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Contents, speciation and isotopic ratios of sulfur in volcanic glass samples from the Ferrar LIP, North Victoria Land, Antarctica

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The Ferrar Large Igneous Province was sampled during the German expedition GANOVEX IX in austral summer 2005 in North Victoria Land. Although the area was effected by a widespread Cretaceous hydrothermal event, isotropic volcanic glasses with perlitic cracks were found in the Deep Freeze Range. They are derived from chilled margins of shallow (

<

300m) sill intrusions of andesitic and pillows of basaltic andesite composition. The glasses are in process of being analysed for their 40Ar/39Ar ages, their contents of volatiles (H, C, O, F, and S by the DEGAS method: high-vacuum-hot-extraction combined with a quadrupol mass spectrometer), their S-isotopes (by MC-MS after precipitation as AgS), as well as the speciation of S in mineral inclusions (by micro-Raman spectroscopy).
Preliminary data indicate that all samples were altered to variable extents exhibiting 40Ar/39Ar ages being mostly 10-30 Ma lower than the formation age of 184 Ma. However, some primary information was preserved: the andesitic sill "glasses" contain more sulfur than those from the basaltic andesitic pillow rims and their closing temperatures are lower ($\sim$900°C compared to $\sim$1100°C). The sulfur content in the glasses varies in the range of 200-500ppm. Based on the TiO2/FeO ratio in the samples the sulfur content in the melt inclusions is deduced to be $\sim$1000ppm. Verification by analyses of inclusions using EPMA are still ahead. The inclusions in plagioclase phenocrysts exhibit sulfur with a valency of +6, accompanied by S2- in only one instance. Only two glass samples exhibit a δ34S of –19, thought to be primary. All others are sulfate dominated and characterized by δ34S values of +1.4 to – 1.7.
If the deduced sulfur content in the inclusions may be verified we can assume that around 2 x 1015 g of SO2 would have been released in total during the emplacement of the Ferrar LIP (cf. 65 x 1015 g for the Deccan Traps).