Supplementary data for:

'The deglacial history of NW Alexander Island, Antarctica, from surface exposure dating'

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Analytical Methods

Cosmogenic ^{10}Be

Quartz purification and ^{10}Be extraction were completed at Lawrence Livermore National Laboratory (LLNL). Rock and sediment samples were crushed and sieved to 250-500 μm size fractions. Quartz was separated and meteoric ^{10}Be removed using methods described by Kohl and Nishiizumi (1992). After adding Be carrier, quartz was dissolved in a HF/HNO_3 solution. The solution was then dried down and fumed several times with $HClO_4$. Beryllium was separated using ion exchange chromatography as described in Stone (2000). Be was then precipitated as beryllium hydroxide, ignited to beryllium oxide, mixed with niobium powder, and loaded into stainless steel cathodes prior to measurement.

$^{10}Be/^{9}Be$ isotope ratios were measured at the Center for Accelerator Mass Spectrometry (CAMS). 1σ analytical uncertainties for $^{10}Be/^{9}Be$ ratios were 1.6-2.4 %. Be isotope ratios were calibrated to the 07KNSTD3110 standard described in Nishiizumi et al. (2007); samples normalized to 07KNSTD3110 use the revised nominal isotope ratio and revised ^{10}Be decay constant. The high precision of the measurements are the result of low background carrier, prepared from beryl with a $2 \pm 2 \times 10^{-16}$ $^{10}Be/^{9}Be$ ratio, and low process blanks (~0.4-2.6 % of the total number of ^{10}Be atoms in the samples). In addition, boron corrections were less than 0.2% and the ion source beam currents were high, at 10-21 μA.

Exposure-age calculations were made using the CRONUS-Earth online exposure age calculator, Version 2.2 (http://hess.ess.washington.edu/math/) (Balco et al., 2008), with a constant production rate model and the scaling scheme for spallation of Lal (1991)/Stone (2000). Corrections for topographic shielding, surface geometry, and sample thickness corrections are <2 %; corrections for snow cover were not applied.

Cosmogenic ^{3}He

The ultramafic xenoliths of maximum thickness 3.5 cm were crushed and sieved, and clinopyroxene picked under a binocular microscope from the 1-2 mm grain size for all samples except L7.201.1, for which the 0.5-1 mm fraction was picked. Approximately 1 g of each was crushed in vacuo and the He isotope composition of the trapped magmatic gas was determined. The cosmogenic He was extracted from the resultant powder by melting using a near-visible laser. Analytical procedures and apparatus are reported in Williams et al. (2005) and Foeken et al. (2009). Helium isotope data and calculated exposure ages for the xenoliths are shown in Table 2.

References

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