



Simulated Southern Ocean response to forcing with climate model output

Ralph Timmermann, Hartmut H. Hellmer, and Frank Kauker

Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany (Ralph.Timmermann@awi.de)

In the framework of the EU-funded project ICE2SEA (Contribution of Land Ice to Sea Level Rise) we forced a regional (south of 50°S) coupled sea ice—ice shelf—ocean model with the atmospheric output from the climate models HadCM3 (MOHC) and MPEH5C (MPI-Hamburg). The skills of the climate models with regard to conditions in the Southern Ocean were investigated by comparing the results from three regional model simulations, two forced with the 20th-century climate model outputs, the other with NCEP reanalysis products. The comparison shows significant differences in Southern Ocean hydrography and sea ice characteristics, and thus allows for an identification of the most suitable climate scenario forcing product. We found that using MPEH5C output causes maximum temperatures on the southeast Pacific continental shelf being too high and too variable in time, and sea ice extent being too large for the whole Southern Ocean. The analysis of the climate models' atmospheric outputs indicates the reasons for the diverse responses. Representation of the ENSO signal, e. g., is much more pronounced in MPEH5C, while inter-decadal variability in the 20th-century appears to be underestimated when using the HadCM3 product. In view of the differences between the climate model projections, we also present results from the regional model forced with the climate change scenario A1B for the period 2000-2100.