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Changes in the Indonesian Throughflow and southeast Asian hydroclimate during the Middle-Miocene Climate Transition

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The present-day Indonesian Throughflow (ITF), a key component in the global ocean circulation, transports relatively cold low-salinity water from the Pacific to the Indian oceans. This ocean current is of course not a constant system, meaning that its characteristics have changed throughout its history, both due to local forcings, such as changes in the geometry of the passages, and changes in the global climate system, such as the Middle-Miocene Climate Transition.

The Middle-Miocene Climate Transition leads from the warm Middle-Miocene Climatic Optimum into the subsequent "icehouse world". The transition is associated with an increase in Antarctic glaciation at $\sim$13.9 Ma. The aim of this study is to investigate the differences in atmospheric and ocean circulation between the warm and cold climate states in the Middle Miocene, specifically on changes in the characteristics of the ITF and shifts in the tropical rainbelt. We test whether there was a northward movement of the tropical rainbelt in southeast Asia as has been suggested on the basis of palaeoclimatic proxy records.

We employ the comprehensive Community Climate System Model (CCSM) version 3.0 in a medium resolution. All the experiments used Miocene boundary conditions, including topography, bathymetry and vegetation. Two simulations were carried out, representing the time before and after the climate transition. Different boundary conditions take into account changes in ice-sheet geometry, sea-level and atmospheric CO_2 concentration. The state prior to the transition is characterized by Antarctica being partially glaciated, with one ice cap covering the Transantarctic Mountains and another over East Antarctica. The second simulation corresponds to a fully glaciated Antarctica with one single merged ice-sheet covering the whole continent. We will present initial analyses of hydrological fields and ocean circulation to assess the role of Antarctic glaciation on tropical climate.