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Observations of volcanic hotspots with TET-1

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The most important source of uncertainties in thermal monitoring of active volcanoes from space stems from the lack of dedicated satellite instruments. Considering the currently available technology, we usually have to make a compromises between spatial and temporal resolution – if the data is available at high temporal resolution (from geostationary instruments), it is impossible to provide high spatial resolution data. The most promising solution seems to be a constellation of small satellites, for they can provide data at high spatial resolution and provide a short revisit time as there is a high number of satellites in the constellation. It is also difficult to provide narrow spectral channels at high radiometric accuracy for monitoring high and low temperatures at the same time. Instruments designed for meteorological applications are usually used in remote sensing of volcanic thermal anomalies. These instruments contain a mid-infrared channel, which provides crucial data for monitoring active volcanoes. However, the settings of meteorological instruments are optimized for monitoring low temperatures, which results in often saturated data over active volcanoes.
The volcanological community can partially overcome the gap between the available meteorological satellites and its requirements with the small satellite TET-1 German abbreviation for “Technologie-Erprobungsträger 1” meaning Technology Experiment Carrier). TET-1 is the first satellite within the FireBird constellation. This consists of two small satellites which are predominantly dedicated to investigating high temperature events. They were built and are operated by the German Aerospace Center. TET-1 was launched in June 2012. Here we present the first results obtained from TET-1 data. The data were retrieved over several volcanoes: Etna, Stromboli, Bárdarbunga, etc. We show that using TET-1 data, it is possible to better constrain the time averaged lava discharge from other satellite data sources.