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Asynchronous Antarctic and Greenland ice-volume contributions to the last interglacial sea-level highstand

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Sea-level rise is among the greatest risks that arise from anthropogenic global climate change. It is receiving a lot of attention, among others in the IPCC reports, but major questions remain as to the potential contribution from the great continental ice sheets. In recent years, some modelling work has suggested that the ice-component of sea-level rise may be much faster than previously thought, but the rapidity of rise seen in these results depends on inclusion of scientifically debated mechanisms of ice-shelf decay and associated ice-sheet instability. The processes have not been active during historical times, so data are needed from previous warm periods to evaluate whether the suggested rates of sea-level rise are supported by observations or not. Also, we then need to assess which of the ice sheets was most sensitive, and why. The last interglacial (LIG; ~130,000 to ~118,000 years ago, ka) was the last time global sea level rose well above its present level, reaching a highstand of +6 to +9 m or more. Because Greenland Ice Sheet (GrIS) contributions were smaller than that, this implies substantial Antarctic Ice Sheet (AIS) contributions. However, this still leaves the timings, magnitudes, and drivers of GrIS and AIS reductions open to debate. I will discuss recently published sea-level reconstructions for the LIG highstand, which reveal that AIS and GrIS contributions were distinctly asynchronous, and that rates of rise to values above 0 m (present-day sea level) reached up to 3.5 m per century. Such high pre-anthropogenic rates of sea-level rise lend credibility to high rates inferred by ice modelling under certain ice-shelf instability parameterisations, for both the past and future. Climate forcing was distinctly asynchronous between the southern and northern hemispheres as well during the LIG, explaining the asynchronous sea-level contributions from AIS and GrIS. Today, climate forcing is synchronous between the two hemispheres, and also faster and greater than during the LIG. Therefore, LIG rates of sea-level rise should likely be considered minimum estimates for the future.