Project: 958 Title: Weddell Sea Ice

Project lead: **Günther Heinemann,** Report period: **2021-01-01 to 2021-08-31**

The regional climate model COSMO-CLM (CCLM) is used with a horizontal resolution of 15km the whole Antarctic continent. CCLM is run with a new turbulence parametrization for the stable boundary layer (Zentek and Heinemann 2020) and a new sea ice model (Heinemann et al. 2021). CCLM is nested in AWI-CM (100km resolution for the atmosphere) and uses the AWI-CM sea ice data (10km resolution). Simulations have been performed for the periods 2000-2014, 2036-2050 and 2086-2100 (SSP5-8.5), and they are part of polar CORDEX. CCLM data are used to drive the sea ice/ocean model FESOM for these periods.

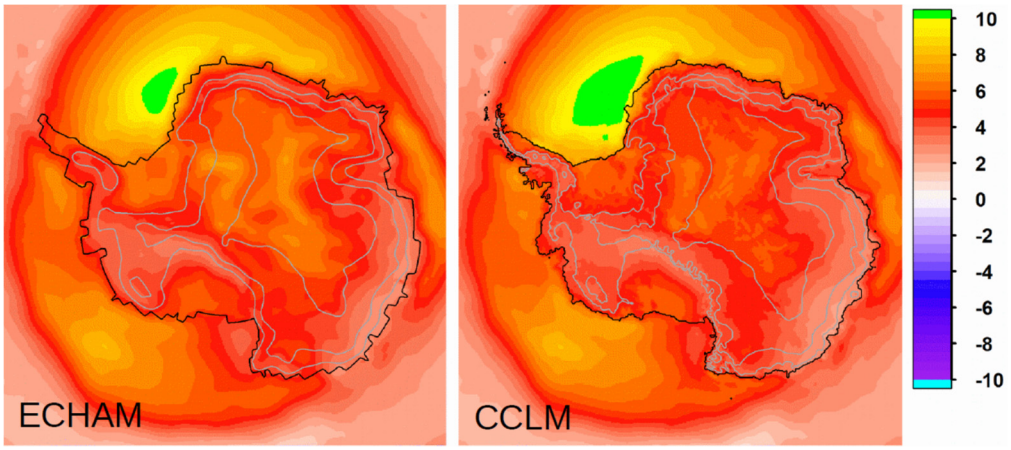

Fig. 1: Wintertime (April-Sept.) climate change signal for the 2m-temperature (in K) for SSP5-8.5 for the AWI-CM simulations (ECHAM) and for CCLM.

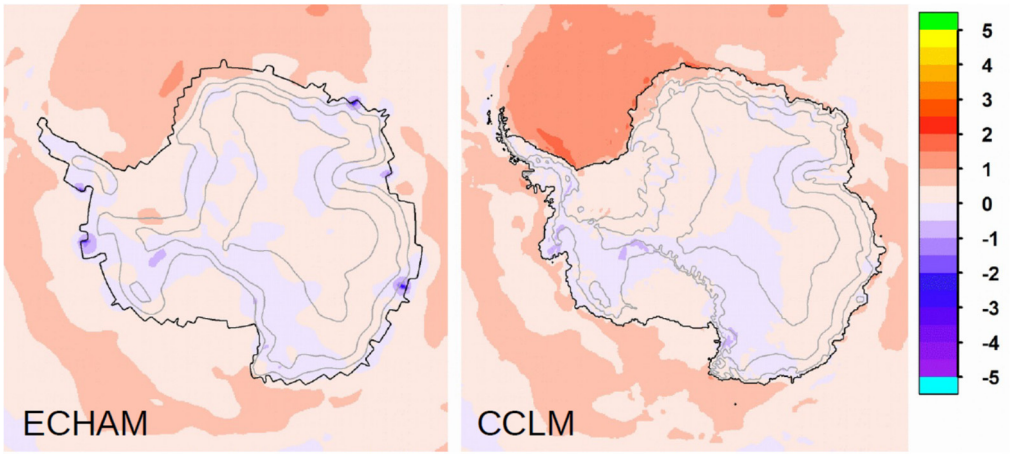

Fig. 2: Wintertime (April-Sept.) climate change signal the 10m-wind speed (in m/s) for SSP5-8.5 for the AWI-CM simulations (ECHAM) and for CCLM.

The climate change signals for 2m-temperature and 10m-wind are shown in Fig.1 and Fig.2. The gross structure of the warming is similar for the AWI-CM and CCLM, but CCLM shows a stronger warming over the Weddell Sea. For the wind field, both simulations show an increase over the sea ice areas, which is again more pronounced for the Weddell Sea in CCLM. Here we see also a stronger increase along the Antarctic Peninsula indicating a more pronounced barrier wind. Over the ice sheet a slight decrease of the (katabatic) wind can be seen, which likely caused by a weakening of the surface inversion.

References

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Zentek, R. and Heinemann, G., 2020: Verification of the regional atmospheric model CCLM v5.0 with conventional data and lidar measurements in Antarctica, Geosci. Model Dev., 13, 1809–1825, doi: 10.5194/gmd-13-1809-2020.