

HOLOCENE CHANGES IN THE LEVEL OF THE BLACK SEA: CONSEQUENCES AT A HUMAN SCALE

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Abstract: Recent research on Holocene changes in the Black Sea has provided an extraordinary data set for archaeologists studying the region. Most immediate discussion has focused on population movements, the location of submarine sites, or the origins of myth and legend, but proposed links between a dramatic rise in the Black Sea and the spread of agriculture across Europe, the floods of the Bible, or the Gilgamesh epic are unhelpful. They spring from long-abandoned approaches to human behavior in which causation is assumed to be simple and direct, of environmental origin, and, more often than not, grounded in the movement of populations (i.e., cultures). From the perspective of a modern, critical archaeology, the Holocene changes in the Black Sea have important consequences, yet their importance lies not in how they may have immediately or directly changed life in the Circum-Pontic region but in how an increasingly refined and broadened documentation of these changes can radically refigure our understanding of a critical period in European prehistory.

Keywords: Mesolithic, Neolithic, southeastern Europe, Iron Gates Gorges sites, scales of analysis

1. INTRODUCTION

This paper investigates the evidence for possible impacts of a Black Sea transgression in the seventh millennium calBC on the ways people lived along the Black Sea's western coast. Chronologically, the closest significant change in human behavior occurred at the start of the Neolithic, *ca.* 6500 calBC in the southern Balkans (i.e., Greece) and at 6000 calBC further north and west (in

northern Bulgaria, southern Romania, Serbia, and beyond). The record of human activity before and after the sea-level rise in the latter, northern region, will be examined, and possible connections between coastal change and archaeologically documented patterns in human behavior will be discussed.

It is this writer's intention to question widely held (yet unsupportable) generalizations about (1) the causes of change in prehistoric societies, (2) the coherence of the Neolithic as an archaeological reality, and (3) attempts to marry significant geological events (such as the Black Sea rise) with changes in the patterns of past human activities. It is suggested in conclusion that most of the current debate over the Black Sea flood is misdirected. The significance of any transgression is not to be found in arguments about direct causes for major changes in human behavior, e.g., the emergence or spread of agriculture. The true significance is that the rise in sea level preserved a unique archaeological record of early Holocene southeastern Europe, and its documentation presents us with one of the most outstanding archaeological discoveries of the past half-century.

2. BACKGROUND TO THE FLOOD

Recent research into the paleohistory of the Black Sea has revolutionized our understanding of the marine geology of the region. Work by Popp (1969), Panin (1974, 1997), Skiba *et al.* (1976), Shcherbakov (1979), Shcherbakov and Babak (1979), and Popov (1983) established stratigraphies for shelf sediments and documented changes from brackish to marine fauna. The lack of reliable dating, however, prevented correlation of these changes with patterns of human behavior. The opening of the Black Sea to western researchers in the late 1960s beginning with Ross, Degens, and others (Ross *et al.* 1970; Degens and Ross 1972, 1974; Ross and Degens 1974) initiated a new era of scientific cooperation.

By the end of the 1990s, Ryan, Pitman, and others argued for a dramatic rise in sea level at 7150 BP. Their writings, which made popular and scientific headlines, suggested links between a flood and two important major events in world (pre)history and folklore: the introduction of settled farmers into central Europe during the Neolithic and the genealogy of the Flood Myth that appears in the Bible (Ryan and Pitman 1998; Ryan *et al.* 1997a, 1997b, and Ryan *et al.*, this volume). Relying on a change in strontium 87/86 ratios in Black Sea molluscs, Ryan's research team has recently re-dated the rise in sea level to 8350 ± 70 BP uncorrected and uncalibrated (Ryan *et al.* 2003). This date calibrates to 7500 calBC, however, using a marine curve and local ΔR offset for the Black Sea of 67 ± 26 years (Siani *et al.* 2000), the date calibrates to

7000–6640 calBC, rounded to the nearest decade (see Stuiver and Reimer 1993; Stuiver *et al.* 1998a, 1998b).

