



## **Volcanism and Holocene Climate**

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Volcanism has long been suggested as a contributing factor to Little Ice Age climates. More recent work has succeeded in establishing a highly significant, dominant contribution of volcanism to climate change between about 1250-1850. However, absolute calibration of past volcanic forcing levels has eluded confident verification. Herein I discuss results from a new study using ~20 cores from Antarctica and Greenland to develop a composite index of volcanism that can be directly compared with the instrumental record – in particular the most reliable part of the record since 1980, when satellite observations of aerosol optical depth (AOD) are available. Comparison of the Antarctic Pinatubo sulphate fluxes provide the key, which are validated against independent lunar AOD estimates and ice core radiogenic flux estimates from 1950s bomb testing. This double verification of the Pinatubo calibration is then applied to a new ice core composite extending back 2000 years. Key results indicate, for example, that the Pinatubo sulphate flux was almost identical to the 1883 Krakatau flux, that the great 1256-1257 eruption emitted a sulphate loading about 10X Pinatubo, and broader support for the conclusion of Castellano et al that late Holocene volcanism (in particular from about AD 1230 onward) represents a clear increase in both intensity and frequency from the prior time interval. New climate simulations confirm that volcanism accounts for about 40% of Little Ice Age decadal scale variance in a new composite of northern hemisphere climate.