *I* in that it compares defined neighborhoods to an entire study area. However, since this measure compares variables directly rather than the differences among them, it may show a statistically significant cluster within a neighborhood when one feature within that neighborhood is exceptionally high or low. This presents a problem when trying to identify clusters that are expected to occupy a large space, such as main centers of activity, as opposed to smaller peripheral areas.

Moran's *I* can play an important role in debates on settlement hierarchy, and thus structures of authority, as it allows for changes in the use of space to be quantified and compared, adding a new stream of evidence to be used alongside more traditional approaches. The methodology of archaeological survey projects encourages using Moran's *I* rather than the other measures described above. Continuous, or at least interrelated, survey grids allow for a wide variety of neighborhood sizes and conceptualizations of space to be tested. In addition, the goal of contrasting settlement patterns across time implicit in many survey projects lends itself to the directly comparable, quantified results that Moran's *I* produces.

Beyond the various methodological issues involved with using Moran's *I* outlined above and elsewhere (e.g. Chen 2013), this study faces several problems. Survey archaeologists have increasingly scrutinized issues of quality assurance in recent years (e.g. Banning *et al.* 2006; Banning *et al.* 2016). Thus, the methodology of the primary case study on Cyprus, as well as the surveys it is being directly compared to must be carefully considered.

The Maroni Valley Archaeological Survey Project was conducted along the coast of southern Cyprus, near the village of Maroni, as well as in the lower Maroni valley. The Maroni valley is

one of many river valleys that cuts through the foothills of the Troödos mountains. Elevations reach 120 meters above sea level at the points furthest from the coast and deepest into the foothills. However, most of the survey was conducted along the relatively flat and low coast line and the parts of the valley closest to the sea. The MVASP team collected the data analyzed with Moran's *I* in this study in 50m by 50m grid squares (figure 1). Pedestrian survey of the area occurred primarily between 1990 and 1995, with an additional field season in 2004. This project, while concerned primarily with the Late Bronze Age (LBA), collected Iron Age Cypro-Archaic (CA) artifacts during intensive pedestrian survey conducted between 1990 and 1995 (Manning & Conwell 1992; Manning *et al.* 1994; Manning & Monks 1998: 301; Manning *et al.* 2014). The survey assigned dates to artifacts that are almost entirely ceramic and thus these will be the analyzed data. The 5185 survey units cover nearly 13km^2 and can be reasonably expected to capture much of the use of the landscape in various periods, useful for the diachronic investigation.

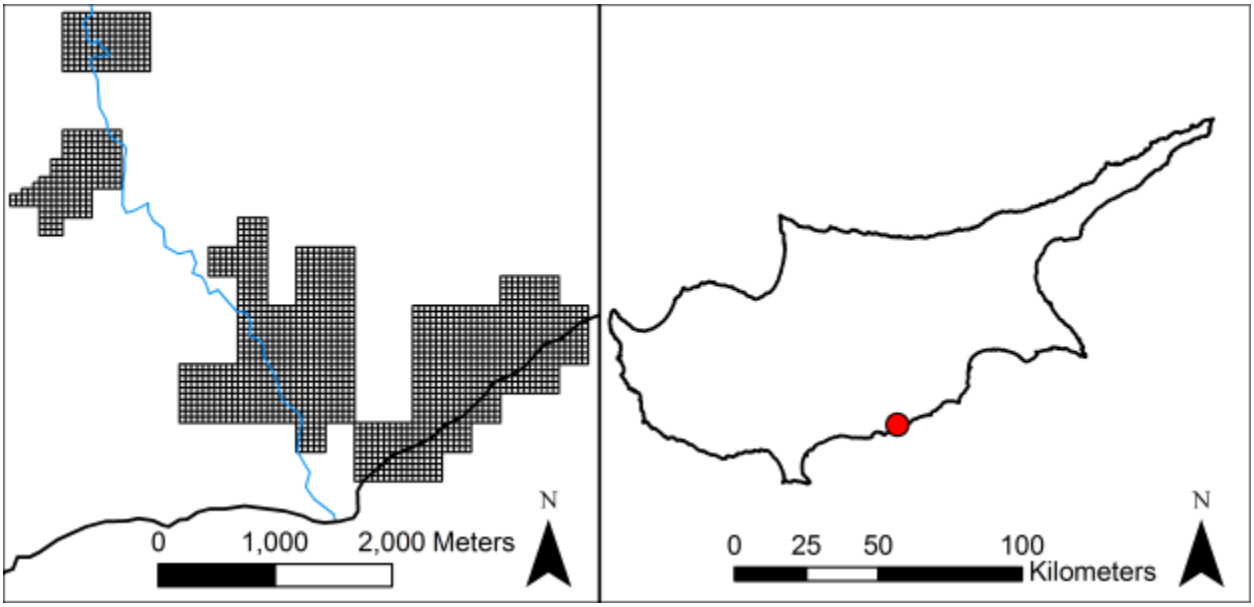

Figure 1: MVASP survey grids and location on Cyprus.

