The Culture 2000 training school in Italy: images and locations. Preliminary results

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The opportunity to develop a project in oblique photography based on landscape surveys has been introduced during ninety-nine in the occasion of XI International School in Archaeology[1]. Anticipating the imminent modification of Italian law regarding the aerial photo and filming activities on the Italian territory[2], we discussed the possibility of organizing a course in Siena about oblique aerial photography, with Chris Musson, aerial archaeologist of English Heritage[3]. In the spring of two thousand, we have carried out the first aerial surveys with Chris Musson, Otto Brasch and Darja Grosman. In this occasion we wanted directly verify some potentials and limits of oblique landscape photography in Tuscany. In the spring of two thousand one, it has been carried out in Siena, the first Italian Aerial Archaeology Research School, attended by twenty one students coming from the whole Italy, engaged in the fields of research, protection and planning of the landscape. Besides instruction, the objective of the school was to start the construction of an archive of oblique photography for a census of the Tuscany archaeological heritage.

During the week of aerial surveys, we released, in one hundred twenty eight hours of flight, five thousand five hundred ten photos and tree hours of films. A remarkable quantity of documentation that increased the problem, already present in the Siena Department of Archaeology[4], of the management of the remote sensed data and the relative alphanumeric information.

The school and the future perspectives of an aerial photography project in the whole Tuscany, were a strong incentive to develop a system of management of the remote sensed data that could be completely integrated in the powerful LIAAM's archaeological data management system[5] (*Fig. 1*). The conceptual and logical planning of the system, has been developed by the author and by Lorenzo Bianchini[6].

Our job has been set up on the structure of the system. The first step was the systematic scan of all the photography taken during the school[7]. Subsequently we have inserted the images and films in a multimedia database. The chosen software solution, Canto Cumulus, is quite interesting. It concurs to create extensive catalogues of images and other media data in general, apparently without record limits. This software allows building a system of hierarchized and thematic categories that help to order the elements under characteristics of their own content. The files are equipped with previews of variable dimension and associated with a descriptive space (*Fig. 2*).

At the same time, every series of frames, on the base of the acquired GPS data during the flights, has been placed in GIS environment. In this phase of the work the availability of detailed maps represent the main assumption for the correct localisation of frames and then to pass from frames series of the same site to the site[8].

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[1] CAMPANA, FORTE, 2001.

[2] Gazzetta Ufficiale, Serie Generale, 141, 289, 12 December 2000, Roma.

[3] DRIVER, MUSSON, 2000, pp. 51-54.

[4] About this subject, is enough to think about the project *Hill Fort of Tuscany*, that counts more than 5000 anomalies taken from vertical aerial photography; FRANCOVICH, GINATEMPO, 2000.

[5] About the system developed by the Laboratory of Information Technology Applied to Medieval Archaeology (LIAMM); FRANCOVICH, 1999, pp.45-61; VALENTI, 1999, pp.61-62.

[6] BIANCHINI, *The Cataloging of the Survey data: the representation through GIS and DBMS. An integral suggestion for data recording in the Knowledge of the territory*.

[7] This work has been carried out by Enrico Donati.

[8] DOLATOWSKA, GOLIASZ, 1999, pp.41-42.

