Europlanet TNA Report

PROJECT LEADER

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COLLABORATORS

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Renaud Merle	University of Western Australia
Date of TNA visit:	24-30 May 2010
Host laboratory:	CRPG , Nancy

Project Title – **Re/Os analyses of the Central Atlantic magmatic province continental flood basalts: evidence for a continental lithospheric contribution**

- Report on the outcomes of the TNA visit (approx 1 page)

The TNA program permitted Sara Callegaro, PhD student under the direction of Andrea Marzoli at the University of Padua, to spend a week in the CRPG-CNRS laboratory in Nancy, France. The goal of her visit was to prepare samples from the Central Atlantic magmatic province (CAMP) for Re-Os isotopic analysis. This isotopic system is of particular interest for understanding the genesis of continental flood basalts because it allows the contribution of the subcontinental lithospheric mantle to be distinguished from that of the continental crust. During her visit Sara worked under the scientific direction of Laurie Reisberg (senior research scientist), and received technical instruction and assistance from Catherine Zimmermann (engineer) and Christiane Parmentier (technician).

Re-Os isotopic analyses consist of two main steps. The first and most time-consuming step is the chemistry, which includes sample digestion and chemical separation of Re and Os from the dissolved matrix. The second step is the isotopic analysis of the separated fractions by thermal ionization mass spectrometry. The concentrations of Re and Os are determined by isotope dilution. Thus at the beginning of the chemistry isotopic traceurs ("spikes"), artificially enriched in specific non-radiogenic isotopes (^{185}Re and ^{190}Os), are added in carefully weighed quantities to the sample powders. A mixture of concentrated hydrochloric and nitric acids is then added and the samples are attacked at high temperature (~300 ^{o}C) and pressure (~100 bars) in a high pressure asher (Anton Paar HPA-S), in order to dissolve the Os and Re bearing phases. After dissolution, Os and Re are separated from the liquid using techniques developed by Birck et al. (1997, Geostandards Newsletter 21, 19-27). Briefly, Os is separated by extraction into liquid bromine, which is insoluble in aqueous solutions, and purified by microdistillation. Re is then extracted from the aqueous residue using anion

exchange columns (filled with AG1-X8 resin). During her visit, Sara learned these techniques and was able to complete the chemical preparation of nine samples. Unfortunately, the isotopic analysis of these samples was not possible during or soon after Sara's visit because of an instrumental problem with the Finnigan MAT262 mass spectrometer. This problem (the failure of the magnetic field regulator) will be resolved in the upcoming week, and Sara's samples will be analyzed in priority as soon as the mass spectrometer is fully operational.

Though we do not yet have the data from Sara's samples, we are quite confident that the results will provide useful information. Re-Os results obtained in the CRPG laboratory from a related suite of CAMP basalts yielded an isochron with an age in agreement with the accepted Ar-Ar age, and an initial Os isotopic ratio that argues strongly for a major lithospheric contribution to these rocks (Merle et al., Lithos, under revision). Sara plans to continue her Re-Os study of continental flood basalts during two future visits to CRPG planned for November, 2010 and February, 2011, and the results will be an important part of her thesis. The expertise that she acquired during her visit sponsored by the Europlanet program will make these future visits, funded by independent sources, much more productive.

Please include:

- Publications arising/planned

  - Os/Os isotopic composition of the Freetown Layered complex, Sierra Leone
  - Geochemistry of the CAMP lava flows from Morocco

- Host approval The host is required to approve the report agreeing it is an accurate account of the research performed.

The host at CRPG, Laurie Reisberg, approves this report, which accurately reflects the research performed during Sara Callegaro's visit to our laboratory. This visit has allowed us to strengthen our collaboration with the Geoscience department of the University of Padua.