The important consequences of the model proposed by Ryan and his colleagues are that the Black Sea shoreline (as it existed immediately prior to the rise in the first quarter of the seventh millennium calBC) is currently ~ –80 m below the surface of the Black Sea, and that when the sea rose, it did so quickly without reworking and eroding the paleoshoreline. The archaeological significance is that the transgression conserved an early Holocene landscape on the large and flat (or slightly undulating) coastal shelf of Bulgaria, Romania, and Ukraine, which preserves clearly visible river channels that once flowed across the shelf towards the ancient shore.

In separate research, Robert Ballard's team has shown that the ancient beaches sloping gently toward the coastline contain fragile but well-preserved features (e.g., concreting pavement), thus demonstrating that when the sea level rose, it did so quickly without disturbing shoreline structures (Ballard *et al.* 2000). These flooded shelf areas should therefore harbor a superb archaeological resource from the early Holocene.

Ryan's hypothesis has been challenged, however. Proponents of an alternative model argue for a longer, more gradual rise in the Black Sea, starting much earlier in the post-glacial (Görür *et al.* 2001; Aksu *et al.* 1999, 2002a, 2002b; Hiscott and Aksu 2002; Hiscott *et al.* 2002; Kaminski *et al.* 2002; Major *et al.* nd; and see other papers in this volume, such as Hiscott *et al.*, Yanko-Hombach, Panin and Popescu, Balabanov, Chepalyga, Kuprin and Sorokin, and Shmuratko). From an archaeological perspective, supporters of both models have missed the boat. Unquestionably, changes in the character and level of the Black Sea are important, yet their value is not as stimuli for human action (at least not at the scale that has been proposed to date). Rather, the continually refined documentation of the Black Sea rise provides an extraordinary archaeological data set for understanding the critical changes that took place in southeastern Europe at the end of the seventh millennium calBC.

Assessing whether any connection exists between the Black Sea transgression and changes in the archaeological record requires an understanding of (1) how and where people were living before 7000–6640 calBC in this region, and (2) the principal changes in human behavior that occurred at the end of the seventh millennium calBC (i.e., from the start of the Neolithic). Furthermore, once the similarities and differences in lifeways before and after the rise in sea level have been clarified, it will be necessary to recognize that changes in ancient human behavior occurred over a variety of scales (e.g., spatial, chronological, perceptual) and thus must be understood over a similar range of scales.

3. HUMAN BEHAVIOR BEFORE AND AFTER 7000–6640 calBC

What was life like along the western coast of the Black Sea at 7000–6640 calBC when the sea level rose and inundated the wide coastal plain of Bulgaria and Romania? The responsible, but unsatisfying, answer is that we do not know. Despite more than a century of dry-land excavation and field survey along the western coast of the Black Sea, very little is known about life in the period that preceded the appearance of the first communities of pottery-making, settled farmers, who define the Neolithic and who have been firmly dated no earlier than 6000 calBC in this part of southeastern Europe (see Whittle 1996; Bailey 2000).

Whereas research in other parts of Europe to the north and west has documented a dynamic late Pleistocene and early Holocene way of life (i.e., a Mesolithic), excavation and analysis in southeastern Europe has preferred to investigate the Neolithic and subsequent proto-historic and historic periods, neglecting the mysteries surrounding the activities of early Holocene societies (see discussions on archaeological research agendas in Velkov 1993; Bailey 1998; Kotsakis 1998). While detailed work has focused on the first appearance of Anatomically Modern Humans in the Balkans at 50–60 ky BP (Kozłowski 1982; Pawlikowski *et al.* 1990; Kozłowski *et al.* 1994; Ivanova and Sirakova 1995), we still have a poor understanding of the Upper Paleolithic (45–10 ky BP), and especially the period starting with the Last Glacial Maximum at 18 ky BP.¹

