Geophysical Research Abstracts
Vol. 21, EGU2019-16572, 2019
EGU General Assembly 2019

On the use of RST approach to identify TEC and TIR variations at time of L'Aquila earthquake (6 April 2009; Mw 6.3)

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Different parameters (chemical, physical, biological, etc.) have been associated to the complex process of preparation of earthquakes. Among these, also the fluctuations of Earth's thermally emitted radiation, as measured by sensors on board of satellite system operating in the Thermal Infra-Red (TIR) spectral range, and anomalous variations of ionospheric electron content (TEC) and ion densities have been proposed, since long time, as possible indicators of an impending earthquake.
Since 2001, the general change detection approach RST (Robust Satellite Techniques; Tramutoli, 1998; 2005; 2007) has been used to discriminate anomalous thermal signals, possibly associated to seismic activity, from normal fluctuations of Earth's thermal emission related to other causes (e.g. meteorological) independent on the earthquake occurrence.
Being based on a statistical definition of anomalies and on 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 the time/season or satellite view angles) conditions, and thanks to its full exportability on different satellite packages, the RST methodologies could be applicable also to TEC measurements recorded by the GPS satellite constellation, in order to discriminate anomalous signals from normal fluctuations of the signal itself.
In this work, RST approach has been reformulated in order to be applicable to the TEC measurements. To this aim, more than six years (since 2003 up to 2009) of TEC measurements collected over Italy have been analyzed to study the preparatory phases of the L'Aquila earthquake (6 April 2009 Mw 6.3).
Achieved results will be discussed and compared with TIR anomalies detected in the same period by using independent RST analyses carried out over Italian peninsula by Genzano et al., 2009 (using MSG/SEVIRI TIR data), Lisi et al., 2010 (using NOAA/AVHRR TIR data) and Pergola et al., 2010 (using EOS/MODIS TIR data), in order to evaluate the impact of the joint use of both parameters (TIR and TEC) in the framework of a multi-parametric approach to time-Dependent Assessment of Seismic Hazard (t-DASH).