MVASP and the other surveys under consideration here are no exception to quality assurance problems. These include the spacing between transects, which was much lower in the grid squares surveyed in the 1991 year of MVASP than it was in later years, and testing of personnel effectiveness. Thus, analyses of potential problems and biases in the data will be taken in account before MVASP results are compared with those of other survey projects.

Broader theoretical concerns are also inherent in studies like this, relying heavily on GIS and spatial statistics. GIS approaches to archaeology have been frequently critiqued for simplifying landscapes and removing the human experience of a place (e.g. Tilley 1994: 23; Kvamme 1999; Rennell 2012). Although GIS databases are built routinely at the vast majority of archaeological projects, many archaeologists have questioned the utility of GIS and statistical analyses since the 1980s. Archaeological analyses based in GIS have been criticized for focusing on the physical environment to the exclusion of social factors that influence space, including the location of settlements and human behavior, thus sidling towards environmental determinism (Kvamme 1999: 181). GIS in archaeology has also been criticized for the 'objective' presentation of results as well as the imposition of a specific viewpoint in maps (Rennell 2012: 513). Landscapes are shaped and understood through social processes, and thus are both contended over and the means of contending (Smith 2003: 7-8). Landscapes are multi-layered. Physical, political, religious, and other social factors shape the landscape, to say nothing of individual experiences and memories. GIS analyses, in the view of critics, cannot represent landscape in a truly useful way because of its object-centric viewpoint, focusing on the physical and glossing-over the contentious nature of landscape.

Critiques of GIS in archaeology go too far. Of course, GIS cannot represent the world perfectly and correspond to human experience, but this does not mean that it is not useful.

Because landscape is multi-layered, GIS is not and should not be the sole source of information about a landscape. Social, experiential, and other contextual information are certainly important, and acknowledging the existence of these factors is enough to dismiss any notion of objectivity in representing landscape. Though unable to completely capture experience, GIS has also made significant contributions to the study of physical experience as well as social differentiation (e.g. Kosiba & Bauer 2013; Sullivan 2016). GIS representations and analyses of archaeological landscapes can inform us about many of the layers of a landscape, especially with regard to the physical distribution of artifacts, and thus should not be dismissed out of hand for failing to capture some aspects of landscape, human perception, and ideology.

The statistic used in this study contributes to archaeological research in a more fundamental way than the other measures described above. Context is the basis of archaeology. Thus, understanding spatial relationships of material is something every archaeologist is concerned with. Moran's *I*, though couched in the same statistics vocabulary prevalent in the New Geography and the New Archaeology, is effectively a measure of distance between points. Though more mathematically complicated than counting objects per unit of area or running a tape measure between two features, Moran's *I* is not radically different from these common archaeological activities in that these all address spatial relationships. Unlike the statistical models prevalent in the New Geography and the New Archaeology claiming to be objective and predictive, Moran's *I* is used in this thesis as a way to challenge assumed relationships and generate research questions. Moreover, statistical analyses like the ones present in this paper should not be the end goal of any research, but rather should lead us to ask *why* the results are seen and how they can inform us about the lives and choices of ancient peoples.

Results and Analysis

The results of Moran's *I* analyses for Cyprus demonstrate a previously unidentified spatial pattern for rural settlement unique (on the island) to the Cypro-Archaic period. Contrasts between the Late Bronze Age and the Cypro-Archaic make up the bulk of this discussion, although results for other periods with large datasets are also presented below. These other periods are included to provide further context for the Iron Age results by comparing sample sizes. The Late Bronze Age was chosen for this comparison both for this study's goals of examining the re-emergence of authority in Cyprus after the Late Bronze Age collapse and because it has been the primary focus of investigation at Maroni (Manning *et al.* 1994; Manning *et al.* 2014).

