

Climate dependent contrast in surface mass balance in East Antarctica over the past 216 ka

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Documenting past changes in the East Antarctic surface mass balance is important to improve ice core chronologies and to constrain the ice-sheet contribution to global mean sea-level change. Here we reconstruct past changes in the ratio of surface mass balance (SMB ratio) between the EPICA Dome C (EDC) and Dome Fuji (DF) East Antarctica ice core sites, based on a precise volcanic synchronization of the two ice cores and on corrections for the vertical thinning of layers. During the past 216 000 a, this SMB ratio, denoted SMB_{EDC}/SMB_{DF} , varied between 0.7 and 1.1, being small during cold periods and large during warm periods. Our results therefore reveal larger amplitudes of changes in SMB at EDC compared with DF, consistent with previous results showing larger amplitudes of changes in water stable isotopes and estimated surface temperature at EDC compared with DF. Within the last glacial inception (Marine Isotope Stages, MIS-5c and MIS-5d), the SMB ratio deviates by up to 0.2 from what is expected based on differences in water stable isotope records. Moreover, the SMB ratio is constant throughout the late parts of the current and last interglacial periods, despite contrasting isotopic trends.

Keywords: Antarctica, precipitation, ice core