BaySys Climate Scenarios

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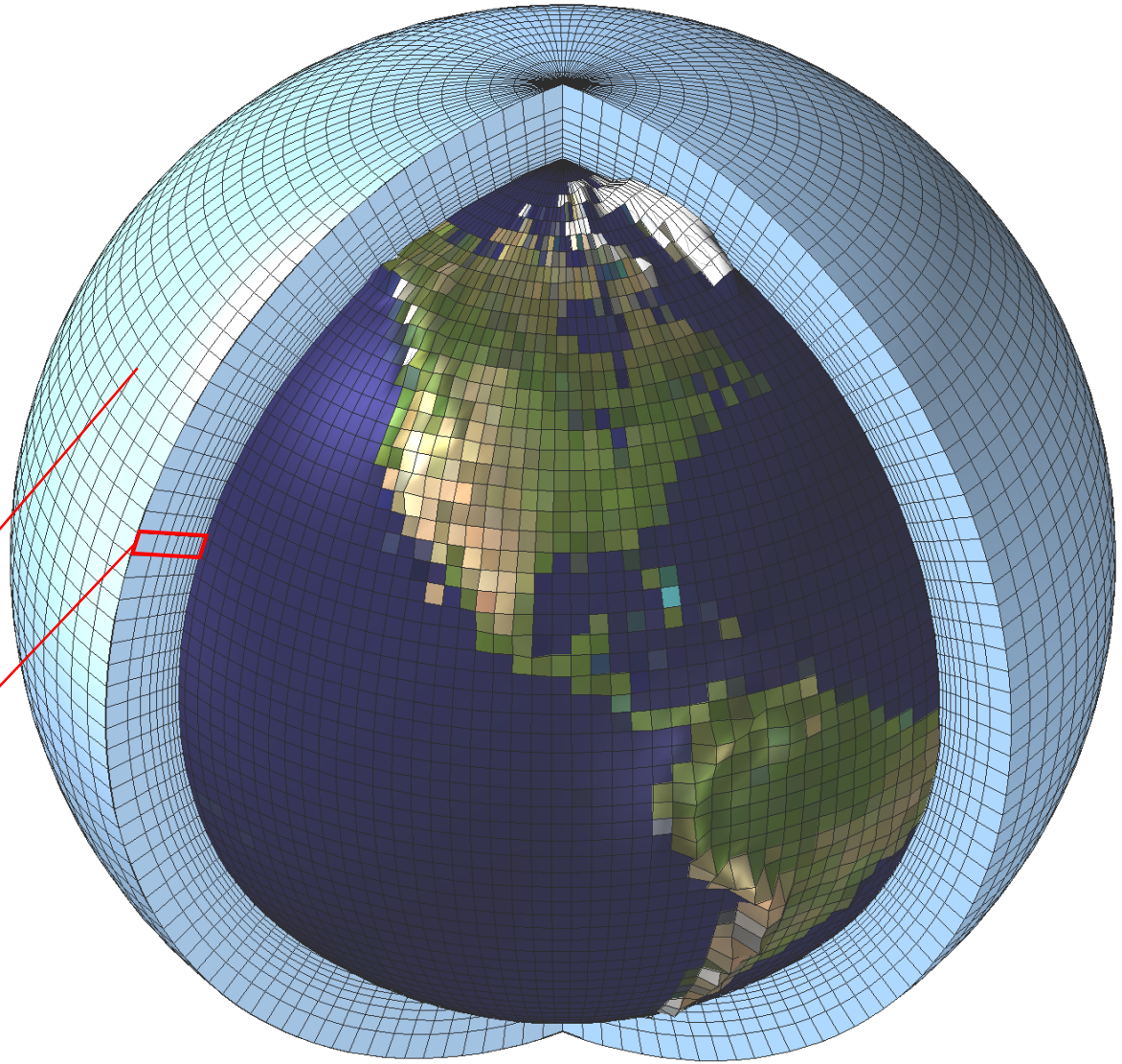
Earth Simulators (rather than Global Circulation Models – GCMs)

- 3D descretisation of the atmosphere
- System of differential equations based on well established laws of physics (fluid dynamics, thermodynamics, gravity, rotation, …)
- The ‘Earth Simulator’ generates its own climate, 100% independent from what we can observe on the real planet
- Key experiment:
  What happens in a system like planet Earth when atmospheric GHG concentrations change?

