East Antarctic meltwater influx from the Wilkes Subglacial Basin since the Last Glacial Maximum as determined by beryllium isotopes

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The West Antarctic Ice Sheet (WAIS) and East Antarctic Ice Sheet (EAIS) contain an amount of ice equivalent to 3-5 m and 53 m sea level rise, respectively (1). The WAIS, as a largely marine-based ice sheet, is susceptible to changes in ocean temperatures and prone to retreat. Recent research has revealed that areas of the EAIS situated below sea level are also very sensitive to atmospheric and oceanic temperature changes and vulnerable to retreat (2, 3). The two largest subglacial basins in East Antarctica, the Wilkes and Aurora subglacial basins, hold a total ice mass equivalent to 28 m sea level rise (4), demonstrating that even a partial collapse of the EAIS would have a major effect on global sea level.

To investigate the response of these vulnerable areas to a warming ocean and atmosphere, we have evaluated beryllium isotope concentrations from Adélie Basin, located on the continental shelf offshore the Wilkes Subglacial Basin. Our record covers the most recent period of major Holocene ice sheet retreat, sea level rise, and increased atmospheric CO_2since the Last Glacial Maximum ice sheet retreat (5). The beryllium isotope data suggest oceanic or climatic changes occurred at ca. 9.8 ka, ca. 6.3 ka, and from ca. 4.1 ka. From prior research, we can conclude our high meteoric ^{10}Be values at ~9.8 ka and ~6.3 ka are attributed to an open marine environment created by the retreat of grounded ice along with an increased influx of meltwater (6-8). The elevated concentration and frequency variation of meteoric ^{10}Be values starting from ~4.1 ka indicates a change in regime, possibly linked to changes in climate.

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