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Anthropocene as an evolving paradigm

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Abstract

At some point during the Holocene, human action began to accelerate or redirect landscape and biospheric evolution. Basic questions for this preface are whether we should define this new dynamism as an 'Anthropocene era' and how might it be delimited with respect to absolute time or to the Holocene. Traditional geo-stratigraphic nomenclature developed through accretion of field observations, vetted by theoretical discussion, to facilitate four-dimensional reference to lithology, topography, space, and time. Current notions for an Anthropocene carry additional connotations: (1) the focus is on a more dynamic agenda that is far from being synthesized; (2) this revolves around the increasingly salient role of cultural agents that selectively shape a multitude of small and large specific areas, so as to favor divergences and disjunctures; (3) the result is a non-normative dynamic of changing spatial configuration and temporal scales that was superimposed on non-cultural Holocene processes predominantly steered by 'natural' forces; and (4) this would argue for a flexible, time-transgressive concept, rather than a firm time-frame, that should stimulate identification and investigation of centers of early or unusual human disturbance. The amplified energy and amplitude of these culturally modified divergences are formidable, but Pleistocene glaciation posed a more severe test for biotic evolutionary success than did past or current global change driven by human actions. This would suggest that instead of proclaiming alarmist schedules, we should concentrate on constructive research and university instruction that better emphasizes environmental and sociocultural resilience, adaptation, and the interplay of buffering feedbacks with systemic micro-evolution.

Keywords

a new agenda, a time-transgressive definition, importance of case studies, divergences and disjunctures, human impacts transposed on non-cultural processes

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Preamble

Anthropocene is not a pretty word, yet there is indeed a need for something like it.

Beginning in the late 18th century, geo-stratigraphical nomenclature developed through an accretion of field observations and theoretical refinements, in order to facilitate four-dimensional reference to lithology, topography, space, and time. '*The Holocene*' at first served as a convenient descriptor for the presumed lower amplitude processes and features of the Postglacial, post-Pleistocene, or geological Present. But after about 1950, Holocene research intensified and proliferated, amplified by fresh perspectives drawn from geomorphology, pedology, biology, and especially technique-driven, detailed mapping. In the course of this increasingly multidisciplinary trajectory, it became apparent that shifts or discontinuities over time were not only modified by climatic change, regional context, or tectonics but also by human action that accelerated or redirected landscape evolution.

Whereas cultural intervention had played no more than an incidental role in Pleistocene change, human action now began to redefine, interrupt, or even control the shaping of landforms, as well as the efficacy and direction of surficial processes. Meandering floodplains could be converted to valley floors dominated by radically different patterns of hydrology and sedimentation that might persist for centuries or millennia, before reverting to landscapes similar to what was characteristic before. The typically smooth, Holocene rhythms of non-cultural contexts tended to create environments evolving within certain constraining parameters. But agricultural or industrial intervention introduced new equilibrium modes that differentiated the probabilities of directional change from one region to another, so that observed processes and outcomes become not only more rapid but more complex in both character and temporal delimitation. In the anthropogenic context that most of us work, there is little room for bold proclamations or apocalyptic hand-wringing. Field-derived impressions prove more difficult to interpret; deductive hypotheses are equivocal and resistant to ready validation; while research demands more detailed attention and at a smaller scale. Holocene investigation of a landscape with a history of cultural intervention is likely to require adjusted methods, priorities, temporal scales, and assumptions.

Searching for fresh positions

In drawing serious attention to the direct interface between environment and society, *we need models that can transform Holocene study into an applicable, post-disciplinary science*, pertinent to a much broader audience as well as more inviting to participants from archaeology and environmental management. It is this challenging continuum of inter-connective issues and processes that invites us to look together at the awesome transformation of natural and cultural environments that is underway in this century.

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For example, channels adjust to greater flood volumes by entrenching their beds or widening their channelways in order to accommodate more water moving at impressive or exceptional velocities. The excess sediment is either placed in storage as sandy or gravel shoals within the channel, during periods of quiescence, or is swept out onto the floodplain via bank ruptures and sediment splays or branching secondary channels (see Butzer and Helgren, 2005). Eventually that fluvial landscape is converted to watersheds gullied by low-order streams, larger channelways, and higher energy floodplains. Medium- or long-term shifts of climatic inputs or human use of the land may bring on a new surge of fluvial activity or, instead, a systemic deceleration that begins to leave higher level alluvial fills as detached terraces. This is the exciting plot confronted by geoarchaeologists in the field, and our challenge is to bring more researchers out of the office to join us.

We can also focus on the critical differences of scale and grain, which introduce questions of human settlement and ideas that help deal with emerging problems of soil erosion and gullying of cultivated land. Farmers prefer to seek out more clayey, moisture-retentive alluvial soils, and step-like progressions of more level land. Modal productivity and economic dynamism is of course dictated by the mosaic of agricultural and pastoral land embedded in an epistemologically split human landscape (Butzer and Endfield, 2012) in that it accelerates energy flows from the initial watershed to the urbanizing landscapes of consumer demand. Mediating between these two models are the buffering and accelerating feedbacks of societal approbation (read: community decision-making) and sociopolitical constraints, encompassed in the concepts of cultural and political ecology (Butzer, 2011: Figures 1–3). Such competing forces will ultimately determine the degrees of sustainability that these interacting systemic models may allow.

