A LAND BETWEEN: SICILY'S PLACE ON THE EMERGENCE OF MEDIEVAL HILLTOP SETTLEMENTS

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Abstract

Within the scope of urban development in 9th-13th century Europe, Sicily stands apart. Like elsewhere in Europe, settlements gradually began to position themselves upon defensible hilltops but, while this phenomenon is seen in both Islamic and Christian Europe, Sicily is perhaps the only place where this process occurs under successive Islamic then Christian rule. Though it is understood that this transition occurs under different circumstances, with Islamic fortifications beginning as refuge sites and Christian fortifications serving as the residence for feudal lords, both can be seen in terms of what is known as *incastellamento*. As such, the phenomenon of *incastellamento* must have an underlying cause transcendent of both Islamic and Christian styles of social organisations. Using Sicily as a case study, I believe that, by examining the spatial relationships between castles and communities to their landscapes and to each other, it is possible to understand broader changes in medieval settlement patterns. Specifically, this paper focuses on the economic implications behind the positioning of both castles and their communities rooted in the Roman past, their defensive use of the landscape, and the possible use of a network strategy that went into their construction.

Keywords: Sicily, Castles, GIS, Medieval, Geospatial

Resumen

En el ámbito del desarrollo urbano de Europa entre el siglo IX y XIII, Sicilia merece un interés particular. Al igual que en todos los lugares del continente, donde los asentamientos fueron desplazándose gradualmente hacia las colinas, para una mejor defensa, en Sicilia se produjo un proceso parecido, primero en relación a los asentamientos islámicos y después, los cristianos. Aunque dicha transición sucedió en circunstancias diferentes, dado que las fortificaciones islámicas se utilizaban al principio como zonas de refugio y las fortificaciones cristianas servían como lugares de residencia para los señores feudales, en ambos casos podemos hablar de un fenómeno conocido bajo el nombre de "encastillamiento". El fenómeno de "encastillamiento" como tal debió de tener una causa externa en ambos estilos, el islámico y el cristiano, y tendría que ver con la organización social de dichas comunidades. Al tomar Sicilia como el caso de estudio y al examinar las relaciones espaciales entre los castillos y los pueblos adyacentes creemos que es posible comprender los cambios sustanciales del asentamiento medieval. El presente artículo se centra, en particular, en el impacto económico que está detrás de la transición de ambas poblaciones, construcciones y comunidades arraigadas en el pasado romano, en el aprovechamiento del paisaje para fines defensivos y en el posible uso de una estrategia de redes.

Palabras clave: Sicilia, castillos, GIS, medieval, geoespacial

INTRODUCTION

Sicily is heir to a rich medieval legacy. It is almost overwhelming to consider the sheer number of castles and cathedrals spread throughout the island. These structures attest to nearly a millennium of activity archaeologically characterised as medieval or early modern. But, what exactly does this mean? Do these medieval monuments stand as a testament to the modern world's break with antiquity? To the replacement of an empire with the feudal system? Or could they be trying to tell us something more?

This paper will look at the development of medieval and early modern urbanism in Sicily from the 9th-16th centuries through the appearance of castles on the landscape; essentially using castles as proxies for the development of urban, trade based economic centres. While in many places this would not be possible, as castles are not clearly associated with urban development throughout all of Europe, the relationship between cities and castles in Sicily has been well documented by such scholars as Bresc and Maurici (2009: 273). Given this and their association with the state by the 13th century (Bresc and Maurici 2009: 277), I argue that the appearance of these defensive, fortified hilltop settlements arising through the process of *incastellamento* (defined below) may signify a reinvestment in urban development as well as the construction of a network strategy allowing for the growth of trade and a wealth based system of political economy for the island.

Through an analysis of the characteristics surrounding early castles using both GIS and satellite imagery, I hope to shed more light on this development for a better understanding of early urbanism in Sicily. Specifically, this paper will begin by looking at the relationship between classical and medieval landscapes, continue with an analysis of the relationship between castles and their corresponding communities, move on to an analysis of the characteristics of the landscape around these settlements weighing both their defensive and economic features, and conclude with an analysis of the importance of proximity to one another.

BACKGROUND: OUT OF THE ROMAN WORLD

Standing on a high peak and looking out over the Sicilian landscape, it quickly becomes apparent that a majority of the island's settlements are located on hilltops with what is usually a rather imposing castle situated at the apex and the settlement spreading out around it. There are many permutations to this pattern but the general picture that this description evokes is accurate enough to convey the idea that the modern Sicilian landscape arose from the medieval one. As such, any study of the early medieval landscape is, in essence, a study of the origins of the modern one.

However, while the medieval aspects of the modern Sicilian landscape loom large, they obscure the Roman aspects that many of these settlements were built upon. In a semi-random sample of 81 Roman sites (Figure 1), derived largely from Wilson's (1990: 10, 36, 144, 335) maps of major centres, nucleated settlements, and trade routes in Sicily, over half (58%) show habitation during the Middle Ages. This phenomenon has already been discussed by Bintliff (2014: 203-204) who has looked at why certain areas are repeatedly chosen for habitation. Here, I would suggest that one possible reason for such rehabitation is that, in choosing a location that had once been linked by networks of roads and infrastructure, these medieval settlements would have stood to benefit from the same economic activities as their Roman counterparts.