Most frustrating is the major gap in the archaeological sequence between *ca.* 10,000 and 6000 years calBC: the Mesolithic record from southeastern European Mesolithic is patchy at best (a full discussion appears in Bailey 2000:32–36). Based on the better studied Mesolithic record in other parts of Europe, one can predict that traces of corresponding activity in southeastern Europe will be ephemeral (i.e., short-term camps, hunting stations, and activity places). Such sites are most likely to be found along rivers, lakes, and seas, under significant accumulations of alluvium. Alluvial landscapes can experience high levels of change over relatively short periods of time (cf. Howard and Macklin 1999, Macklin 1999, and Bailey *et al.* 2002). There are also several examples of deeply buried Mesolithic occupations in the flat Pannonian alluvium of Serbia and Hungary. A few sites from such contexts are known from Romania and Bulgaria. The 100,000 sq km western Black Sea coastal shelf that was lost at the end of this poorly understood (and previously thought of as poorly populated) period suggests that perhaps the Mesolithic is not missing at all in southeastern Europe. On one hand, existing evidence argues that much of it lies beneath deep alluvium along inland river courses or around ancient,

extinct lakes, buried at a depth and in positions that make their discovery by standard field survey almost impossible. (For a good example from another part of Europe, see Louwe Kooijmans 2001). On the other hand, perhaps the missing Mesolithic is better preserved and more accessible (i.e., without the levels of alluvium that have built up along the dry-land rivers) on the surface and along the river valleys that can be seen on the flooded western coastal plain of the Black Sea.

3.1 Pre-7000 calBC Human Activities: the Missing Mesolithic

Based on the few well studied dry land sites from the period before the 7000–6640 calBC Black Sea rise, it is clear that the landscapes of southern Romania and northern Bulgaria were inhabited by highly mobile groups that hunted, fished, and gathered what they needed to live.² High biomass zones like those found along coasts, rivers, and other lowland water bodies (e.g., marshes, lagoons) would have provided a relatively abundant and easily accessible supply of food. Knowledge of the natural environment, its rhythms and schedules, and an understanding of how best to exploit (but also manage and conserve) available wild resources were the essential tools and technologies of people in this region at this time. Group mobility (as well as group fissioning and regrouping) was a necessary and good thing, providing flexible solutions to social and political, as well as the inevitable economic problems and crises.

Absent from this mobile existence was the greater level of attachment and commitment to particular parts of the landscape that came to characterize the relationships communities had with their natural and social environments in later Neolithic times. However, even before the Neolithic, it is clear that people identified particular places in specific landscapes with distinct meanings and uses. One such place is Pobiti Kamuni in northeastern Bulgaria (Dzhambazov and Margos 1960; Gatsov 1984a, 1984b; Bailey 2000:32–33, 128–129). Studies of Pobiti Kamuni reveal a long period of intermittent use stretching back before the Last Glacial Maximum, but importantly, also containing at least one period of activity dating to between the ninth and the seventh millennia calBC (Gatsov 1995:74). In truth, Pobiti Kamuni is not one isolated site; it is a large area (up to 50 sq km) consisting of individual surface scatters of flint tools and flint working debris. Analysis of the thousands of cores, tools, blades, and bladelets from the area suggests that while these were places to which people came to make flint tools, they were not the places at which people used those tools (Gatsov 1995). Pobiti Kamuni was but one of many places to and from which people moved within a larger mosaic of social and economic landscapes.

Different from Pobiti Kamuni are the better known semi-sedentary sites found during rescue excavations along the Danube in Romania and Serbia, where the river runs through the Iron Gates Gorges. At the Cuina Turcului rock

shelter, for example, several hearths and assemblages of flint scrapers together with the debris from flint working document early Holocene activity areas that date as early as the tenth millennium calBC (Păunescu 1978; Radovanović 1996a:319). At other early sites in the Gorges, similar evidence for communal activities has been found. Some of the earliest sites containing durable architecture were concentrated in this stretch of the river between the eighth and the sixth millennia calBC. Small trapezoidal buildings have been recovered with semi-permanent superstructures (made from saplings, tree branches, and trunks) that sat on stone foundations arranged around carefully prepared plastered floors. With their longest side facing the river, these structures occupied narrow terraces squeezed between the river and the steep forested slopes leading to higher terraces. Faunal evidence indicates that significant quantities of large river fish were caught and consumed, that pigs, dogs, and red deer were also important food sources, and that food storage also took place (i.e., smoking fish). By the seventh millennium calBC, pottery and domesticated food stuffs are also present.³

The Gorges sites are dramatic. Not only do their buildings represent early appearances of oddly shaped (later Neolithic buildings are oval or rectilinear) durable, semi-permanent architecture, but they also contain significant concentrations of human remains (nine sites have produced bones from over 600 individuals) as well as strikingly decorated material culture (e.g., boulders pecked with human and animal appearances).