Period	**Moran's *I***	**z-score**	**p-value**	**Artifacts**	**Date**
Early/Middle Bronze Age	0.473942	39.745562	0.000000	388	c. 2400 – 1600 BCE
Late Bronze Age	0.652194	56.283648	0.000000	2738	c. 1600 – 1200 BCE
Cypro-Archaic	0.002765	0.255956	0.797985	1022	c. 750 – 475 BCE
Early Roman	0.446694	36.906336	0.000000	308	c. 27 BCE – 150 CE
Late Roman	0.359512	29.583383	0.000000	7690	c. 150 – 375 CE

Table 1: Spatial autocorrelation analyses by period. Inverse distance, 50m threshold.

Initial Moran's *I* analyses of the data for each of the five periods with the greatest numbers of artifacts from Maroni valley are presented above in table 1. These were generated with an inverse distance conceptualization of space (assuming the relationship between points is correlated with their proximity) and a fifty-meter distance threshold. Immediately, the Cypro-Archaic, the first period with any artifacts after the Late Bronze Age collapse, stands out. This is the only period where strong indications of clustering are not present. Instead, the spatial pattern is so widely distributed that it appears random. The p-value makes the seeming randomness of

the pattern explicit, showing that over 79 out of every 100 random distributions would result in a similarly unclustered (or a more clustered) pattern.

This result cannot be disregarded due to the sample size, as periods with both more and fewer artifacts demonstrate clustering. Furthermore, the result is not a quirk of the neighborhood considered. A comparison of results from the Late Bronze Age and Cypro-Archaic at increasing distance thresholds shows that the same patterns are seen at a variety of distances. The contrast between the Cypro-Archaic period (c. 750-475 BCE) and other periods is even starker here, as the Moran's *I* score for the Late Bronze Age decreases as the size of the neighborhood considered increases but the opposite pattern holds true for the Cypro-Archaic, though it never becomes differentiable from random distribution.

Distance Threshold	**LBA Moran's *I***	**LBA z-score**	**LBA p-value**	**CA Moran's *I***	**CA z-score**	**CA p-value**
50m	0.652194	56.283648	0.000000	0.002765	0.255956	0.797985
100m	0.586369	56.599919	0.000000	0.007179	0.713588	0.475482
150m	0.520159	56.375675	0.000000	0.008023	0.892818	0.371901
200m	0.475868	56.226780	0.000000	0.008226	0.997485	0.318529
250m	0.438736	56.575050	0.000000	0.008097	1.071885	0.283772

Table 2: Analyses for the Late Bronze Age and Cypro-Archaic at various distance thresholds.

This is not to say that the Cypro-Archaic artifact distribution is actually random, but rather than it contains so little clustering and is distributed over so wide an area that it cannot be differentiated from a random distribution. Although results around 0 are termed random in Moran's *I* analyses, a genuinely random distribution is extraordinarily unlikely in this case. More likely explanations than random distribution include issues in the identification of artifacts

and various interactions with the landscape in the Cypro-Archaic period. These will be explored below.

The distinction between the Cypro-Archaic results and the results for other periods is also seen at the local level. Local Moran's *I* analyses, depicting the indications of clustering, show broad areas of clustered artifacts for the Late Bronze Age but only two small areas of outliers (very high density units bordered by very low density units) for the Cypro-Archaic. These are presented alongside the Late Bronze Age results in figure 2. The locations of the three Cypro-Archaic sites described by MVASP, a settlement at Maroni *Vouni*, a cemetery at Maroni *Viklari*, and a third site of undetermined purpose at Maroni *Yialos* (Kearns 2015: 176-7) are also indicted on these maps. When viewed through this lens, however, it becomes difficult to securely identify the discrete location of any Cypro-Archaic settlement at Maroni despite the abundance of finds. Although siteless surveys in which the individual artifact forms the basic unit of analysis, like MVASP, have been recently criticized (e.g. Cherry 2002: 571-3), much as site-based survey had been criticized previously (e.g. Cherry 1983: 396-7), this type of survey is ideal for interrogating issues raised by low-density scatters (Caraher et al. 2006: 8). Regardless, the lack of any distinct indications of clustering, combined with the contrast between the Cypro-Archaic and other periods at Maroni, points toward either a radically different interaction with and experience of the landscape or debilitating problems in the identification of Cypro-Archaic remains – or likely some classes of such material.

One possible explanation for the difference between the Cypro-Archaic results and those of other periods are problems in artifact identification. If Cypro-Archaic artifacts are being over- or under-identified, then density distribution analyses – including Moran's *I* and more traditional means – may be unreliable for this period. Similar arguments have been made for the

identification of Late Roman artifacts in Greece (Pettegrew 2007).

