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Local and regional environmental signals in a 250 yr ice core record from Hercules Névé, Northern Victoria Land, East Antarctica

Content

Hercules Névé (73° 03'S, 165° 25'E) is a coastal plateau in Northern Victoria Land (NVL), East Antarctica, located ~100 km inland with an area of >250 km² and an elevation of >2800 m. The >700 m thick glacier in this area is potentially a good place to reconstruct climate change and volcanic activity in the coastal NVL over the past millennium. In this study, we present water isotope ratios ($\delta^{18}\text{O}$ and δD) and concentrations of major ions and trace elements measured in a 2 m thick surface snowpack and a 80 m long ice core. Annual layers in both the snowpack and ice core could be well defined by seasonal variations in water isotope ratios and concentrations of methanesulfonate and non-sea-salt sulfate. The 80 m ice core covered the period of 1747-2016 CE with the mean annual accumulation rate of 188 ± 47 kg m⁻² a⁻¹. The value is 14 - 38% greater than those previously estimated at two other sites in the Hercules Névé plateau, which are 6 - 16 km apart from our site. In addition, despite mutually similar ranges and amplitudes of water isotope ratios, comparisons with the previous records reveal spatial differences at the local scale, which varied in degree over time. Such spatial heterogeneity would be mainly ascribed to postdepositional processes; Stacked composite records are to be built to increase the signal-to-noise ratio and to seek the regional scale environmental changes in the coastal NVL.

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