Fig.1 – Organisation of the data and relationship with the Information Management System of the LIAAM
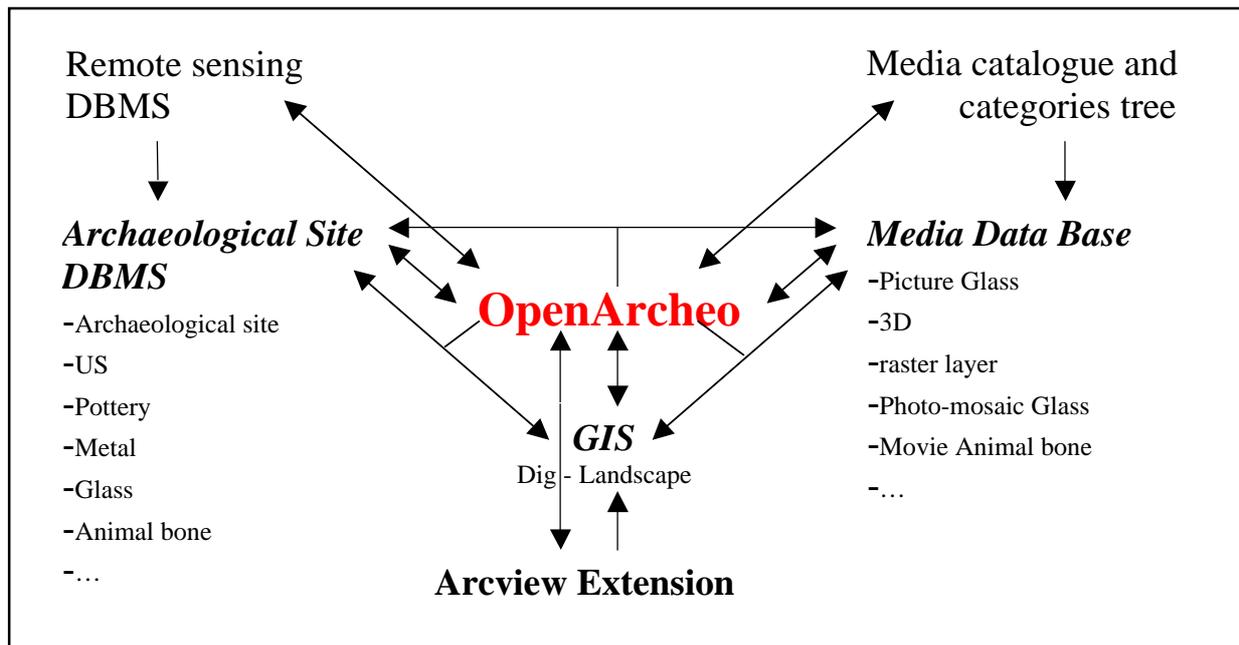
We have 616 marker altogether that correspond to 281 archaeological sites in Tuscany and a not still yet specified number of sites distributed in Lazio, Abruzzo and Umbria. The main problem to work on these regions is typically Italian, to lead back, first of all, at the bureaucratic difficulties in obtaining technical cartography. Secondary, the absence of diachronic archaeological maps, concur to a rapid comparison between well-known sites and oblique photos.