Horizontal grid:
Longitude / Latitude

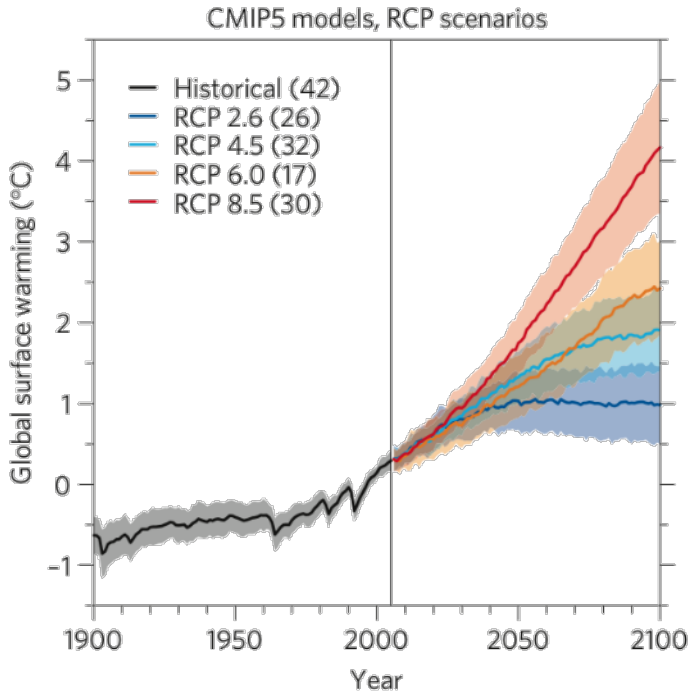
Vertical grid:
Elevation or pressure

2.5° / ~ 300km

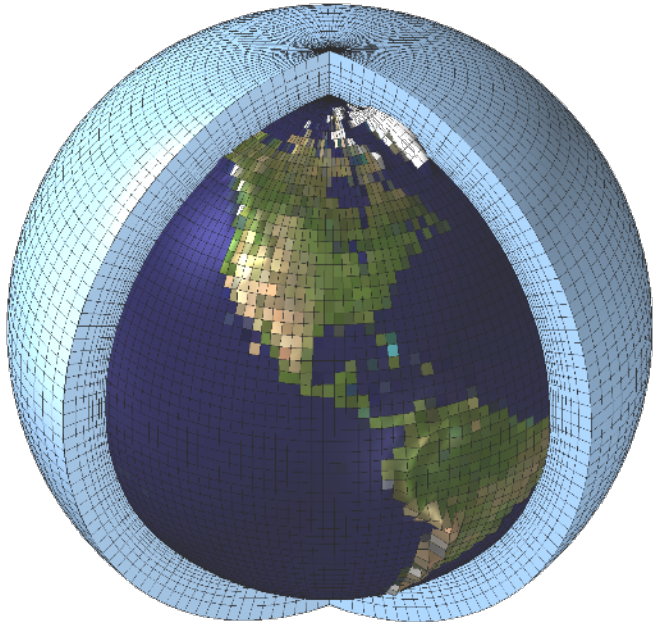


