

PRECURSORS AT VESUVIUS BY HISTORICAL AND ARCHEOLOGICAL FONTS

Aldo Marturano

Osservatorio Vesuviano, Istituto Nazionale di Geofisica e Vulcanologia
Via Diocleziano 328, 80124 Napoli, Italy

Two concomitant causes combined to made uncertain evaluation of the vesuvian seismicity for a long time. On the one hand, although both the whole vesuvian area has been constantly inhabited over the last twenty-five centuries, and famous, large and numerous eruptions occurred in this period, little is known about local earthquakes in historical times. Earthquakes often had been only felt in a few towns at the foot of Vesuvius and in historical reports sometimes is only mentioned Naples, the most important town of the area, 10 km distant from the volcano. On the other hand, since the last eruption of 1944 up to ninety years, the seismicity at Vesuvius has been marked by moderate-energy events ($M < 3.5$); therefore a satisfactory correlation between macroseismic and instrumental parameters has never been worked out.

On October 9, 1999 an earthquake was felt over a very wide area around the volcano. Numerous instrumental as well as detailed macroseismic studies allowed the determination of typical seismological parameters by using completely independent data. Focal mechanisms were also obtained independently, enabling comparison of both faulting parameters and field effects. It was verified that shallower depth and focal mechanism with priority affected the near field, whereas lateral discontinuities determined far field anomalies prevalently. This all aims to assess the “sizes” of historical vesuvian earthquakes in order to determine seismicity levels that can be associated with the volcanic structure, in particular during the pre-eruptive phase. Today it is possible to estimate for some certainty that the vesuvian events have always been found to be of moderate energy, excluding the 62 A.D. earthquake ($M=5$). The earthquakes from 1631 to 1944 do not appear to cross the threshold of $M=4.5$. In particular, the seismic crisis preceding the 1631 eruption is characterized by comparatively more energetic activity, temporally limited to the hours preceding the eruption, and, probably, by minor activity that had been occurring for a while. The greatest pre-eruptive event, however, was rated at magnitude 4, a value similar to those of the present ones.

The seismicity preceding the eruption of the 79 AD is poorly known by historical fonts. However, on the one hand, large damages have been repeatedly recognized at Pompeii, probably caused by the earthquake of 62. On the other hand, evidence of reconstruction and repair are recorded on the walls, floors, plasters, mosaics and decorations at towns around Vesuvius, as well as generalized presence of works in progress that regard fundamental services, such as the water supply system. Numerous samples in Pompeii provide an evidence that at the time of the eruption, and probably from a long time, the civic aqueduct was out of use and a new one was being built. The *Castellum Aquae*, the arrival and departure water point in Pompeii, was not supplied by the regional aqueduct and the outlet for the water was not connected with the civic pipe network. Probably the town was in a difficulty for a long time and some ground deformation occurred before the eruption, in accordance with the recorded seismicity.