The Gorges sites are good examples of the kind of human record that is missing from the rest of the region.⁴ The location of the sites is significant: tightly packed on thin strips of terrace land between the river and the slopes. Though the use of any one site or building was probably not continuous or permanent (perhaps seasonal use is the most accurate reconstruction), it is striking that people chose to build durable structures and to bury their dead in these places. In doing so, they were marking out particular locations along certain stretches of the river. The combination of access to large river fish on one side and red deer and pig from the wooded slopes behind would have made these places extremely popular. Indeed, these locations would have taken on particular significance and meaning to the people who used the strange little buildings, caught and ate fish, and buried their dead under the floors and in the spaces between structures (see especially Chapman 1992). These were special places, perhaps best understood by the juxtaposition of rich wild resources (river fish and deer) and the unique social, economic, and spiritual atmosphere created by the co-existence of the living and dead.

The greatest lesson to take from the Gorges sites may not be in the presence of burials here, or the early durable architecture, or even the exotically decorated boulders. Perhaps their greatest importance lies in the way that these sites were discovered and in their locations along the high-biomass strips of

riverbank. If it was not for rescue excavations in advance of hydroelectric dam construction, there is little chance that the sites would have ever come to light, and without the Gorges sites, our understanding of the pre-Neolithic would be even poorer than it is. More importantly, the fact that the Gorges sites sit low down along the alluviated banks of a major river suggests that these are the types of places in which archaeologists should be looking for more evidence of this period (i.e., deeply alluviated locations along other watercourses). In this sense, the apparent emptiness of the pre-Neolithic landscape may be more a factor of heavy alluviation along many river valleys than it is a consequence of an actual absence of people and sites.

Equally important for understanding the apparent absence of the Mesolithic in the Balkans may be the changes in the Black Sea that occurred at 7000–6640 calBC. If the rise in the Black Sea removed from the region's landscapes a large coastal plain (cut by significant river systems, coastal lagoons and marshes), then that flooded plain must contain much of the missing pre-Neolithic record, perhaps in localized concentrations similar to what was found in the Gorges. At present, in addition to the Danube Gorges sites and the lithic resource sites such as Pobiti Kamuni, there is little else to help fill the otherwise empty landscape of this region throughout the period before the Black Sea transgression and prior to the start of the Neolithic. What is clear, however, is that the landscape (both the dry-land and the currently submerged coastal plain) was not empty of people.

3.2 Post-6000 calBC Human Activities: the Neolithic

If the archaeological record of the pre-Neolithic in the northern Balkans is thin, the evidence after 6000 calBC is abundant. From this time, people started living in new ways, adopting new technologies to exploit novel species of plants and animals, using ceramic pyrotechnology to produce a wide range of vessels and other objects, and building new, durable places in which to live. Pigs, dogs, and cattle, which had been hunted for millennia, were supplemented by new species, such as sheep and goat, and all were managed as domesticates, though hunting remained a significant social and economic activity.

Following the introduction of simple architectural constructions, new forms of organization arose that linked social groups together in particular places, and in many cases, for long periods of time. People developed new perceptions of the landscape (of its products and of the rights of access to those products) and new conceptions of how individual people (and groups of people) should be associated or differentiated. Social and economic life focused on houses and households within bounded villages, though at the beginning of this period, organization of people across social and natural spaces was more fluid and open. In many places, less permanent camps emerged before longer lasting

villages. The firing of clay to make pots, tools, and figurines was a novelty that had fundamental consequences. In addition to the importance of pottery vessels as a new container technology, fired clay became a major medium with which (and literally upon which) occurred an explosion of symbolic expression. Whittle (1996), Bailey (2000), Chapman (2000), and Tringham (2000) provide a more complete discussion of the Neolithic in this region.