The three main components of uncertainty in climate simulations

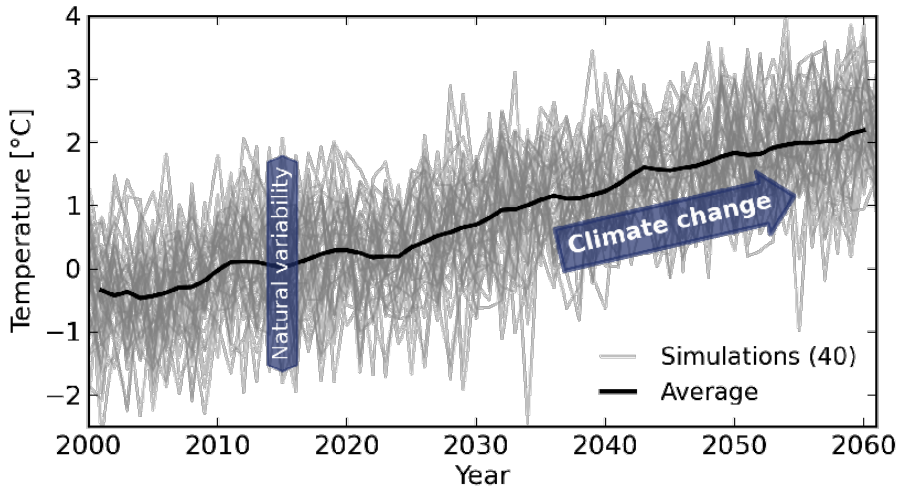
Emission scenario



Model structure

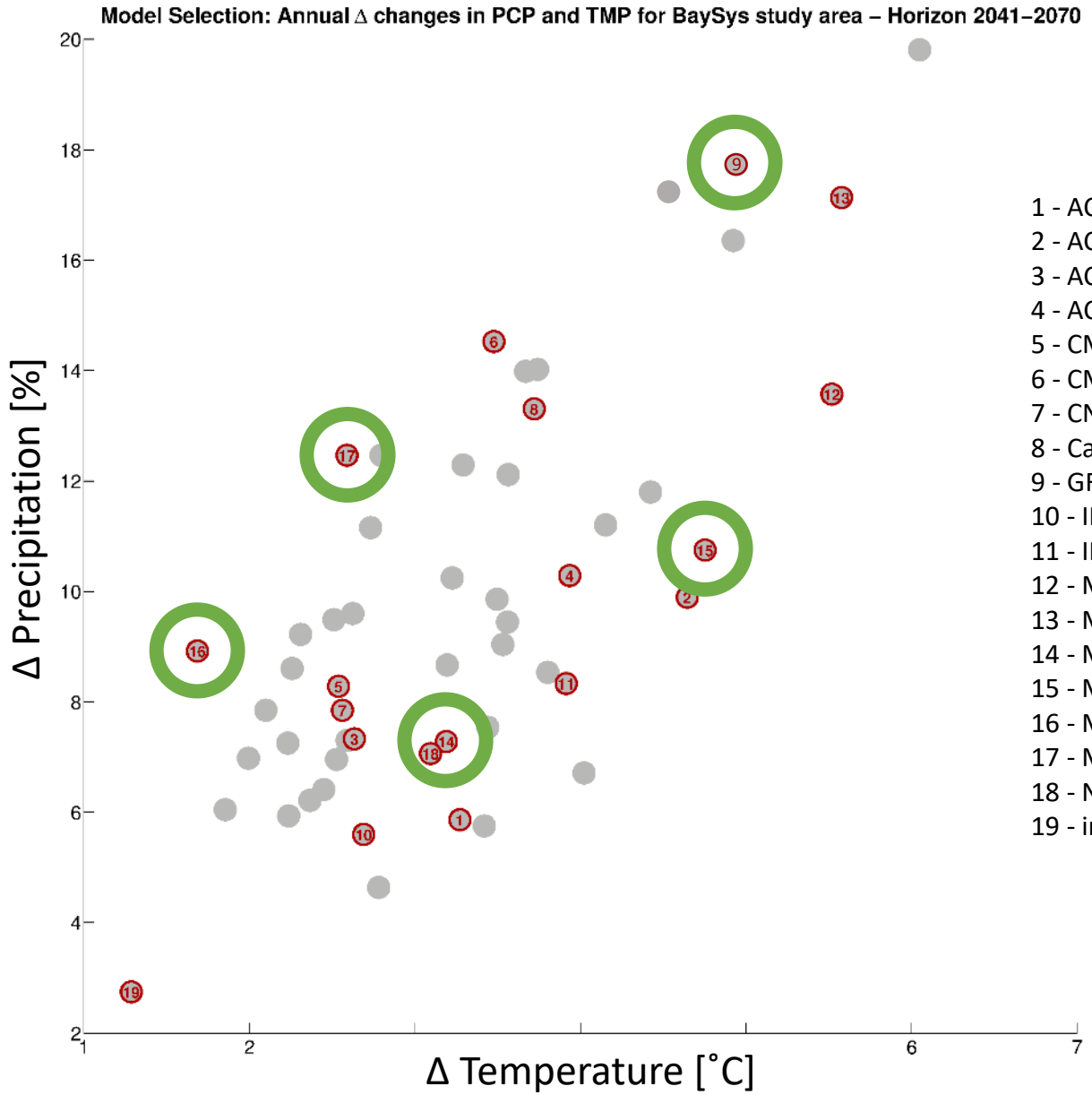


Natural Variability



