Digital archaeometry and the spatial analysis of Mediterranean palaeoenvironments: unravelling the Minoan landscape of Central Crete by remote sensing and GIS

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Remote sensing (RS) and GIS-based studies are increasingly being applied for archaeological purposes, while reconstructions of ancient landscapes or detection of anthropogenic remains are of prime interest. However, in most cases only few environmental variables are incorporated in the investigations, mainly because obtaining and developing useful geodata can be a very time consuming and costly issue. The growing demand for detailed knowledge about the environment poses a future challenge, since a better understanding of space and an enhanced analysis with supplementary environmental data input will offer more precise results.

It is the aim of our studies to show how geoscientific ground-truth and techniques can be adopted for detailed archaeological research using a comprehensive set of environmental parameters that might have influenced Bronze-Age settlement patterns. In contrast to conventional applications, which are generally based on digital elevation models (DEMs) and their derivatives, additional geoecological information (e.g. geological structures, hydrology, land-surface, geomorphology, vegetation) help to specify the results explicitly. The project focuses on the spatial distribution of Minoan communication paths as well as archaeological sites in Central Crete by applying a multi-method approach (surveying, land surface classification with satellite imagery, DEM analysis, least-cost analysis, candidate site detection, predictive modelling, etc.).

As demonstrated by the results, an already known but still imprecise and hypothetical Minoan road network in Central Crete, connecting Bronze-Age sites and serving as a linkage between the palatial centers and their surroundings, can now be visualised for the first time. With regard to the hidden and remote landscape of the Cretan Ida Mountains, which were barely considered in corresponding discussions so far, the ancient infrastructures reveal new insights in Bronze-Age mobility and land-use. Moreover, the detection of potential Minoan candidate sites and useful areas by RS applications opens up new perspectives for the archaeological understanding of Mount Ida during Mid- and Late Holocene. According to our findings, the region could have been intensively used for agri- and horticultural purposes, while explicit settlement locations can be pinpointed by the spatial analysis with GIS. Future archaeological work can therefore be significantly facilitated and accelerated by immediately surveying these sites.

Concerning RS and GIS, cooperation between Archaeology and Geosciences is still uncommon, but recent research points out the steadily increasing interest in this topic. In addition to geophysical, geochronological and geomorphologic collaboration, IT-based prospection is surely one of the most promising future tasks among pluridisciplinary archaeometrical or geoarchaeological research and offers promising prospects regarding landscape and settlement reconstructions.