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Using characteristics of the Antarctic surface elevation to infer information on ice flow dynamics.

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Sea level rise is one of the expected impacts of global warming. Among the processes responsible of this sea level rise, ice sheet dynamics is not only an important one, it is also a domain where our ability to perform realistic simulations is still poor and bad surprises cannot be excluded. Two main branches of ice sheet modelling are concerned: Surface mass balance will hopefully be dealt with by coupling with GCMs. Ice flow is another aspect that we need to improve by identifying mechanisms, developing suitable models and methods to test them.

Ice sheet elevation is a free surface reflecting both internal processes and surface mass balance. It is both a characteristic observed by satellite alitmetry with a good spatial coverage and a prognostic variable of ice sheets models. We present here a variety of indicators to characterize the Antarctic ice sheet surface. Our indicators are mainly based on first and second derivatives of the ice sheet surface (respectively slope and curvature) and we investigate the impact of spatial scale on which they are computed. To link them with ice drainage we first compare the surface patterns with observed velocities or balance velocities. Secondly, we apply this method to the surface elevation modelled by the ice sheet model GRISLI to assess how, where and why this model is able to reproduce observed features (or not).