



## **Dating magma evolution of Mt. Somma-Vesuvius volcanic complex (South Italy) by U-Th disequilibria**

**B. Scheibner** (1), A. Heumann (1), L. Civetta (2), G. Wörner (1)

(1) GZG - Geowissenschaftliches Zentrum Göttingen, Göttingen, Germany, (2) Osservatorio Vesuviano, Naples, Italy (bscheib@gwdg.de)

We present U-Th-isotopic composition for whole-rocks (wr), glass (gl) and mineral separates of two prehistoric plinian eruption of Mt. Somma-Vesuvius volcanic complex (South Italy) to estimate mineral residence times and magma ages in Somma-Vesuvius. This information is important for assessing the natural hazard of volcanic activity in the area of Somma-Vesuvius. The activity of Somma-Vesuvius is divided into three geochemical distinct periods, with increasing alkali content (Somma et al. 2000; Ayuso 1998). The two plinian eruptions analysed (Mercato - 8 ka, Avellino - 4,5 ka) erupted during the second period of Somma-Vesuvius. Our U-Th isotope analyses show U-excess for all whole-rocks, glass and almost all mineral separates (for wr and glass between 28% and 42%) and a correlation in the ( $^{238}\text{U}/^{232}\text{Th}$ ) versus ( $^{230}\text{Th}/^{232}\text{Th}$ )-isochron diagram. One exception is the feldspar mineral separate, which plots above the correlation trend of Mercato and Avellino wr and minerals. The ( $^{238}\text{U}/^{232}\text{Th}$ ) versus ( $^{230}\text{Th}/^{232}\text{Th}$ ) correlation for analysed wr, glass and minerals can be interpreted by two distinct models: First, this correlation may represent an isochrone and all magmas and minerals have the same age of  $24 \text{ ka} \pm 6 \text{ ka}$  (MSWD = 0,84, calculated by ISOPLOT). This age is in accordance with the onset of the activity of SV some 25 ka ago (Civetta et al. 1995). Second, U-disequilibrium in whole rocks of Avellino and Mercato on the one side and the U-disequilibrium in the mineral separates on the other side were produced at different times. The whole rocks would then respectively reflect U-Th fractionation at a younger age of  $14 \text{ ka} \pm 4.0$  (MSWD = 5). This time could reflect U-Th fractionation in the source by subduction fluids. Model II is supported by the fact that all analysed wr of Mercato and Avellino and one other prehistoric interplinian eruption from a previous study (Cortini et al. 2004) show similar ( $^{230}\text{Th}/^{232}\text{Th}$ )-ratios and a small range in ( $^{238}\text{U}/^{232}\text{Th}$ ). In model II the minerals of

Mercato and Avellino could then be interpreted as a mixture between juvenile minerals of the Mercato and Avellino magma and older xenocrysts with a minimum crystallization age of  $24 \pm 6$  ka and older. Due to the correlation of the mineral separates in the isochrone diagram, model II would imply that juvenile minerals and xenocrysts must have had similar proportion in the magma. For rating the natural hazard of the area of Somma-Vesuvius, Model I would imply that the magmas of period II were formed already at the beginning of the activity of Somma-Vesuvius and resided for more than 10 ka in the crust. Model II, which is more likely, indicates that the magma was formed shortly or at least less than 10 ka before the eruption.