



## **Evolution of the ice extent in the Southern Ocean during the last 100 years.**

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During the last 25 years for which we have good estimates based on satellite records, the sea ice extent has dramatically decreased in the Arctic while it has remained remarkably stable in the Southern Ocean. This absence of trend for Antarctic ice extent in a context of global warming due to the increase in the concentration of greenhouse gases in the atmosphere could be related to various processes: large inertia of the ocean that delays the response to the external forcing, changes in the ocean or atmospheric circulation that could affect the sea ice cover, internal variability masking the response to the forcing,... On the other hand, the simulations performed in the framework of the 4th IPCC assessment report using sophisticated three dimensional climate models generally display a decrease of the ice extent in the Southern Ocean over the 20th century. Because of the large interannual variability, the trend is not significant if only 25-year time series are analysed but the trend becomes clear on longer term in the majority of the models. Longer time series of ice extent would thus be of particular interest for a relevant model data-comparison and to analyse precisely the role of the various processes responsible for the observed stability of the ice extent in the Southern Ocean. Unfortunately, the reconstructions of the ice extent are not reliable before the 1970s. The goal of this study is to review various long-term observations of surface air temperature as well as ocean temperature and salinity to check how they could provide us with indirect information on the long term evolution of the ice cover. To do so, we will use results of coupled climate models. In a first step, the compatibility between those long-term observations and available simulations will be analysed to assess model quality on those time scales. In a second step, a simple data assimilation technique will be used in order to gain more direct information on the evolution of the

system.