

Space Archaeology: Attribute, Object, Task and Method

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Archaeology takes the material remains of human activity as the research object, and uses those fragmentary remains to reconstruct the humanistic and natural environment in different historical periods. Space Archaeology is a new branch of the Archaeology. Its study object is the humanistic-natural complex including the remains of human activities and living environments on the earth surface. The research method, space information technologies applied to this complex, is an innovative process concerning archaeological information acquisition, interpretation and reconstruction, and to achieve the 3-D dynamic reconstruction of cultural heritages by constructing the digital cultural-heritage sphere. Space archaeology's attribute is highly interdisciplinary linking several areas of natural and social and humanities. Its task is to reveal the history, characteristics, and patterns of human activities in the past, as well as to understand the evolutionary processes guiding the relationship between human and their environment. This paper summarizes six important aspects of space archaeology and five crucial recommendations for the establishment and development of this new discipline. The six important aspects are: (1) technologies and methods for non-destructive detection of archaeological sites; (2) space technologies for the protection and monitoring of cultural heritages; (3) digital environmental reconstruction of archaeological sites; (4) spatial data storage and data mining of cultural heritages; (5) virtual archaeology, digital reproduction and public information and presentation system; and (6) the construction of scientific platform of digital cultural-heritage sphere. The five key recommendations for establishing the discipline of Space Archaeology are: (1) encouraging the full integration of the strengths of both archaeology and museology with space technology to promote the development of space technologies' application for cultural heritages; (2) a new disciplinary framework for guiding current researches on space technologies for cultural heritages required; (3) the large cultural heritages desperately need to carrying out the key problems research of the theory-technology-application integration to obtain essential and overall scientific understanding of heritages; (4) focusing planning and implementation of major scientific programs on earth observation for cultural heritage, including those relevant to the development of theory and methods, technology combination and applicability, impact assessments and virtual reconstruction; and (5) taking full advantage of cultural heritages and earth observation sciences to strengthen space archaeology for improvements and refinements in both disciplinary practices and theoretical development. Several case studies along the ancient Silk Road were given to demonstrate the potential benefits of space archaeology.