3.2.1 Explaining the Neolithic Transformation

The differences in lifeways that distinguish the post-6000 calBC Neolithic from what came before (even based on the very thin record that we have for that earlier period) are clear and fundamental. Early explanations of the changes that occurred at 6000 calBC were principally economic, e.g., Childe's (1936) powerful model for a shift from a food gathering to a food producing system. They assumed that these changes were absolute, temporally abrupt, had the same character and cause as those that marked the appearance of the Neolithic in the southern Balkans at 6500 calBC (i.e., Greek Thessaly), and were the result of singular events, such as migrations of people or changes in climate.

Until very recently, it has been acceptable to speak of the early European Neolithic as a single way of life. Even as mid-twentieth century applications of nuclear physics to absolute dating made it clear that the Neolithic appeared in different parts of Europe at different times (Renfrew 1973), it was still assumed that the repertory of activities and technologies that made up the Neolithic was the same wherever and whenever it appeared. More sophisticated work has broken down the assumed homogeneity of the Neolithic (Whittle 1996; Thomas 1999). It is now clear that even within a single region, e.g., Thessalian Greece, there was significant variation in how people lived, even in how the same people lived at different times of the year or during the same season at a single site (Whittle 1996; Kotsakis 1999, 2005; Bailey 2000; Souvatzi 2000, nd; Halstead 2005). The same is true in the Northern Balkans (Greenfield 1993, 2000, nd a, nd b; Greenfield and Jongsma nd a, nd b; Greenfield *et al.* nd). The recognition of such variation within a single landscape makes any attempt to generalize across larger regions and between parts of Europe foolhardy at best.

Significant progress in research on the varied components of the Neolithic package (i.e., sedentism, ceramic pyrotechnology, animal and plant domestication) has opened up our understanding of the adaptation in new and increasingly complex ways. For example, it is no longer accurate to speak simply about the domestication of plants. There are many different scales of relationship between people and plants, and large-scale, field-based, crop cultivation of highly productive and robust species such as wheat and barley was a relatively late development in European prehistory. It is clearly not evident in the Early Neolithic of the northern Balkans (Greenfield and Jongsma nd a, nd

b; Greenfield *et al.* nd). Evidence for the wide-spread clearance of land for planting fields of crops does not appear in the archaeological record for many regions until the late Bronze or early Iron Ages, *ca.* 2500 calBC (Willis 1994, 1995). It is much more likely that the early selection and exploitation of particular plants were more heterogeneous processes that entailed small-scale use of both wild and managed species, which functioned through a combination of garden-sized plantings with sophisticated understanding of local wild resources.

In similar ways, research into human-animal interactions has ranged well beyond simplistic ideas about corrals or the farmyard and has exploded assumptions about the ways early Europeans exploited animals (Higgs 1972; Sherratt 1981; Ingold 1980; Halstead 1998). A general claim for the economic importance of domesticating animals has been replaced by subtle understanding not only of differing scales of animal exploitation (e.g., for primary and secondary products, via herding and grazing or hunting and managing wild stock), but also for different scales of consumption for the products of different sized animals (Greenfield 1988, 1991, 1993, nd a, nd b; Russell 1998).

Even in these well argued fragmentations of the long accepted but overly simplified perceptions of plants and animals in the Neolithic, most current explanations retain a level of generalization that smooths the data in an unrealistic way and presents the non-specialist reader with a charade that proposes that there was a particular Neolithic way of living that can be clearly and cleanly documented by the presence of domesticated plants and animals. Indeed, as debate continues to pick apart the increasingly fuzzy entity that archaeologists have called the Neolithic, it has become progressively clear that none of the constituents of the original package occur without significant variation across the regions (indeed even within a single region) and through the several millennia that make up the period.

