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Research and support for knowledge transfer in the ATHENA Twinning project: Remote sensing for cultural heritage

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Abstract: This paper presents some of the outcomes of an on-going Horizon 2020 Twinning project, under the acronym ATHENA. The project aims to establish a “Remote Sensing Science Center for Cultural Heritage” in Cyprus. The Center foresees to support the current Cultural Heritage (CH) needs through the systematic exploitation of Earth Observation technologies. For the establishment of the center, the existing Remote Sensing and Geo-Environment Research Laboratory of the Eratosthenes Research Center (ERC) based at the Cyprus University of Technology (CUT), is twinned with internationally-leading counterparts from the EU, the National Research Council of Italy (CNR, through IMAA and IBAM) and the German Aerospace Centre (DLR). Through this network, the ATHENA twinning project strengthens the remote sensing capacity in cultural heritage at CUT’s ERC.

A core element within ATHENA is knowledge transfer, achieved primarily through intense training activities (including virtual training courses, workshops and summer schools) with an ultimate scope to enhance the scientific profile of the research staff and to accelerate the development of research capabilities of the ERC, as well as to promote Earth Observation knowledge and best practices intended for CH. Active and passive remote sensing data for archaeology, SAR for change and deformation detection, satellite monitoring for archaeological looting, integration of remote sensing data for protection and preservation of cultural are elaborated in these training activities.

The preservation of CH and landscape is today a strategic priority not only to guarantee cultural treasure and evidences of the human past to future generations, but also to exploit them as a strategic and valuable economic asset. This is an extremely important key factor for the countries which are owners of an extraordinary cultural legacy, that is particularly fragile due to its specific characteristics and specific risks at which CH is continuously exposed. Taking advantage of large-spatial coverage, high-spectral and sensitivity satellite remote sensing can be usefully adopted for contrasting looting. Satellite technologies offer a suitable chance to quantify and analyze this phenomenon, especially in several countries, from Southern America to Middle East, where the onsite surveillance is not much effective or non-practicable due to military or political restrictions. The training activities organized by CNR are focused on the characterization of the looting phenomenon from a multi-faced prospective. The training activities are focused on the use of high spatial resolution satellite and aerial optical images and Lidar acquisition to quantitatively assess looting. An overview of methodologies and data processing for the identification and quantification of looting features (using both single date and multi temporal satellite images and OBIA classifications) are discussed for several study areas.

The project's scope is to position the Centre internationally and stimulate future cooperation through placements at partner institutions and participation at international conferences as well as enhance the research and academic profile of all participants. The scientific strengthening and networking achieved in Cyprus through the ATHENA project could be of great benefit for the entire Eastern Mediterranean Region bearing a plethora of archaeological sites and monuments urgently calling for monitoring and safeguarding.

Keywords: Remote sensing; Cultural Heritage; Cyprus; ATHENA project