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Glacial-isostatic adjustment and sea-level change near Berkner Island, Antarctica

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We present forward-modeling calculations of the relative sea-level (RSL) height throughout the last glacial cycle at the location of the Berkner Island ice core, Ronne Ice Shelf, Antarctica. The objective is to evaluate the recent retrieval of aeolian sediment presumably from the ice-bedrock interface, at a depth of 62 m below present-day sea level.

We use a self-gravitating viscoelastic earth model with the sea-level equation implemented according to Hagedoorn (2005). We employ various mantle viscosities along with different glacial histories and determine the vertical crustal motion and the RSL height caused by the glacial-isostatic adjustment and the global redistribution of melt water during the last 180 ka.

We show that the time interval of the sediment deposition is sensitive to the viscoelastic behaviour of the earth and the glacial history of the Ronne Ice Shelf. For the most realistic modeling scenario, deposition is possible from 114.5 to 92.2 ka before present. Conversely, if, in future, the time of deposition is known, this study may provide a constraint on the mantle viscosities and the regional glacial history.