Fig.2 – The interface of Canto Cumulus media catalogue: pictures, movies and thematic categories
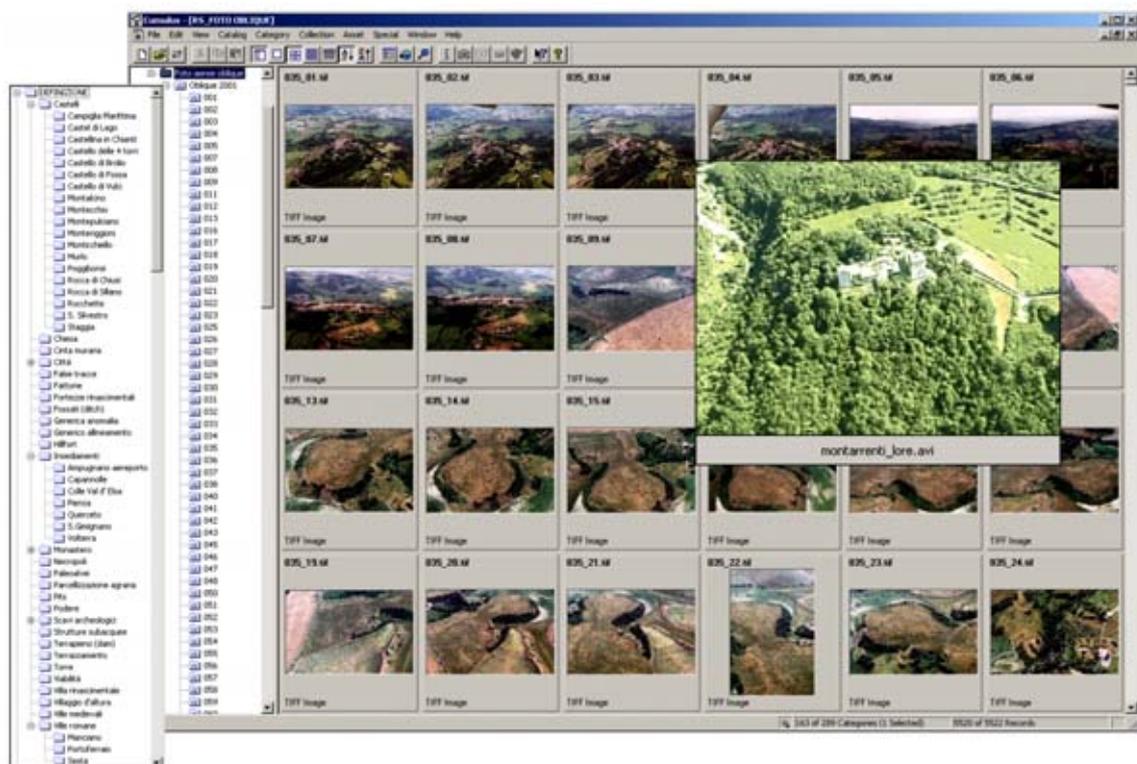
In Tuscany the situation is more favourable. The Chair of Medieval Archaeology of Siena, is involved in projects of archaeological cartography since twenty years, so we could rely on a most precise and updated census of the archaeological resource, regarding the whole Tuscany[9]. The comparison between the known archaeological data and oblique photos was obtained in the archaeological GIS, supported by the control of correspondence between images and cartographic elements. At this stage of the work, we dedicated ourselves in locate the images, creating a point layer but we foresee the rectification and mapping quite soon.

With a first comparison with the archaeological GIS of the Department of Archaeology, that counts more than 9000 sites, on 280 sites catalogued, 132 of them result never discovered before (*Fig. 3*).

The first observation is rather obvious. The area characterized with the largest amount of new sites is the Valdichiana, that substantially corresponds at the less studied area, observing the low number of sites known before the school. A more interesting observation is that only 19 sites (14%) out of 132 are inside the fieldwalking sample areas. If this trend will be confirmed, in the future aerial survey will represent a solution for the knowledge of the non-sample areas improving the impact our research and consequently the possibilities of heritage conservation.

The preliminary interpretation of the sites gives a significant contribution to the research for the knowledge of the settlements patterns and the roads systems. In this way the trend is growing up, if we consider the 66% of the new sites are generically defined as cropmarks, soilmarks and unidentified traces (*Fig. 4*).
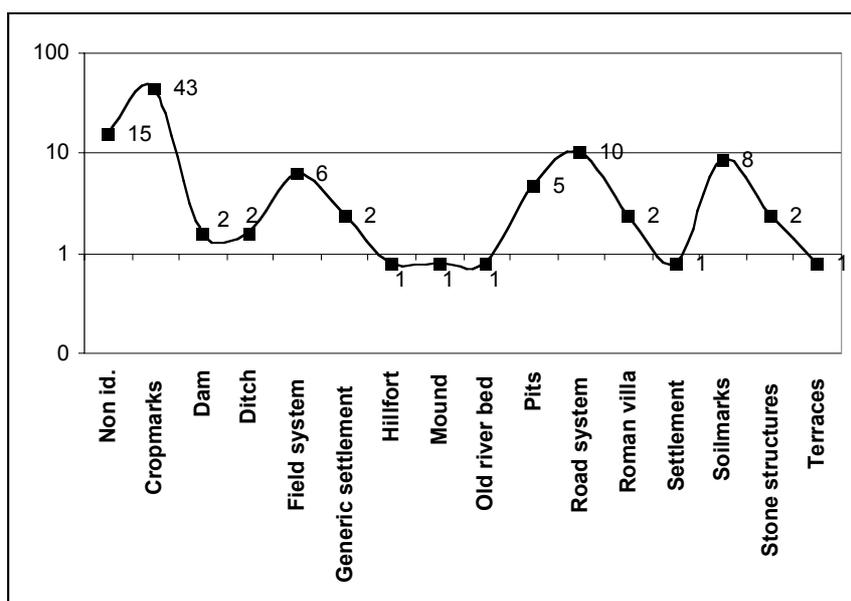
Notwithstanding our work with oblique is just at the beginning and the individual anomalies might still be confirmed in the field, the experience of aerial archeological has been, as a whole, positive.

