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Temperature changes at high southern latitudes during the last 1000 years: evaluation of simulations and reconstructions

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The temperature changes at high southern latitudes during the past millennium are investigated using proxy records, a set of simulations driven by natural and anthropogenic forcings and simulations with data assimilation. In response to the forcing, the models display on average over Antarctica a cooling trend during the period 1000-1850 AD followed by a warming. Compared to the observations, the simulated warming is overestimated over the last decades. On longer term, all the model results are in qualitative agreement with an estimate of past Antarctic temperatures obtained by averaging seven temperature records derived from isotope measurements in ice cores. This mean over Antarctica is however the residual of large spatial scale variations. This implies that the common signal between the ice cores explains only a small part of the regional variability. Furthermore, this average is influenced by the choice of the records. It also indicates that the complex spatial distribution of the temperature changes in Antarctica during the past millennium cannot be satisfactory described here because of the too small number of records. Models results also display large variability between the regions at decadal to centennial time scales but the simulated changes are more spatially consistent at multi-centennial scales than shown in the ice core records.