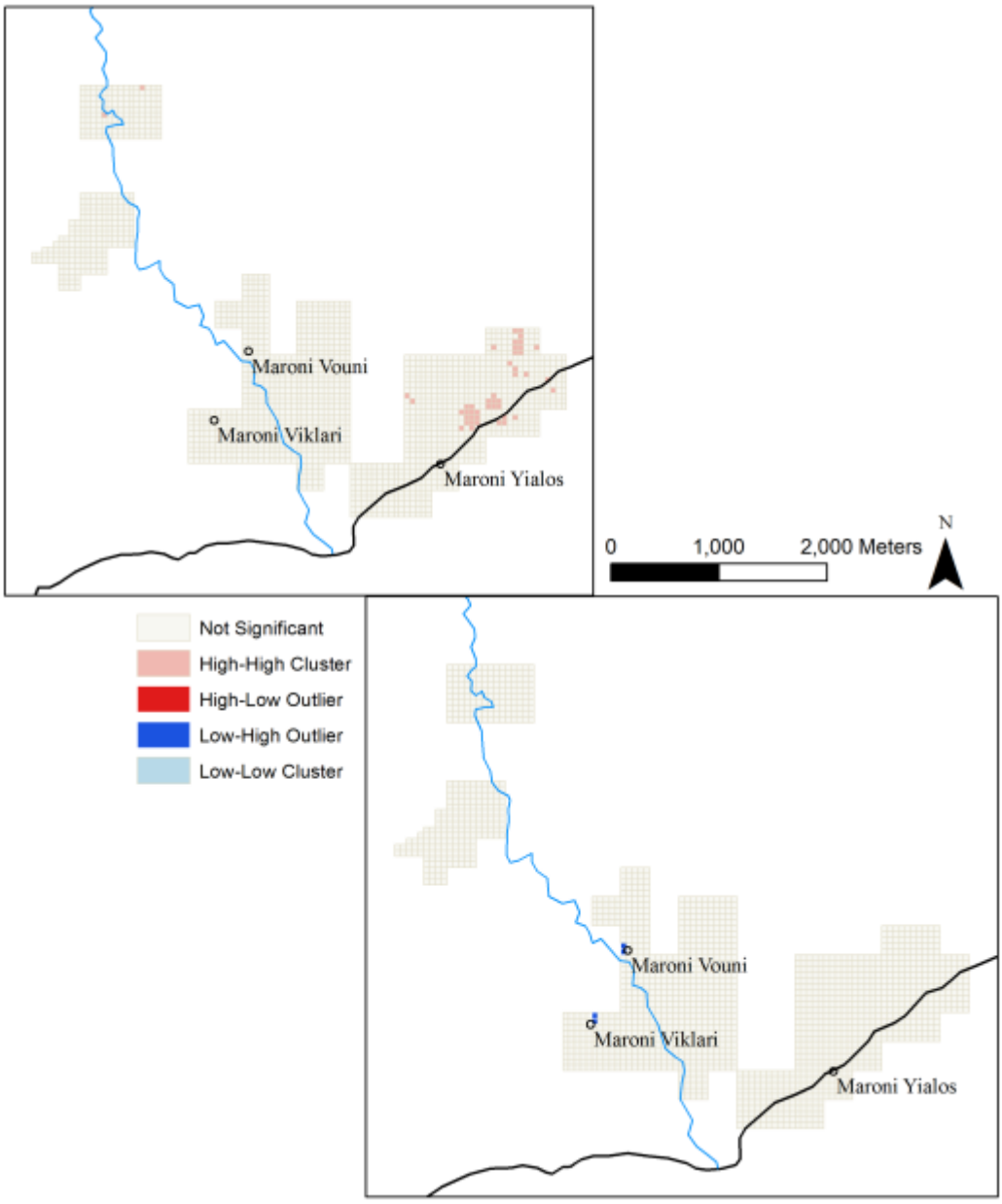

Figure 2: Map of Local Moran's *I* analyses.

This potential problem is especially relevant for the identification of Cypro-Archaic artifacts in the Maroni valley, as outlined in Catherine Kearns' work (2015: 186). Kearns notes that the identification of post-Bronze Age artifacts on Cyprus is difficult, reflecting the dominance of pre- and proto-historic research on the island. This problem is compounded by a

bias towards collecting decorated and fineware ceramics, often of types primarily known from graveyards. Finally, and perhaps most distressingly, is the lack of a locally excavated sequence of Cypro-Archaic artifacts, posing problems for both the accurate identification of artifacts as well as sub-periodization. In sum, a lack of detailed knowledge about the Cypro-Archaic phases of settlement in southern Cyprus results in a danger of conflating settlement phases, the under- or over-identification of objects, and inconsistent sampling.

