

Spatial Variability of Late Holocene Volcanic SO₄²⁻ Deposition in West Antarctica

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Comparing SO₄²⁻ concentration in high-resolution glaciochemical records can provide information on spatial patterns of volcanic deposition that are linked to inter-annual scale atmospheric transport processes. Here we compare data from four sites in West Antarctica (three sites near Byrd Surface Camp [RIDS A, B, C] and Siple Dome) to data already published from the Antarctic Plateau (Siple Station) and South Pole. Three volcanic events, Tambora (1815), the 1809 event and Krakatoa (1883), are normalized to the Tambora event in each core and compared between the records. Normalization was done because of the variability of the biogenic SO₄²⁻ input to each location and was calculated as a ratio (concentration of event/concentration of Tambora). In all of the records, the 1809 eruption has at least 43% of the Tambora SO₄²⁻ concentration, indicating general agreement between the cores regarding the magnitude of the 1809 eruption. The Siple Dome core has SO₄²⁻ concentration values for the 1809 eruption that are slightly larger than those for the Tambora event. The normalized Krakatoa concentration is between 40-49% of the Tambora eruption within the RIDS cores. It is larger in the Siple Dome core, at 92% the size of Tambora. The South Pole cores show Krakatoa as having between 21-24% the Tambora SO₄²⁻ concentration. The discrepancy between the Siple Dome core and the other WAIS cores as to the magnitude of both the Krakatoa and 1809 events could be indicative of a higher input of biogenic SO₄²⁻ into that site. Looking at the isotopic differences between volcanic and biogenic SO₄²⁻ could give a clearer picture of the actual magnitude and variability of these eruptions, as well as providing a quantitative estimate of biogenic SO₄²⁻ flux during volcanic events.