Other recent arguments have (1) acknowledged the differences between the northern and southern Balkans (Halstead 1989; Greenfield 1993; Jongsma and Greenfield 2001; Greenfield and Jongsma nd a, nd b), (2) given more credit to the choices made by indigenous local pre-Neolithic inhabitants in adapting, adopting, and rejecting particular elements from the Neolithic package of technologies, plants, animals and social organs (Zvelebil and Lillie 2000), and (3) argued the probability of a less exact, less complete, and less absolute transition to the Neolithic way of living (Zvelebil 1986, 1994; Greenfield and Jongsma nd a, nd b; Greenfield *et al.* nd; and papers in Bailey *et al.* nd). The concept of sedentism has been subject to similar assaults and critical re-definitions; it is no longer acceptable to assume that permanent buildings document year-round sedentism, that the inspiration for the construction of early architecture was simply the provision of shelter, or even that the same group of people could not exploit two apparently contradictory types of settlement

systems, e.g., complementary villages of permanent houses and more mobile camps of temporary pit-features (see papers in Bailey *et al.* nd).

A major result of these refinements and redefinitions of the Neolithic and its constituent parts is that we can no longer speak of one Neolithic. There were many Neolithics that appeared and disappeared at different times and places. The distinction between what was Neolithic and what was not has been irrevocably blurred both in terms of chronological sequence (i.e., the permeability of boundaries with pre- and post-Neolithic phenomena) and in terms of an individual definition of typical Neolithic behavior (i.e., there are no universal activities represented by the terms animal and plant domestication or permanent sedentism; see papers in Bailey *et al.* 2005). A fundamental consequence of breaking down the Neolithic as an archaeological construct is the devaluing of the earlier, easy explanations for the origins of the Neolithic, which proposed a clearly defined package of goods, techniques, and knowledge that could have been brought into southeastern Europe by migrating groups from the Near East. There was no one origin to the Neolithic lifestyle in southeastern Europe, nor even a set of easily identifiable events that caused people to change their lives in ways that might appear to us (looking back 8000 years) as dramatic and radical. It is much more likely that the patterns of behavior that eventually accumulated and that archaeologists uncover today, are the result of very gradual alterations, testings, adaptations, rejections, re-alignments, regressions, and adoptions of a host of alternative components of living. Change was slow.

4. MULTIPLE SCALES OF HUMAN BEHAVIOR AND GEOLOGICAL EVENTS

If we accept that the transition to the Neolithic is most accurately understood as a gradual process, then what role might changes in the Black Sea occurring at 7000–6640 calBC have had within such an extended transition? Again, the answer is neither simple nor straightforward but lies in a rigorous examination of the relationship between geological events and changing patterns of human behavior. One of the greatest obstacles to an accurate understanding of the rise in the Black Sea is the still current assumption that geological events, physical (and cultural) topographies, and human communities are homogenous, i.e., that they are easily modeled entities that react in predictable ways making them understandable at a single general level. In reality, we can approach both geological and human events on many different scales.

For example, when discussing the effects of the Black Sea rise, geologists often make broad assumptions and conclusions that incorporate broadly what, in reality, archaeologists hold to be heterogeneous spatial scales. In this sense, this writer has a range of different (but not mutually exclusive)

perceptions of the Black Sea and its western coast. Such perceptions include:

(1) *the largest scale*, upon which the Black Sea itself is an entity compared to the Aegean, the Caspian, or the Marmara,

(2) *the medium scale*, where the Turkish coast can be distinguished from the northwestern coast along the littoral of Romania and Ukraine,

(3) *the small scale*, in which one section of a regional coast is compared to another section of that same coast,

(4) *the local scale*, where a particular inlet or river mouth is distinct from an inlet or river mouth a few kilometers along the coast, and finally

(5) *the intimate human scale*, upon which the specific reaction of one individual is separated from the reaction of a second individual standing in the same place on that coast at the same time.

It is important to note that each of these spatial scales requires a separate detail of enquiry, a different set of information, and a different focus of research. Most critically, each will create a different image of the same geological event. Furthermore, each scale will provoke a different type of explanation and will provide a different level of understanding of both people and environment. In the context of any potential effects of a Black Sea transgression at 7000–6640 calBC therefore, we cannot simultaneously generalize across all of these different scales. Each scale of spatial dimension will entail a different understanding of the geological events and their potential human consequences.

