CliC update for WDAC7

Ben Galton-Fenzi (Australian Antarctic Division and Antarctic Climate & Ecosystems Cooperative Research Centre)
Lawrence Hislop (CliC Director)

26-27 March 2018, Geneva, Swizerland

Organization – what is CliC?

Host agreement
1993 – 2003
2003 – 2018

= Climate and Cryosphere project

CliC structure

Scientific Steering Group (SSG)
Co-chairs:
James Renwick (2017-2019)
Gerhard Krinner (2014-2017) (outgoing)
Fiamma Straneo (2018-2020) (incoming)

International Project Office
Director: Lawrence Hislop
Executive Officer: Gwénaëlle Hamon
Hosted by the Norwegian Polar Institute

WCRP Grand Challenge – Melting Ice and Global Consequences, Lead: CliC, Chair: Greg Flato

- **Earth System Model-Snow MIP (ESM-SnowMIP)** (tightly linked to Land Surface, Snow and Soil Moisture MIP (LS3MIP))*
- **Ice Sheet MIP for CMIP6 (ISMIP6)***
- **Marine Ice Sheet-Ocean MIP (MISOMIP)***
- **Diagnostic Sea Ice MIP (SIMIP)***
- **GlacierMIP**
- **Permafrost Carbon Network** *(part of the Study of Environmental Arctic Change (SEARCH) project)*

** Contributions to CMIP6, the 6th Phase of the Coupled Model Intercomparison Projects (MIP)*

Groups, Panels, and Fora

- **Polar Climate Predictability Initiative (PCPI)** *(joint with SPARC)*
- **Southern Ocean Region Panel** *(joint with CLIVAR and SCAR)*
- **Northern Oceans Region Panel** *(joint with CLIVAR)*
- **BEPSII - Biogeochemical exchange processes at Sea Ice Interfaces** *(joint with SCOR and SOLAS)*
- **Antarctic Sea Ice Processes & Climate (ASPeCt)** *(joint with SCAR)*
- **Technical Committee on Sea Ice Observations**
- **Arctic Sea Ice Working Group**
- **Sea Ice & Climate Modelling Forum**
- **Ice Sheet Mass Balance and Sea Level (ISMASS)** *(joint with SCAR and IASC)*

Limited Lifetime Targeted Activities

- **Polar Coordinated Regional Downscaling Experiment (Polar CORDEX)**
- **Earth Observations and Arctic Science Needs** (with ESA)
- **Linkage Between Arctic Climate Change and Mid-Latitude Weather Extremes**

Scientific Steering Group

Chairs

James Renwick, Victoria University of Wellington, New Zealand (1/2017-12/2019)
Gerhard Krinner, LGGE, France (Co-Chair, 7/2014-12/2017 - outgoing)
Fiamma Straneo, SIO, UCSD, USA (1/2018-12/2020 - incoming)

Members

Alexandra Jahn, University of Colorado Boulder, USA (1/2014-12/2018)
Hiroyuki Enomoto, National Institute of Polar Research (NIPR), Japan (1/2016-12/2019)
Shichang Kang, Chinese Academy of Sciences, China (1/2015-12/2019)
Sebastian Mernild, Nansen Center, Bergen, Norway (1/2014-12/2018)
Stephen Hudson, Norwegian Polar Institute, Norway (1/2016-12/2019)
Lars H. Smedsrud, University of Bergen, Norway (1/2016-12/2019)
Dario Trombotto Liaudat, Centro Cientifici Tecnólogico, Argentina (1/2016-12/2019)

Outgoing Members

Margareta Johansson, Lund University, Sweden (1/2015-12/2017)
Rob Massom, Australian Antarctic Division, Australia (1/2013-12/2017)
Tatiana V. Pavlova, Voeikov Main Geophysical Observatory, Russia (1/2015-12/2017)

WCRP Joint Science Committee Liaisons

Mauricio M. Mata, Federal University of Rio Grande-FURG, Brazil (2014 -)
Jens Hesselbjerg Christensen, Danish Meteorological Institute, Denmark (2016-)

