

# Impact of changes in the IT on global climate evolution

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## Brief project description

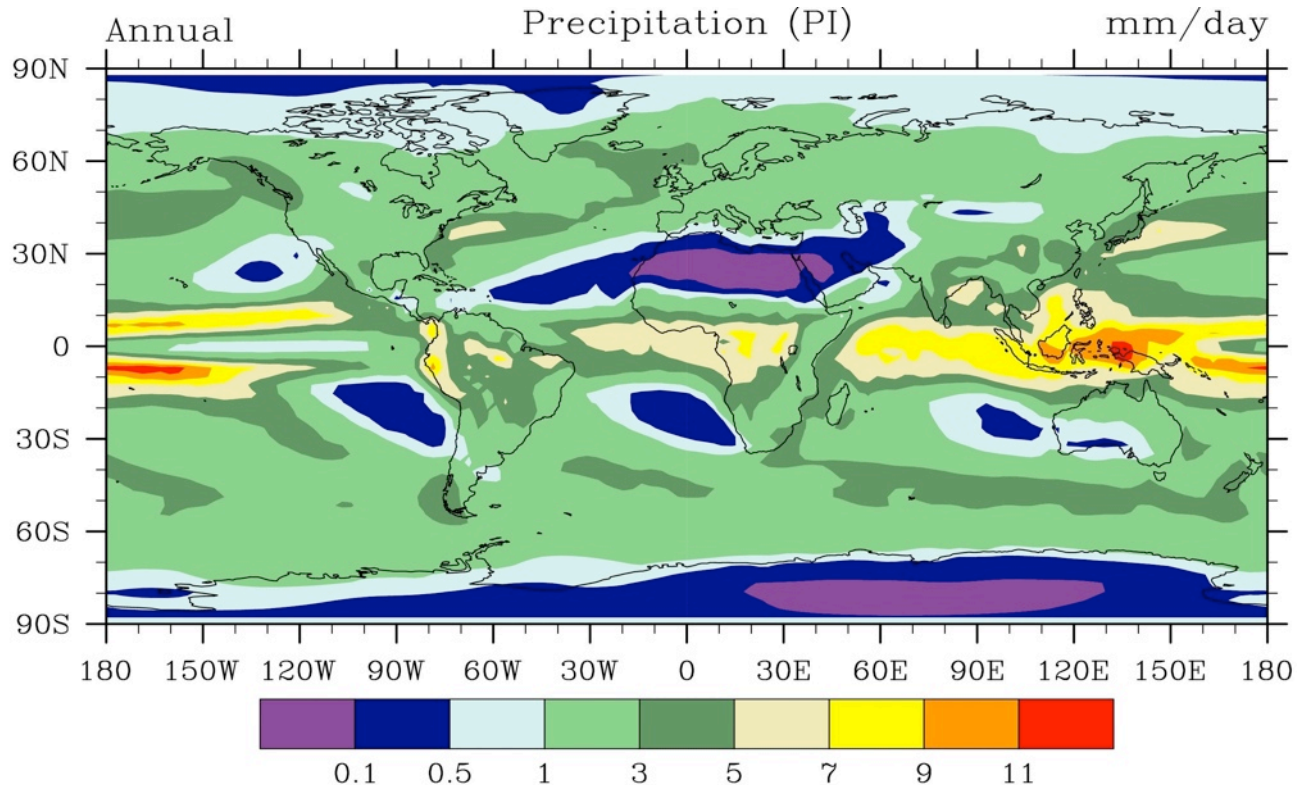
- Middle-Miocene Antarctic glaciation effect in the IT region.
- Deep water passage closure effect around 25 Ma.
- Sensitivity of Oligocene climate to changes in atmospheric CO<sub>2</sub> concentrations.

# General model setup

- Model: earth system model CCSM3.
- Required initial and forcing files:
  - Topography/bathymetry data.
  - Vegetation data.
  - Atmospheric GHG concentrations (e.g CO<sub>2</sub>).
  - Orbital parameters and solar constant.
  - Stratospheric ozone.
  - Aerosols distribution.

