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Mt. Etna seismicity (1988-2010): evidence of the space-time evolution of seismic activity

Salvatore Alparone, Salvatore D'Amico, Vincenza Maiolino, and Andrea Ursino
Istituto Nazionale di Geofisica e Vulcanologia - Sezione di Catania, Italy

Mt. Etna, one of the most monitored active basaltic volcanoes in the world, is characterized by an important volcanic and seismic activity. It is located in eastern Sicily in a complex geodynamic framework, where the main regional tectonic structures play a key role in the dynamic processes of the volcano. Mt. Etna seismicity occurs with a high rate of earthquakes of low and moderate magnitudes which, sometimes, because of the extreme shallowness of the source, causing damages to cities and villages close to epicentral area. Systematic monitoring of seismic activity of Mt. Etna has made since 1988 by a local permanent seismic network, which over time has been subject several improvements. The first network configuration consisted of about 10 analog stations with short period sensors managed by the Istituto Internazionale di Vulcanologia (IIV-CNR). In 1994, a seismic network consisting of about 40 stations (with short period analog sensors) was installed on Mt. Etna in the Poseidon Project. In 2001, the seismic networks managed by the IIV-CNR and the Poseidon project joined in the Istituto Nazionale di Geofisica e Vulcanologia (INGV). Now the seismic network, consisting of about 50 digital stations equipped with three components broadband sensors, is managed by INGV - Sezione di Catania.
In the period 1988-1999, the catalog of earthquakes is composed of about 2000 events with a threshold of magnitude completeness equal to 2.0, from 1999-to present it contains about 6000 earthquakes with a threshold of magnitude completeness equal to 1.5.
In this work, we present the predominant characteristics of Mt. Etna seismicity during the last 20 years, with more detail about the spatial-temporal distribution of seismic activity occurred since 1999 to present. The analysis of the seismicity is a useful tool for the interpretation of the dynamics that have marked many important eruptions (2001, 2002-03, 2004-05, 2006, 2008-09). In particular, the variation of seismic energy release has significantly contributed to identify the likely geodynamic processes related to the recharge of the volcano's magma system.
The spatial distribution of seismicity has allowed to highlight the existence of different seismogenic areas characterized by a different earthquake rate, focal depths and associated kinematics.