THE NEODYMIUM ISOTOPE COMPOSITION OF THE JNdi-1 OXIDE REFERENCE MATERIAL: RESULTS FROM THE LAGIR LABORATORY, RIO DE JANEIRO

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INTRODUCTION

Preliminary analyses of the isotope composition of Nd in the JNdi-1 reference material are reported here from 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 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.

The JNdi-1 is a Neodymium oxide reference material prepared by the Geological Survey of Japan, reported by Tanaka *et al*. (2000) to have a relative $^{143}Nd/^{144}Nd$ ratio of 1,000503 ± 1 (1σ) with respect to the LaJolla standard (Lugmair and Carlson, 1978).

With the progressive exhaustion of the widely used La Jolla standard, an increasing number published reports of the JNdi-1 is observed in the literature (see the GeoReM database: http://georem.mpch-mainz.gwde.de), allowing continued interlaboratory calibration.

PROCEDURES

A quantity of 100 mg of powder from batch 89 (split 1) of JNdi-1 Nd was dissolved into a HNO_3 5 % stock solution with a gravimetric Nd concentration of 861 ppm. A diluted batch solution of 150 ppm concentration was then separated for the analyses. Reagents were distilled twice in sub-boiling conditions, using Milli-Q water, for purity purposes.

Each analysis represents between 30 ng and 300 ng of Nd directly loaded on a previously degassed Rhenium filament using HCl (1N) as the ionization activator.

The measurements were performed between September/2005 and September/2007 using an array of 8 Faraday cups measuring masses from ^{142}Nd to ^{150}Nd in static mode.

RESULTS

The measured Nd isotope ratios are (power law) normalized to the La Jolla $^{146}Nd/^{144}Nd$ ratio of 0,7219, except for the $^{146}Nd/^{144}Nd$ ratio itself. All absolute errors are stated within 2σ. The averages isotope ratios obtained are: $^{142}Nd/^{144}Nd$ = 1,141821 ± 50, $^{143}Nd/^{144}Nd$ = 0,512092 ± 2, $^{145}Nd/^{144}Nd$ = 0,348399 ± 9, $^{148}Nd/^{144}Nd$ = 0,241582 ± 8, $^{150}Nd/^{144}Nd$ = 0,236443 ± 20, $^{146}Nd/^{144}Nd$ = 0,723359 ± 233.

The obtained average $^{143}Nd/^{144}Nd$ = 0,512092 ± 2, with an external precision of 0,0026 % RSD, shows a relative ratio of 1,000045 with respect to the value of 0,512115 ± 7, calculated by Tanaka *et al*. (2000) as an inter-laboratory average (Fig. 1).

Speculation on the causes of the observed systematic deviation on $^{143}Nd/^{144}Nd$ favors instrumental bias related to differential ion transmission intrinsic to every instrument, rather than gain calibration, which is a factor minimized on the Triton mass spectrometer, equipped with an electronic device that distributes equally all amplifiers to all collectors.

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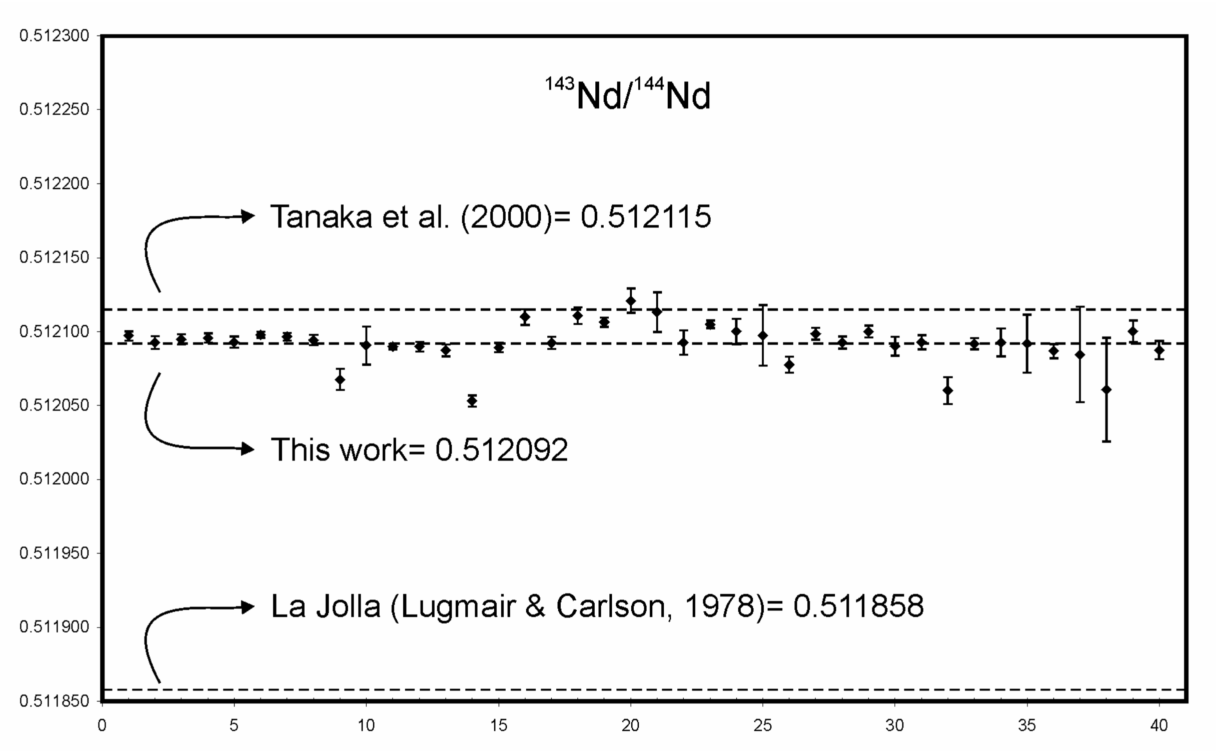

Figure 1. Measured $^{143}Nd/^{144}Nd$ ratios of JNdi-1 compared to average results (dashed lines) reported by Tanaka *et al.* (2000). The $^{143}Nd/^{144}Nd$ ratio of 0,511858 for the La Jolla standard is also shown for reference.