# Pre-industrial control experiment

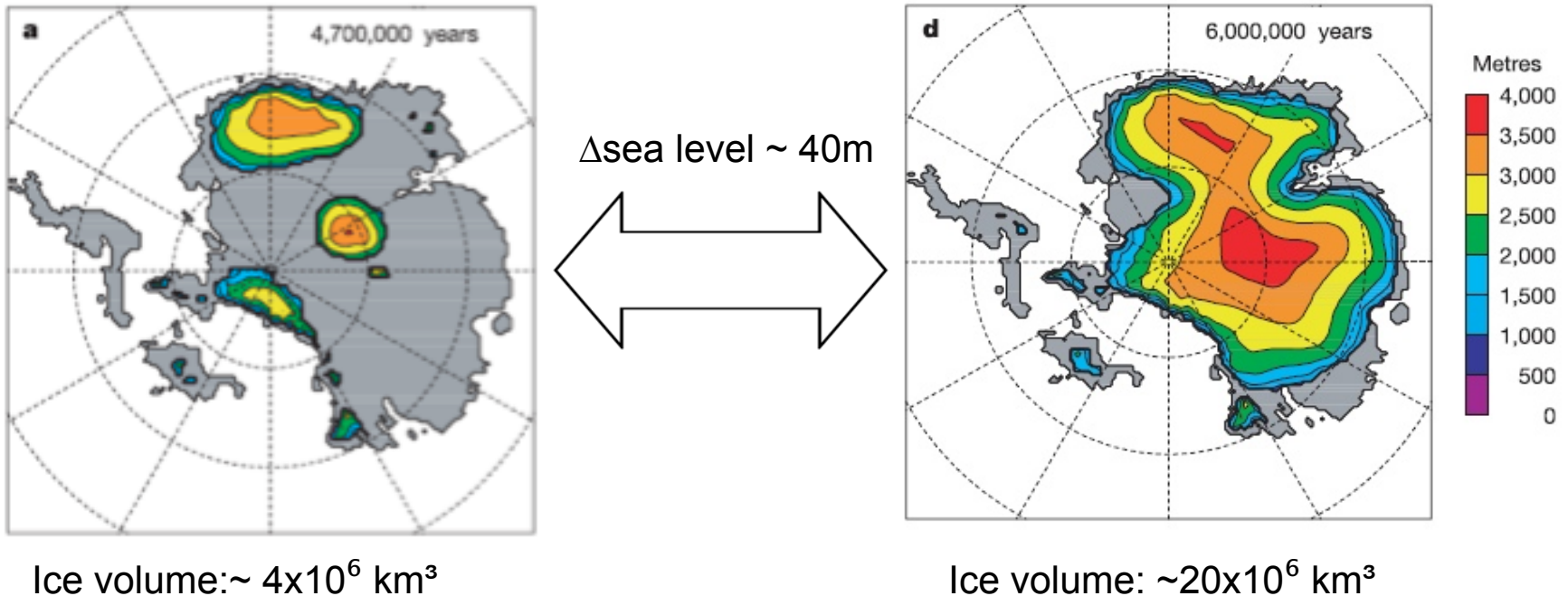
- What are pre-industrial boundary conditions?
- Model settings: ~ present-day, except for: GHG concentrations, orbital parameters and solar constant, aerosols and stratospheric O<sub>3</sub>.



