



## Research Networking Programmes

Short Visit Grant  or Exchange Visit Grant

(please tick the relevant box)

### Scientific Report

**Scientific report (one single document in WORD or PDF file) should be submitted online within one month of the event. It should not exceed eight A4 pages.**

***Proposal Title:*** Potassium stable isotopic compositions measured by high-resolution ICP-MS

***Application Reference N°:*** 6034

**1) Purpose of the visit**

The purpose of the visit was to measure  $41\text{K}/39\text{K}$  ratios in standards and mineral standards used in  $40\text{Ar}/39\text{Ar}$  geochronology. The approach taken here is to use MC-ICP-MS in "cold plasma" mode, using techniques previously developed at the Thermo Scientific factory in Bremen, Germany.

**2) Description of the work carried out during the visit**

We used the Thermo Scientific NEPTUNE Plus MC-ICP-MS to measure  $41\text{K}/39\text{K}$  ratios in standards, mineral standards, and a few samples. This required significant work in tuning the mass spectrometer parameters and ensuring accuracy (ca. 1 week). We also used the Princeton Element 2 single collector ICP-MS to determine the concentration and impurities in standards and samples. This was followed by measurements of NIST standards,  $40\text{Ar}/39\text{Ar}$  mineral standards, and samples including seawater, whole rocks, and ocean clays.

**3) Description of the main results obtained**

We obtained 41K/39K values for NIST K standard 999b, and other industrially available KCl samples. This showed variability in the 0.3 to 0.4‰ range. Mineral standards yielded 41K/39K values within 0.3‰ of the NIST standard 985. Seawater yielded values nearly consistent with the standard (<0.1‰), whole rocks within 0.4‰, and oceanic clays within ca. 0.5‰. This variability is readily distinguished from the standard as uncertainties reach as low as 0.05‰, which represents an order of magnitude improvement over previous work (e.g. Humayun and Clayton, 1995).

**4) Future collaboration with host institution (if applicable)**

I will be returning to Princeton in ca. one month, to complete measurements on mineral standards and spikes to determine K concentrations in mineral standards. I will also work on a suite of terrestrial rocks, minerals, and other samples in order to determine the natural variability of terrestrial K isotopes and begin to determine how they may be used to understand Earth history and processes.

**5) Projected publications / articles resulting or to result from the grant (*ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant*)**

These results will be part of multiple future publications. Some will be included in publications regarding the K concentration of mineral standards (in concert with work ongoing at NASA-JSC in Houston), and other results will be included in publications regarding the natural variability of K isotopes.

**6) Other comments (if any)**