There are methods of testing the likelihood of these problems affecting MVASP data. Tests can be run to determine what certain forms of pottery identification issues would look like in Moran's *I* analyses. These can then be compared to the Cypro-Archaic results in order to determine if any hypothesized issue is responsible for the observed pattern. Table 3 shows several examples of what the problems described above may look like by manipulating MVASP data. As shown in this table, the conflation of multiple phases of settlements, achieved through combining the data from multiple periods, does not produce the same scattered Moran's *I* result observed for the Cypro-Archaic. Perhaps surprisingly, the sherds of unidentified periods also display slight though statistically significant clustering in these analyses. This probably reflects the grouping of unknown vessel types and the tendency for sites – and thus most objects – to be clustered as observed in every period other than the Cypro-Archaic. Finally, testing the assumption that the Cypro-Archaic results observed are the result of under-identification, combining all unidentified sherds with all known Cypro-Archaic sherds shows a slightly more clustered, though still undifferentiable from random, pattern.

Thus, the observed result is supported by all of these tests. The Cypro-Archaic pattern is not only securely identified, but consistent across multiple distances, unique to the period, and not easily replicated through manipulating the data of other periods or solved by including

unidentified sherds. It now seems likely that the Cypro-Archaic pattern is the result of the choices of ancient peoples as well as settlement and other activities in Maroni valley rather than difficulties in data collection and interpretation. In order to better establish both the validity and significance of this analysis, the MVASP results will be compared to the findings of two more recent survey projects on Cyprus. This will also serve to determine if the Iron Age landscape practices observed at Maroni valley are seen elsewhere on the island.

Test	**Moran's *I***	**z-score**	**p-value**
Period Conflation (Early Roman and Early/Middle Bronze)	0.457954	38.031898	0.000000
Unidentified Sherds	0.094764	4.757652	0.000002
Unidentified Sherds and Cypro-Archaic	0.004450	0.618378	0.536326

Table 3: Results of Moran's *I* tests for potential issues with MVASP data.

Dispersed Settlements on Cyprus

Two of the most methodologically systematic survey projects in Cyprus have identified a dispersal of Cypro-Archaic artifacts that appears to mirror the MVASP results. Here I examine both of these survey projects to assess their methodologies, goals, and the regions studied. Next, I determine how they may inform and be informed by the MVASP results, and show what the low-density scatter of artifacts at Maroni valley implies for the re-emergence of authority on Cyprus as well as the archaeology of Iron Age Cyprus as a whole.

From 1992 to 1997 the Sydney Cyprus Survey Project (SCSP) conducted intensive survey in a 65 km^2 area of the northern foothills of the Troödos mountains. SCSP's goals were to better understand the copper-rich Troödos mountains and the resource exploitation and settlements around them (Given & Knapp 2003: 1-2). The project team paid special attention to site hierarchy in an effort to reconsider proposed models. Additionally, the natural environment

and its interactions with human behavior and society were a major area of interest (Given & Knapp 2003: 2). The region surveyed by SCSP is described as "the interface between igneous (metal-bearing) ore bodies and the sedimentary (arable) soils" (Given & Knapp 2003: 26). SCSP chose to focus on intense survey of a relatively small area. Thus, field walkers covered about 6.5km^2, typically walking 50m wide transects at 500m intervals across the entire survey area (Given & Knapp 2003: 30-1). This coverage allowed SCSP to acquire high-resolution data within the geographic area under study, providing detailed information on settlement patterns throughout an environment that is mountainous and inland, unlike the coastal river valley of the MVASP study area.

Between 2000 and 2005, an international team of archaeologists organized the Troodos Archaeological and Environmental Survey Project (TAESP) in the northern foothills of the Troödos mountains, west of the SCSP survey area. TAESP was a self-described 'siteless' survey (Given 2013: 20), and thus focused on the artifact as the unit of analysis, much like MVASP. The project was primarily concerned with settlement patterns, paying special attention to the effect of environmental factors, resource exploitation, imperialism, and interconnectivity (Given 2013: 2). The survey covered an area of 164km^2, including diverse environmental features and topographies (Given 2013: 18-9). The entire survey area was not subjected to the same level of collecting intensity in order to investigate regional, rather than local, research questions. Slightly less than 20% of the survey area was subject to intensive survey, with 3% of these intensive survey areas covered by transects in order to achieve statistically significant collections for the variety of environments in the TAESP area (Given 2013: 19). These intensive survey transects augmented extensive survey transects that provided a lower resolution picture of the wider area

not heavily covered. Each of the extensive transects were one kilometer long and made up of alternating collection units and observation walk-throughs (Given 2013: 20).

