On the use of SSTAs (Significant Sequences of TIR Anomalies) to activate Natural Time Analysis: a long term study on earthquakes (M>4) occurred in Greece during 2004-2013

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Real-time integration of independent observations is expected to significantly improve our present capability of dynamically assess Seismic Hazard. Specific observations (e.g. anomaly in one parameter) can be used as a trigger (and/or to establish space/time constraints) for activating (implementing) the analysis on other independent parameters (e.g. b-value computation, Natural Time Analysis, on seismic data) whose systematic computation could result otherwise very computationally expensive or operationally impossible. In the present paper one of these parameters (the Earth's emitted radiation in the Thermal Infra-Red spectral region) has been used to activate the application of Natural Time Analysis of seismic data in order to verify possible improvements in the forecast of earthquakes (with M$\geq$4) occurred in Greece during 2004-2013. The RST (Robust Satellite Technique) data analysis approach and RETIRA (Robust Estimator of TIR Anomalies) index were used to preliminarily define, and then to identify, Significant Sequences of TIR Anomalies (SSTAs) in 10 years (2004-2013) of daily TIR images acquired by the Spinning Enhanced Visible and Infrared Imager (SEVIRI) on board the Meteosat Second Generation (MSG) satellite. A previous paper showed that in the same period of time more than 93% of all identified SSTAs occurred in a pre-fixed space-time window around earthquakes time (30 days before up to 15 after) and epicenter (within 150 km or Dorbrovolsky distance) with a false positive rate smaller than 7%. In this paper a circular area around the barycenter of the observed Thermal Anomalies (and not just the convolution of them) has been used to define the area from which to collect seismic data required for Natural Time Analysis. Fifteen days prior the date of the first observed Significant Thermal Anomaly (STA) was the starting time used for collecting earthquakes from the catalog. The changes in the quality of earthquake forecast that were achieved by using each individual parameter in different configurations as well as the improvement emerging by their joint use of them will be presented referring to the 10 years studied period and to several recent events occurred in Greece.