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The use of Remotely Piloted Aircraft Systems for the Innovative Methodologies in thermal Energy Release monitoring

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Last years have been characterized by a fast development of Remotely Piloted Aircraft Systems which are becoming cheaper, lighter and more powerful. The concurrent development of high resolution, lightweight and energy saving sensors sometimes specifically designed for air-borne applications are together rapidly changing the way in which it is possible to perform monitoring and surveys in hazardous environments such as volcanoes.
An example of this convergence is the new methodology we are currently developing at the INGV-Osservatorio Vesuviano for the estimation of the thermal energy release of volcanic diffuse degassing areas using the ground temperatures from thermal infrared images. Preliminary experiments, carried out during many-years campaigns performed inside at La Solfatara crater by using thermal infrared images and K type thermocouples inserted into the ground at various depths, found a correlation between surface temperature and shallow gradient.
Due to the large extent of areas affected by thermal anomalies, an effective and expedite tool to acquire the IR images is a RPAS equipped with high-resolution thermal and visible cameras. These acquisitions allow to quickly acquire the data to produce a heat release map. This map is then orthorectified and geocoded in order to be superimposed on digital terrain models or on the orthophotogrammetric mosaic obtained after processing photos acquired by RPAS.
Such expedite maps of heat flux, taking in account accurate filtering of atmospheric influence, represents a useful tool for volcanic surveillance monitoring purposes.
In order to start all the activities of these drones we had to acquire all necessary permissions required by the complex Italian normative.