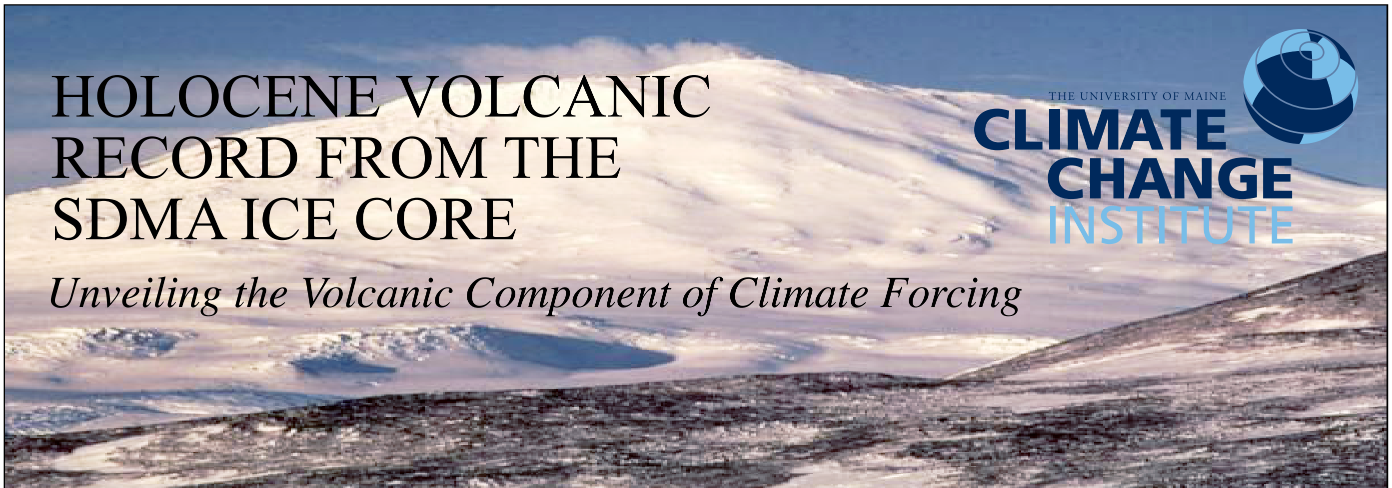

HOLOCENE VOLCANIC RECORD FROM THE SDMA ICE CORE

THE UNIVERSITY OF MAINE CLIMATE CHANGE INSTITUTE

Unveiling the Volcanic Component of Climate Forcing

Photo Credit: Erebus Volcano, Antarctica - Richard Waitt, 1972 (U.S. Geological Survey)

AT THE PRESENT TIME

volcanic forcing is widely accepted by the scientific community as one of the major natural components impacting the climate system. Detailed knowledge of timing, location and magnitude of volcanic eruptions is crucial for realistic parameterization of volcanic forcing in future paleoclimate models.

We developed a new continuous glacio-chemical sulfate time series from Taylor and Siple Dome ice cores drilled in Antarctica (Fig 1). In addition, we identified sources of the tephra layers in these ice cores. This allows us to refine ice core time scales, refine history of volcanism, and reconstruct possible prehistoric atmospheric pathways for volcanic products.

The microprobe “fingerprinting” of glass shards found in the SDMA core points to Balenny Island, Pleiades, Mount Berlin, Mount Takahe, and Mount Melbourne volcanic centers in Antarctica as well as Mount Hudson and possibly Mount Burney volcanoes of South America. A comparison of this newly developed Southern Hemisphere record with previously developed GISP2 ice core volcano-chemical records provides a base for the history of global volcanism.

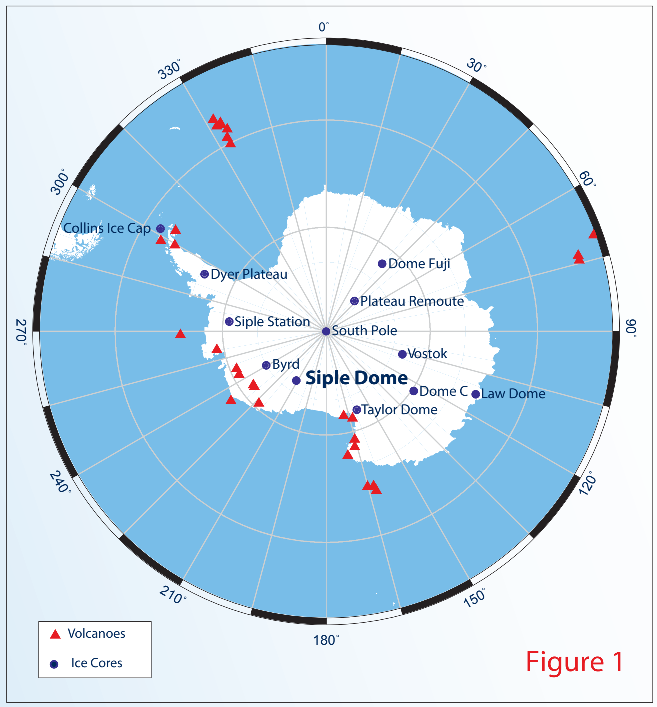

Figure 1: Location of deep ice core drill sites and volcanic centers in Antarctica.

