



## **Seismic Monitoring of the Tatun Volcano Group, Northern Taiwan: an Evaluation of the Volcanic Risk Potential posed by a Quaternary Volcano**

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The Tatun Volcano Group lies in the northern tip of the island of Taiwan, a broad area that is full of heavily populated centres (like Taipei and Keelung) and industrial units essential for the economic activity of the country. For many years in the past there was a common belief among scientists that the volcanoes of the Tatun group were extinct, a conclusion solely based on age determination of erupted rocks, showing that the last eruption took place about 200 kyr ago. This conclusion was challenged by more recent tephrochronological and geochemical studies indicating that eruptions may have been taking place also 19 kyr ago and that a magma chamber may still be present beneath Tatun. Despite these results there was no detailed seismological study of the area that would aim at investigating the nature of the recorded seismicity in space and time and the existence (or not) of exotic volcanoseismic signals. During the summer of 2003 a local seismic network, consisting of four broadband and four short period seismometers, was deployed in the Tatun area recording continuously the seismic activity up to now. The analysis of data recorded during the period September 2003-September 2004 consisted of location and local magnitude determination for the events, spectral analysis for the purpose of signal classification (tectonic/volcanoseismic event) and a preliminary source mechanism study. This analysis revealed a number of interesting results, such as: (a) the seismic activity in the area appears to be irregular, in the sense that it exhibits certain highs and lows as a function of time; (b) events deeper than 3.5 km are infrequent, while the local magnitude of the recorded events is in the range 0.5-2.9; (c) except from the usual tectonic events the network has recorded a number of exotic signals, like tornillos, spasmodic bursts (series of events with overlapping co-

das) and 10 s period oscillations known in the literature as Very Long Period Tremor (VLPT); (d) a number of events with harmonic spectra that are probably generated by the interference of seismic waves coming from two distinct seismic sources where the one is delayed with respect to the other by about 0.4-0.5 s, thus creating a fundamental harmonic at 2 Hz. A comparison of these observations with those reported in other dormant Quaternary volcanoes (e.g. Alban Hills in Italy, Long Valley caldera in US) shows many similarities in their seismicity characteristics and calls for a multidisciplinary, continuous monitoring of the Tatun area in order to be able to assess more fully the possibility of future awakening of the Tatun volcano group.