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Diatoms in the Skytrain ice rise, a complementary record to study the potential collapse of the West Antarctic Ice Sheet during the Last Interglacial period

Content

Future sea-level rise projections are largely dependent on the instability of the West Antarctic Ice Sheet (WAIS). Recent modelling studies suggest significant mass loss and rapid collapse of the WAIS have occurred in the past. However, major uncertainties exist regarding the past and future stability of the WAIS. To better predict the fate of the WAIS under future warming scenarios, we must first validate these scenarios using accurate paleoclimatic records, during periods analogous to present and future climates.

The last interglacial (LIG) is an ideal period to assess the relationship between climate, ice sheets and sea level. During this time, both polar regions were warmer than the present and global mean sea levels were higher, suggesting a considerable (but uncertain) contribution of meltwater from WAIS. In 2019, the WACSWAIN project drilled a 651-meter ice core in the Skytrain ice rise, aiming to provide unique evidence for WAIS instability and loss during the LIG.

Here, we present a multi-centennial resolution (~200 years) diatom record from the Skytrain ice core during the LIG. The diatom diversity in Antarctic ice cores closely represents the proximity of the nearest open water source. Antarctic coastal domes present diatom assemblages dominated by locally-sourced sea-ice species. This contrasts with the diatom diversity observed at inland sites, which are dominated by open ocean species indicating long-range transport. We use these characteristic signatures to track past changes in the proximity of the nearest open water source, providing new evidence to explore the potential retreat of the WAIS during the LIG and its timing.

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