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Recession of Thwaites Glacier: inferring relevant processes using the ice sheet model Elmer/Ice

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Numerous studies focusing on ice sheets mass balance clearly show an increasing ice discharge mainly induced by the acceleration of ice flow through coastal outlet glaciers. As a crucial impact, imbalance of both Greenland and Antarctica is today an essential driver of the current sea level rise. In the specific case of West Antarctica, the Amundsen Sea sector is the most impacted region and current recession may be the first sign of a large, unstable and irrevocable retreat of the whole region. Projecting the forthcoming behavior of that sector in general, and the most out of balance Pine Island and Thwaites Glacier is therefore a large matter of concern.

Using notably the 3D full-Stokes ice sheet model Elmer/Ice, a recent study has shown that the Pine Island Glacier retreat is currently driven by marine ice sheet instability. Here, we use similar methodologies to investigate the condition of stability of the neighboring Thwaites glacier. In particular, we focus on the effect of ice rises and induced crevasses onto the ice flow and show that their impact is of crucial importance prior to any attempt of projecting the short term response of Twaites glacier.