Fig. 3 – Distribution of anomalies in the landscape

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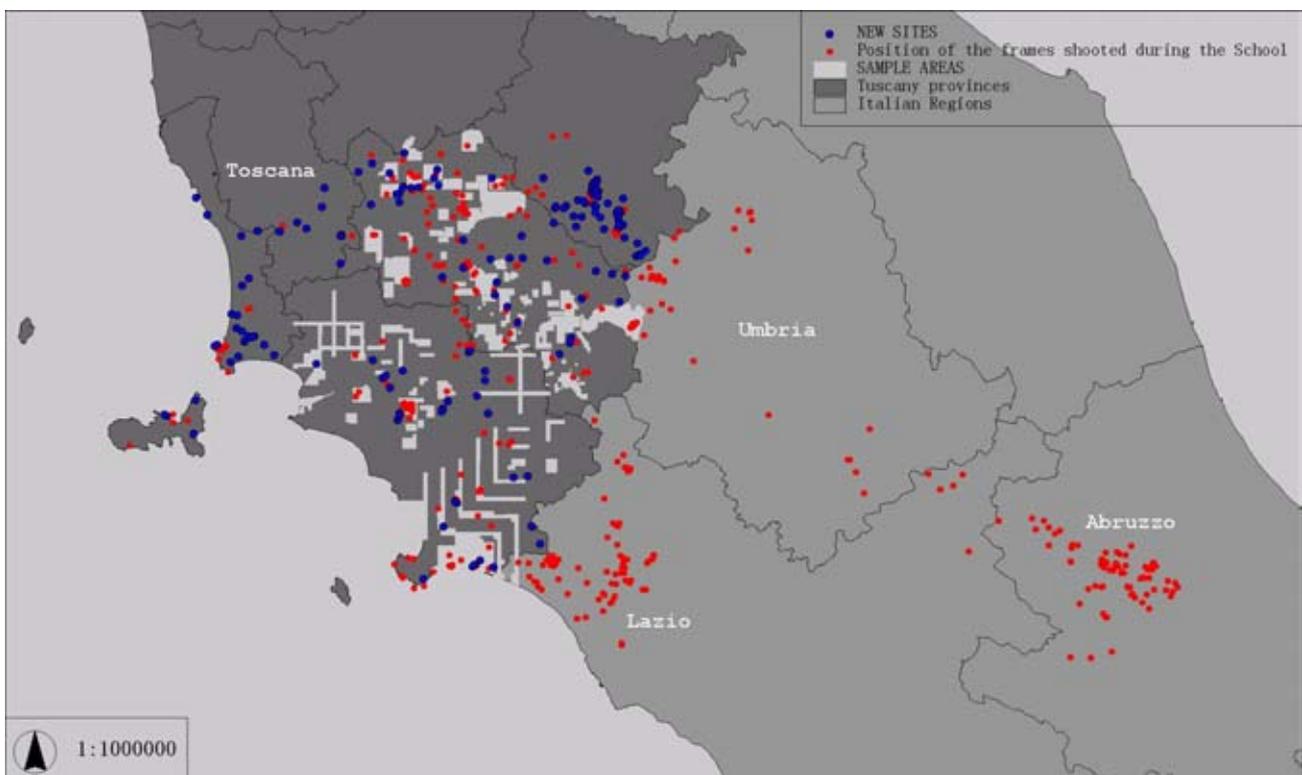
[9] FRANCOVICH, VALENTI, 2001, pp.83-116.

