DFG-Project REDOCCA
(Regional high-resolution Downscaling of Climate Change in the Antarctic)

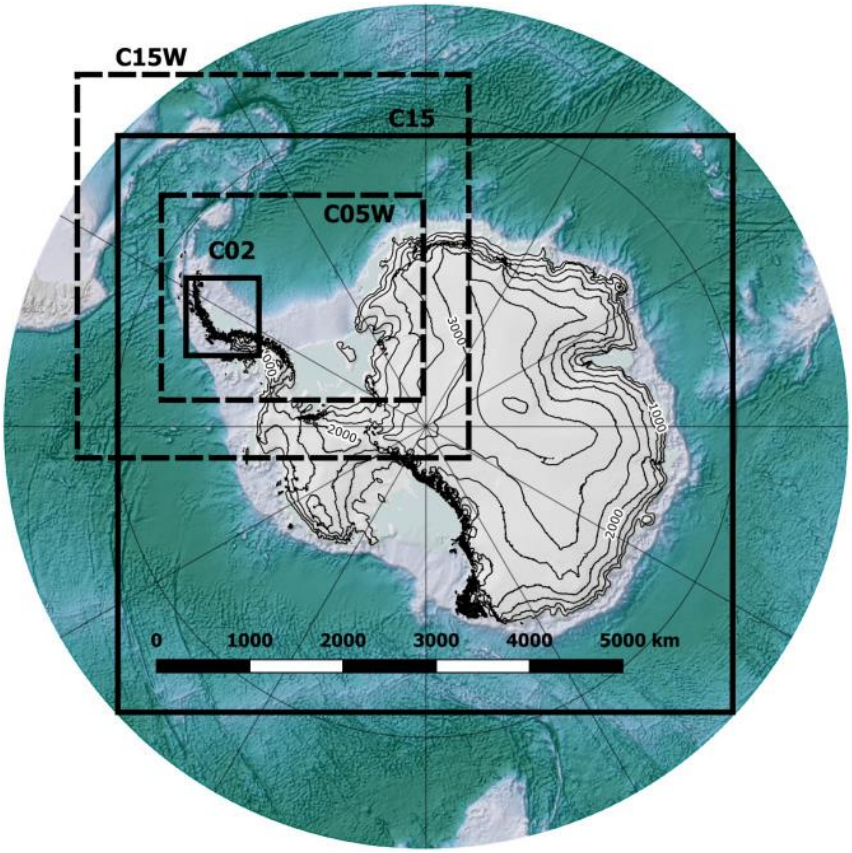

Fig.1: Model domain and topography (isolines every 500 m). New model domain (solid line) C02/C15 with a resolution of 2/15 km; model domain C05W/C15W (dashed line) from the project „Weddell-sea-ice“.

In the southern Weddell Sea (see C05W in Fig.1) and generally along the coast of Antarctica open water areas (called polynya) inside regions of sea ice are common. Their size is around several 100 km² and after development, they persist up to several days before the water is covered again by sea ice. The energy transfer from “warm” water to the “cold” atmosphere within these polynyas (see Fig.2) has a big influence on the atmospheric boundary layer, the sea ice production and thus the production of High-Salinity Shelf Water (HSSW). The production of HSSW plays and important part for the global thermohaline circulation of the ocean. This circulation again influences the melting rate of ice shelf.

Fig.2: Ronne-Polynya in January 2016.

In this project global climate simulations are used to force regional high-resolution climate

simulations. Three simulations, each for 15 years, for the Antarctic continent are planned (see C15 in Fig.1): a reference-simulation for the years 2000-2014 und two future-simulations (2036-2050 und 2086-2100), that use the IPCC RCP 8.5 scenario. As atmospheric model the Community Climate Model COSMO-CLM and as sea-ice-ocean model the FESOM-Model from AWI is used. These simulations will help in further understanding the processes surrounding sea ice, polynyas and ocean circulation and a change by the end of the end of the century can be investigated. Furthermore, the melting of the Larsen Ice Shelf will be studied. For this a simulation with and even higher resolution will be performed (see. C02 in Fig.1). We will investigate the atmospheric influence (from above) and the oceanographic influence (from below) to the melting of the Larsen Ice Shelf.

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