



## **Time variations of the Long Period events recorded at Mt. Etna during November 2003 - May 2006**

G. Di Grazia (1), A. Cannata (2), S. Alparone (1), S. Gresta (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Italy, (2) Università' di Catania, Italy  
(andrea.cannata@libero.it / ++39-095-7195709)

Almost 50,000 long period events (LP) were recorded at Mt. Etna volcano by the permanent broadband seismic network, during the period November 2003 - May 2005. The spectral features of LP (the highest peak frequency and the overall spectral amplitude) remained essentially unchanged for some months; then they showed sharp changes. Some of these spectral variations occurred at the same time as seismic swarms, affecting the eastern side of the volcano. Moreover, by performing Short Time Fourier Transform, two different frequency bands have been distinguished: low frequency ( $< 2$  Hz) and high frequency ( $> 2$  Hz) bands. The lag of the high frequency band with respect to the low frequency one was quite steady during the whole period and most of the obtained lag values ranged between 1 and 2 s. We also studied the wavefield features, analysing the particle motion at the used stations. The wavefield remained essentially unchanged at the farthest stations from the summit area. It was composed by Rayleigh or SV waves (or by a combination of different wavetypes). The particle motion at the nearest stations was relatively steady during time periods of some months, and then sharply changed. These wavefield variations allowed us to distinguish five different sub-periods. In particular, during the third sub-period (June-November 2005) the wavefield was composed by P waves. By using synthetic LP characterised by wavefield similar to that observed during the third period, we tested the reliability of both Semblance and Radial Semblance location methods. Our results indicated that the latter method is more reliable and steady than the former. Moreover, the most correct velocity model, needed to locate the LP, can be found by trying different velocity models and comparing the obtained maximum semblance values. Therefore, by using the Radial Semblance method, we located about 150 LP, occurring during July-November 2005. Two changes in location have been considered. The

former was a deepening of the LPs from 0.3 to 0.8 km; the latter was both a deepening and a horizontal migration. These source migrations have been accompanied by variations of the spectral features.