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# Multispectral thermal airborne TASI-600 data to study the Pompeii (IT) archaeological area

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The management of archaeological areas refers to the conservation of the ruins/buildings and the eventual prospection of new areas having an archaeological potential.
In this framework, airborne remote sensing is a well-developed geophysical tool for supporting the archaeological surveys of wide areas. The spectral regions applied in archaeological remote sensing spans from the VNIR to the TIR. In particular, the archaeological thermal imaging considers that materials absorb, emit, transmit, and reflect the thermal infrared radiation at different rate according to their composition, density and moisture content.
Despite its potential, thermal imaging in archaeological applications are scarce. Among them, noteworthy are the ones related to the use of Landsat and ASTER [1] and airborne remote sensing [2, 3, 4 and 5].
In view of these potential in Cultural Heritage applications, the present study aims at analysing the usefulness of the high spatial resolution thermal imaging on the Pompeii archaeological park. To this purpose TASI-600 [6] airborne multispectral thermal imagery (32 channels from 8 to 11.5 nm with a spectral resolution of 100nm and a spatial resolution of 1m/pixel) was acquired on December the 7th, 2015.
Airborne survey has been acquired to get useful information on the building materials (both ancient and of consolidation) characteristics and, whenever possible, to retrieve quick indicators on their conservation status. Thermal images will be, moreover, processed to have an insight of the critical environmental issues impacting the structures (e.g. moisture).
The proposed study shows the preliminary results of the airborne deployments, the pre-processing of the multispectral thermal imagery and the retrieving of accurate land surface temperatures (LST). LST map will be analysed to describe the thermal pattern of the city of Pompeii and detect any thermal anomalies.
As far as the ongoing TASI-600 sensors pre-processing, it will include:
(a) radiometric calibration of the raw data by using the RADCORR software provided by ITRES (Canada) and the application of a new correction tool for blinking pixel correction, developed by CNR (Italy);
(b) atmospheric compensation of the TIR data by applying the ISAC (In-Scene Atmospheric Compensation) algorithm [7];
(c) Temperature Emissivity Separation (TES) according to the methods described by [8] to obtain a LST map.
The obtained preliminary results are encouraging, even though, suitable integration approaches with the classical geophysical investigation techniques have to be improved for a rapid and cost-effective assessment of the buildings status. The importance of this study, moreover, is related to the evaluation of the impact of the unmanned aerial vehicles (UAVs) imaging in the Conservation of Cultural Heritage that can provide: i) low cost imaging; ii) very high spatial resolution thermal imaging.

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