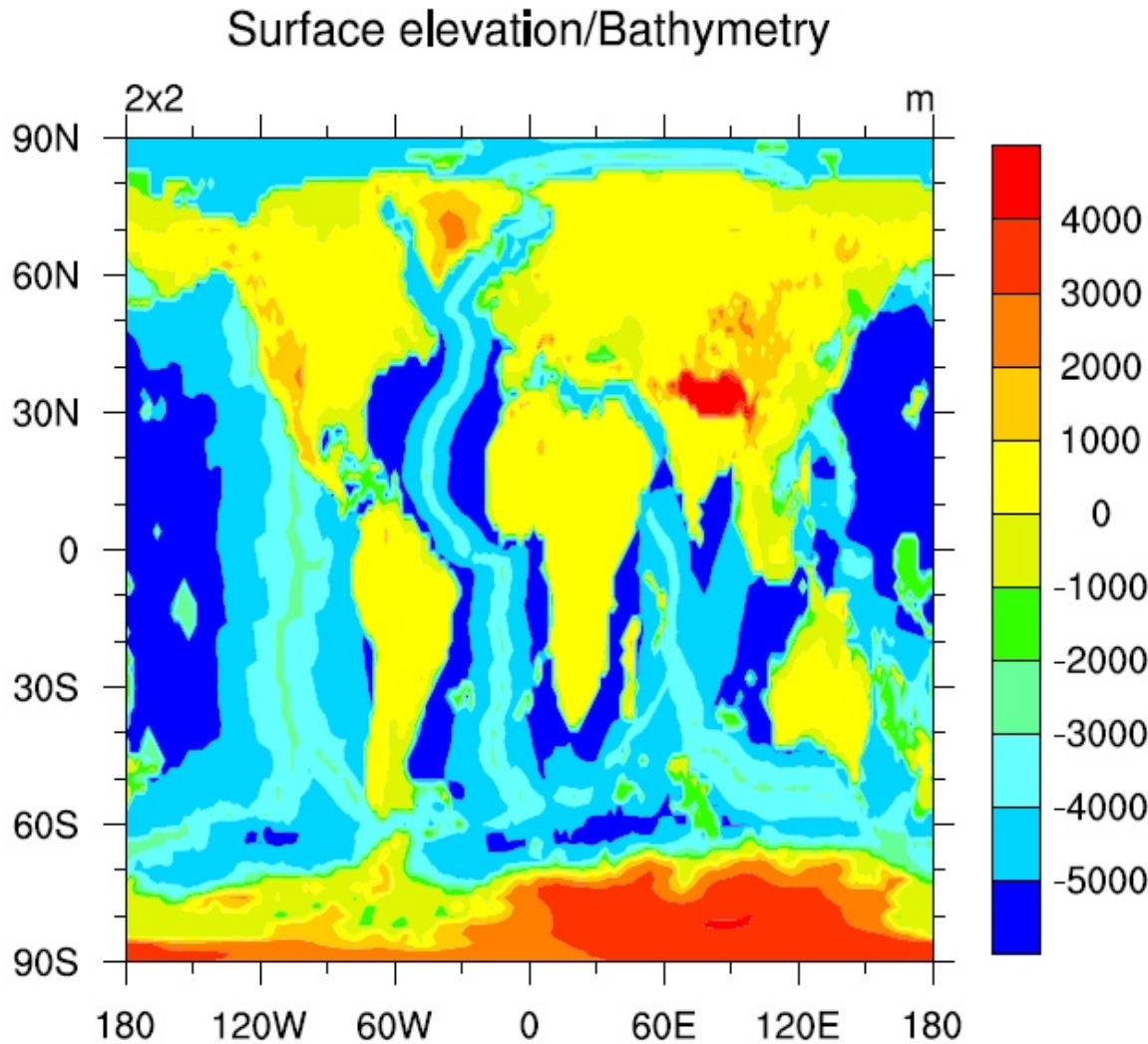
*Mean annual precipitation (mm/day) for the pre-industrial control simulation (100-year climatological mean).*

# Middle-Miocene Antarctic glaciation experiment

- Which were the climatic effects of Middle-Miocene Antarctic glaciation in the Indonesian region?
- How were ocean currents and hydrography in the Indonesian seas affected?
- Did growth of ice-sheets in Antarctica lead to a northward shift of the ITCZ?



# Middle-Miocene Antarctic glaciation experiment



- Globe:
  - Middle-Miocene topography/  
bathymetry data from Herold  
et al. 2008.
- Antarctica:
  - present-day bedrock  
topography.
  - surface elevation relative to  
Icehouse conditions from  
David Pollard.

*Surface elevation and bathymetry for Middle-Miocene Icehouse conditions.*

## Next steps

- Create topography dataset for Antarctica for MMCO.
- Improve Middle-Miocene vegetation dataset for the SE Asia region.
- Set up atmospheric CO<sub>2</sub> concentrations and average orbital parameters for Middle-Miocene.
- Run two different Middle-Miocene experiments with CCSM3: corresponding to before and after MMCT.

# Networking

- Proxy data for temperature, precipitation, salinity or intensity of currents before and after MMCT (to track a potential northward shift of the ITCZ).
- High resolution data to study seasonality and interannual variability.
- Oligocene and early Miocene climate proxy data.
- Oligocene atmospheric CO<sub>2</sub> concentrations estimates.







# Outline

- Brief project description.
- General model setup.
- Pre-Industrial control experiment.
- Middle-Miocene Antarctic glaciation experiment.
- Next steps.
- Networking.