



MSG/SEVIRI, NOAA/AVHRR and EOS/MODIS TIR observations during the Abruzzo 6 April 2009 earthquake (ML~ 5.8)

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Space-time fluctuations of Earth's emitted Thermal Infrared (TIR) radiation have been observed from satellite months to weeks before earthquakes occurrence. Different authors, in order to explain the appearance of anomalously high TIR records near the place and the time of earthquake occurrence, attributed their appearance to the increase of green-house gas (such as CO₂, CH₄, etc.) emission rates, to the modification of ground water regime and/or to the increase of convective heat flux.

In this contest, an approach called Robust Satellite Techniques (RST) has been proposed in order to discriminate normal (i.e. related to the change of natural factor and/or observation conditions) TIR signal fluctuations from anomalous signal transient possibly associated to earthquake occurrence. In the past RST was already tested in the case of tens of earthquakes with a wide range of magnitudes (from 4.0 to 7.9) occurred in different continents and in various geo-tectonic setting (e.g. 1980 Irpinia-Basilicata earthquake; Izmit earthquake, 17 August 1999; Hector Mine earthquake, 16 October 1999, etc.).

The RST analysis is based on a statistically definition of "TIR anomalies" and a suitable method for their identification even in very different local (e.g. related to atmosphere and/or surface) and observational (e.g. related to time/season, but also to solar and satellite zenithal angles) conditions, and has been always carried out by using a validation/confutation approach, to verify the presence/absence of anomalous space-time TIR transients in the presence/absence of seismic activity.

In this work the same approach is applied to the case of Abruzzo 6 April 2009 event (ML=5.8) and compared with an identical analysis (confutation) performed in seismically unperturbed years. RST analysis was performed on a historical data set made of 30 years of contemporary observations done by 3 independent satellite systems (5 years of MSG/SEVIRI, 15 years of NOAA/AVHRR and 10 years of EOS/MODIS). The results shown significant (space-time persistent) TIR anomalies in some space-time correlation with the Abruzzo 6 April earthquake (starting few hours before to main foreshock on March 30) and the other main earthquakes occurred in Italy in the considered period. No similar anomalies have been observed in the confutation step.