

## Sm-Nd ISOTOPE DILUTION TIMS ANALYSES OF BCR-1, AGV-1 AND G-2 USGS ROCK REFERENCE MATERIALS: PRELIMINARY RESULTS FROM THE LAGIR-UERJ LABORATORY, RIO DE JANEIRO

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**Key words:** Neodymium, Reference material, REE, mass spectrometry

### INTRODUCTION

Preliminary Sm-Nd isotopic analyses of the three USGS rock reference materials (basalt BCR-1, andesite AGV-1 and granite G-2) isotope using conventional isotope dilution thermal ionization mass spectrometry (ID-TIMS) are reported here. These are the first complete analyses performed at the recently built Laboratory of Geochronology and Radiogenic Isotopes - LAGIR, from the Rio de Janeiro State University. The LAGIR represents the fifth TIMS (Thermal Ionization Mass Spectrometry) laboratory built in Brazil. The chemical procedures are performed in clean rooms under positive air pressure and the isotope ratio measurements are done with a Finnigan-TRITON multi-collector mass spectrometer.

### PROCEDURE

Each sample weighing approximately 100 mg was mixed with 45-50 ug of <sup>149</sup>Sm-<sup>150</sup>Nd double tracer solution. Four of the samples were acid-digested in steel-jacketed high-pressure PTFE bombs and two in PTFE beakers on hot plate. Sample dissolution was done in two 5-day cycles using a mixture of HF (6 mL) and HNO<sub>3</sub> 6N (0.5 mL). Separation of Sm and Nd was performed using HCl in two ion exchange columns: the primary one separates the rare-earth elements from the sample solution with the AG 50 W-X8 (100-200 mesh) resin, and the secondary column uses the LN-spec (150 mesh) resin for separation of Sm and Nd. Samarium and neodymium are separately loaded on a previously degassed double Re filament mount, using HCl (1N) as the ionization activator. The analyses were carried out between February and September 2007. The isotope ratios were measured with a TRITON-Finnigan thermal-ionization mass spectrometer. Data acquisition was performed in multi-collector static mode using an array of 8 Faraday cups. The measured Nd isotope ratios are normalized to the La Jolla standard (<sup>146</sup>Nd/<sup>144</sup>Nd = 0.7219) and corrections were applied for weighed tracer and measured blanks below 1 ng for Nd and 0.1 ng for Sm.

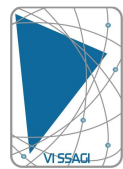
### RESULTS AND CONCLUSION

The analytical results are presented in Table 1 and in Figure 1. The measured <sup>143</sup>Nd/<sup>144</sup>Nd ratio agrees well with literature data (GEOREM database), with special reference to the recent work of Raczek et al. (2003) and Weis et al. (2006). Regarding the Sm and Nd calculated contents, however, values fall within or slightly below the compiled in the GEOREM database.

**ACKNOWLEDGEMENTS** - The authors acknowledge the effort of the Universidade do Rio de Janeiro – UERJ – in the construction of LAGIR, and the financial support of FINEP (CT-MINERAL 3648/05) and CNPq (471200/2003-4 and 502006/2005-6) Brazilian funding agencies. W. R. Van Schmus (University of Kansas, USA) and N. Machado (Université du Québec a Montréal, Canada) were kind to have assisted us with setting up procedures.

### REFERENCES

- GEOREM - Geological and Environmental Reference Materials Database. <http://georem.mpch-mainz.gwdg.de/>. (15th May, 2007).
- Raczek, I., Jochum K.P., Hofmann A.W. 2003. Neodymium and strontium isotope data for USGS reference materials BCR-1, BCR-2, BHVO-1, BHVO-2, AGV-1, AGV-2, GSP-1, GSP-2 and eight MPI-DING reference glasses, Geostand. Newsl., 27(2), 173–179.



Weis D.B., Kieffer C., Maerschalk W., Barling J., Williams G., Hanano D., Pretorius W., Mattioli N., Scoates J.S., Goolaerts A., Friedman R., Mahoney J.B. 2006. High-precision isotopic characterization of USGS reference materials by TIMS and MC-ICP-MS. *Geochem. Geophys. Geosyst.*, Technical Brief 7(8): Q08006, doi:10.1029/2006GC001283, ISSN: 1525-2027.

