1. Opening Remarks

Archaeologists have been working closely with geologists and paleontologists since the beginning of the 19th century, and the basic concepts employed for the time ordering of prehistoric sites were borrowed by archaeologists from geology. The most common example is the subdivision of the prehistoric sequence into Lower, Middle, and Upper Paleolithic, following the tripartite division of the Pleistocene. Geologists participated in prehistoric excavations and in many regions became responsible for describing the site stratigraphy and the paleo climatic interpretation of the deposits. As the approach of regional archaeology evolved, mainly after the 1950s, geoscientists studied the changes of past landscapes with the archaeologists. The rapid evolution of dating techniques opened a new avenue for the involvement of earth scientists in archaeology, and in particular in the dating of prehistoric periods. Finally, the advancements in
fields such as mineralogy, magnetic susceptibility, remote sensing, and others increased the potential interactions between archaeologists and earth scientists. At the end of the 20th century, there are probably thousands of archaeologists who have had at least some experience working closely with a variety of earth scientists. It would therefore be presumptuous to assume that my personal view can represent such a large community. I accepted the invitation of the editors of this volume to write this chapter because I felt that over my 40-year career I have been involved with numerous practitioners of science in archaeology. I was originally trained as both an archaeologist and a geomorphologist, but as one cannot do both full-time, I chose to be responsible only for archaeological research. In this domain, I was lucky to be engaged in the study of the entire sequence of the Paleolithic and Neolithic in Western Asia and in some adjacent regions, and I am well aware of the importance of successful cooperation with geoscientists.

I have chosen three categories in which the close cooperation between earth scientists and archaeologists is crucial, including the sites and their environments, site formation processes, and geochronology. Finally, as, let us say, an “experienced” teacher, I thought it would be useful to propose, within various sections of this chapter a few practical suggestions.

Before delving into the various issues, it seems appropriate to remind ourselves of the original motivation for practising earth sciences in archaeology. Sometimes, while reading papers or site reports, I gain the impression that the impetus behind publishing a series of dates, a reconstructed past landscape, or a sequence of paleoenvironmental fluctuations lies in the recipe for “how to do and succeed in modern-day archaeology”. In numerous cases, one is surprised by the brevity or almost total lack of explanation of how the information is related to an archaeological or an evolutionary query and whether the current results corroborate other sources of information. In such published instances, one can find the name of one or more archaeologists who either were involved in the excavation of the site or were solely the submitters of the samples. It is my contention that in a large number of joint publications the interdisciplinary integration of information is rarely well worked out. I detail these criticisms in the sections that follow. Here, I assume that most scientific research is carried out because earth scientists are interested in the archaeological implications of their results. Of course, not every scientist can be involved in the intricacies of the archaeological information, which in recent decades, like other fields of investigation, has enjoyed an explosion of knowledge. In addition, when most of the Paleolithic sequence is dealt with, interpretations of the evolutionary trends, the classification of fossils, and the validity of nuclear and molecular studies are constantly debated, by the majority of archaeologists. For example, in most cases when archaeologists are presented with the various dating techniques, even those with which they consider themselves familiar, in a new series or volume (e.g., Aitken et al., 1993; Taylor, 1997; Wagner, 1998), they are only qualified to evaluate the results in relation to the archaeological information and generally are not able to decipher the assumptions, measurements, and calculations behind the dates, whether they consider them correct or not.