Despite the different methodologies and different areas covered by MVASP, SCSP, and TAESP, all of these surveys worked with largely consistent ceramic sequences for Cypro-Archaic artifacts. Surveys on Cyprus, including these projects, almost all follow Einar Gjerstad's 1948 typologies for post-Bronze Age artifacts, thus avoiding potential problems in translating results among projects (Kearns 2015: 186). Because of this similarity, comparisons among the three intensive pedestrian surveys under discussion should be reliable in general, if not specific, terms. Thus, the conclusions of SCSP and TAESP regarding Cypro-Archaic distributions will now be examined and put into dialogue with the MVASP results.

SCSP described the Cypro-Archaic distribution in their survey area as "low density but broad scatters of material" in what are thought to be agricultural area, and areas of settlement are also described as having very low densities (pottery index of 5000 or less) (Given & Knapp 2003: 274-5). Furthermore, SCSP identified several "density peaks" of Cypro-Archaic material throughout the survey area that were not stark enough to be noticed by surveyors in the field and only later revealed through GIS analysis (Given & Knapp 2003: 274). SCSP suggested that these perhaps represent "dispersed farmsteads" where intensive agriculture and manuring occurs, though the lack of evidence for structures complicates this suggestion.

The Iron Age, including the Cypro-Archaic, results from TAESP are similar to SCSP and MVASP in some respects. Within the Iron Age, the vast majority of finds fell into the Cypro-Archaic (Given 2013: 326). While distinct sites were noted in several areas, the lower Karkotis valley had a very dispersed distribution pattern, despite containing the largest number of Iron

Age finds (Given 2013: 63). Throughout the rest of the survey zone seven Iron Age "Places of Special Interest" were identified, yet none contained a "noticeable increase of Iron Age chronotypes identified among the pottery from the Survey Units" (Given 2013: 63). The TAESP team was less willing to speculate about settlement patterns or land use than the SCSP team, and instead focused only on sanctuaries and mortuary evidence in their analysis (Given 2013: 326-7). Only two possible settlements were identified within the very large survey area, though these were both "Places of Special Interest" that did not demonstrate an increase in artifact density.

Despite some differences in methodology, SCSP and TAESP reached similar conclusions about the distribution of Cypro-Archaic artifacts within their broad survey areas. Both projects noted a tendency for broad, low density scatters of artifacts and had great difficulty in identifying distinct settlements. Although SCSP suggested that this scatter could be the result of manuring practices, this remains only a hypothesis remains an undemonstrated hypothesis. If manuring, like the kind proposed for SCSP, was responsible for the dispersal at Maroni, then Moran's *I* analyses should have still identified dense centers of occupation within scatters. Both projects also noted the immense problems in identifying, and thus interpreting, Cypro-Archaic remains in survey. The lack of excavated sequences is perhaps the most pressing of these problems, but the reliance on finds from mortuary and sanctuary sites in identifying Cypro-Archaic artifacts makes finding rural sites especially difficult. Furthermore, most Cypro-Archaic artifacts are identified by surface treatments rather than vessel forms, making surface finds from survey potentially difficult to identify. Although these problems are significant, the results of SCSP and TAESP can be taken seriously, especially in comparison with the above analyses of Cypro-Archaic artifacts at Maroni valley.

The description and presentation of finds in the northern Troödos foothills by SCSP and TAESP match the pattern of Cypro-Archaic finds at Maroni valley. Although the SCSP and TAESP data are unavailable for Moran's *I* analysis in this paper, it seems reasonable to assume that the diffuse, scattered pattern described by the survey projects would also appear as randomly distributed, like the MVASP finds. The comparisons with TAESP and SCSP thus suggest that the results at Maroni are not due to local taphonomic conditions or the particular methodology deployed or the specific region studied. Likewise, the tests of manipulated results from MVASP imply that the observed patterns by SCSP and TAESP may be generally accurate, despite the issues in pottery identification.

Moreover, this dispersed pattern of Cypro-Archaic artifacts is present across the island and in very different ecological and environmental zones. The arable land and copper rich areas focused on by SCSP, the diverse array of environmental zones studied by TAESP, and the coastal Maroni valley all show the same pattern appearing at the same time, as far as can be determined. Thus, it appears that the landscape practices that created the diffuse pattern at Maroni valley were also at work throughout the island. Further investigation into this pattern would address critiques of the dominance of the emergent Iron Age cities in research by placing more prominence on island wide rural patterns, but it would also answer A.T. Reyes' critique, above, that the archaeology of Iron Age Cyprus has recently been too particularizing and has neglected island-wide and regional patterns.