This cuts to the heart of one of the great debates in both archaeology and historical studies: whether the end of the Roman Empire really was the collapse of civilisation, as illustrated by historian Bryan Ward-Perkins in his book *The Fall of Rome and the End of Civilization* (2005), or whether it represents a transformation as illustrated by Chris Wickham in his book *The Inheritance of Rome* (2009). Through this analysis, I argue that the appearance of medieval settlements, as denoted by the
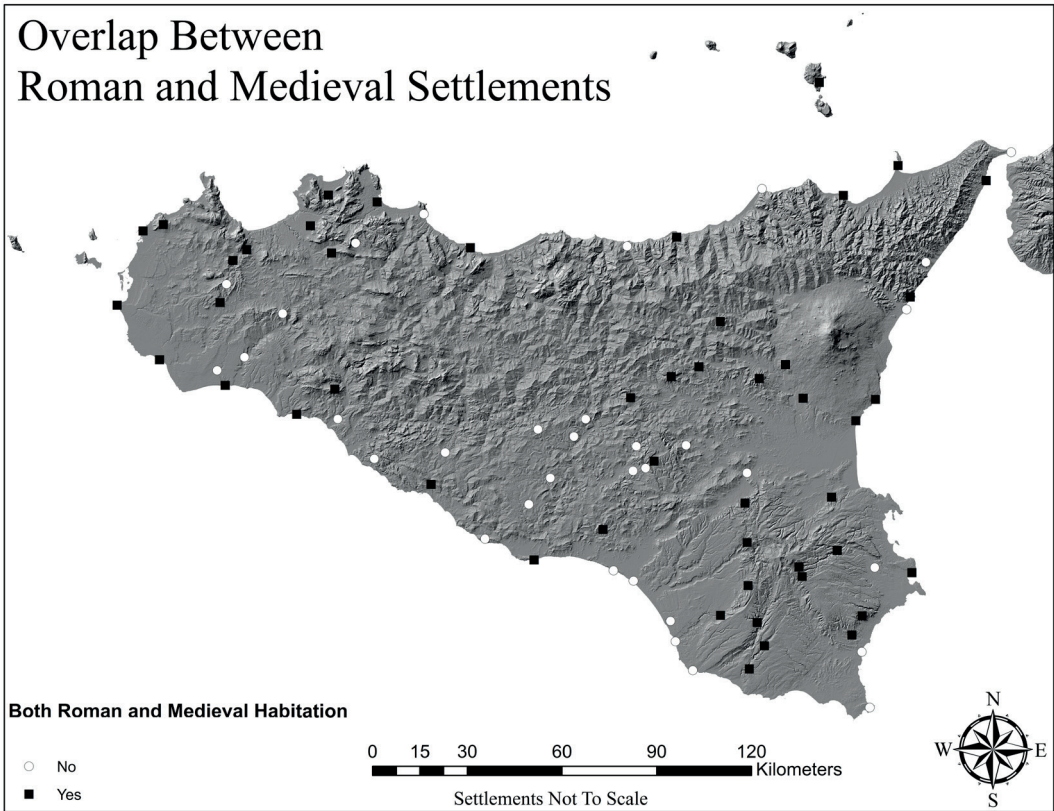
Figure 1. Map of Overlap between Roman and Medieval sites.
Random Sample of 81 Roman sites showing that a majority of them, 58%, continued to be used or were reoccupied in medieval times. On Average, settlements within the sample have at least one other settlement within 15 km (or a day's walk) from them. This sample is by no means representative of the total population of Roman settlements. (Map derived from ASTER GDEMs- a product of Meti and NASA- and created by author).

construction of castles on former Roman sites, shows more of a continued occupation, repopulation, and transformation happening in Sicily rather than a rebuilding of civilisation. Regardlessly, this transformation is typically shrouded by the often compartmentalist nature of both archaeology and history which separates the medieval from the classical. This has been changing in recent years as exemplified by Roger Wilson's 1985 work comparing the locations of settlements between the Roman, Byzantine, and Arab periods but, despite these exceptions, much of the work that exists today still fits into a compartmentalist framework. As such, it is difficult to determine the exact nature of what happened between the supposed fall of Rome and the dawn of the Middle Ages. What is known about Sicily is that the island was likely massively depopulated at the end of antiquity with its inhabitants fleeing low-lying areas and large population centres to take refuge in more defensible places like caves and abandoned hilltop ruins from the Greek era (Maurici 1992: 15).

This is not necessarily what is reflected in the construction of the island's earliest castles though. In many cases it seems that, while being located in an easily defensible position was important, it was

equally important to secure overland trade routes. Few hilltop settlements in Sicily are located in places that would have provided optimal defence in the event of attack at the expense of easy access to land and trade routes. Nonetheless, the idea of a complete abandonment of Roman sites for defensive ones persists because of the existence of such spectacular examples as Cefalu, where the seaside Roman era port town was relocated to the top of a coastal mountain, and Entella, where the former Greek hilltop town was reoccupied during the Islamic era (Ardizzone 2007: 87, 101).

These examples seem to obscure other hilltop sites with substantial Roman components and the knowledge that several major urban centres, such as Palermo, Catania, and Messina, were likely never totally abandoned. Indeed, the very notion of *incastellamento*, the construction of fortified hilltop settlements, often seen as the hallmark of medieval settlement, is somewhat problematic in Sicily since many early Sicilian fortifications, such as those at Caltabellotta and Centuripe, are located at sites with Roman components and many of these towns were known to have been inhabited long before (Freeman 2012 [1892]: 20). Likewise, other hilltop fortified settlements, such as Mussomeli, and Castroreale seem to have been built much later in time due, not to the chaos of the early Middle Ages, but to conflicts and rivalries between feudal lords during later periods. Still, the continued use and expansion of fortified hilltop settlements is indeed a major factor in medieval Sicilian urban development and deserves to be discussed in greater detail.

INCASTELLAMENTO: THE CONSTRUCTION OF A FORTIFIED HILLTOP

The phenomenon of *incastellamento* is a process aptly named but not fully understood. Here, I loosely refer to it as the construction of fortified hilltop settlements but, in terms of a more formal definition, it can be seen as the "reorganization of European settlement in the ninth to eleventh centuries around hilltop fortifications, or castles, which imposed feudal dominance on dependent villages within their jurisdiction" (Boone 2009: 19; Toubert 1973; 1990). Note that this definition disassociates itself from urban development making it more appropriate for use in terms of the widespread development of castle building throughout Europe as opposed to the more specific urban development I am describing here.

The key component to the development of *incastellamento* in both rural and urban settings is that the system relies on some sort of relationship between the castle and community. The problem with understanding this relationship is that similar spatial relationships appear under vastly different social contexts. In Sicily, *incastellamento* begins under imperial Byzantine power at the latest and continues under Arab domination before finally existing within the feudal environment that *incastellamento* is typically associated with under the Normans, Swabians, and those ruling powers that followed. Thus, as both Boone (2009: 95-102) and Wickham (2005: 131-132, 153-154; 1985) have pointed out the differences in political organisation between Arab Muslims and European Christians, the process of *incastellamento* must have a driving factor separate from the political underpinnings in which these hilltop fortifications were constructed.

While it was once thought that the encastellation of European hilltops was strictly due to the tumultuous nature of the Middle Ages between the 9th and 13th Centuries, I argue that the spatial organisation of early hilltop settlements in Sicily shows that equally important to their defence was the need to rekindle economic growth. Indeed, the locational continuity between these castles and former Roman sites as well as their existence on both modern and Roman trade routes and the persistent production of coinage when it seems to almost disappear in the rest of Europe (see Metcalfe 2009: 13, 162-164, 145-146; Grierson and Travaini 1998; Rovelli 2009 for more on coinage) strongly suggests that the development of *incastellamento* had some sort of economic incentive behind it. Thus, it is likely that these elements reflect a wealth-based political economy with trade as a central factor as

opposed to the staple based political economies typically associated with feudal domination (see D'Altroy and Earle 1985 for more on wealth and staple political economies).

Indeed, as the physical centre for trade in the Mediterranean, it is probable that Sicily and parts of Italy retained much of the wealth-based economic system they enjoyed under the Roman Empire and fortifications arose as a means of protecting that investment. Yet, that does not mean that Sicily did not invest in agricultural based activities as well. Indeed, before the modern era a majority of people were either agriculturalists or pastoralists (Bintliff 2014: 204). Most seem to have lived in rural villages but, as Bintliff (2014: 208) and Blok (1969) have pointed out, Sicily seems to have been characterised by what are referred to as „agro-towns" where major landowners relied on a labour force that existed in nucleated settlements. As Sicily, along with Egypt, was considered one of the major breadbaskets for the Roman Empire (Wickham 2005: 76; 2009: 34), it would not be a stretch to suggest that much of Sicily's medieval wealth may have been derived from agricultural riches, which does seem to be the case in both Arab and Norman times (Metcalfe 2009: 66, 162).

The idea that economics plays a vital role in the development of *incastellamento* is nothing new, however. A similar economic proposal suggesting that castles in central Italy were ideally located for control over drove-roads has been proposed by Neil Christie (2008). In terms of Sicily however, this argument can be taken further to suggest that castles were constructed in an attempt to regrow the Sicilian economy by the various powers that held control over the island. From this point of view, castles located in positions once occupied by the Romans were ideal for control over goods, and communities grew up around them as a byproduct of the economic wealth that these structures accumulated.

METHODS

As a sizeable island, Sicily allows for the analysis of *incastellamento* in a self-contained and manageable area. This project utilises both satellite imagery as well as GIS to analyse the spatial characteristics of an unbiased representative sample of 326 castles and 493 total defensive structures and palaces in use between the 9th and 16th Centuries AD. As proxies for the development of medieval settlements across the island, it was hoped that the data gathered from these defensive structures could provide a quantitative way to understand what environmental characteristics were likely to have been considered in the selection process for medieval fortifications and their corresponding settlements. However, though this study is quantitative in nature, many of its findings are based on interpretation of data and thus, the results are in many ways more qualitative.

To begin with, even the most basic attributes of the castle and its environment are open to interpretation starting with where to find information. For this project, data was taken from a number of sources — both academic and internet-based — to construct a database of Sicilian castles large enough to be representative of the entire population (see bibliography). From there, dates were assigned to the foundation and abandonment of each castle. Yet, dates for medieval castles in Sicily can be extremely variable from source to source and the dates given in most of these sources tend to be that of each castle's most recent incarnation when, in reality, these castle can be much older. Take, for instance, the example of the Salemi castle. Here, a typical reference to the castle states that a fortification was mentioned by Idrisi in the 12th century but that the structure existing today is likely to date to the 13th century. While this reference is not wrong, it obscures the likelihood that some sort of fortification existed on that spot before the construction of the castle seen there today, as Salemi is, after all, derived from the Arabic *al-Sanam* which suggests an Arab presence before the Norman conquest (Cognata 1960: 10; Idrisi and Nef 1999: 324).

With this in mind, many of the dates used in this study are on the early end of the dates accounted for in the bibliography and a great deal of the fortifications and their corresponding communities

could most probably date to even earlier. Nonetheless, once the database was constructed, geographic coordinates were obtained using Google Earth to locate the fortifications that are still visible. Only 234 of the 326 castles used in this study could be pinpointed exactly and were categorised according to their relationship to the modern community, the dominant features on the landscape, and whether or not they were located on modern roads. Though these features may have varied between the initial construction of the castle and the modern era, in many cases these changes were probably minimal as a medieval layout for towns, standing in contrast to the grid layout of modern towns, can be seen surrounding a majority of castles and many of the modern roads connecting these towns are located on mountain passes that have not changed. In the event classificatory mistakes were made, the sample size is likely robust enough to correct for these.

This analysis was followed up by several more quantifiable analyses using GIS. Multiple ASTER GDEM (a product of METI and NASA) 1 arc second digital elevation models of Sicily were acquired from the USGS *Earth Explorer* website. These were mosaicked together and the exact locations of the 234 castles still visible were pinpointed to determine each castle's prominence on the landscape and the slope surrounding them. Afterwards, the approximate locations of the remaining 92 castles were added to the sample for an analysis of each castle's proximity to one another over time within a buffer of 15 kilometres (the average distance a person could walk in a day according to Glick (1995: 22)), and 30 kilometres (the average distance one could travel on horseback in a day). The idea behind this is that if the relationship of each castle to one another was important (i.e. via a network strategy), then in any given century each castle should have a number of castles within easy travel distance to call on for trade and/or assistance and that changes in the average over time would likely indicate changes in networking strategies.

By the end of the 17th century however, the habitation and abandonment patterns of castles likely no longer correlates with the habitation and abandonment of their corresponding communities. This is likely due to a shift in trade and defensive strategies centred more on maritime activities with a series of watchtowers built to guard the island as a whole (Mazzarella and Zanca 1985). To account for this shift, the proximity analysis was run a second time taking into account the development of watchtowers and the use of palaces beginning in the 16th century to show the continued habitation of inland sites bringing the total sample size for this final test up to 493. Data was not run after the 16th century due to the inability to correlate towers and palaces with communities after that point.

THE COMMUNITY, THE CASTLE, AND THE RELATIONSHIP BETWEEN THE TWO

Since the appearance of castles in Sicily has largely been seen as an urban phenomenon (Bresc and Maurici 2009: 273), it stands to reason that they can be used as an indicator of urban development and repopulation as well. Thus, an understanding of the relationship between the castle and the community is necessary for a consideration of medieval settlement and the development of urbanisation in Sicily. This relationship is more complicated than it may seem at face value, however, as urbanism within Sicily seems to have begun during antiquity. Yet, if what we know about the Arab conquest of Sicily is correct and their invading armies were, in fact, entering a massively depopulated landscape as discussed in Maurici (1992: 15), then it is possible to use the fortifications of this time period as a means of understanding the redevelopment of urbanisation that occurred in the Middle Ages.

