



Impact of the removal of the Greenland Ice Sheet on the Northern Hemisphere climate in a high-resolution GCM

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We investigate the consequences of the removal of Greenland Ice Sheet in a series of uncoupled and coupled simulations with EC-Earth 3.0.1 with a horizontal resolution of about 80 km and 91 vertical levels. While few local changes are observed in the atmosphere-only runs, important anomalies from a baseline experiment are seen in the coupled simulations. A marked warming is observed around the Greenland landmass, caused by the lower orography and the darker surface albedo. A reduction of sea-ice is immediately observed in the first years of the simulations, increasing the shortwave flux and locally warming the SSTs. This finally leads to a decrease in the poleward heat transport, manifested by a weakening of the Meridional Overturning Circulation of about 20% and by a southward shift of the subtropical jet. After 100 years of simulations, even if a warming of several degrees is still observed over Greenland, the temperature of the remaining part of the Northern Hemisphere is decreased by about 2 degrees. Colder SSTs and a stronger eddy-driven jet stream are also found over the Central North Atlantic. Interestingly, weak differences are seen between the complete flattening of Greenland orography and the removal of the Greenland Ice Sheet only (i.e. leaving the natural bedrock).