WCRP DAC

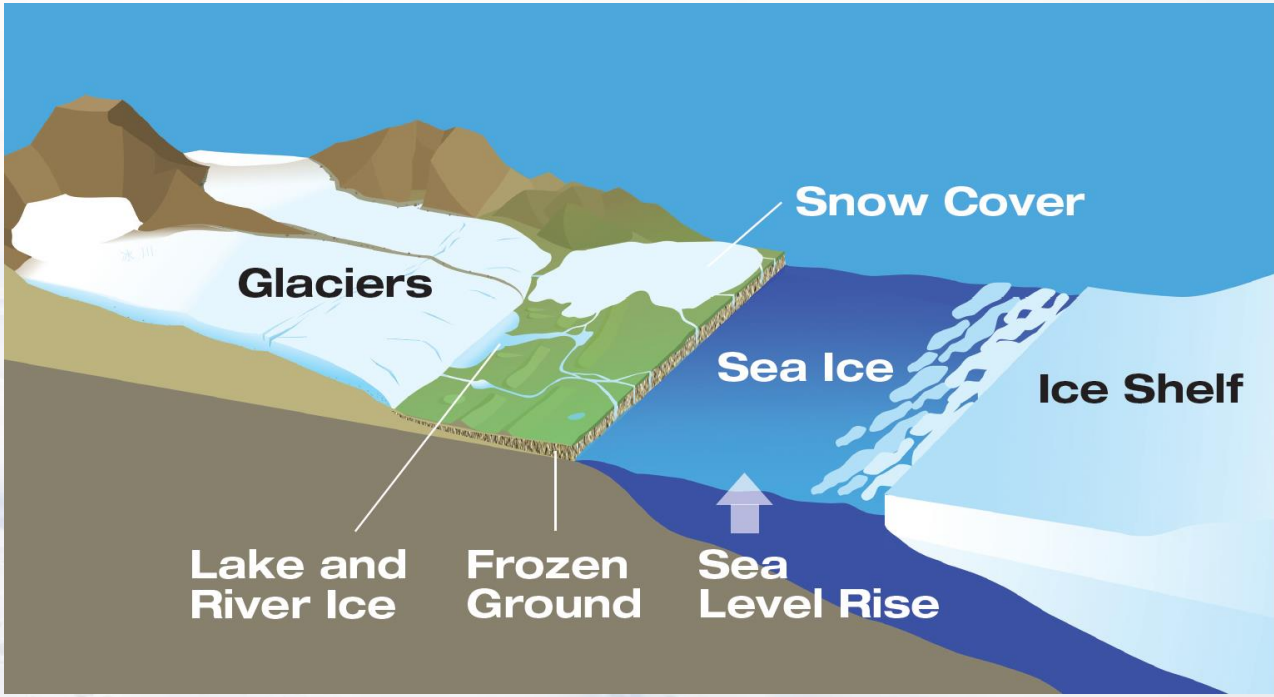
Ben Galton-Fenzi, Australian Antarctic Division (2017-2020)

What we do

- Improve understanding of the cryosphere and its interactions with the global climate system
- Improve the ability to make quantitative predictions and projections of the cryosphere in a changing climate
- Link observation and modelling communities

Domains…

- Sea Ice
- Ice Sheets
- Glaciers
- Permafrost
- Snow cover
- Freshwater



How we work

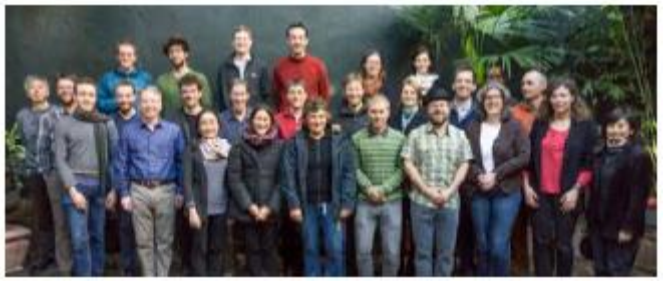
CliC funding supports

- Workshops
- Meetings
- Papers
- Publications
- Videoconference
- ECS - Fellowships

Rising Coastal Seas on a Warming Earth
New York University Abu Dhabi Center for Global Sea-Level Change (NYUAD-CSLC)
Abu Dhabi, UAE
October 27 - 29, 2014
In Conjunction with: NYUAD Institute, NSF, NASA & CliC