In a similar way, one could investigate the potential effects of the rise in the Black Sea along a range of temporal scales. One could examine the immediate effects of the marine transgression. Indeed, this is the scale at which popular interest in the research of the Ryan team has focused: the BBC *Horizon* and *Ancient Voices* programmes reconstructed dramatic scenes of people thrashing about in the crashing waves of a flood. However, there is variation and a range of understanding even at this single temporal scale: how are we to define immediate? The span of time that the sea took to rise to its new level? The time it took for its new composition to stabilize? As a series of individual moments when each significant landform of the coastal shelf was submerged?

At the other end of the range of temporal scales (i.e., the longest term), one could examine the effects of all of the rises in sea level and all the changes of water from brackish to marine in the Black Sea within its complete paleohistory (i.e., from its origin as a geological entity to the present). Furthermore, between these temporal extremes, there are many other scales that would repay investigation, whether they are measured in subjective analytic terms (e.g., millennial, century, decade, annual, seasonal, monthly, daily), whether they follow climatic divisions (e.g., Bölling, Older Dryas, Allerød, Younger Dryas, PreBoreal, Boreal, and Atlantic), or whether they refer to a human life as the scale (e.g., the effects of changes over the life of an

individual, 25–50 years, or over any number of generations of ancestors or descendants living on the coast).

The recognition that such ranges of scale exist can begin to clarify the causes of conflict over the different reactions (i.e., archaeological versus geological) to the proposed consequences of the rise in the Black Sea. Perhaps the grandest suggestion, that the transgression is the origin for the Biblical or Gilgamesh flood epics, sits comfortably at the highest, most general, spatial and temporal level. It applies across the Black Sea without reservation; it fits very badly, however, with the particular contexts of individual archaeological sites in their specific topographies and cultural locations, and it does not fit at all at the most intimate, human scale, outlined above.

Tremendous power dwells at the most general scale. It is the place of myth and legend, and it relies on trust and faith in the unmeasurable. It is untraceable, unquantifiable, and literally (and to its benefit) unscientific. However, it is also of least value for understanding the prehistoric past at the human scale. Explanations and proposals that thrive at the most general scales have extraordinary influence over our understanding of the past precisely because they are untethered to reality by the specificity of facts; they are beyond both proof and disproof. They rely on faith. Explanations developed at this level have particularly dangerous consequences, as they often invoke otherwise invisible mechanisms of migration, invasion, and culture change that have little if any palpable or documentable traces in the archaeological record. Worse, they are often deployed in racial and nationalist claims for rights to residence. To write about migrations in the prehistoric past is to construct generalized, mobile human communities for which there is not significant archaeological evidence.

4.1 The Human Scale

So how are we to understand the human consequences of the 7000–6640 calBC changes in the Black Sea? This writer suggests focusing on the human scale, acknowledging that there would have been many different effects and reactions to the changes in the Black Sea, in many different places (within the soon-to-be submerged coast and plain) and at many different times (during the inundation and in the immediate aftermath of the flooding), and especially, in the period of geological, environmental, and social stabilization that must have followed the loss of the coastal plain. Perhaps it is this latter period which is the most interesting for our understanding of consequences of the changes. If there were movements (or even displacements) of people, then they would have occurred during this period: re-organizations of previously mobile communities into new landscapes (perhaps similar to previous landscapes, though just as likely dramatically different). How long might this period have lasted? It is

difficult to know. Was it even a coherent period that had a recoverable beginning or end? Did it even have one set of unshifting geographic foci?

