# Antarctic ice sheet modeling of the Last Glacial Maximum and the last deglaciation using the three-dimensional ice sheet model SICOPOLIS

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Reconstructions indicate that the Antarctic ice-sheet extent and volume decreased during the last deglaciation. Sea level reconstructions of the Last Interglacial (LIG), after the penultimate deglaciation, indicate that the volume of the Antarctic ice sheet was smaller than during the present interglacial. Climate reconstructions indicate that the surface temperature over the Antarctic continent and the sea surface temperature over the Southern Ocean during the LIG were higher than during the present interglacial. A transient climate simulation of the last deglaciation using MIROC suggests that these higher surface temperatures in the Antarctic region are a result of a weaker AMOC during the deglaciation and associated warming in the Southern Hemisphere.

In the present study, we use the three-dimensional ice sheet model SICOPOLIS to conduct a quantitative assessment of the retreat of the Antarctic ice sheet during deglaciations. The horizontal resolution is set to 32 or 16 km to conduct long-term simulations of the last one glacial cycle efficiently. The model was forced by reconstructed surface temperature, sea-level changes and simplified sub-ice-shelf melting rates. The simulated position of grounding lines during the LGM was less advanced compared with reconstructions, suggesting that grounding line migration is weakly simulated if the horizontal resolution is too coarse. We speculate that either higher resolution or adaptation of a grounding line parameterization into a coarse resolution model might be required to represent proper grounding line migration during glacial cycles.