Geophysical Research Abstracts
Vol. 13, EGU2011-8113, 2011
EGU General Assembly 2011

LiDAR, Aerial and satellite remote sensing in Vignale

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Since 2007, two institutes of CNR from Italy (IMAA and IBAM) and the Institute of Swedish Classic Studies of Rome, have starting to carry out a multidisciplinary investigation, in the territory of Blera (Northern Lazio, Italy) characterized by a long human frequentation and in particular by several archaeological sites related to Etruscan civilization [1].
The Swedish-Italian project is aimed to verify, locate and spatially characterize Etruscan remains on the Vignale plateau near the ancient site of San Giovenale, and to study them in a landscape-archaeological perspective.
The project is strongly based on the contribution of remotely sensed data such as: i) satellite imagery; ii) digital terrain models (DTMs) derived from LiDAR survey; iii) aerial infrared thermographical images; iv) near infrared and conventional photographs, the latter two captured from a modified ultra-light airplane, flown by the team itself; v) historical aerial photographs.
Satellite imagery at very high and medium resolution (QuickBird and Aster images, respectively) allowed us to analyze the landscape and to identify potential sites of archaeological interest, by exploiting the synoptic view and the multispectral resolution of such data. The satellite data are also the georeferenced maps for locating and studying, by means of methods of spatial analysis, archaeological findings, sites and anomalies identified by using the rich aerial and satellite data set.
LiDAR survey has been carried out in order: to overcome the limits of optical imagery [2], such as over all, the dense vegetation which covers a large area of Vignale plateau: i) thus preventing to investigate potential cultural site by using the aerial and satellite photos, and ii) restricting the land-survey. Moreover, the very high spatial resolution of DTMs derived from LiDAR survey allowed us to observe and analyze microrelief, thus discriminating those microrelief related to geomorphological factors from those of possible cultural interest [2].
The availability of an ultra-light airplane allowed us to capture several images with different view angles and heights the Vignale plateau, by using on board infrared thermocamera and digital photographic equipment, able to take near infrared- and conventional photographs.
The integration of the various data set, enabled the identification of a number of unknown structures, some of them have been verified by land survey.

Reference:

[1] Y. Backe Forsberg , R. Holmgren, A. Lanorte, R. Lasaponara, N. Masini, Airborne and satellite Multi-spectral imagery at the Etruscan site of San Giovenale, Blera (Lazio) – Preliminary results, in Advances in Remote Sensing for Archaeology and Cultural Heritage Management, R. Lasaponara & N. Masini (Eds), Aracne, Roma, 2008, ISBN: 978-88-548-2030-2 , pp. 225-228.
[2] R. Lasaponara, N. Masini, Full-waveform Airborne Laser Scanning for the detection of medieval archaeological microtopographic relief, Journal of Cultural Heritage, 10S (2009), pp. e78–e82 [doi:10.1016/j.culher.2009.10.004]