Evaluating Causality of Landscape Change
Examples from Alluviation

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1. Introduction

Compiling and summarizing regional and local evidence of geomorphic change are among the more common tasks of field geoarchaeologists in North America, where they have become almost routine aspects of archaeological survey. The scale of geoarchaeological projects in America is often regional, owing to a considerable number of large development projects such as reservoirs, open cast mines, and highways. In Europe, the scale of development is often (but clearly not always) of smaller scale, and it is my impression that the majority of geoarchaeological projects are performed at the scale of individual sites. The principal exceptions to this generalization are often academic surveys, which in some regions of Europe routinely incorporate geoarchaeological studies. Perhaps the best example of this may be found in Greece (e.g., Pope and van Andel, 1984; Wells et al., 1990; Zangger, 1994; Zangger et al., 1997).

The rationale of investigating geomorphic change as part of archaeological research is clear where the archaeological record under investigation has no
significant architectural components. In such situations, deciphering multiple prehistoric occupations from stratigraphically compressed scatters of burnt rock and debitage on ancient landforms is often problematic. In an attempt to find clearer separation between occupations, archaeologists in some regions (e.g., Texas) have turned to excavating sites in dynamic or rapidly aggrading portions of the landscape, such as river valleys, where occupations of short duration are found in stratigraphic isolation (see Collins, 1995). The effects of aggradation on the stratigraphic separation of cultural deposits has been illustrated by Ferring (1986). In general terms, as the sedimentation rate increases, so does the thickness of sediment between occupations of different age. Clearly, the degree to which this occurs is a function of the rate of sedimentation and the periodicity, intensity, and duration of occupation. Sites with multiple, stacked, but stratigraphically separated components have been referred to as sites with “isolable components” or as *gisements* (cf. Collins, 1995:374). This stratigraphic situation facilitates interpretation of the archaeological record, sometimes allowing us to refine artifact seriations as well as simply providing a much clearer image of cultural activity areas.

In this context, which is common in North American archaeology, stratigraphic and geomorphic data are used as a proxy for climate and vegetation change, to search strategically for archaeological sites of a particular age, or to establish age estimates for sites discovered during the survey work. Although it is rarely articulated explicitly (e.g., Xu, 1998:67), most researchers assume that climatic variation is principally responsible for erosion and sedimentation, except where tectonic activity is suspected or in proximity to the modern coast where sea level variation may affect stream response (e.g., Blum, 1991; Blum and Price, 1994, 1998). Exceptions to this generalization include regions where significant sedentary populations were present during the prehistoric period and/or deposits that postdate European settlement. In both cases, anthropogenic factors are argued to have caused soil erosion and concomitant valley alluviation.

Where sites with earthworks and/or earth or stone buildings are common, as in Europe and in Mesoamerica, the majority of field archaeology occurs on stable upland surfaces that have relatively high archaeological visibility and may comprise graphic palimpsests. In these regions, the role of human activity in environmental change is a prominent research theme. Studies addressing this issue are not often performed in site context, because most archaeological excavations in these landscapes are not suitable. Researchers must seek out settings where evidence of environmental change is likely to be preserved, such as lakes, bogs, mires, slopes, and alluvial valleys. Sites in bogs and in mires are suitable for compiling records of past vegetation change, but are not necessarily suitable for evaluating ancient soil erosion and sediment mobilization. Lake basins, slopes and river valleys are the preferred landscape elements for compiling records sensitive to soil erosion. Lakes may yield high resolution and potentially less problematic records, but they are uncommon in arid and in semiarid landscapes and as such are not universally applicable. Alluvial and colluvial deposits, on the other hand, occur much more frequently and are therefore more useful for evaluating the origins of prehistoric and historic erosion and sedimentation.