Short- and Long-Term Earthquake Forecasts Based on Statistical Models

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The epidemic-type aftershock sequences (ETAS) models have been experimentally used to forecast the space–time earthquake occurrence rate during the sequence that followed the 2009 L'Aquila earthquake and for the 2012 Emilia earthquake sequence. These forecasts represented the two first pioneering attempts to check the feasibility of providing operational earthquake forecasting (OEF) in Italy.

After the 2009 L'Aquila earthquake the Italian Department of Civil Protection nominated an International Commission on Earthquake Forecasting (ICEF) for the development of the first official OEF in Italy that was implemented for testing purposes by the newly established "Centro di Pericolosità Sismica" (CPS, the seismic Hazard Center) at the Istituto Nazionale di Geofisica e Vulcanologia (INGV). According to the ICEF guidelines, the system is open, transparent, reproducible and testable. The scientific information delivered by OEF-Italy is shaped in different formats according to the interested stakeholders, such as scientists, national and regional authorities, and the general public. The communication to people is certainly the most challenging issue, and careful pilot tests are necessary to check the effectiveness of the communication strategy, before opening the information to the public.

With regard to long-term time-dependent earthquake forecast, the application of a newly developed simulation algorithm to Calabria region provided typical features in time, space and magnitude behaviour of the seismicity, which can be compared with those of the real observations. These features include long–term pseudo-periodicity and clustering of strong earthquakes, and a realistic earthquake magnitude distribution departing from the Gutenberg-Richter distribution in the moderate and higher magnitude range.