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Preliminary results of a coupled ice-shelf - ocean model for the south-eastern Weddell Sea

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Modelling coupled systems gain importance for a better understanding of interactive effects in the earths climate system. Our investigations concentrate on a coupled ice-shelf - ocean system in the south-eastern Weddell Sea sector.

We revise an existing ice-shelf model, regarding to the implementation of shear fracture zones and a new usage of boundary conditions. From our point of view the implementation of shear fracture zones enables us to model a more realistic ice-shelf flow regime. Our adaptation of the boundary conditions leads to a spatially symmetric structure of the ice-shelf flow regime. This is different to commonly applied models in a Cartesian system that favour flow directions parallel to the coordinate axis.

The three dimensional ocean model is driven by thermohaline circulation and is initialised and forced with a realistic hydrography and a climatological wind. The basal mass balance at the ice-shelf base is calculated on the basis of fundamental thermodynamic formulations.

Before the models are coupled we analyse the results of the individual systems under steady-state conditions. Both models use the same ice-shelf geometry and the resulting basal mass balance of each model should be approximately equal. After this validation the coupling of the two models is performed by interchanging the ice-shelf geometry (from the ice-shelf model to the ocean model) and the basal mass balance (from the ocean model to the ice-shelf model). Thus we have the possibility to calculate possible climate change scenarios, e.g. increasing/decreasing of the surface temperature, and its implications on the south-eastern Weddell Sea.

First modelling efforts show that the Eastern Weddell Ice Shelves are an important

region for water-mass conditioning and formation in the Weddell Sea. Preliminary results of our coupled ice-shelf - ocean model and the interaction between the individual systems will be presented.