

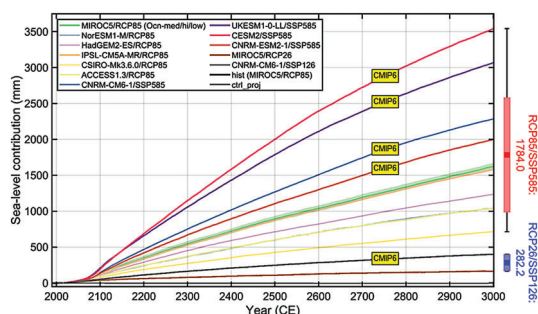
# Committed mass loss of both GrIS & AIS under a sustained late-21st-century climate exceeds by far the mass loss reached by 2100 and reaches >1000 years into the future.

## Simulating the fate of the Earth's ice sheets in a warming world

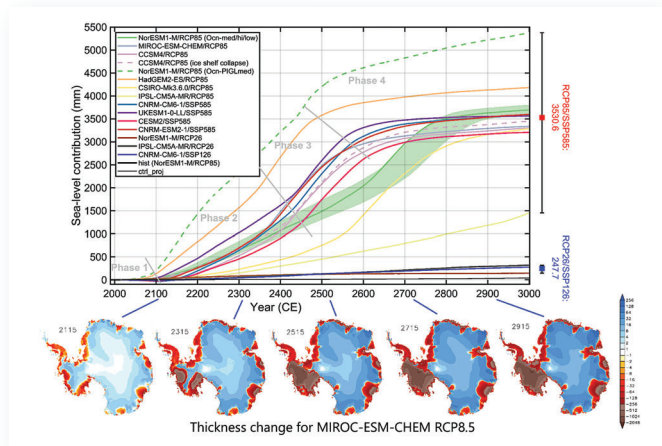
**Background:** The Greenland and Antarctic ice sheets (GrIS, AIS) are major contributors to sea-level rise. Projections for the future, including assessing uncertainties, are of major societal importance.

## Results

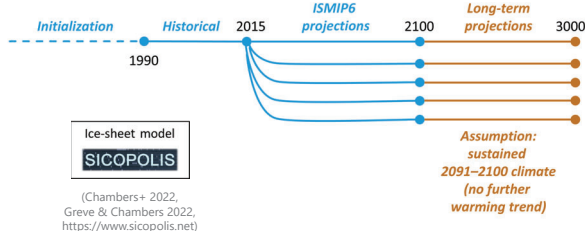
Simulated mass loss of the **GrIS** until 3000 CE. ISMIP6 period 2015–2100, after that no further climate change assumed. Gradual behaviour, but multi-metre sea-level contribution possible.



Same for the **AIS**.  
Note the tipping-point behaviour (WAIS instability).



## Methods



Grounded ice dynamics: Shallow-ice-shelfy-stream hybrid.  
Floating ice dynamics: Shallow-shelf approximation (only AIS).  
Thermodynamics: Enthalpy method.  
Weertman-Budd-type sliding law, tuning for discrete regions.  
Regular grid, 5 km (GrIS) / 8 km (AIS) resolution.  
Climate forcing by CMIP5 and CMIP6 ESMs (ISMIP6 ensemble).  
Scenarios: RCP8.5 / SSP5-8.5 ("business as usual"),  
RCP2.6 / SSP1-2.6 (efficient mitigation).

**Outlook:** Towards ISMIP7 (IPCC 7th assessment cycle) → improved paleoclimatic spin-up, historical/con-temporary periods (1850–1990–2025) & assimilation of observational data, climate forcing by CMIP7 ESMs...



Resources

