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Insight on the results of three different correlation analyses between satellite TIR anomalies and earthquake occurrence

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In order to evaluate the potentiality of the parameter “RST-based satellite TIR anomalies” in relation with earthquake ($M \geq 4$) occurrence, in recent years we performed three long-term statistical correlation analyses on different seismically active areas, such as Greece (Eleftheriou et al., 2016), Italy (Genzano et al., 2020), and Japan (Genzano et al., 2021).

With this aim, by means of the RST (Robust Satellite Techniques; Tramutoli, 1998, 2007) approach we analysed ten-year time series of satellite images collected by the SEVIRI sensor (on board the MSG platforms) over Greece (2004-2013) and Italy (2004-2014), and by the JAMI and IMAGER sensors (on board the MTSAT satellites) over Japan (2005-2015). By applying empirical spatial-temporal rules, which are established also taking account of the physical models up to now proposed to explain seismic TIR anomaly appearances, the performed long-term correlation analyses put in relief that a non-casual relation exists between satellite TIR anomalies and the occurrence of earthquakes.

At the same time, in the carried out studies we introduced and validated refinements and improvements to the RST approach, which are able to minimize the proliferation of the false positives (i.e. TIR anomalies independent from the seismic sources, but due to other causes such as meteorological factors).

Here, we summarize the achieved results and discuss them from the perspective of a multi-parameter system, which could improve our present knowledge on the earthquake-related processes and increase our capacity to assess the seismic hazard in the medium-short term (months to days).

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