

Simulation of the Indonesian Throughflow response to Antarctic ice-sheet changes during the Middle-Miocene Climate Transition

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The Middle Miocene Antarctic Glaciation, reflected as a ~0.5 ‰ increase in the benthic oxygen isotope record at ~13.9 Ma, is a major climatic event in the Cenozoic history. The Antarctic ice-sheet expansion caused important changes in the global climate. This work is focused on the local effects of the Middle Miocene Antarctic Glaciation on the Indonesian Throughflow.

We run the Community Climate System Model (CCSM) version 3.0 with the fully coupled configuration, forced with Middle-Miocene global topography, bathymetry and vegetation and a detailed reconstruction of the South East Asian passages configuration.

Two simulations are carried out, representing the Middle Miocene Climatic Optimum and the subsequent period with maximum ice-sheet expansion, differing in terms of ice-sheet geometries, sea-level and atmospheric CO₂ concentrations. The first simulation corresponds to a partially glaciated Antarctica, with two main ice-sheets, one covering the Transantarctic Mountains and the other one in East Antarctica, the second simulation corresponds to a fully glaciated Antarctica with one single ice-sheet covering it all.

The aim of this study is to investigate the changes in atmospheric and ocean circulation caused by the glacial expansion with a particular focus on shifts in the tropical hydrologic cycle. More specifically, we test whether there

was a northward movement of the Intertropical Convergence Zone in South East Asia as it has been suggested on the basis of paleoclimatic proxy records.