Table 1- ID-TIMS Sm-Nd analytical data.

Sample	run #	Digestion vessel	Sm (ppm)		Nd (ppm)		$^{143}\text{Nd}/^{144}\text{Nd}$	Abs (2s) St Error	$^{147}\text{Sm}/^{144}\text{Nd}$
			Measured	GeoRem range	Measured	GeoRem range			
<b>BCR-1 basalt</b>	N003	bomb	6.09	5.9-7.3	26.80	28.4-29.0	0.5125922	15	0.137299
	N010	bomb	5.77		26.84		0.5126305	4	0.129870
<b>G-2 granite</b>	N002	bomb	6.51	6.3-7.8	48.86	49.8-57.22	0.5122153	3	0.080587
	N005	beaker	6.50		49.01		0.5122160	5	0.080213
<b>AGV-1 andesite</b>	N001	bomb	5.37	5.3 - 6.3	29.78	29.3 - 35.7	0.5127819	4	0.109009
	N009	beaker	5.24		29.07		0.5127900	5	0.108943

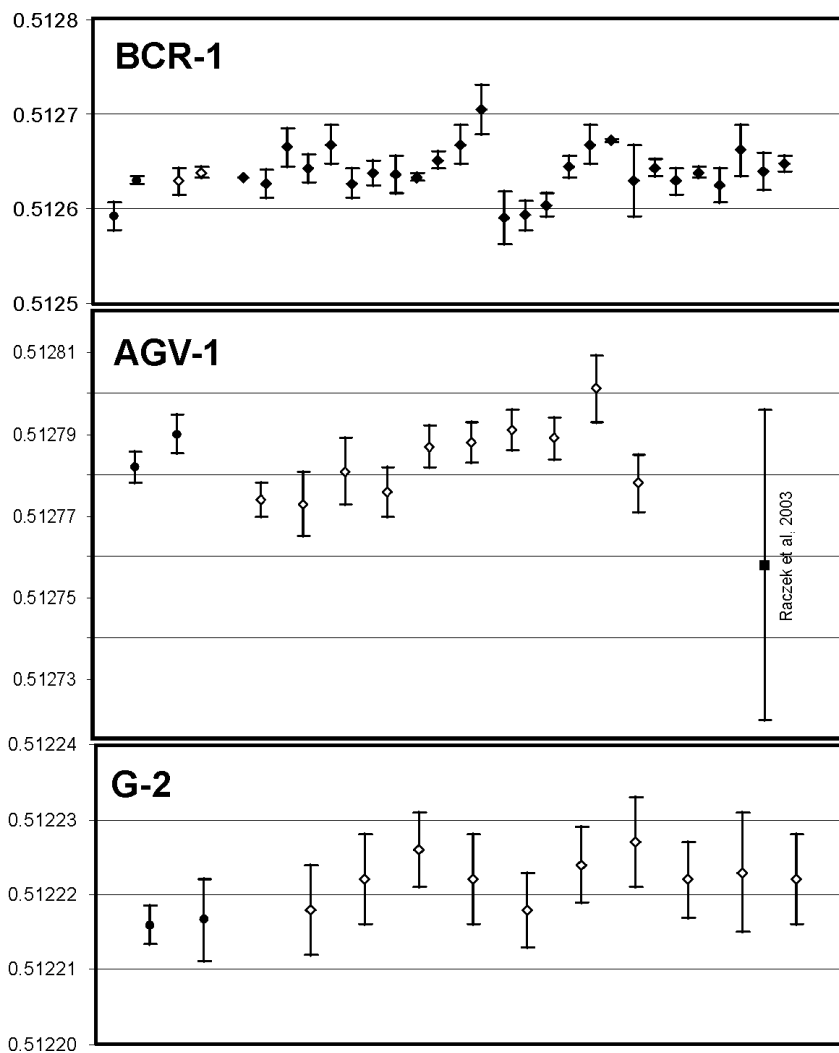


Figure 1-  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios of USGS rock standards obtained by ID-TIMS in this work (black circles) compared to results from the literature: Weis et al. (2006)- white diamonds; GEOREM database- black diamonds; Raczek et al. (2003)- square.