Chapter 27
Aerial and Remote Sensing Archaeology

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ABSTRACT

New techniques and methodological procedures, which would allow at a short time and at low cost for the identification of a new archaeological site, were always in the interest of archaeologists. In this paper, aerial and remote sensing archaeology issues will be analyzed, both as measuring tools for the documentation of existing archaeological structures as well as tools of archaeology prospection, which are based on the appearance of the reflection of covered structures in images, i.e. the so-called marks.

AERIAL ARCHAEOLOGY

The first aerial photographs of known archaeological sites were made in the early 20th century by a balloon, with the photographs of the Roman Market excavations in Rome in 1899 by the archaeologist Giacomo Boni, and of the Stonehenge in southern England by Captain Sharpe (Guerra & Pilot, 2000; Driver, 2004; Bewley, 2003). Aerial photographs with a camera tied on the belly of a dove (Renfrew, 1996) took place in 1913 during excavations in Sudan by Sir Henry Wellcome.

The First World War marked the beginning of aerial archaeology, using the aircraft as a platform for air photographing of archaeological remains at Mount Sinai by German aviators.

During the 1920s the English archaeologist O.G.S. Crawford, founder of Aerial Archaeology, accidentally observed the formations of covered Celtic constructions in black and white aerial photographs of

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the Windmill Hill area (England). He was the first to suggest that the covered structures can be observed on aerial photographs, when the conditions permit it. In 1928, he conducted the first, extensive at that time, systematic aerial photography in the Wessex region, emphasizing on the ability of air identification and mapping of covered archaeological remains (Doneus, 1996; Bewley, 2003).

A covered monument can be a ‘’compact structure’’, e.g. the foundation of a building, or an ‘open structure’, for example an ancient trench. The interaction of covered monuments with the soil, or vegetation results in the appearance of traces. The types of traces and their intensity depend on the size, depth, and type of the covered monument, the air temperature, the soil, the amount of soil moisture, the type of soil coverage, the type of vegetation, the period and intensity of rainfall, etc. Therefore, different soil moisture and temperature, and, also, qualitative (height, density, color) and temperature difference in the vegetation are caused between the material covering the monument and the material on either side. These differences are recorded on aerial photographs, essentially revealing traces of covered structures (Figure 1).

In 1925, Antoine Poidebard, while presenting the identification of the ancient port in Lebanon, claimed that monuments at shallow depth beneath the sea can be detected in aerial photographs (Renfrew, 1996). In 1921-1922, Wells and McKinley mapped with the help of aerial photographs the monumental mounds of Cahokia near St. Louis (Illinois, USA). Reevers followed with the capture of vertical stereoscopic images in the same area. In 1930 new archaeological sites of the Mayas were identified from aerial photographs taken in Mexico by the Lindberghs (American Society for Photogrammetry and Remote Sensing, 1997).

After the Second World War systematic aerial archaeological researches were conducted both in Europe (mainly Italy, France, Austria, United Kingdom, Netherlands, Germany, Denmark, Sweden) and America (USA, Mexico, Canada) (American Society for Photogrammetry and Remote Sensing, 1997; Alvisi, 1963; American Society of Photogrammetry, 1983; Chevallier, 1963; Jalmain, 1963; Agache,

Figure 1. Anatomy of traces (Kaimaris, 2006)