



Estimating trends in Antarctic sea ice extent over the last century

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Antarctic sea ice extent has slightly increased over the past 30 years. The origin of this trend is currently debated but one hypothesis is that the large internal variability at decadal time scales at high southern latitudes may mask the small warming trend associated with the anthropogenic forcing. Temperature observations over the last 60 years are compatible with this hypothesis of large multi-decadal variability but no reliable estimate of past changes in ice extent are currently available before the 1970s. Here, those past changes in ice extent over the whole 20th century are estimated thanks to simulations with data assimilation using the coupled climate model of intermediate complexity LOVECLIM. Despite its coarse resolution and some simplifications in the atmospheric dynamics, LOVECLIM is able to simulate Antarctic sea ice concentration with biases similar to the ones of Coupled General Circulation Models. Several simulations are performed, constrained by different data sets and using different parameters in the data assimilation method. They all display a large decrease in the sea ice extent between 1950 and 1975, leading to an overall decrease in ice extent over the period 1950-2010.