



Retrospective forecast of ETAS model with daily parameters estimate

Giuseppe Falcone (1), Maura Murru (1), Rodolfo Console (1,2), Warner Marzocchi (1), and Jiancang Zhuang (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Italy, (2) Center of Integrated Geomorphology for the Mediterranean Area, Italy, (3) The Institute of Statistical Mathematics, Japan

We present a retrospective ETAS (Epidemic Type of Aftershock Sequence) model based on the daily updating of free parameters during the background, the learning and the test phase of a seismic sequence. The idea was born after the 2011 Tohoku-Oki earthquake. The CSEP (Collaboratory for the Study of Earthquake Predictability) Center in Japan provided an appropriate testing benchmark for the five 1-day submitted models. Of all the models, only one was able to successfully predict the number of events that really happened. This result was verified using both the real time and the revised catalogs. The main cause of the failure was in the underestimation of the forecasted events, due to model parameters maintained fixed during the test. Moreover, the absence in the learning catalog of an event similar to the magnitude of the mainshock ($M9.0$), which drastically changed the seismicity in the area, made the learning parameters not suitable to describe the real seismicity. As an example of this methodological development we show the evolution of the model parameters during the last two strong seismic sequences in Italy: the 2009 L'Aquila and the 2012 Reggio Emilia episodes. The achievement of the model with daily updated parameters is compared with that of same model where the parameters remain fixed during the test time.