Crustal anatexis at the western edge of the South Aegean arc?

I. SMET[*1], B. SOENS[1] AND M. KLAVER[2]

[1]Dep. of Geology and Soil Sciences, Ghent University, Krijgslaan 281 S8, 9000 Gent, Belgium (*ingrid.smet@ugent.be)

[2]Department of Geology and Geochemistry, VU University Amsterdam, The Netherlands

The volcanic islands of the Saronic Gulf (Greece) are regarded as the westernmost part of the presently active South Aegean arc. There are, however, a few small-scaled volcanic deposits located further north-west, on the mainland between Athens and Corinth, whose emplacement ages coincide with the main periods of volcanic activity in the Saronic Gulf. All outcrops of these Crommyonia lavas occur along important extensional faults and are spatially confined to a ca. 3.6-4.0 Ma western and a ca. 2.7 Ma eastern group [1]. We carried out a detailed geochemical and petrographic study of 30 samples collected from multiple outcrops of both the eastern and western group in order to investigate the relation of these Crommyonia volcanic deposits to the coeval Saronic Gulf arc volcanics.

Whole rock major and trace element concentrations of the Crommyonia lavas (66-72 wt.% SiO_2) plot at the more evolved end of the differentiation trend defined by the Saronic Gulf volcanic deposits (47-68 wt. % SiO_2). The radiogenic isotope geochemistry of these high-K rhyodacites to rhyolites also supports a higher degree of crustal differentiation/contamination as they have similar to higher Sr-Pb isotope ratios, and a similar to lower Nd-Hf isotopic composition, than the Saronic Gulf deposits. A petrogenesis for the Crommyonia lavas as further evolved Saronic Gulf magmas can, however, not be reconciled with field observations and petrography.

The nearly total lack of enclaves in the Crommyonia deposits is in sharp contrast to the up to 10 vol% of mafic enclaves present in the Saronic Gulf volcanics, which is interpreted to reflect magma mixing due to mafic replenishments of more felsic magma chambers. And although the major mineral constituents of the Crommyonia rocks are similar to the modal mineralogy of the Saronic Gulf lavas (feldspar - amphibole - biotite - quartz) they are clearly distinguished by the presence of cm-sized K-feldspar crystals and occasional muscovite, garnet, monazite/xenotime and sillimanite.

We therefore propose that Pliocene volcanic activity in the Crommyonia area resulted from crustal anatexis due to asthenospheric upwelling, which was facilitated by (1) crustal-scale extensional tectonics and (2) the position above the western edge of the subducted African lithosphere.

[1] Pe-Piper & Hatzipanagiotou (1997) *Geol. Mag.* **134** 55-66.