While in most cases the locations for these castles were chosen in places that had once been home to Roman settlements, their revival can be seen as both economical, allowing the newly established Muslim population to rebuild using Roman materials, and opportunistic, allowing for the reestablishment of Roman infrastructure. To make certain assumptions about the characteristics in

urban development and *incastellamento* in Sicily, this study rests on the assumption that the modern landscape is, in actuality, a built up reflection of the medieval one (which, given the number of medieval cathedrals and castles located in urban environments dating to this period combined with the number of towns that do not fall into the grid layout of modern cities, this should not be much of a stretch). Relating castles to communities then reflects the relationship that would have existed in the medieval era and is thus necessary for establishing the validity of the following tests.

For this analysis, each castle was placed within a classificatory scheme where known castles with clear relationships to medieval communities were put into the categories of Rural (not associated with any large urban developments), Adjacent/Outside (castles associated with a community but not exactly located within them), Edge (located within the community but on the edge of urban development) and Centre (castles located within the centre of urban development); the results of which can be seen in Figure 2. Of the total population, castles built at the edge of urban development far outnumbered those of any other category beginning in the 12th century. This could have been for a number of reasons including the castle's ability to overlook both agricultural fields and trade routes, much like Flannery and Marcus (2005: 7) have suggested for the Tierras Largas phase settlements in the Valley of Oaxaca.

Prior to the 12th century however, it seems that castles are more often built just outside of towns in positions of power above them, possibly fitting with the castle/village structure (also refered to

Community Relationship to the Castle
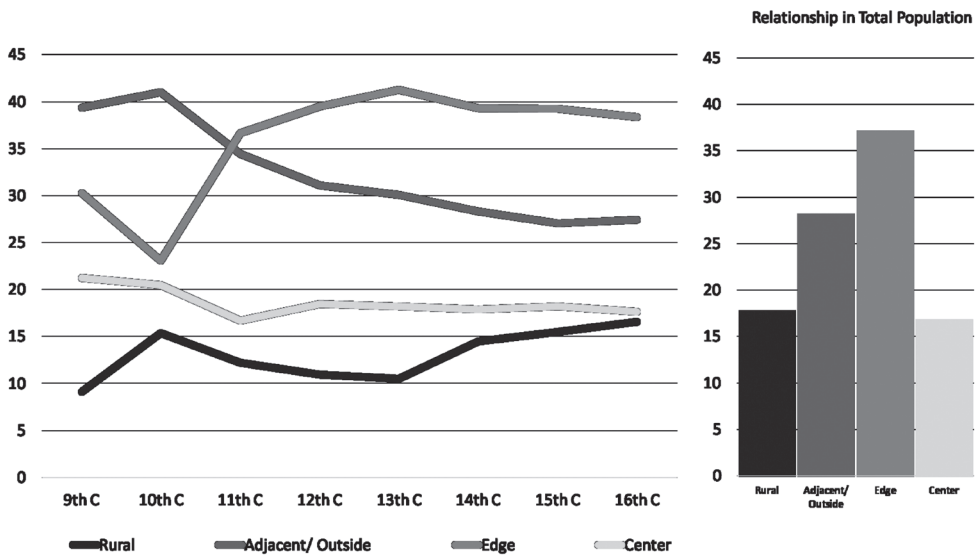
Figure 2. Castle Relationship to the Community.
The relationship of castles inhabited in a century to communities normalized by percent. Rural castles are castles located in the country side not associated with a town whereas castles that are adjacent/ outside are those associated with a town but not located within the community proper. Castles designated as edge or centre refer to castles that are located on the edge of a town and the centre of a town respectively. Here, a trend can be seen with a growing number of castles being located within and at the edge of communities starting around the 12th century. This is in contrast to the 9th, 10th, and 11th centuries where castles located just adjacent to towns but on elevations higher then them are the dominant trend.

as *hisn/qarya* by Glick (1995: 20-21) and Boone and Benco (1999: 56, 61-63) and *casale/rahl* by Rotolo and Civantos (2013: 242)) common in Spain and noted by Rotolo and Civantos (2013: 242) as existing in pre-Norman Baida whereby a rural, open air village existed with a nearby hilltop fortress for protection. Often, this relationship is considered to be an expression of tribal organisation as opposed to the feudal domination that *incastellamento* implies (Boone and Benco 1999: 61-63). Thus, the difference in dominant trends between castles built before and after the Norman Conquest seems to confirm that there is a marked distinction in the how the castle and the community were linked in Islamic and Norman times.

This split is something that I believe is fairly unique to Sicily, since in many other parts of Europe castles are not built within the town and therefore this pattern cannot be seen as falling nicely along Christian/Muslim lines of political organisation. Likewise, the spatial descriptor used in which the Islamic castle/village system would fall does not nicely correspond to what is being seen in *al-Andalus* either. For instance, take the city of Cefalu. Here the classification for the medieval city (different from the modern layout) is that of a castle above and adjacent to the village. This fits a spatial descriptor similar to the spatial patterns of the castle/village system seen in Spain and yet, the village itself was not an open air, rural settlement. Indeed, the medieval village was a fortified hilltop settlement existing on a plateau above the city's Roman port but under the castle. The town had a walled defence dating to what is most likely the Byzantine period before the Muslims (Ardizzone 2007: 87-91) and thus, the Byzantine system of defence falls into a spatial descriptor similar to the Islamic one. On the other hand Baida, which was probably constructed by Muslims (although the possibility for a Byzantine Phase exists), does more closely resemble the system seen in Islamic Spain (Rotolo and Civantos 2013: 237-238). Thus, there is a great deal of variability within each of the categories used in this classification and so, while the trend exists, the exact meaning of this change in spatial relationship is allusive.

TRADE AND URBAN DEVELOPMENT

As has been argued thus far, trade is likely a major factor in the development of *incastellamento* within medieval Sicily. As such, the next phase of this study was to determine the defining feature of the landscape around these castles and their communities. For this, each castle was categorised according to a ranked classification system of Prominent Defensive Point (designated by prominence over the landscape and distance from other resources), Prominent Trade Route (designated by the presence of a mountain pass or major road), Seaside, and Other. The results for this can be seen in Figure 3 but nearly 38% of the total population was located in a location where the prominent feature happened to be the presence of a trade route and, much like in the previous analysis, there seems to be a break between the Islamic and Norman periods as this trend seems to emerge in the initial phases of the Norman Conquest during the 11th century.