The resulting volcanic records enhance the long-term history of global volcanism. For example, the large increase in the number of volcanic events in the early part of the Holocene period in the GISP2 ice core is different from the SDMA ice core, which shows a relatively constant number of volcanic events during the Holocene. Differences in the phasing of deglaciation, and consequent ice sheet unloading between Northern and Southern Hemispheres, and changes in atmospheric circulation patterns is a likely cause of observed patterns.

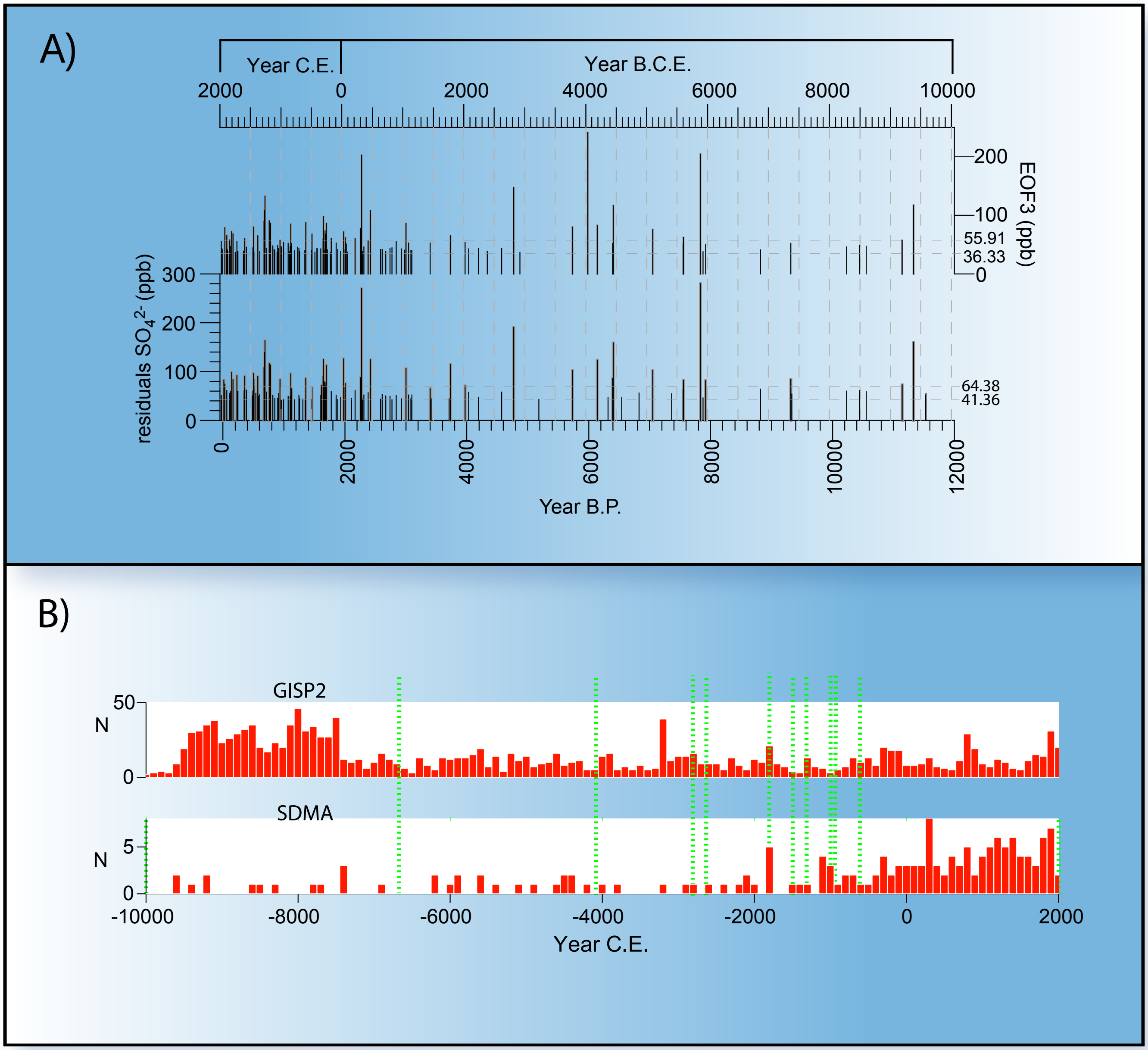

Figure Legend: A) Comparison between volcanic SO_4^{2-} time series for the last 12 kyr from the Siple Dome A ice core developed using different statistical selection algorithms.

B) Observed fluctuations in the number of volcanic eruptions per century in the SDMA ice core compared with the GISP2 ice core.

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