Summary of the kick-off meeting at IUGG 2015, Prague

GlacierMIP - Targeted Activity of *Climate and Cryosphere* (CliC)

http://www.climate-cryosphere.org/activities/targeted/glaciermip

Location: IUGG venue: PCC floor 2, room 224

Meeting times: Friday, June 26, 15:00 – 18:00
               Saturday, June 27, 13:00 – 15:00

WG Participants: Regine Hock (co-chair)
                 Ben Marzeion (co-chair)
                 Andy Bliss
                 Rianne Giesen (via teleconference)
                 Matthias Huss
                 Marco Möller
                 Valentina Radić
                 Akiko Sakai
                 Sarah Shannon

CliC representative: Gwen Hamon

Guest participants: Georg Kaser
                    Christian Kienholz
                    Fabien Maussion
                    Tobias Sauter

It was agreed that there will be three tiers to this targeted activity:

- Tier 1: Intercomparison of published results
- Tier 2: Dedicated experiments for projections (and potentially, reconstructions)
- Tier 3: Dedicated sensitivity experiments

**Tier 1: Intercomparison of published results**

- variables to be collected: glacier volume, glacier area
- time resolution: full annual time series covering the full period of the projections
- spatial resolution: regional sums (based on RGI regions)
  *important note: connectivity level 2 in the Greenland regions has to be excluded*
- individual model runs should be submitted individually, i.e. not ensemble means, etc., all available scenarios should be submitted

Format: standardized csv file with standardized name. An example will be prepared and send to all participants (responsibility: Andy Bliss).

**Submission:** to Andy Bliss (via dropbox); deadline: September 1, 2015; responsibility: all

Redistribution of collected results: A netcdf file containing the collected results will be prepared and distributed (via dropbox) back to the participants.

Analysis of results and preparation of a potential first publication: responsibility left open at the moment, co-chairs responsible to ensure progress once data are collected

**Tier 2: Dedicated experiments for projections (and potentially, reconstructions)**

Projections:

- prescribed initial conditions: RGIv5.0 (outlines/area, length, hypsometries, etc.)
• suggested initial conditions: ice thickness from Huss & Farinotti (2012) (it is acknowledged that this initial condition may create discontinuities for some models, if this is the case that model should use its own method of initializing ice thickness)
• time period: at least until 2100, if forcing scenario is extended to 2300 and the glacier model is able to continue, longer simulations are welcome
• boundary conditions: scenarios/CMIP model identifiers to be applied will be decided on later; coordination with ISMIP6 (responsibility: Regine Hock). A certain subset of scenarios/CMIP model runs will be required, additional runs are welcome
• variables to be collected: glacier volume, glacier area
• time resolution: full annual time series covering the full period of the projections
• spatial resolution: regional (based on RGI regions) sums
  important note: connectivity level 2 in the Greenland regions has to be excluded
• archive: we see the need for a public archive and need to investigate possibilities (responsibility: Gwen Hamon)

Reconstructions:

Most models do not run freely during the initialization/calibration period but are tied to different observation-based data sets and don’t necessarily allow changing glacier geometry. The use of reconstructed data is therefore quite limited, but the results of the different approaches should be investigated. Additionally, the high value of reconstructions is acknowledged, including detection and attribution studies. The potential to perform reconstructions with the models needs to be investigated (responsibility: all).

At least, we will collect regional mean specific mass balances during the reanalysis period (i.e., at least during ERA-Interim, which ist used by most models).

Tier 3: Dedicated sensitivity experiments

• sensitivity on initial conditions 1 – date of initialization: currently, models handle the image acquisition dates in the RGI differently; some use that actual image acquisition date for each glacier, others use regional (mean) dates; others prescribe the date. Sensitivity runs with prescribed handling of the initialization date are planned
• sensitivity on initial conditions 2 – ice thickness: experiment for all models with the technical possibility to initialize with a prescribed ice volume (even if this creates discontinuities) will start with prescribed ice volume/thickness
• equilibrium sensitivity: run glaciers into equilibrium state at different climate states; minimum: “present-day” climate (exact definition to be done), ideally also at additional projected climate states (e.g., 2 K warming, 4 K warming, etc.)

Other items:
Sarah Shannon, Akiko Sakai and Marco Möller introduced the concepts of their respective models. The additional diversity of model approaches brought to GlacierMIP is greatly appreciated, because the other participating models are all relatively similar in the basic approach.

Sarah Shannon:
• incorporation of glaciers in the JULES land surface model
• grid-based glacier mass balance in elevation bands based on full energy balance
• SIA for ice flow (input: DEM, ice thickness)
• Output: glacier mass balance, discharge

Akiko Sakai:
• Energy mass balance model, grid-based
• albedo model and refreezing (based ice temperature)
• works on catchment scale (in central Asia), not yet applied for projections
• volume-area scaling for geometry change

Marco Möller:
• grid-based, covering Svalbard at 500m scale, spatially distributed
• simplified energy-balance model, orographic precipitation modeling
• model almost finished for ERA-interim, will likely be run for projections (funding pending)
• geometry change: bedrock and mass balance parameterization, including calving

Next meetings:
An ad-hoc workshop will be held at the 2015 AGU Fall meeting to discuss first results from tier 1; further meeting will be announced later.

Envisaged publications:
• Comparison of model results (projections) from existing global-scale publications;
  Authors: all WG participants who contribute their existing data for all RGI regions by the deadline above (Tier 1) and contribute to the writing/discussion of the paper
• Comparison of new generation model results; ‘consensus’ projections in preparation for IPCC 6;
  Authors: all WG participants who produce projections according to TIER 2 above and contribute their regionally differentiated projections (see TIER 2) for all or at least one major RGI region and the sensitivity results according to TIER 3 in addition to contributing to the writing/discussion of the paper. The deadline for data submission will be established later (likely in 2017).

Minutes prepared by Ben Marzeion and Matthias Huss