RECOGNITION OF POSSIBLE RECURRENT PATTERNS IN SEISMICITY PRECEDING RECENT FLANK ERUPTIONS AT MOUNT ETNA VOLCANO

L. Sandri (1,2), W. Marzocchi (1,2) and P. Gasperini (2)
(1) INGV Italy, (2) University of Bologna

Mount Etna flank eruptions represent the most prominent source of volcanic damage in the Etnean area. Past works concluded that the occurrence of flank eruptions in Mount Etna might be linked to the regional state of tectonic stress. In this work, we make use of two nonparametric statistical pattern recognition algorithms, to analyze seismic clusters occurring around Mount Etna. The goal is to study whether there is a statistically significant link between the regional tectonic stress regime and the occurrence of flank eruptions. Therefore, we check whether there are recurrent patterns among the seismic clusters preceding a flank eruption on Mount Etna, and check their feasibility in being used as efficient precursors to forecast Mount Etna flank activity. We compare the results obtained by statistical pattern recognition and a multiple regression analysis performed on the same seismic clusters. Also, we apply the patterns found to the clusters registered in the Etnean area before the current flank eruption started on October 28, 2002 to check preliminarily, on a new and independent datum, the validity of the results obtained. From our analysis, confirmed by the control experiments and by the multiple regression analysis, we find that the discrimination between clusters preceding flank eruptions and clusters occurring "far away" in time from flank activity is linked to the time elapsed from the end of the previous flank eruption and to its volume output, and not to the seismicity signature of the cluster itself. Thus, we do not find a significant link between the regional state of stress and the occurrence of flank eruptions on Mount Etna volcano. However, the pattern found might indicate the need of the system to recharge, before the next flank eruption can occur.