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The multispectral thermal airborne TASI-600 survey to map serpentinites outcrops in the San Severino area (Italy): preliminary results.

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The mapping of the serpentinites rocks formations could be of extreme interest to the public Authorities because these outcrops contains natural occurring asbestos (NOA) minerals such as chrysotile, tremolite and actinolite, which are minerals with a high potential hazard to human health. The weathering of serpentines outcrops causes the dispersion of asbestos fibers into the environment that, when inhaled, can lead to lung cancer. In Italy, serpentinites and ultramafic rocks are common in the Alps and Apennines Mountains and in particular in the Liguria, Toscana, Piemonte, Calabria and Basilicata regions.
In the framework of the BRIC 2016-2018 research activities supported by the Italian “Istituto Nazionale Assicurazione contro gli Infortuni sul Lavoro”, the research contract (ID57/2016) deals with the exploitation of the different sensing technologies from proximal to remote (from airborne to satellite) and processing methodologies to detect both manmade materials containing asbestos and NOA.
The peculiar asbestos characteristics spectral features can be found at about 1.385 μm, 2.323 μm and at about 9.6 μm in the LWIR spectral range. While the NIR and SWIR spectral regions have been well explored with the available imaging systems both by airborne (configured with either multispectral or hyperspectral payloads) or high-resolution spaceborne sensors, the LWIR spectral range, has been less investigated for the detection of the asbestos minerals group. The LWIR spectral range is very promising because of the lack of the adjacency of other specific spectral features of the minerals normally associated with the building material containing asbestos (e.g., asbestos cement) and minerals (e.g. limestone). In the literature, an example of retrieving materials occurring asbestos (roof shields) with LWIR spectral range is reported in the work of Bassani et al. (2007).
Thus, to allow the exploitation of the LWIR spectral range potential for the detection and identification of the asbestos cement material (mainly roof shield) and NOA, an airborne survey has been carried out with the airborne hyperspectral TASI-600 sensor acquiring 32 spectral bands in the LWIR spectra range. The stripes acquired cover the area of San Severino Lucano in the Basilicata Region (Italy), an area of about 80 km2 with 25 flight lines at an altitude of 900-1000 above ground. The survey will acquire images with a spatial resolution of 1m/pixel and 32 channels from 8.0 to 11.5 μm with a spectral resolution of 100nm. The survey covered the ophiolitic rocks and the Plio-quaternary sediments outcrops of the ophiolites, which are associated with fragments of continental crust rocks, which can provide information about the geodynamic evolution of the ophiolites.
This communication will present the multispectral LWIR TASI survey performed on the San Severino area in terms of: (i) flight plan and the images quick looks; (ii) data pre-processing for radiometric and geometric correction and its accuracy; (iii) retrieving of LST by using a split window technique and (iv) a preliminary map of the serpentinites outcrops of the area validated with the available geologic map.