EGU2020-20837
https://doi.org/10.5194/egusphere-egu2020-20837
EGU General Assembly 2020

Antarctic sea ice decline delayed well into the 21st century in a high-resolution climate projection

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Despite ongoing global warming and strong sea ice decline in the Arctic, the sea ice extent around the Antarctic continent has not declined during the satellite era since 1979. This is in stark contrast to existing climate models that tend to show a strong negative sea ice trend for the same period; hence the confidence in projected Antarctic sea-ice changes is considered to be low. In the years since 2016, there has been significantly lower Antarctic sea ice extent, which some consider a sign of imminent change; however, others have argued that sea ice extent is expected to regress to the weak decadal trend in the near future.

In this presentation, we show results from climate change projections with a new climate model that allows the simulation of mesoscale eddies in dynamically active ocean regions in a computationally efficient way. We find that the high-resolution configuration (HR) favours periods of stable Antarctic sea ice extent in September as observed over the satellite era. Sea ice is not projected to decline well into the 21st century in the HR simulations, which is similar to the delaying effect of, e.g., added glacial melt water in recent studies. The HR ocean configurations simulate an ocean heat transport that responds differently to global warming and is more efficient at moderating the anthropogenic warming of the Southern Ocean. As a consequence, decrease of Antarctic sea ice extent is significantly delayed, in contrast to what existing coarser-resolution climate models predict.

Other explanations why current models simulate a non-observed decline of Antarctic sea-ice have been put forward, including the choice of included sea ice physics and underestimated simulated trends in westerly winds. Our results provide an alternative mechanism that might be strong enough to explain the gap between modeled and observed trends alone.

How to cite: Rackow, T., Danilov, S., Goessling, H. F., Hellmer, H. H., Sein, D. V., Semmler, T., and Jung, T.: Antarctic sea ice decline delayed well into the 21st century in a high-resolution climate projection, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-20837, https://doi.org/10.5194/egusphere-egu2020-20837, 2020