Assuming classificatory bias was at a minimum and that sample size was robust enough to correct for changes between the modern and medieval environment, this distinction further supports the suggestion that there is some sort of difference between *incastellamento* under feudal and non-feudal societies. Yet, this analysis was not without a certain amount of interpretation as one needs to question whether modern roads used at an indicator of trade routes were built to connect modern urban centres or whether medieval centres were, indeed, built on the trade routes of the Roman period. I would argue the latter as many of these routes travel along mountain passes which connect towns and would not appreciably have moved in the past thousand years. Additionally, since many of the medieval sites exist on former Roman ones, it is likely that old Roman roads already existed and that the people of the medieval period and later exploited them and paved over them in modernity.

Characteristic Surroundings
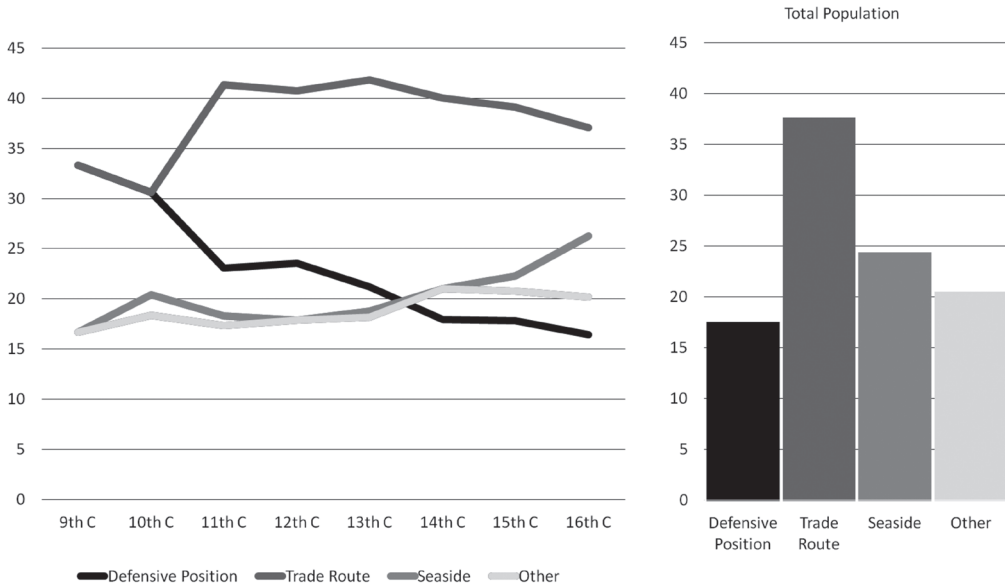
Figure 3. Characteristic Surroundings of a Community.
Graph showing the characteristic surroundings of a castle and its community over time normalised by percent. A clear shift can be seen in the 10th century where more castles are being built along trade routes with fewer being built in positions that would hold only a defensive value. Another shift can be seen beginning in the 15th century where more castles are being built on the seaside, suggesting an increased importance in maritime activities.

Nonetheless, the difference here proves interesting as trade is known to have played a big role in Islamic settlement and the construction of caravanserais along trade routes is thought to have been a hallmark of Islamic civilisation (Milwright 2010: 159-173; Insoll 1999: 114-116, 151-162; Michell 1996: 80-111). Yet, the data presented here does not seem to indicate trade during the Islamic period as being as important as it is under feudal domain. Therefore, one has to question why, and the answer to this may lie in the differences between castles in Islamic and feudal political organisations. Within feudal France, Sidney Painter (1956: 244) has discussed that castellans, or people charged with watching over castles, were allowed to extract tolls from major roadways that passed by and this could have something to do with why later castles are more closely association with trade routes in Sicily. In Islamic systems of political organisation, as has already been demonstrated above, castles built prior to the Norman Conquest do not seem to as strongly correspond to communities and thus, the data here may not accurately reflect the communities associations with trade routes during the Islamic period.

In any event, the positioning of communities throughout Sicily seems optimal for the control of movement around the island by the 11th century. This bolstering of defences along trade routes and the rise of communities associated with them strengthens the argument that the development of hilltop fortifications in Sicily was motivated by the reemergence of trade and leaves one to wonder how much the natural defensibility of the landscape actually played into the development of fortified hilltop settlements.

THE MYTH OF CONFLICT CREATING THE MEDIEVAL LANDSCAPE: DEFENSIBILITY, PROMINENCE, AND SLOPE

Defensibility has long been thought to be the defining characteristic of the hilltop fortification. Yet, as a feature, it is difficult to define and quantify (Borgstede and Mathieu 2007: 196). Essentially, "it is the degree to which a place is capable of protecting itself or withstanding an attack" (Borgstede and Mathieu 2007: 195). Here, the problem is not in the definition, but how to characterise it quantitatively. In this analysis, the defensibility of a castle's natural landscape is quantified in two ways; firstly, by looking at the amount of prominence a castle has over its surrounding landscape (a feature that may also display power) and secondly, by its use of surrounding slope.

Beginning with the question of prominence, one needs to consider how high a castle is over its surroundings. Naturally, the further above everything a castle and its corresponding community are, and the further an invading army has to march uphill to attack, the safer the people inside the city walls and/or castle are. In this analysis, prominence was determined by taking five elevations from the low-lying area surrounding a castle, averaging them, and then subtracting that average from the elevation of the castle. While this may seem fairly straight forward, in reality it is not. Prominence can be subjective and within this analysis a judgment had to be made as to what constituted a castles surroundings. Take, for instance, a castle located on a hillside. In this case, the castle's surroundings incorporate an area both above and below it making the prominence for that castle difficult to calculate and therefore, only the level a castle rises above the low-lying area was recorded in this analysis.