Would there have been an instantaneous shift in lifestyle and a ready adaptation to new landscapes, new resources, and new special places? This is highly unlikely. Much more probable would have been a substantial period of stabilization, both for the composition and level of the Black Sea as well as for the dynamics and tensions between groups of people across the terrestrial landscape. Could this period have been the 650–1000 years that separate the inundation of the coastal plain and the first archaeological appearance of the new way of living that has come to be called the Neolithic? Perhaps. Would such a period of the gradual settling of water, land, resources, and people which fills the half millennium that leads up to 6000 calBC help to explain the exceptional coherence and longevity of the Neolithic way of life in this region for the next 2500 years? Though impossible to assess based on current understanding of the pre-6000 human landscape of Romania and Bulgaria, it is a highly attractive and stimulating possibility that should be addressed using new research strategies.

5. MOVING RESEARCH FORWARD

To conclude, if we want rigorously to investigate the effects of the Black Sea changes of 7000–6640 calBC, then we need a much better understanding of the record of human behavior along the ancient western coasts of the Black Sea as it existed previously. This record can be produced only by collaboration between dry-land archaeologists and marine geologists. The aim should be to reconstruct the complete pre-7000–6640 calBC landscape, including the vast area of the currently submerged coastal plain. We need a programme of research that will take us past the debate of the rate and date of rise in sea level. Indeed, the research proposed here will resolve, once and for all, the arguments over the date of the Black Sea rise. We need a project to create a detailed map of the coastal plain (using the data gathered to date by all of the teams which have been working in the region) and which can coordinate a large-scale, detailed coring and submarine excavation programme. Key project goals would be to use the mapping data to identify those places on the coastal plain that have the highest probability of containing pre-7000–6640 calBC sites, and to core and excavate these locations in order to recover cultural, environmental, and datable material. The result would be the recovery of a long lost Holocene landscape, which this writer believes will contain the missing Mesolithic of this part of southeastern Europe, and which would provide a scientifically supportable answer to the question, what were the human consequences of the 7000–6640 calBC changes in the Black Sea?

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ENDNOTES

1. Of the more than 150 sites that Alexandru Păunescu includes in his recent corpus of Mesolithic and Paleolithic sites in southern Romania (i.e., between the Danube and the Carpathians), only 12 date to the end of the Upper Paleolithic (i.e., Epipaleolithic or Tardigravettian) or the Mesolithic (i.e., the Tardenoisian or the “Schela Cladovei Culture type”) (Păunescu 2000:Table 1).

2. See examples at Franchthi Cave (van Andel and Vitaliano 1987; Perlès 1987, 2004; Jacobsen and Farrand 1988; Shackleton 1988; Wilkinson and Duhon 1990; Hansen 1991; Vitelli, 1993; Farrand and Jacobsen 1999; Vitelli and Dengate 1999), Grotta dell’ Uzzo (Bietti 1981; Piperao 1981), and the discussion below about the Danube Gorges sites.

3. For a full discussion of the Danube Gorges, see Srejšović (1967, 1969, 1972), Boroneanț (1970, 1982, 1989, 2001); Prinz (1987); Voytek and Tringham (1989); Chapman (1989, 1992, 2000); Radovanović (1996a, 1996b); Whittle (1996); Bonsall *et al.* (1997, 2000); Radovanović and Voytek (1997); Borić (1999, 2002a, 2002b, 2003, 2005); Bailey (2000:62–71); and Borić *et al.* (nd). There are also more recent excavations at Schela Cladovei; their full publication is eagerly anticipated (see Boroneanț 1973; Bonsall *et al.* 1997).

4. Of the 12 Mesolithic sites listed from Romania, all but three are from the Danube Gorges. The exceptions are LARGU CORNUL MALULUI and LARGU LE CALENTIR (both in Buzău County), and LAPUS POINA ROMAN (in Prahova County). For LARGU CORNUL MALULUI, see Păunescu (1979:517–518, 2000:114), Dragomir (1957:300–301, 1959:475–476). For LARGU LE CALENTIR, see Păunescu (1979:518, 2000:114–115). For LAPUS POINA ROMAN, see Păunescu (2000:118–130), Mogoșanu and Bitiri (1961:215–226), Mogoșanu (1960:127–128, 1962:145–151, 1964:337–350, 1978:349), Cârciumar and Beldiman (1994:380), and Cârciumar (1996:425).

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