A new data set more than quadruples the number of slip mechanisms. Only a 1.6% is given by reverse with the percentage of strike-slip solutions being 98.4%. This inversion result is consistent with the focal mechanisms of other swarms in the area, such as the Serra Lunga cluster, located around 12 km to the north-west of the Campoli Appennino swarms and it plays an important role in the stress field distribution within the considered area.

The stress field inversion method (Gephart and Forsyth, 1984) was applied to the fault plane solutions of the two Campoli Appennino swarms (October 2009 and May 2011) and the first Campoli Appennino swarm (September 2008). The inversion results provide insights into the stress field distribution within the considered area.

Swarm activities during the observed time period

Several fault plane solutions of events located in the area of the Abruzzo National Park, in the area of the Marsica-Sorano, and in Volta Park, in the October 2009 and May 2011 swarms show right-lateral strike-slip motion. The same observations can be performed in the Serra Lunga cluster, located around 12 km to the north-west of the Campoli Appennino swarms and plays an important role in the stress field distribution within the considered area.

Frequency-Magnitude Distribution (FMD)

The cumulative number of events according to the magnitude is ranging from 0.5 to 2.4. The largest sequence detected (mainshock Mw = 4.8, February 16, 2013) was localized close to the city of Sora. In the Marsica area, beneath the Serra Lunga massif, one earthquake of magnitude 4.3 occurred on May 2010, within two days (29-30 May) of the largest sequence (Mw = 4.9). The main shock hypocentre is located at 8.6 km of depth. The epicentre is characterized by a dip of ~70° and a depth range between 8 and 18 km.

The magnitude of completeness (Mc) is determined as the magnitude of the lowest earthquake within the observed FMD. The value of Mc is equal to 0.5, meaning that the relation between the cumulative frequency and the magnitude is characterized by a power law fit (Wiemer and Wyss, 2000).

Reliability of the selected focal mechanisms is considered by the ratio of the observed number of events greater than Mc and the number of events expected to be greater than Mc for a complete magnitude-frequency distribution. A value of 0.8 (i.e. 12 observed events out of 15 expected events) is considered a good result, while a value of 1.2 (i.e. 18 observed events out of 15 expected events) is considered a poor result.