Using a sample of 224 castles, the prominence for each was placed into a category reflective of its position over the landscape. As can be seen in Figure 4, universally from the 9th to the 16th centuries locations were selected with rather low prominence. For the entire population, 40% of castles have a prominence of less than 80 meters above their surroundings and, even though 80 meters may seem like a lot, one has to take into account that that these are defining hilltop settlements in mountainous terrain (i.e. there were more prominent locations available in many cases). Furthermore, the data recorded here for the overall population fits nicely into a linear trend towards lower prominence (Cochran's Test of Linear Trend χ^2=115.716; p=<.001). Of course, there are fluctuations through time but at no point do the results fit nicely into a bell shaped curve even if the categories are reorganised and the <80 meter category is broken down.

This could be for a couple reasons; the most likely of which is that this trend towards lower prominence might be reflective of the hardship in bringing resources up to great elevations for the construction and maintenance of communities. Yet, there are clearly communities, such as Erice and Caltabellotta, located in places of great prominence over the surrounding landscape (> 559 meters) showing that it is possible. Equally interesting is that when prominence is averaged between all inhabited castles in a century, the average for the 9th-14th centuries clearly falls into the 240-319 meter category and thereafter in the 80-159 meter category; decreasing by several meters per century between the 9th and 18th centuries (Figure 4). This seems to indicate that prominence does have some sort of effect on the location of a castle at the onset of the Middle Ages and loses its importance over time as maritime activities are believed to have increased due to the construction of coastal towers. Nonetheless, the results of this analysis show that great prominence, strictly by the numbers, is not a contributing factor in the positioning of a majority of castles. Provided that fortifications are designed to use their natural defences to their advantage, there must be another driving factor. Here, I believe the slope of the surrounding area may be that defining factor.

Using the Slope Analysis feature of ArcMap, the mosaicked DEM described above was converted into a map showing the gradient of slope for the terrain across the island. Slope was then categorised as under 8.01° being No Slope, 8.01-16° being Low Slope, 16.01-24° being Medium Slope, 24.01-32°

Castle Prominence
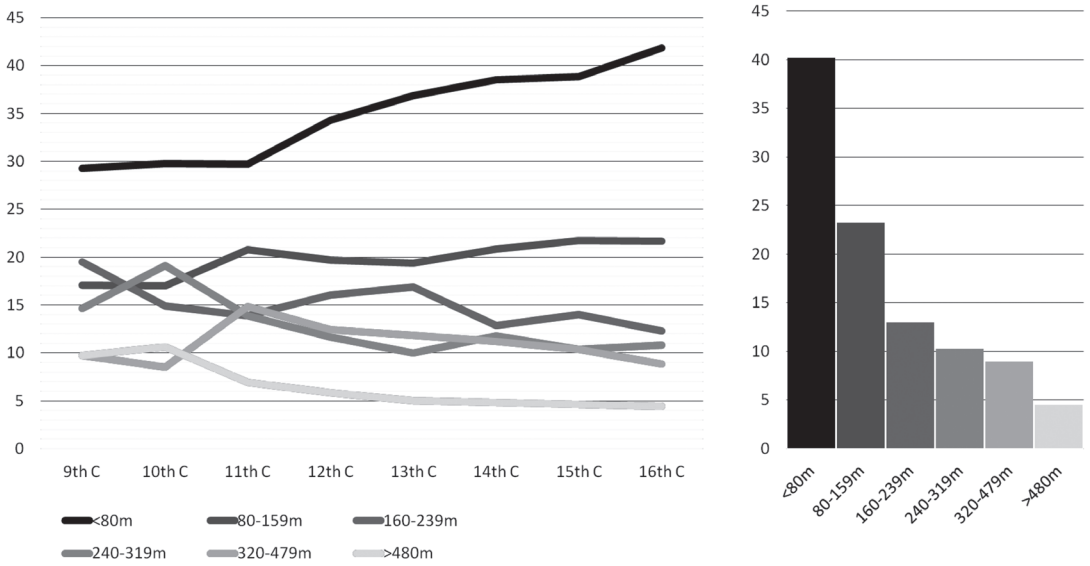
Figure 4. Castle Prominence.
Breakdown of castle prominence over time normalised as percentages. Note, these numbers reflect castles inhabited during a century and not newly constructed ones. Each castle was assigned a category for which their prominence fell in showing a trend towards castles with a lower prominence. A Cochran's Test of Linear Trend on the total population shows a trend of 115.716 with a p value less than .001 and a departure value of 324.284 (df= 4).

being High Slope, and anything over 32.01° being Severe Slope. In terms of defence, a castle sitting on a slope with a gradient more than 24° would be reasonably defendable as such a slope would be too difficult to easily march an army up, giving it an advantage even without great prominence over the surrounding landscape.

Like prominence, however, the measurement of slope also came with some amount of subjectivity. As the correlation between each castle, the gradient of slope around them, and the number of sides where this slope is present is a bit too abstract for a computer to handle, each castle had to be individually analysed by myself and categorised. Again, the average slope of the four sides of the castle were used to define the surrounding slope. As expected, castles typically have a relatively high average slope through the 9th-16th centuries. However, the percentage of castles with the steepest slope declines over time whereas the percentage of castles existing on relatively level ground rises over time (Figure 5). If one looks at slope differently, however, characterising castles by their steepest slope and assumes that artificial defences could be constructed to protect all other sides, then the relationship between a castle and its surrounding slope is even stronger with a linear trend towards castles being built in locations characterised by a slope of greater than 32° (Figure 6). Clearly, while prominence appears to have little bearing over where a castle and its corresponding community is located, slope in the immediate vicinity plays a huge role.