Although the broad Cypriot context provides more evidence that the distribution pattern in the Maroni valley is a reflection of the ancient landscape rather than an accident of taphonomy, there is still no readily apparent reason for *why* this pattern appears the way it does and when it does. However, based on currently available data, the dispersed pattern is most

likely a reflection of post-Late Bronze Age collapse patterns and has parallels with Iron Age rural settlement patterns in the Assyrian heartland. This parallel will now be turned to in order to evaluate how the landscape practices observed in Cyprus fit into regional trends and what implications this has for the re-emergence of authority in rural areas after the Late Bronze Age collapse.

Forced Dispersal in the Land of Aššur?

Perhaps the best comparison for these results is in the Jazira region, where modern-day Iraq, Turkey, and Syria meet. In this area the Tell Hamoukar Survey (Ur 2010: 162), the Upper Tigris Archaeological Research Project (Parker 2003), and the North Jazira Survey (Wilkinson & Tucker 1995: 60-2) have concluded that regional settlement was widely dispersed during the period contemporary with the Cypro-Archaic, c. 750-475 BCE. Furthermore, all of these projects have identified the same sort of broad scatter of artifacts, in at least part of their survey areas, as seen in the Cypriot surveys discussed above.

Several other surveys have identified similar patterns of sprawling, low-density scatters of artifacts identified as rural settlements. These sites occur throughout the wider Jazira region at the same time as the other surveys discussed above. The Balikh valley, Tell Beydar area, Upper Lake Tabqa, Lower Khabur, Wadi Ajij, and Khabur Basin all have evidence for the same dispersed pattern observed in Cyprus (Wilkinson & Barbanes 2000). All of the archaeological surveys working in these areas and in Cyprus identified wide-spread, low-density rural settlements despite disparate methodologies, different ceramic chronologies, taphonomic conditions, and research goals.

These patterns are not universal to the Assyrian realm. Pre-existing, discrete, small settlements continued throughout this period, even in the survey areas covered above (e.g. Wilkinson & Tucker 1995: 60-1) and large, apparently dominant, discrete tells were constructed (e.g. Wilkinson 1990: 113). Wilkinson *et al*. (2005) argued that the discrete small settlements and tells represented the continuance of Late Bronze Age settlement practices and degrees of local authority (for a time) under the Assyrian Empire. Thus, the dispersed pattern of artifacts and expansive rural settlements in the Jazira represent a set of particular and local landscape practices characteristic of the Land of Aššur rather than behavior shared by all inhabitants of the region. Researchers working on the northern Mesopotamian data have advanced several proposals for what this trend represents. Such proposals can be further refined with the results from Cyprus.

Because all of the surveys in the Jazira described above have noted an increase in the number of settlements, most explanations for this pattern assume there was a large influx of people at around the time of the Late Assyrian Empire (concurrent with the Cypro-Archaic period) (e.g. Wilkinson 2000: 420; Parker 2003; Ur 2010: 162). However, the cause of this influx is not well established. The two most common hypotheses for the increase in settlement (as well as the dispersed nature of individual settlements) are that previously mobile populations became mostly sedentary due to the ideological importance placed upon settled farming by the Assyrian regime (Rosenzweig 2016), and that these newly established communities are people moved forcibly by the Assyrian state (e.g. Wilkinson & Barbanes 2000: 420; Ur 2010: 162-3).

These ideas are, of course, not mutually exclusive. Evidence exists for Assyrian attempts to forcibly settle pastoralists as well as resistance to Assyrian rule through persisting pastoral practices within forcibly settled communities (Rosenweig 2016). It is also impossible to

conclusively tell the difference between these two hypotheses with currently available survey data, as even proponents of the forced movement hypothesis stress (Wilkinson & Barbanes 2000: 420). Without conclusive material or textual evidence to identify the residents of new, dispersed communities throughout the Jazira, both possibilities must remain open. However, given the scale of the phenomenon and the evidence for resistance through continued semi-pastoral practices identified by Rosenzweig, it seems unlikely that the establishment of these communities, and thus the observed spatial pattern, was unrelated to the Assyrian administration as opposed to natural processes of population growth and economically motivated settlement.