Fig. 4 – Diagram of features distribution

Among the purposes we would like to achieve in 2002, one is the publication of the whole photographic archive in the Internet.

Altogether the results are significantly, allowing the identification of a large sum of new sites, the monitoring of well-known sites, and last but not least, the achievement by the department of the know-how to proceed independently. About this last observation another purpose we are working about is the developping of a systematic project of aerial photo mapping in Tuscany.

Fig. 5 – Some examples of new sites detected during the Aerial Archaeology Research School: a-b) roman villa, c) necropolis, d) hillfort, e) road.
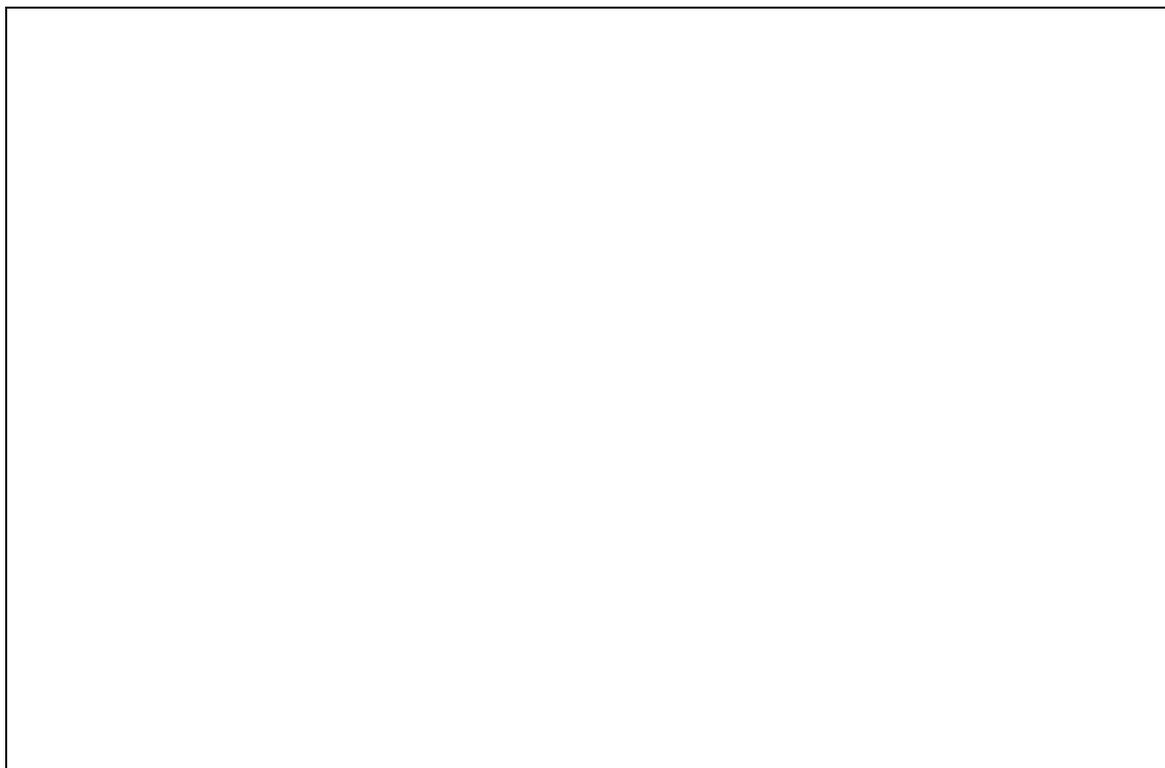
The introduction of the oblique method to the projects of Siena University on landscape, refined by aerial vertical photography and high resolution satellite images, creates a system of modular prospecting, which, from the synoptic precision of the area of investigation, through a series of steps, arrives ultimately to a level of detailed definition of the object. Besides having multiple scales, the system place multiple time sequences and multispectral data at our disposal.

