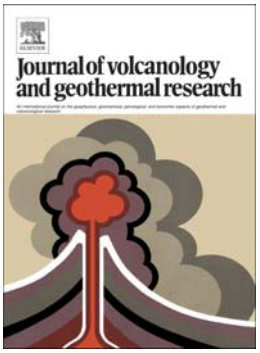

Temporal radiative heat flux estimation and alteration mapping of Tendürek volcano (eastern Turkey) using ASTER imagery

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Temporal radiative heat flux estimation and alteration mapping of Tendürek volcano (Eastern Turkey) using ASTER imagery

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Abstract

Tendürek volcano is a polygenetic, basaltic shield volcano formed by successive alkaline basalt flows. It is one of the youngest volcanoes of Turkey; both historical and Holocene activities have been reported for the volcano. Continuous hydrothermal and fumarole activity has been observed on the twin summit craters located 4.5 kilometres apart. ASTER daytime and nighttime satellite imagery acquired between 2001 and 2014 are used to calculate surface temperature, surface temperature anomaly and relative radiative heat flux from the craters to determine a base value for the current thermal emission.

Surface temperature and surface temperature anomaly calculations yield a heat flux between 14.4 and 35.5 W/m^2 at the western crater and between 7.72 and 28.3 W/m^2 at the eastern crater. These values are well-correlated with other known low-level activity volcanoes. The annual and long term consistency of the thermal pattern is investigated. The location and extent of surficial hydrothermal alteration within and surrounding the Tendürek craters is identified by band ratioing and indexing using ASTER visible through shortwave infrared bands. Spectral identification of gypsum, hydroxides, sulfates, hydrated sulfates and clay mineralisation indicates pervasive acid-sulfate alteration due to the activity of fumarole vents around Tendürek craters.