Rural Landscape Practices and Authority

The results from Cyprus demand the most investigation, in light of the probability of state involvement in the rural Assyrian pattern. Much as the scale of the spatial arrangement in the Jazira implies state involvement, the similarities of the data on Cyprus suggests that the cause of the Jaziran and Cypriot settlement patterns are the same, or at least closely related. Likewise, the similarities in form and contemporaneity of these two phenomena strongly suggest that neither case is the result of region-specific problems like pottery chronologies and are thus more likely to be the result of shared political factors, such as increasing Assyrian involvement in rural Jazira and new Cypriot city-kingdom investment in hinterland areas. Thus, research on both the Assyrian Empire and Iron Age Cyprus will likely benefit from becoming more closely integrated.

If Assyrian administrative policies are directly responsible for the pattern on Cyprus, as has been argued for the Jazira, then political connections between the emergent Cypriot city-kingdoms and the empire must have been stronger than currently thought. The predominant

model of Cypro-Assyrian relations is one of loose direct control but close economic relationship based off of inscriptions and other historical evidence (e.g. Iacovou 2013: 30-2). Assyrian texts, such as the Esarhaddon Prism, evidence that Cyprus was a dependent of the Assyrian state, at least in name. However, there is insufficient evidence of direct control for the dictation of hinterland settlement patterns to be plausible.

A more likely explanation, consistent with current models, is that even if Assyrian policy of forced resettlement is not directly responsible for dispersed settlement organization on Cyprus, it still was a major factor due to imitation by local actors seeking to establish authority over and better exploit hinterland resources. Thus, in the process Cypriot city-kingdoms replicated Assyrian ideology relating to economic extraction. An analogy to this can be found in the Inkan movement of peoples, which was replicated on a smaller scale by local administrators (D'Altroy 2005: 262-3). If the Assyrian state is the root cause, then the indirect model is more likely given current evidence.

This explanation prompts a reevaluation of the increased rural habitation in this period throughout the empire in this period. Cyprus shows that the dichotomy between the Assyrian core and peripheries does not hold throughout the empire. The new landscape practices of the core are also shared by Cyprus, which does not reflect the continuing Bronze Age patterns associated with Assyrian peripheries. One of the most distant, and least directly controlled, peripheries conducted similar landscape practices to the heartland. Cypriot elites, unlike others in Assyrian peripheries, organized hinterland activities in the same way as the imperial core. This choice is unlikely to be the result of violent deportations, as is argued for the Jazira. More probable, Cypriot elites chose to emulate Assyrian settlement practices, with the Assyrian state acting as an ideological model for distant Cypriot elites.

Furthermore, if the Assyrian political connection is viewed as likely or even possible, then this stands to radically change work on resettlement practices through the addition of new data. Ömür Harmanşah outlined the importance of establishing communities in unpopulated regions of the empire (2013: 25-7, 79-80) and similar analyses could benefit from Cypriot comparanda, with similar landscape practices that are likely not the result of forced resettlement. Regional and local differentiations in place-making within the Assyrian realm would then become available for study. The work presented in this study may also benefit from studies on Assyrian re-establishment of communities in abandoned areas, not just unpopulated regions, as seen in Assyrian royal texts (Harmanşah 2013: 15) because Maroni was a major Late Bronze Age site that was abandoned in the Geometric period before Cypro-Archaic resettlement as a border settlement between Amathus and Kition.

Future work, especially the excavation of rural sites in Cyprus, will prompt reevaluations of the data described above. Pottery sequences for the Iron Age are in desperate need of refinement, especially at the local level. These refined sequences may be brought to bear on the dispersed settlement pattern observed in Cyprus and on the role of local actors and Assyrian hegemony in its production. Better sequences will be vital to challenging old assumptions about rural life on Cyprus as well as to providing more chronologically precise analyses than currently exist, which treat the entire Cypro-Archaic period as a single moment in time by necessity. However, it seems unlikely that refined pottery sequences will significantly change the observed distribution pattern, as the several possibilities explored above showed. A change large enough to reject the observed spatial pattern would also require throwing out the entirety of our current Iron Age sequence. Climatic factors have also been tied to the rehabitation of sites on Cyprus, including at Maroni Valley (Kearns 2015: 164-6). Thus, the effect of climate on spatial

organization of settlements in Cyprus and the Near East may also be a future topic of investigation.

On a final note, the use of Moran's *I* in this study has demonstrated its use for archaeologists on any number of topics. By examining distribution patterns and spatial relationships in a non-traditional way, the use of this measure encouraged a reevaluation of legacy data. There is no reason to suspect that such revelations will be limited to Cyprus, as in this paper. Instead, as a tool of measurement suited for interrogating complex datasets, many archaeological projects may benefit from exploring their data with this tool.

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