

# Euromplanet TNA Report

## PROJECT LEADER

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## COLLABORATORS

<b>Name:</b>	<b>Affiliation:</b>
Sara Callegaro	Dipartimento di Geoscienze, Università di Padova
Laura Parisio	Dipartimento di Geoscienze, Università di Padova
Hervé Bertrand	ENS-Lyon
<b>Date of TNA visit:</b>	November 25- December 7 2012
<b>Host laboratory:</b>	CRPG , Nancy

**Project Title – Re/Os analyses of the Central Atlantic magmatic province gabbros from Sierra Leone: evaluating crustal contamination processes in a layered mafic intrusion**

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

The TNA program permitted Laura Parisio, PhD student under the direction of Andrea Marzoli at the University of Padua, to spend two weeks 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 Laura 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 tracers ("spikes"), artificially enriched in specific non-radiogenic isotopes ( $^{185}\text{Re}$  and  $^{190}\text{Os}$ ), 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 ( $\sim 300^\circ\text{C}$ ) and pressure ( $\sim 100$  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, Laura learned these

techniques and was able to complete the chemical preparation of nine samples. Unfortunately, only some of the isotopic analysis of these samples could be completed during Laura's visit because of an instrumental problem with the Finnigan MAT262 mass spectrometer. This problem will be resolved within the next few weeks, and the samples will be analyzed in priority as soon as the mass spectrometer is fully operational.

Though we do not yet have the data from Laura's samples, we are quite confident that the results will provide useful information. Re-Os results obtained in the CRPG laboratory from related suites of CAMP basalts yielded isochrons 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*, 2011; Merle et al., *J. Petrology*, under review; Callegaro et al., *EPSL*, just submitted). The new Re-Os results will complete a large set of analytical data (including Sr-Nd-Pb-Hf isotopes) obtained at Padova and Lyon on the Sierra Leone samples. The expertise that Laura acquired during her visit sponsored by the Europlanet program will be highly valuable for her formation as a young researcher.

Please include:

- Publications arising/planned

- Sr-Nd-Pb-Hf-Os isotopic composition of the Freetown Layered complex, Sierra Leone

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

I approve this report, which accurately reflects the research performed during Laura Parisio's visit to our laboratory. This visit has allowed us to strengthen our collaboration with the Geoscience department of the University of Padua.