BaySys climate simulation selection to address uncertainty

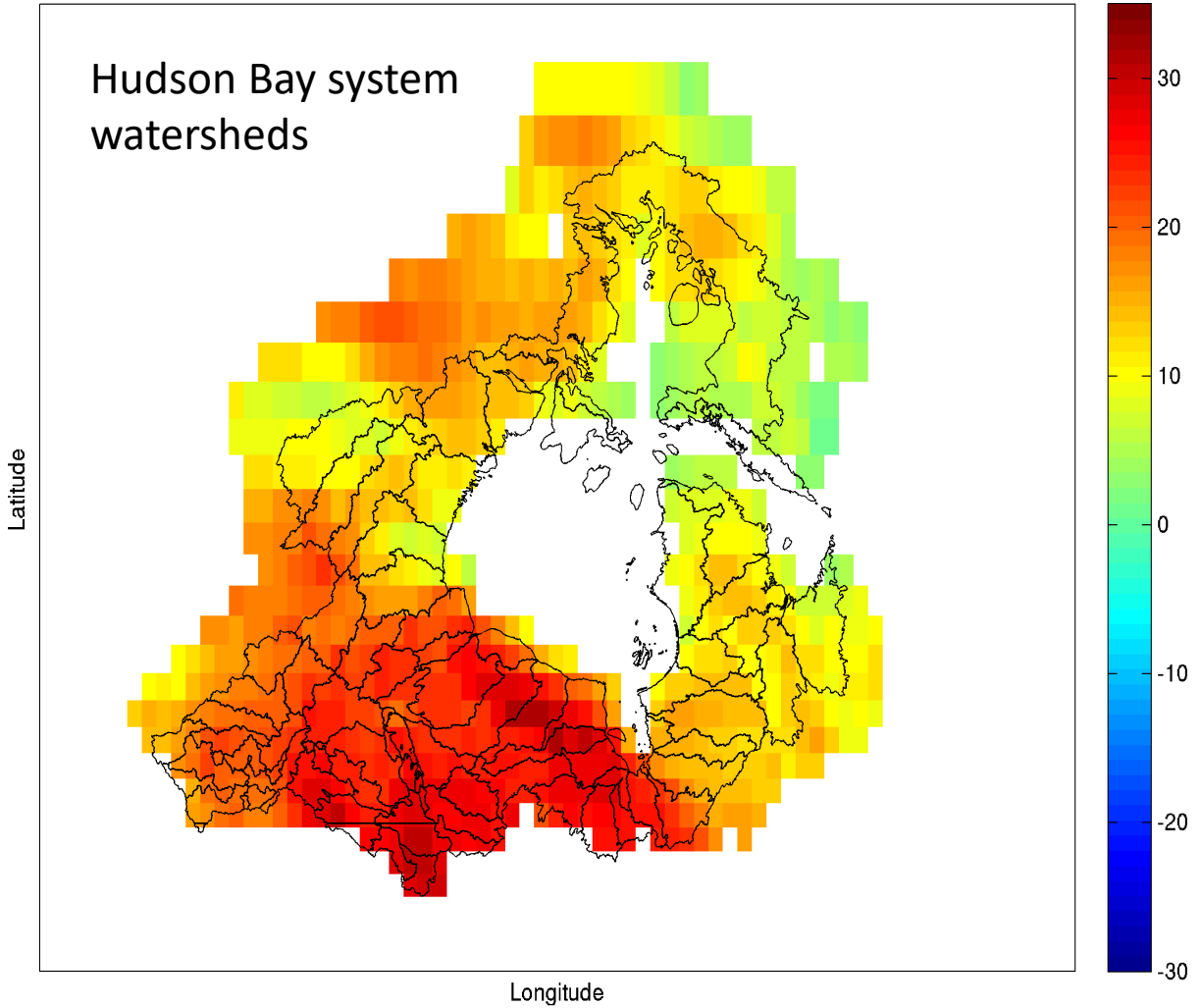
71 simulation ensemble
(RCP4.5 & RCP8.5)
19 selected for Hudson Bay
(cover ~90% uncertainty)
5 of those for driving NEMO