Besides the encouraging results that have emerged by preliminary interpretation of oblique pictures, it should be said that the only research strategy effective in a landscape context such as Tuscany is working with various instruments. In particular we use vertical photography for its historical value, oblique photography for the high-resolution and exceptional results in any season of the year, satellite images for the multispectral dimensions and the continuity of depiction[10].

The contribution that the integration of these data management GIS and compared or merged with other flat information (technical, tematic and historical cartography, digital elevation models of the landscape) can give to archaeological research, can't be dismissed. Digital graphical reconstruction and the creation of a hierarchy for this information constitute a partial reconstruction of a dynamic model for the archaeological landscape. This represents the destination of our search but also is a new database for whole spatial analysis of buried networks distribution.

Fig. 6 – Summary showing the research methodology

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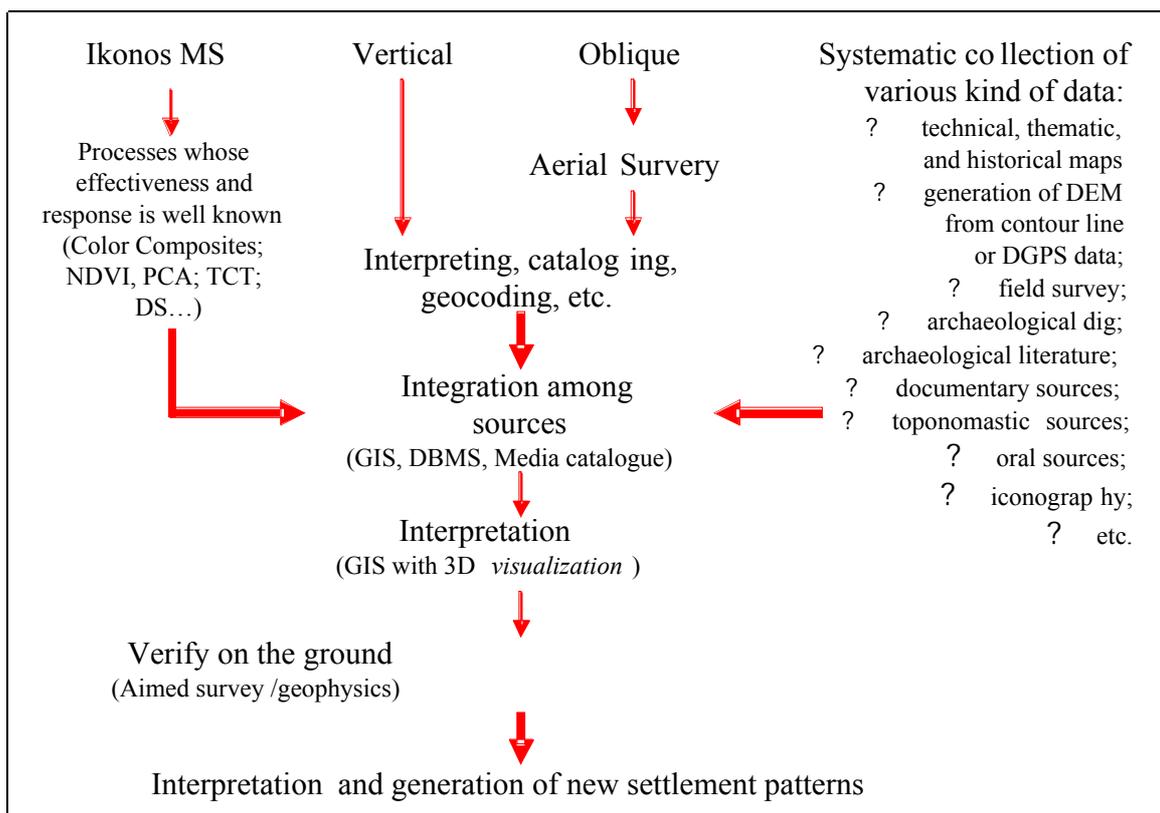
[10] CAMPANA, 2002, cs.; CAMPANA, FRANCOVICH, 2002, cs.

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