Goldschmidt 2000
September 3rd–8th, 2000
Oxford, UK.

Journal of Conference Abstracts
Volume 5(2), 204

Tertiary Nephelinite to Tholeiite Magma Generation in the Veneto Volcanic Province, Southern Alps

Luigi Beccaluva (bcc@dns.unife.it), **Massimo Coltorti** (clt@dns.unife.it), **Lorenzo Milani** (pzr@dns.unife.it), **Leonardo Salvini** (sln@dns.unife.it), **Franca Siena** (snr@dns.unife.it) & **Renzo Tassinari** (pzr@dns.unife.it)

Istituto di Mineralogia, Università di Ferrara, C.so E.1 d'Este, 32, Ferrara, 44100, Italy

The Veneto Volcanic Province, Late Paleocene to Late Oligocene in age, is widespread over an area of about 2000 km^2, representing the main volcanic event of the Southern Alps foreland during the Alpine orogenesis. Three main volcanic districts can be defined from west to east: the Val d'Adige district (Late Paleocene-Mid Eocene); the M.ti Lessini district, subdivided into a western and an eastern part (Late Paleocene/Mid Eocene and Late Paleocene/Late Oligocene in age, respectively); and the Marostica district (Mid-Late Oligocene). Volcanic events occurred at the southernmost border of the Trento Platform, along NNW-SSE tectonic trends. Magma generation appears to have been triggered by decompression effects related to tensional tectonics which affected the South Alpine domain as a foreland reaction of the Alpine orogenesis. Geophysical data indicate a Moho culmination of 28km as minimum depth under the area, and a lithosphere thickness of about 100km. Volcanic products vary from pillow-lavas, volcanic breccias and tuffs (Val d'Adige) to massive sub-aerial lava flows, necks, and tuffs (Western and Eastern Lessini, Marostican Hills). Lavas, mostly basic in composition, encompass a wide range of serial affinity, from (mela)-nephelinites to qz-tholeiites. Nephelinites and basanites often carry spinel-peridotite mantle xenoliths. The relative abundance of silica-undersaturated to silica-oversaturated products varies from west to east: nephelinites and basanites are more abundant in the Val d'Adige and Western Lessini areas, whereas alkali-basalts, transitional basalts and tholeiites become more abundant in the Eastern Lessini and Marostica districts. Incompatible element patterns of the most primitive magmas (MG# > 65), gradually increasing from tholeiites to nephelinites, share geochemical characteristics with within-plate sodic magmas, and show analogies with HIMU and, to a lesser extent, EMII OIB components, as also suggested by their isotopic signature ($^{87}Sr/^{86}Sr$ 0.70315-0.70382; $^{143}Nd/^{144}Nd$ 0.51279-0.51298; $^{206}Pb/^{204}Pb$ 18.97-19.79; $^{207}Pb/^{204}Pb$ 15.63-15.67; $^{208}Pb/^{204}Pb$ 39.03-39.50). Model calculations indicate that most of the magmas were generated within the spinel-peridotite lithospheric mantle from progressively deeper sources, with a concomitant decrease in the degrees of partial melting (25-3%) from qz-tholeiites to nephelinites. The inferred mantle sources have to be lherzolites bearing metasomatic amphibole and phlogopite for qz-tholeiites to basanites (S1) and lherzolite bearing amphibole and phlogopite plus carbonatitic metasomatic components for nephelinites (S2) (see Figure 1). At least two principal mantle components must be invoked to reconcile the geochemical characteristics of volcanic products: a depleted mantle (DM) lithospheric component, resulting from long-term melting extraction events, and a sublithospheric HIMU component, responsible for the main isotopic signature. A possible minor contribution of an enriched (EMII-type) sublithospheric component may also be envisaged.

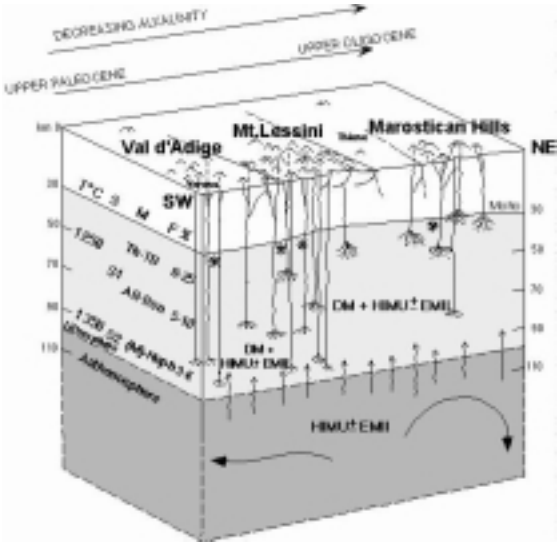

Figure 1: A three dimensional model for the genesis of the Veneto Volcanic Province. The generation of melts at variable depths along NNW-SSE lithospheric faults should be noted. Mantle xenoliths entrained by alkaline lavas are indicated by asterisks.