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Sea level contribution from Amundsen Embayment in the last 200 years

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The Amundsen Embayment presents an interesting combination of ice mass changes, solid Earth properties and geodetic observations that allows us to infer and constrain the cumulative ice mass lost from this region since the end of Little Ice Age (LIA). The rate of present day mass changes in this region is about 130 Gt/yr, which is about half of the total ice loss rate for the whole of Greenland, making the Amundsen Sea Embayment the location of one of the fastest ice losses in the world. A very soft mantle beneath Amundsen sector makes the solid Earth rebound response to present-day and recent ice melting very rapid, and on very short time scale, with a sustained bedrock uplift rate that is clearly observed by the Antarctic GPS Network (ANET). We built a suitable Earth model and a very large ensemble of possible ice history for the past 200 years based on the pattern of present day ice changes. We simulate the rebound produced by our Earth model for each element of the ice history ensemble and we find that only a relatively small subset can skillfully reproduce the observations. All the ice histories in this subset have very similar cumulative ice loss since end of LIA. In terms of sea level rise equivalent the best models produce around 15 mm, which is between 8% and 10% of the global sea level raise over the same period. Another relevant finding is that almost all good models show a sudden increase in the mass loss in the recent past. We further show with a sensitivity study that with our ensemble of models we already explore most of the meaningful possible scenarios. However we investigate further the effect of localized variations in the geometry of the ice changes, such as the strong retreat of grounding line in Pine Island and Thwaites glaciers.