**1. Sample Preparation and Analytical Methods**

**Mineral chemistry.**

*Mineral separates*

Mineral separates were prepared after first crushing rocks by steel pestle and mortar, floating off the dust-size fraction by washing in acetone and then oven drying. Single mineral grains were then hand-picked under a binocular microscope, rinsed in an ultrasonic bath and dried to remove any residual traces of adhering dust. Grains were then mounted in epoxy blocks, sliced and polished and carbon coated. All grain mounts were imaged by back-scattered electron scattering under the electron microprobe. This approach allowed a preliminary assessment of compositional heterogeneity. All grains were essentially homogeneous, apart from exsolution lamellae in some pyroxenes. At least 6 electron microprobe analyses per mineral were made and a mean taken for internal standardisation during laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS).

*Electron microprobe*

Electron microprobe analyses were undertaken in the Analytical Facility of the School of Earth Sciences, Victoria University of Wellington, using a fully automated JEOL-733 Superprobe. Routine operating conditions were accelerating voltage15 kv, Beam Current 1.2 x 10-8 A with a beam diameter of ~ 3 . Full ZAF correction procedures were applied and both natural and synthetic mineral standards were utilised.

*Neutron Activation Analysis*

Several mineral separates (Mt Aldaz) were analysed by routine Instrumental Neutron Activation Analysis methods (Wysoczanski, 1993) at New Mexico Tech, Socorro, New Mexico, USA. Irradiation was carried out in the Research Reactor Facility at University of Missouri. Samples were irradiated for 36 hours in a flux of 2.24 n.cm-2 s-1.

*Laser Ablation Inductively Coupled Plasma Mass Spectrometry*

Laser Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS) was undertaken in the Research School of Earth Sciences Australian National University using two instruments; a Fisons PQ2 STE and a Hewlett Packard 5400. The laser system at ANU uses an ArF (193 nm, 20 ns pulse width) EXIMER laser operated at 0.58 watts and 115 J and a custom built sample and transport cell. Repeat measurements of the NIST 612 glass standard were used as a monitor for instrumental intensities and BCR-1 was also measured routinely.

43Ca was used as an internal standard, based upon the replicate measurements of CaO by electron microprobe on mineral grains prior to laser ablation analysis.

**Whole rock Sr, Nd, and Pb isotopes**

Sr, Nd and Pb isotopes were measured at the Carnegie Institution, Department of Terrestrial Magnetism using TIMS (Sr and Nd) and MC-ICP-MS (Pb) on splits of the same agate-milled powders used for Os isotopic analyses reported in Handler et al. (2003). Details of the methods employed are contained in Petrone et al. (2003).

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