Appendix 3 -
ANALYTICAL METHODS

Whole rock analysis: major and trace elements composition

Whole-rock compositions of 104 samples were determined by X-ray fluorescence (XRF), carried out on a Philips PW 2404 spectrometer, equipped with a Rh anticathode on powder pellets, and corrected for matrix effects (*Franzini et al. 1975*), at the Dipartimento di Scienze Geologiche, University of Catania.

Volatile content was measured as loss on ignition (L.O.I.) by standard gravimetric method. Trace element concentrations were obtained by ICP-MS at SGS Mineral Services (Toronto, Canada). 56 elements are detected by sodium peroxide fusion that involves the complete dissolution of the sample in a molten flux.

Mineral composition

Mineral compositions were obtained using a WDS/EDS-equipped CAMECA SX50 electron microprobe at Istituto di Geologia Ambientale e Geoingegnereia (IGAG)-CNR, Rome, with silicates and oxides as standards, and by SEM-EDS analyses at the Dipartimento di Scienze Geologiche, University of Catania using a Tescan Vega LMU scanning electron microscope equipped with an EDAX Neptune XM4-60 micro-analyzer characterized by an ultra-thin Be window. Analyses were performed at 20 kV accelerating voltage and 0.2 nA beam current. Precision of collected data is on the order of 5%.

Isotopic analysis

Rb and Sr were separated using standard cation exchange techniques (Bio Rad AG50 W-X8, 100-200 mesh, 3,8ml resin volume) in 2.5 N HCl medium.

Nd and Sm were separated from the other REE using standard cation exchange techniques (HDEHP-coated Teflon, 2 ml resin volume) in 0.18 N HCl and 0.4 N HCl medium, respectively.

$^{87}Sr/^{86}Sr$ data are normalized with $^{86}Sr/^{88}Sr$ = 0.1194. Repeated measurement of Sr standard NBS 987 during the measurement period gave 0.710233 ± 0.000004 (2σ, n=12).

Chemical separation of Nd was carried out following the analytical procedure of Lapierre et al. (1999). Samples were leached in HCl 6N after dissolution and prior to REE separation. Dissolution of f0.1 g of samples was realized in closed Teflon screw cap vessels with a HF– HNO3 mixture, converted to chlorine form using HCl. Nd separation was carried out using exchange reverse chromatography AG50WX8 cationic ion exchange column, followed by H_2HP orthophosphoric column separation. Nd isotopic compositions were measured by multicollector inductively coupled plasma mass spectrometry (MC-ICP-MS), according to the method described by Luais et al. (1997). $^{143}Nd/^{144}Nd$ ratio was normalized to a value of $^{146}Nd/^{144}Nd$ of 0.74041. An in-house Nd standard yielded $^{143}Nd/^{144}Nd = 0.504009 \pm 11$ (2SD).

Epsilon Nd values for rocks at their time of formation (t = 290 Ma for calcalkaline lithotypes, and t = 230 Ma for alkaline and tholeiitic lithotypes) were calculated using the expression: $\varepsilon Nd = \{[^{143}Nd/^{144}Nd] / [^{143}Nd/^{144}Nd_{CHUR}] - 1\} * 10^4$, where CHUR = Chondrite Uniform Reservoir).

All isotope measurements were performed on the Nu-Instruments MC-ICP-MS at the University of Bern, Switzerland.