Human understanding is a cumulative result of experience. What is apparently true in one sector of a particular environment is not necessarily applicable in another. What is true at one scale may well not apply at another. Over the years, I have engaged with problems of anthropogenic transformation through case studies in five different areas, on four continents (Butzer, 2008, 2011, 2013). This is also what Beach and Luzadder-Beach (n.d.) signal in their paper by a 'Mayacentric' approach. Indeed, each regional experience is different, and I have always learned much that was new to me, but not necessarily congenial for some colleagues abroad. Most informative is talking directly with farmers. As a result, I have learned to be skeptical of dominant narratives. We need many voices and different ways of doing things, if we are to appreciate that covering diagnoses cannot be expected to emerge from a single project. One 'size' does not fit all.

Sustainability deserves a serious and rigorous place in university curricula, so that we can train interested students in the cross-disciplinary challenges of communication and integration, to contradict the alarmist or apocalyptic publicity seekers. Long-term sustainability issues, subsistence crises, demographic decline, and civilizational collapse are not glib talking points but grounded in the difficult systemic problems touched on here (see Butzer, 2011: Figures 4–5; Butzer, 2012: Figure 1). Current popular interest is to be welcomed, particularly if it can be channeled into innovative academic nodes with committed students, faculty, and institutional leaders, to provide experienced scientific teaching and address genuine research projects.

How to find a temporal frame?

We do need centripetal structures to steer and encourage more explicit attention to a Holocene record impacted by anthropogenic agencies. But what do we do in terms of a temporal framework for such an arena? Diverse groups are interested, but may have different priorities. Some would favor simply dispensing with the designation Holocene altogether. But tangible human impact on global ecosystems was uncommon during early Holocene times, while even robust mid-Holocene modifications are relatively scarce in many world environments. Ruddiman (2003) drew attention to the accelerating build-up of atmospheric methane and carbon dioxide after perhaps 6000 years ago. But given its scanty archaeological support, that trend also has other possible explanations and still requires more rigorous study. It would be better to approach this inductively in centers of early urban settlement and mining, in close association with archaeologists. Put differently, *we should establish a set of representative case studies before we run away with premature generalizations* that ignore current methods and applications of geo- and bioarchaeological advances.

At the other end of the temporal spectrum, a larger and enthusiastic cluster of climate scientists favors turning to contemporary analyses of global warming and increasing atmospheric carbon dioxide. But that would begin an Anthropocene only a century or two ago, which might not serve a useful purpose. Such a limit would exclude many millennia covered by dedicated archaeological research, substituting a simple atmospheric definition for long-standing multidisciplinary enterprises in geo- and bioarchaeological research. In my view, that would short-circuit the more complex resolution of a corpus of multilayered environmental work, at a time we are just examining the nuanced shifts of regional equilibrium in response to external and internal inputs and feedbacks. We are still trying to understand the impact of solar phenomena and atmospheric cycles apparently linked to human inputs.

In the first issue of the new journal *Anthropocene*, Brown et al. (2013) hint that the result of human-driven change tends to be *time-transgressive*. Shifts and discontinuities in earth systems respond to thresholds and tipping points, controlled by environmental resilience, climatic variability, and human activity (Butzer, 2012). *Outcomes are region and environment-specific*, and the time-scales and magnitude of significant human inputs are unpredictable. Despite the hubris of a Jennifer Francis, we are still a long way from fully understanding the interplay of the key variables, let alone presuming to explicate how all of this plays out globally. Many a lucid interpretation is felled by fresh pragmatic data. It is better to construct good building-blocks, via case studies that can eventually be negotiated and assembled, than to jump straight away to global correlations and teleconnections.

Suggestions and caveats

My suggestion would be to opt for a flexible, time-transgressive concept that would allow researchers to identify and investigate centers of early or unusual human disturbance. There also are *good reasons to use Holocene and the proposed new concept in a complementary rather than exclusive manner*. Much of what we do can fit comfortably into two such focal clusters. While each has its own preferred spatial, environmental, temporal, and applied facets, we do understand each other and, at least for the present, opportunities for discussion would be beneficial. Why not optimize on the value of complementary perspectives?

Nonetheless, I continue to question the wisdom of opting for an 'Anthropocene *era*'. For one, our traditional geo-stratigraphic time-units served to synthesize several categories of information that would abstract and facilitate recognition of coherent time-slices in the physical and biotic landscape. By contrast, the notion of Anthropocene is currently *focused on a much more dynamic menu* of ongoing changes that are by no means ready to be synthesized. Indeed, a basic rationale for emphasizing a cultural role in landscape change is to draw more attention to multiple, area-specific divergences and discontinuities. In our present understanding, these represent a less normative perspective on environmental

history. During mid- to late-Holocene times, a new systemic unpredictability is superposed on non-cultural, Holocene processes that were dominantly steered by 'natural' forces. We are now focusing on the resulting *divergences*, in effect creating a two-track investigative mode. I presume that our wordsmiths can suggest a more elegant way to meet both our goals and caveats.

My second concern is that the anthropocentric vision of our species may be blinding us into assuming that recent, global change through human actions may be unique at the scale of the geological record. Yet, environmental crises are inherent stages in an evolving system (Makrushin and Kuzmina, 2014). For example, Pleistocene glaciations posed a more severe test for biotic evolutionary success than did past or current global change driven by human actions. Instead of being distracted by alarmist hypotheses, we should concentrate on constructive research that emphasizes environmental and sociocultural resilience, adaptation, and the interplay of buffering feedbacks with systemic micro-evolution.

I would therefore argue that the most important goal should be to bring archaeology and *the* geo/bio-sciences closer together. Ideally, they should collaborate directly on more and sustained joint projects. That is exactly is what the present Workshop has done, and we must applaud the organizers for that achievement.

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