Along Silk Road: Earth observation and ICT for Cultural Heritage from Italian and Chinese perspectives.

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In the framework of the bilateral scientific cooperation programme between Italy and China a project financed by Italian of Ministry Affairs on Earth Observation and ICT for cultural heritage has been starting since 2013 with the participation of researchers of two Italian institutes of CNR, IBAM and IMAA, and of Centre for Earth Observation and Digital Earth of Chinese Academy of Sciences.

The aims of this project is to achieve advances in knowledge, methods and technologies to support a smart management of cultural sites which require constant monitoring activities to preserve their integrity by means of synergic Italian-Chinese research activities, training and exchanges of working experience in the field of remote sensing, geophysics, virtual reality and geomatics applied to Cultural Heritage.

During the three years of the project, a number of case studies in China and in Italy will represent the test areas to implement in a synergic way different remote sensing approaches from space-borne to airborne remote sensing (Lasaponara and Masini 2011, 2013; Masini and Lasaponara 2013), including UAV, up to geophysics and terrestrial survey methods with different aims, from site discovery to monitoring and management of cultural sites. The paper shows the preliminary results of three case studies in China. One is Luoyang in the western Henan province, located at the intersection of the Luo and Yi rivers, an area that was once considered the center of China. For this reason its territory more times hosted the capital during different dynasties. The first was built on 2070 BCE, during the Xia Dynasty. Another capital of Eastern Han Dynasty was found in 25 AD by Emperor Guangwu of Han. During the Eastern Han Dynasty Luoyang was the most important town of China, from the political, religious and cultural point of view. A few architectural monuments of this period are preserved, among them the White Horse Temple, built on preexisting structures of the first Buddhist temple in China founded in 68 AD. The last capital date back to 493 when the Northern Wei Dynasty moved its capital from Datong to Luoyang and started the construction of the rock-cut Longmen Grottoes. These grottoes are composed of more than 30,000 Buddhist statues sculptured in the rock which represent the second case study of the project. Finally, the third case study is the Silk road which is network of routes connecting the West and East and linking traders, merchants, pilgrims, monks, soldiers, from China to the Mediterranean Sea since the Han Dynasty (206 BC – 220 AD).

For the above mentioned case studies different approaches for the knowledge and conservation have been experiencing. For Luoyang case study the preliminary results of SAR interferometry aimed to assess subsidence phenomena will be presented. Structure for Motion has been applied to obtain 3d models of one of the famous Buddhas of Longmen. Finally, the processing of multiscale optical satellite imagery is bringing to light old routes of the Silk Road in the in Xinjiang region, nearby Kashgar, the westernmost city of China.

Reference
F. Chen, F. Gabellone, R. Lasaponara, G. Leucci, E. Rizzo, Remote Sensing and ICT for Cultural heritage from European and Chinese perspectives, CNR-STES, Potenza, 2013.
Lasaponara R., Masini N. 2013, Satellite Synthetic Aperture Radar in Archaeology and Cultural Landscape: An Overview. Archaeological Prospection, 20, 71-78, doi: 10.1002/arp.1452
Lasaponara R., Masini N. 2011, Satellite Remote Sensing in Archaeology : past, present and future, Journal of

Archaeological Science, 38(9), 1995–2002, doi:10.1016/j.jas.2011.02.002

Masini N., Lasaponara R. 2013. Airborne Lidar in Archaeology: Overview and a Case Study. In: Computational Science and Its Applications – ICCSA 2013, Lecture Notes in Computer Science Volume 7972, 2013, pp 663-676, doi: 10.1007/978-3-642-39643-4_48, ISSN: 0302-9743, Springer Berlin Heidelberg