Average Slope Around a Castle
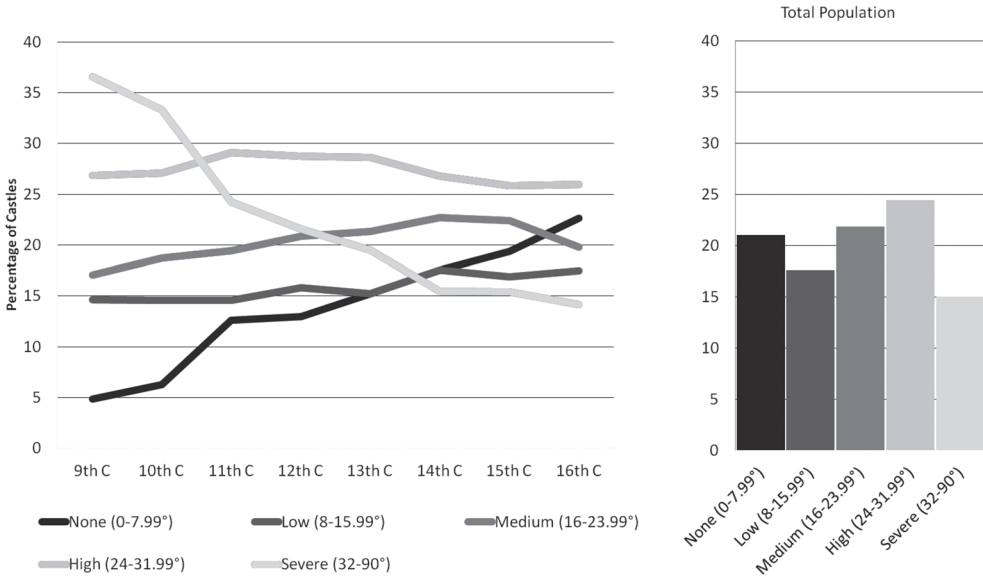
Figure 5. Average Slope Around a Castle.
Bar graph showing the breakdown of average slope for inhabited castles by century and normalised by percent. A trend is seen for a decline in the average slope being severe with an increase of castles being built with no slope around them. Nonetheless, the percentage of castles with a high slope remains consistently high.
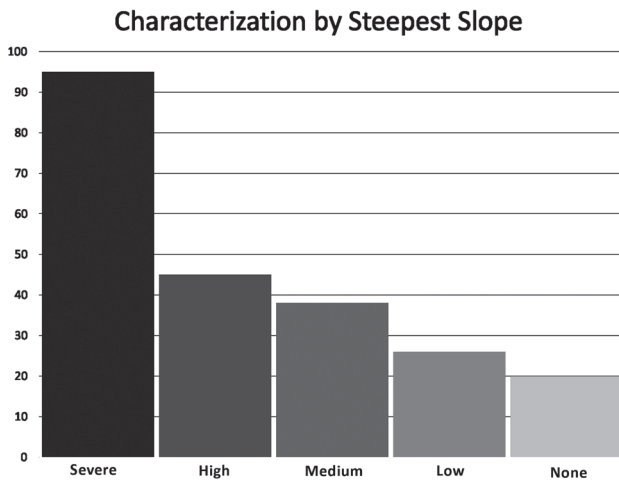
Figure 6. Characterisation of Steepest Slope.
Total population of castles characterised by their steepest slope (not normalised by percent or characterised over time).

PROXIMITY ANALYSIS

Important in terms of both trade and defence, the spatial relationship between medieval urban centres likely plays as crucial a role in their location as slope. It has already been shown that the medieval communities of Sicily are typically located in strategic locations for of inter-island trade. Therefore, it stands to reason that communities should also be located at optimal distances between one another to facilitate this (i.e. no more than a day's walk/ride apart). To examine this, a total sample of 326 castles whose exact and approximate locations were known was analysed to determine the average number of communities, as defined by their castles, within a 15 km and 30 km buffer of each other between the 9th and 16th Centuries.

The results of this analysis can be seen in Table 1. In general there appears to be a steady rise in the number of castles within each buffer until at least the 15th century, with a sharp rise in the number of castles located within 15 km of each other between the 10th and 11th centuries. This suggests more opportunities for trade within a day's walk of each castle, beginning in the Norman Period and greatly accelerating into the 14th century before numbers level out (Figure 7). I suggest that this proximity of castles to one another along major trade routes can be seen as forming a sort of network strategy for communication, trade, and defence. This notion has been suggested for the state owned castles dating from the 13th-15th centuries by Henri Bresc and Ferdianando Maurici (2009), but the spatial data used here suggests that the idea of some sort of network strategy extends much further back than that based on the trends seen in the positioning of earlier castles.

Indeed, it seems likely that some form of network strategy between these castles arose at the onset of the Norman era based on the sudden increase in castles in the 11th century and was only strengthened by the addition of many more state owned castles during the 13th century. The only difference would be that the network between castles in the 13th century would have been state owned while earlier castles

Table 1. Proximity of Castles to Each Other Over Time
Caption: Each castle was surrounded by a 15km and 30km buffer in ArcMap in order to analyse the number of castles within a day's walk and a day's ride of each castle. A one-way ANOVA was run on both data sets with results of the 15K analysis showing an f value of 55.51 with an f-crit of 2.02 and a p value of 9.19E-71. The results of the 30K analysis show an f value of 124.1718 , an f-crit of 2.015698 and a p value of 6.54E-144. The alpha for both analyses was .05.

15 K Proximity Castles Only

Groups	Count	Average	Variance	Mode
9th C	51	0.98	1.26	0
10th C	60	1.23	1.27	1
11th C	135	3.23	4.76	4
12th C	190	4.91	6.70	4
13th C	228	5.93	10.71	5
14th C	273	6.92	14.92	5
15th C	277	7.07	18.08	5
16th C	288	7.24	18.15	5

