

## Sedimentary provenance evidence for the origin of the Gamburtsev Subglacial Mountains, Antarctica

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The Gamburtsev Subglacial Mountains are one of Earth's most enigmatic mountain ranges. They are situated in the middle of East Antarctica and are buried under ~600 m of ice. They reach an elevation of more than 3000 m and a size which is believed to be similar to the European Alps. These dimensions give rise to extensive speculation about their origin and composition.

Here we present an indirect geochemical approach to the origin of the Gamburtsev Mountains, using sedimentary provenance tools. The inferred ancient river drainage pattern of East Antarctica suggest that sediments shed from the Gamburtsev Subglacial Mountains should be deposited within the Lambert graben and Prydz Bay. The sediments sampled come from fluvio-deltaic sand deposits at ODP Site 1166 in Prydz Bay, predating the onset of East Antarctic glaciation.

Bulk sediment Sm-Nd model ages indicate an average crust formation age for the sediments' sources of ~2.0 Ga. Results for U-Pb dating of detrital zircons, reveal a significant age population of ~530 Ma, which is accompanied by a <sup>40</sup>Ar/<sup>39</sup>Ar age population of ~519 Ma for detrital hornblendes. The similar ages of the dominant peak, suggest a rapid cooling from a major orogenic event at about 530 Ma. We see no evidence of significant young crustal contributions to the sediments that would be expected if the Gamburtsev Subglacial Mountains were of volcanic origin. The results point to a Pan-African origin of the mountains, and leave as enigmatic their great height and size.

## *In situ* silicon isotope analysis of cherts by laser ablation MC-ICPMS

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We present *in situ* stable Si isotope measurements on four Archean Cherts from the Pilbara region, Western Australia. In this study we used a Microlas Geolas laser ablation (LA) system equipped with a 193 nm Excimer laser that was connected to a ThermoFinnigan Neptune MC-ICPMS. Molecular isobaric interferences of <sup>12</sup>C<sup>16</sup>O<sup>+</sup>, <sup>14</sup>N<sub>2</sub><sup>+</sup>, <sup>14</sup>N<sup>16</sup>O<sup>+</sup>, that are present on masses <sup>28</sup>Si, <sup>29</sup>Si and <sup>30</sup>Si, were resolved with the aid of a medium resolution slit (RP=4000). An ablation pit size of 49 by 300 μm with a 7 Hz repetition rate and 5 J.cm<sup>-2</sup> was used. The LA measurements on the MC-ICPMS were made with the same setup as described by [1]. To access precision, accuracy and matrix effects of the LA technique, chert samples were analyzed that were previously characterized for silicon isotopes by micro-drilling and subsequent liquid chromatographic purification [2]. A chemically homogenous chert sample that is well characterized for silicon isotopes by wet chemical techniques and has a δ<sup>30</sup>Si of 0.50±0.20 (2 sd, n=4, relative to NIST RM8546) was used as a standard.

Matrix effects were evaluated by mixing the particle flow from the laser with the output from a desolvating nebulizer, in which elemental standard solutions of the major elements were aspirated. The signal intensity of the major elements from the dissolving nebuliser was varied from 25% to 100% of the <sup>28</sup>Si signal produced by laser ablation. Significant shifts (more than 2 ‰ in the δ<sup>30</sup>Si) were found for the elements Ca and Al. Therefore, the use of a standard with a similar composition as the samples is mandatory for this laser ablation method. We obtained a precision of better than 0.26 (2 sd), which is slightly better than the 0.30 for solution work [1]. Micro-drill and laser data are in excellent agreement (differences of less than 0.4 ‰). This new laser ablation technique therefore opens new possibilities to unravel the depositional mechanisms for Archean cherts.

[1] Van den Boorn *et al.* (2006) *J. Anal. At. Spectrom.* **21**, 734–742. [2] Van den Boorn *et al.* (2007) *Geology* **35**, 939–942.