AR-AR INVESTIGATIONS ON QUARTERNARY VOLCANIC SEQUENCES OF MONTE VULTURE (SOUTHERN ITALY)

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Volcanic sanidines and phlogopites from feldspathoid- or sanidine-bearing volcanic sequences of Monte Vulture (Southern Italy) were analysed using Ar-Ar stepwise heating.

In all samples phlogopite and sanidine are internally inhomogeneous as observed in a plot of Cl/K ratio vs step-age. At least two phases that are degassed during different temperature steps can be distinguished, resulting in internal discordance. Hence, all samples are affected by impurities and have to be treated as heterochemical mixtures. These effects are strongest in phlogopite. The high uncertainty of the calculated ages mirrors the statistically significant age discordance. The calculation of average ages was focused on isochemical steps. Isochron calculations necessarily give less precise ages because of the excessive scatter of datapoints. Moreover, most coarse grained phlogopites could contain excess 40Ar (as suggested by non-atmospheric intercepts in isochron plots) which could be of mantle origin. The analysed phlogopites from carbonatitic and melilit-foidolite rocks of the upper stratigraphical sequence of Monte Vulture are Mg-rich, which indicates a mantle provenance (Stoppa and Woolley, 1997). All calculated phlogopite ages have, therefore, to be considered with caution.

One sample, PG5, contains both sanidine and matrix phlogopite. This offers the possibility to directly compare the analytical results and further decipher possible inconsistencies. Ages were calculated as the average of isochemical steps, and errors are indicated at the 95% confidence level. Sanidine gives a weighted average age of 752±13 ka in agreement with the phlogopite age of 801±88 ka. In comparison to these average step ages, an isochron over five sanidine-steps yields an age of 737±35 ka.
(MSWD=1.5) and an atmospheric intercept of 295±49.

The eruptive time-span covered by the analysed samples is 75±20 ka, confirming that the eruption history of Monte Vulture has been organised in clusters of activity instead of a continuous row of eruptive events.

Sanidine from a tephra layer in a lacustrine basin cut by the Ofanto fault gives a weighted average age of 40.7±8.4 ka. That is in agreement with the age of the Campanian Ignimbrite (Deino et al., 1994). Sedimentological and petrochemical analyses confirm that attribution. This finding underlines the importance in dating distal tephra layers for the understanding of the morphostructural evolution of volcanic and non-volcanic areas.

References: