

The newest phase of the Glacier Model Intercomparison Project

Global glacier mass change equilibration experiments (GlacierMIP3)

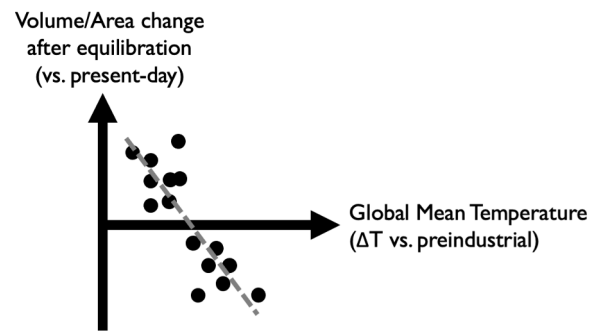
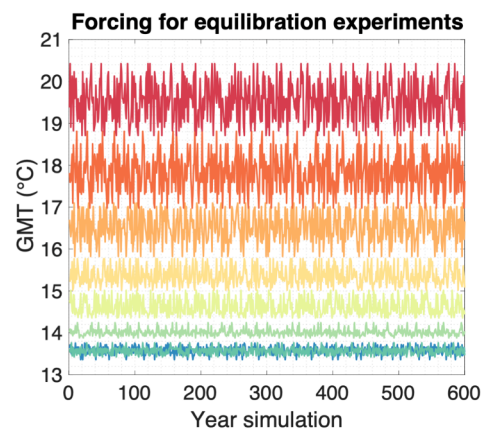
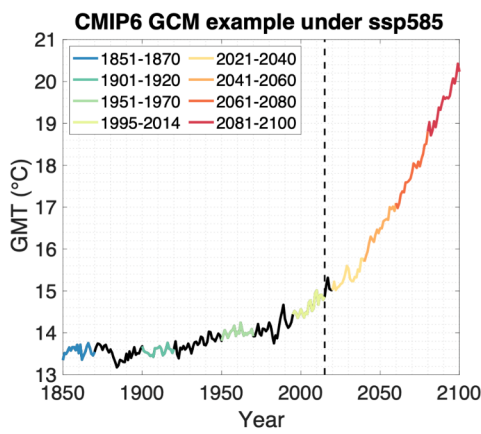


GlacierMIP1: intercomparison of global-scale glacier mass-balance models based on existing studies from literature ([Hock et al., 2019, JGlac](#))

GlacierMIP2: first coordinated experiments (11 models). CMIP5 forcing until 2100 ([Marzeion et al., 2020, Earth's Future](#))

GlacierMIP3: multi-century evolution of glaciers and stabilization under various climatic conditions. Three fundamental questions:

- ☐ Equilibrium volume and area of all glaciers if global mean temperatures were to stabilize at present-day levels?
- ☐ Equilibrium volume and area of all glaciers if global mean temperatures were to stabilize at different temperature levels (e.g. in +1.5/+2°C world)?
- ☐ For these stabilization scenarios, how much time would the glaciers need to reach their new equilibrium? (i.e. focus on response time)



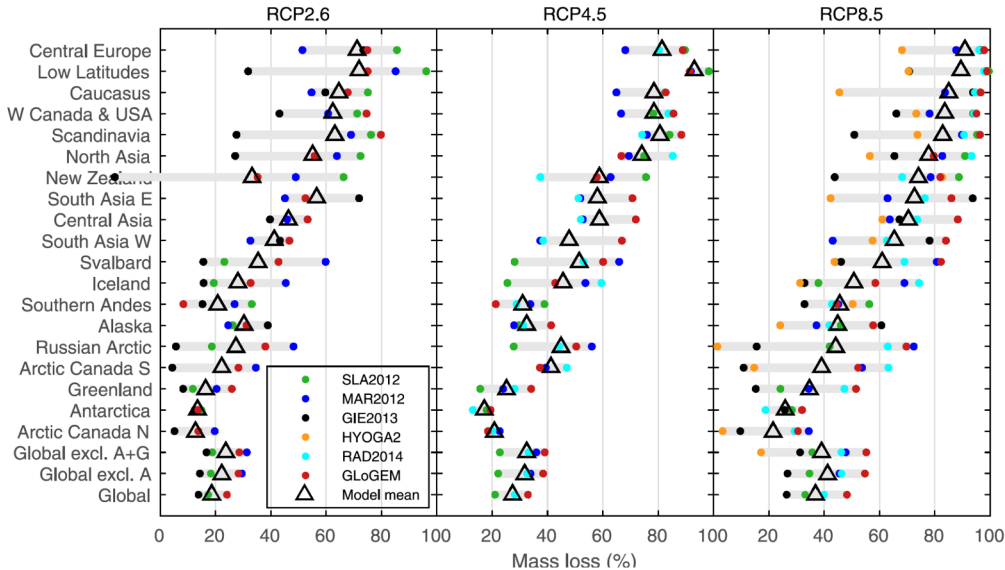
Call will be launched soon: Want to know more about the setup? Interested in joining with your model? Come and chat with us!

Previous GlacierMIP efforts: focus on 21st century glacier evolution

GlacierMIP1: intercomparison global-scale glacier mass-balance

models based on six existing studies from literature

(Hock et al., 2019, *Journal of Glaciology*)

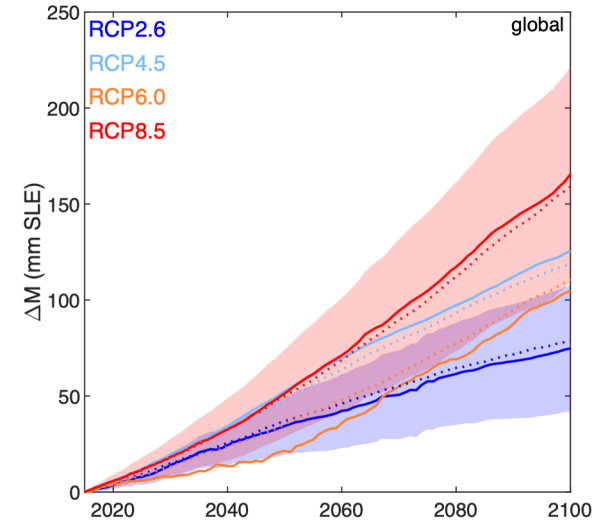


GlacierMIP2: first coordinated experiments.

11 models (also ice-dynamical approaches), CMIP5 forcing.

Specific focus on evolution uncertainty of ensemble projections

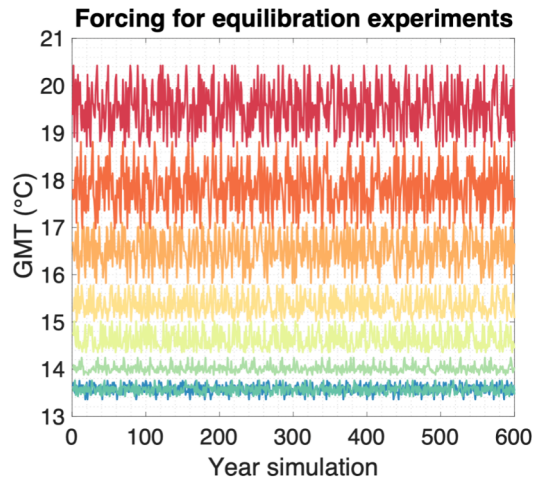
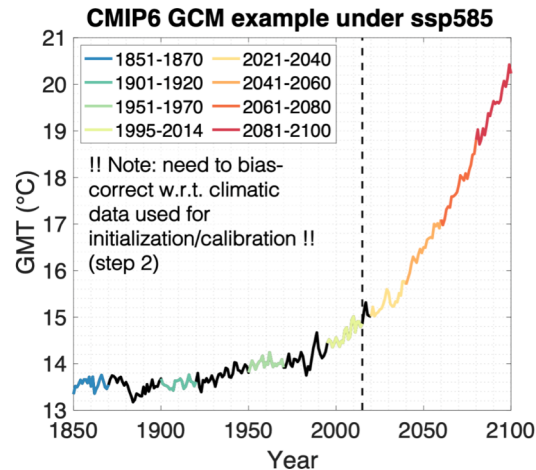
(Marzeion et al., 2020, *Earth's Future*)



vs. **GlacierMIP3:** focus on the **multi-century evolution** and equilibration of glaciers

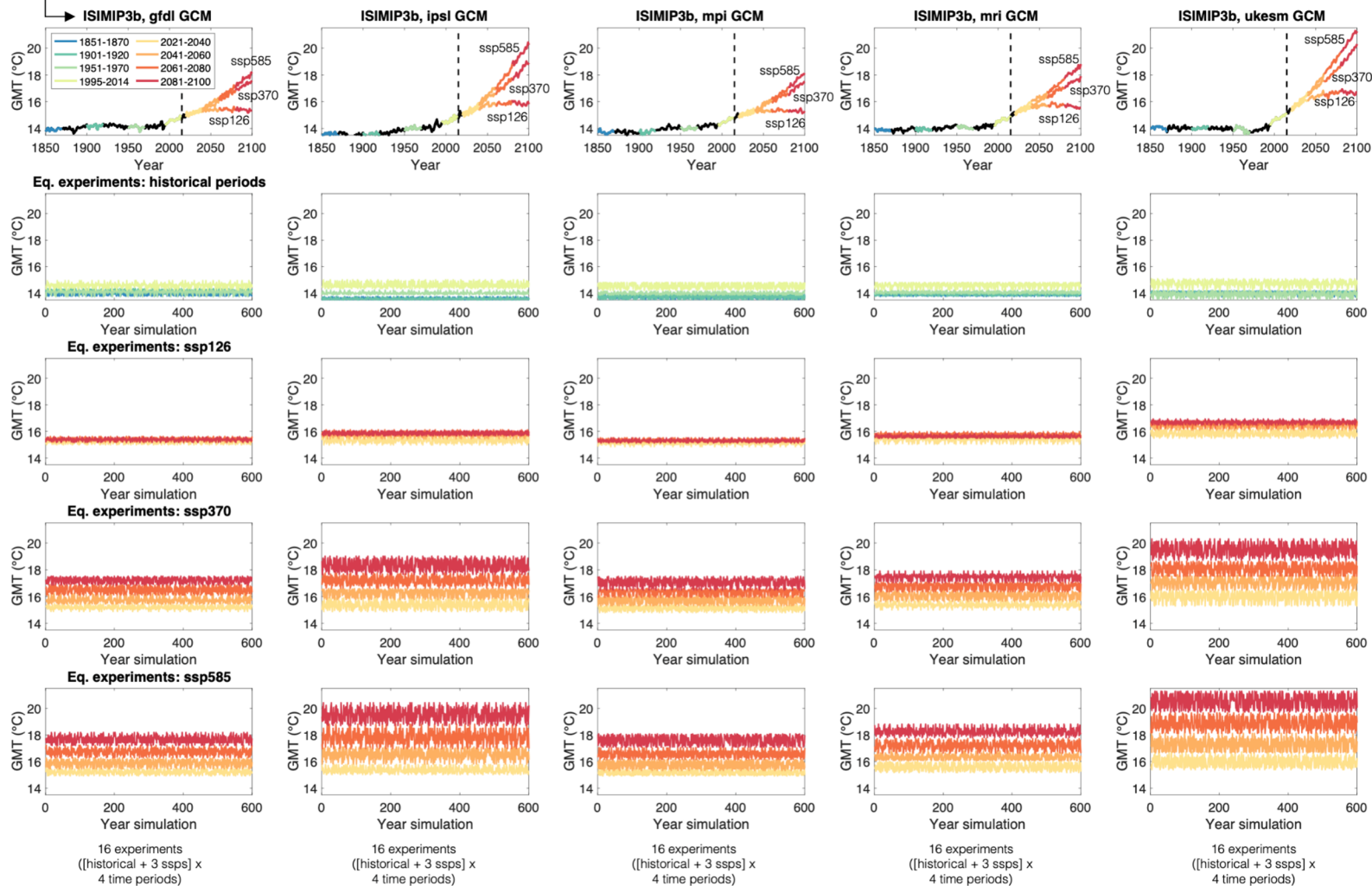
GlacierMIP3: the experimental setup in a nutshell

1. Participants use their **calibrated** model, or calibrate their model to any meteorological forcing data they usually use (e.g. data, e.g. ERA, CRU ...) and **simulate the glacier geometry at the RGI date** (to be done only once, i.e. independent of stabilization experiment)
2. Participants will have to **bias-correct** the prescribed CMIP6 GCMs (as they usually do, and as done in GlacierMIP2) prior to running the experiment.
3. Starting from the glacier geometry at the RGI date (step 1), and the bias-corrected CMIP6 GCM data (step 2), the **glacier equilibration** is simulated by continuously forcing the glaciers with climatic data from the following **eight repeat-periods**: 1851-1870, 1901-1920, 1951-1970, 1995-2014, 2021-2040, 2041-2060, 2061-2080 and 2081-2100.



Overview of 80 equilibration experiments

!! Note: need to bias-correct w.r.t. climatic data used for initialization/calibration !! (step 2)



GlacierMIP3: practicalities

- Climatic data. GCM output from The Inter-Sectoral Impact Model Intercomparison Project (ISIMIP3b)
 - Data available at daily resolution for 11 variables: directly available from ISIMIP data portal (NetCDF)
 - Reprocessed to monthly data for precipitation, temperature and std. dev. of daily temperature within month (ca. 80 GB) → will be available on dedicated server
 - 5 GCMs in total x 16 equilibration experiments (4 historical time periods + 4 future time periods x 3 ssps) = 80 equilibration experiments in total
- Timeline (tentative):
 - May/June: call (announcement cryolist, twitter,...etc). Protocol available on website
 - October/November: deadline for submission results
- Questions / more info / interested in joining? Let us know! (fabien.maussion@uibk.ac / zharry@ethz.ch)