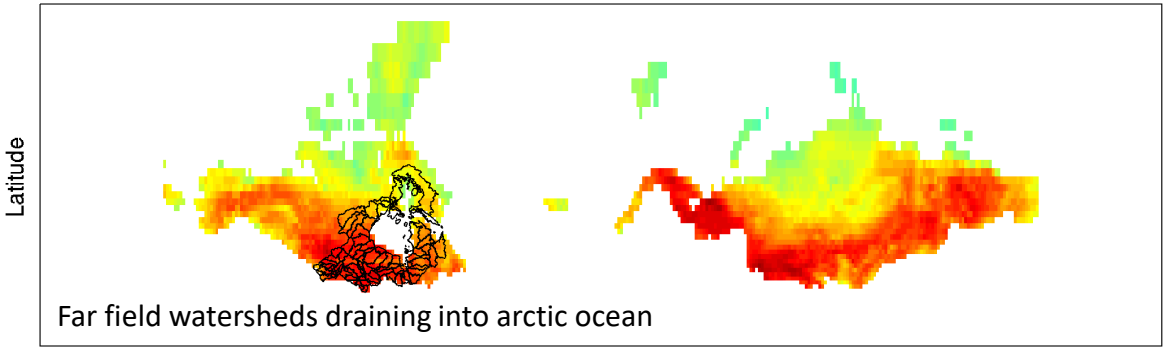
1 - ACCESS1-0_rcp45_r1i1p1 - A10
2 - ACCESS1-0_rcp85_r1i1p1 - A10
3 - ACCESS1-3_rcp45_r1i1p1 - A13
4 - ACCESS1-3_rcp85_r1i1p1 - A13
5 - CMCC-CM_rcp45_r1i1p1 – CMM
6 - CMCC-CMS_rcp85_r1i1p1 – CMS
7 - CNRM-CM5_rcp45_r1i1p1 - CN5
8 - CanESM2_rcp45_r1i1p1 - CE2
9 - GFDL-CM3_rcp45_r1i1p1 - GF3 - NEMO
10 - IPSL-CM5A-LR_rcp45_r1i1p1 - IAL
11 - IPSL-CM5A-LR_rcp85_r1i1p1 - IAL
12 - MIROC-ESM_rcp85_r1i1p1 - MIE
13 - MIROC-ESM-CHEM_rcp85_r1i1p1 - MIC
14 - MIROC5_rcp45_r1i1p1 - MI5 - NEMO
15 - MIROC5_rcp85_r1i1p1 - MI5 - NEMO
16 - MRI-CGCM3_rcp45_r1i1p1 - MR3 - NEMO
17 - MRI-CGCM3_rcp85_r1i1p1 - MR3 - NEMO
18 - NorESM1-M_rcp45_r1i1p1 – NOE
19 - inmcm4_rcp45_r1i1p1 - INM

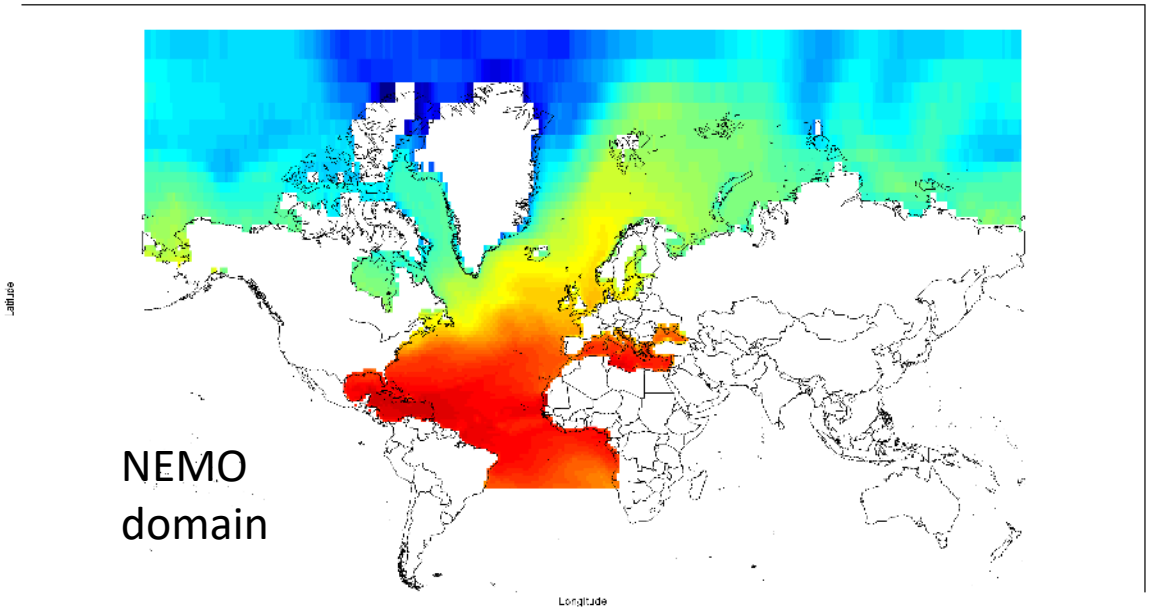
The three bias-corrected datasets used in BaySys

19 simulations for HYPE hydrological modeling



5 out of 19 for 'far field' hydrological modeling & Driving NEMO





Things to consider when using climate model data

- There is no ‘best simulation’ - all simulations are considered to have equal probability in terms of their realism of representing future climate.
- Sound climate change assessments needs to rely on more than one simulation, model, emission scenario to address uncertainty in the projections!
- Observed historical records and climate model simulations represent different climatic characteristics and do not have the same sequence of events!
- A climate change signal can only be derived within the models reality. Never compare the climate models future to observations!
- ‘Climate’ is defined as long term average conditions over 30 years (WMO).
- Double check your terminology related to climate model simulations.

Thank you!

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