

The isotopic measurements of oxygen and hydrogen in Dome-Fuji (Antarctica) ice core:
Annually-resolved temperature reconstructions of the past 2000 years

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We present annually-resolved temperature and SST (sea surface temperature) reconstructions of the past 2000 years based on water (oxygen and hydrogen) isotope measurement on a shallow ice core drilled in 2010 at Dome Fuji station, East Antarctica. Those isotopic data are expected to yield information to elucidate the past climatic condition, and they are planned to contribute to integrated efforts for the reconstruction of temperature profile of the past 2000 years, in such as PAGES 2k project.

Dome Fuji station is located on a summit of Dronning Maud Land at an altitude of 3810 m a.s.l. (above sea level) (77° 19' 01" S, 39° 42' 12" E) in East Antarctica. The 10 m depth mean snow temperature at Dome Fuji is -57.3 °C¹⁾. The inland area around Dome Fuji has been recognized to be especially unique: The snow and ice there contain much stratospheric information. The direct evidence for this comes from tritium contents originated from the nuclear bomb tests in the 1960s; the tritium fallout at the Dome Fuji site is outstandingly high among 16 snow pit samples widely collected over Antarctica²⁾.

To date the concerned Dome Fuji ice core called DFS10, we applied volcanic signature matching to transfer the West Antarctic Ice Sheet (WAIS) Divide ice core chronology constructed by annual layer counting as used in the study by Sigl et al. (2014)³⁾. Based on this chronology of the DFS10 ice core and the measurements of isotopic ratios of oxygen and hydrogen, we have examined the annual changes of $d^{18}O$ to reconstruct the temperature of the past 2000 years. In our presentation, we confine ourselves to discuss the oscillation periodicity that we observed in the oxygen isotope record in our data: The periods of approximately 10, 20, and 200 years were found. We will present the time series analyses for this in detail, and will discuss the origin of this periodicity.

References:

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