30 K Proximity Castles Only

Groups	Count	Average	Variance	Mode
9th C	51	3.25	3.03	5
10th C	60	3.93	3.55	4
11th C	135	10.73	16.30	9
12th C	190	16.52	36.73	18
13th C	228	19.64	57.53	19
14th C	273	22.98	73.12	26
15th C	277	22.85	74.60	20
16th C	288	22.60	73.42	25
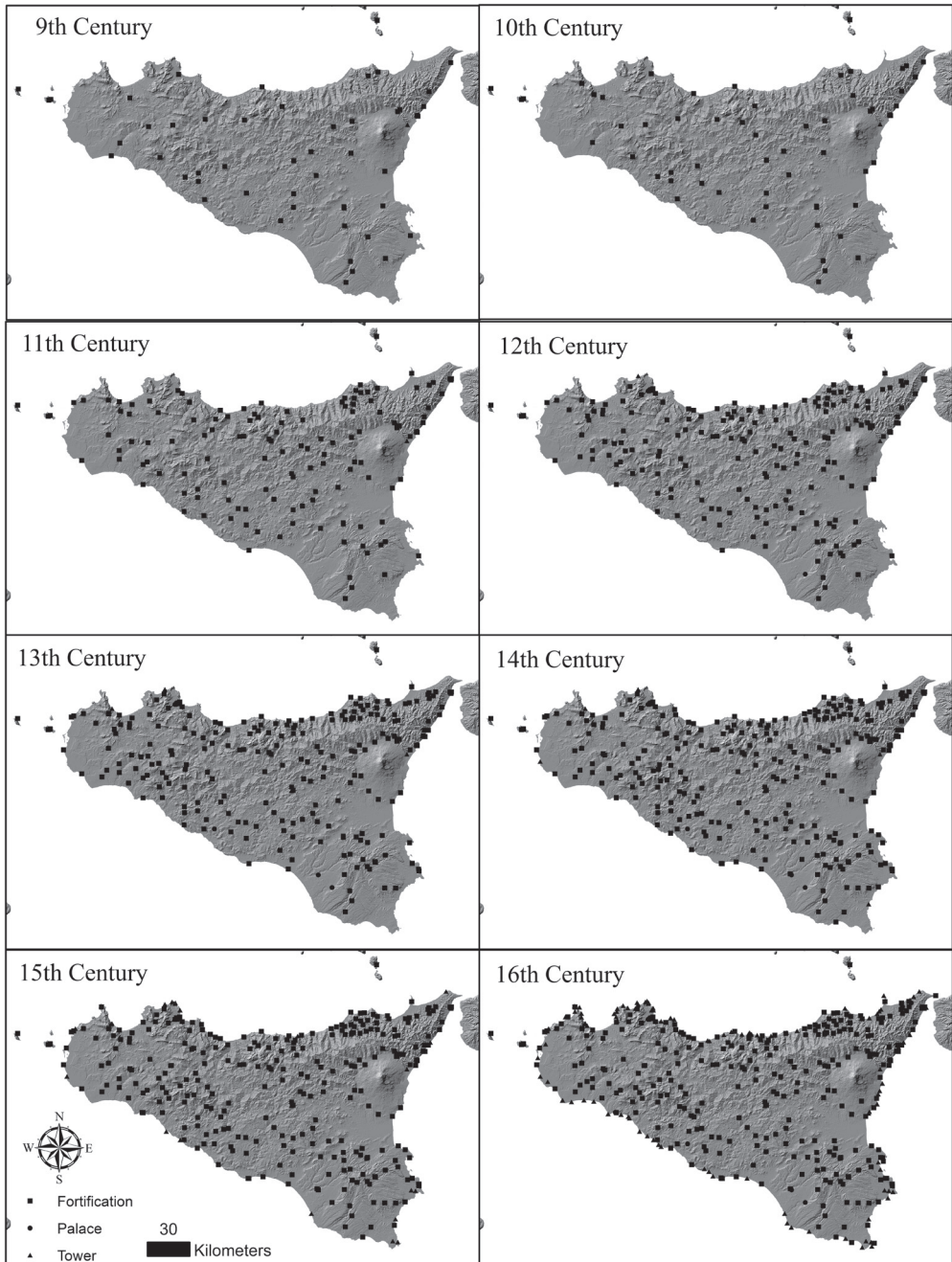
Figure 7. Spatial distribution of Castles, Palaces, and Watchtowers over Time.
Illustration showing the spread of castles, palaces, and watchtowers between the 9th and 16th centuries. (Maps derived from ASTER GDEMs — a product of Meti and NASA — and created by author using data drawn from a variety of sources seen in the bibliography but largely not cited in the paper).

may have formed a more informal network between allied communities or feudal lords. This idea of castles forming networks is not unique to Sicily, either. Creighton (2002: 1-3, 12-13) has proposed that networks may have existed between English castles and that, until recently, they have been overlooked in favour of examining one castle at a time. This increase in castles also occurs during a period where the medieval landscape is being repopulated and the sudden appearance of new castles and urban centres could simply be the result of the landscape filling in.

In any event, the construction of new castles reaches a stagnation point around the 14th century and is countered by the appearance of watch towers along the Sicilian coast beginning in the 15th century. At this time, population and environment may have played a role in this tipping point as the landscape may have naturally reached a point of saturation and a period of depopulation began to express itself throughout Europe (Kirk 2013: 68-69; Goldsmith 1995: 417). Once population begins to rebound in the renaissance and early modern era, castle building had fallen out of favour and the defensive strategies of Sicily, under Spanish control from the 14th century onward, shifted to the use of a series of watchtowers all along its coast; suggesting the increased importance of maritime activity (See Figure 7).

DISCUSSION AND CONCLUSION

In many ways, it is ironic that Sicily, an island so connected to the rest of the world through trade, lost its position of power at the onset of the industrial era. Nonetheless, I believe this study has shown how important economics were at the onset of the Norman era in Sicily.

Unlike other parts of Europe, Sicily rapidly reestablishes itself as an island of many urban centres and, from the 9th-16th centuries, it is possible to use castles as symbols of that reestablishment. Through the interpretation of a castle's relationship to the community, the community's relationship to the landscape, and each community's relationship to each other, it is feasible to begin to draw a picture of how that reestablishment looked.

Rather than being built strictly for defence, hilltop settlements and their associated castles were often built over Roman settlements in places that put them at a strategic advantage for the development of trade with a majority of castles located within the community for defence and protection beginning around the 12th century. In terms of natural defence, these castles often used the immediate slope over sheer elevation to their advantage. Finally, a network strategy likely developed between communities for trade, communication, and/or defence based on their ever increasing proximity to one another along trade routes. In the wider scope of *incastellamento*, castles and the construction of fortified hilltop settlements on the European mainland can probably be seen in much the same way — in terms of a complicated, multi-dimensional transition rather than the simple partitioning off of a community from the world for feudal dominance.

Of course, it is reasonable to expect that some of the data seen here is biased towards later dates as many of the castles studied may have had points of origin further back in history than was recorded here. Likewise, some of the castles recorded with early dates may have been built later and so, it is believed that sample size was likely large enough to correct for error and display trends which would likely hold true if it were possible to construct an even more detailed analysis. As many medieval sites in Sicily were located on top of earlier, Roman ones, the characteristics seen here can likely depict the selection process for pre-modern/pre-industrial urban development as easily as they can characterise the phenomenon of *incastellamento*.

To really understand what occurred after the fall of the Roman Empire, however, more work needs to be done at sites that bridge the gap between the Roman and Norman eras and more holistic studies need to be undertaken that do not compartmentalise the archaeology of one time but rather try

to understand trends over time. Indeed, I believe that once this happens, the emergence of urbanism in Sicily can be more properly analysed making the collapse of the island's population and the onset of the Dark Ages after the fall of Rome, in terms of analogy, seem more like a hiccup on the road to modern urban settlement.

ACKNOWLEDGEMENTS

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