First Row Seated L-R: J. Ahlkrona, D. Menemenlis, K. Kusahara, F. Pattyn, B. Galton-Fenzi, D. Holland, D.M. Holland, A. Jrrar, R. Gladston, G. Djoumna
Second Row L-R: J. Feldmann, M. Bentsen, R. Walker, X. Asay-Davis, J. Ridley, B. Parizek, J. Joughin, G. Durand, N. Jourdain, P. Mathiot, S. Nowicki, S. Price, R. Kumar
Third Row L-R: R. Timmermann, R. Hallberg, S. Goeller, E. Larour, S. Mernild, X. Wang, H-C Kim, W-S Lee, M. Dinniman, T. Hattermann

MISOMIP



Participants in the ISMIP6 workshop at AGU, December 2017, in New Orleans, USA.

SnowMIP

Modelling work for CMIP6 and support for the Grand Challenge on Melting Ice & Global Consequences

- **ESM-SnowMIP** - Earth System Model-Snow Model Intercomparison Project
- **SIMIP** - Sea Ice Model Intercomparison Project
- **ISMIP6** - Ice Sheet Model Intercomparison Project
- **GlacierMIP** - Glacier Model Intercomparison Project
- **PCN** – Permafrost Carbon Network

All need access to best cryosphere observation data!

ISMIP6

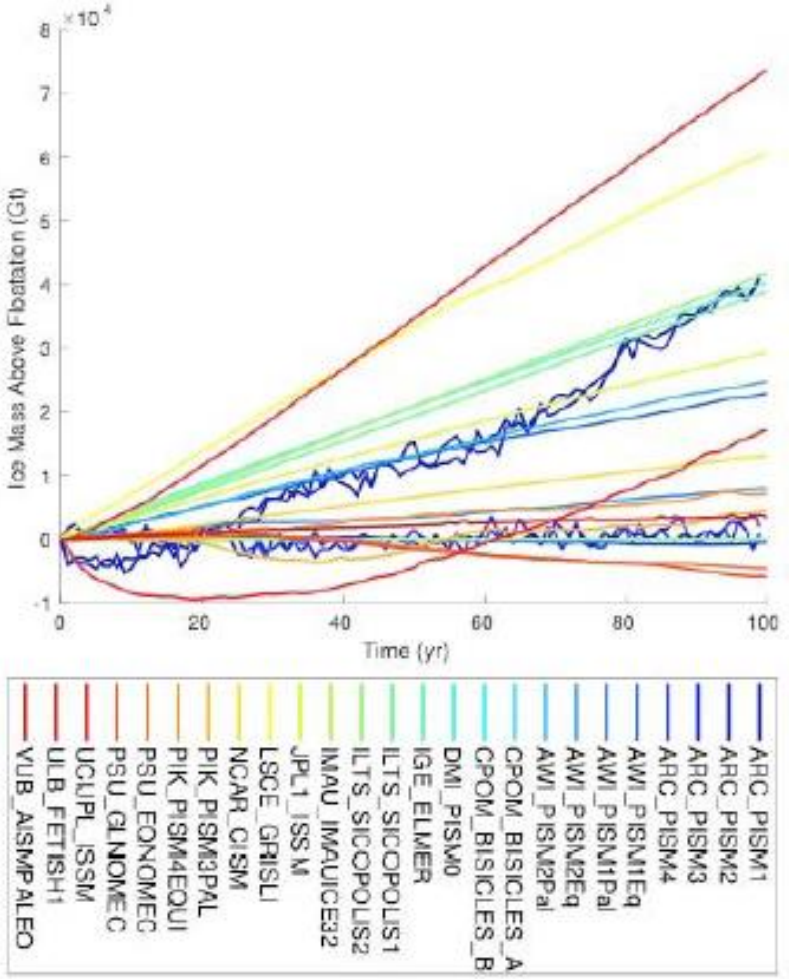
Highlights

- 16 modelling groups participated in initMIPGreenland.
- 15 modelling groups participated in initMIPAntarctica.

Future activities and developments

- Publication of the initMIP-Antarctica results.
- Preparation of forcing dataset for ice sheet models.
- Workshops at EGU, and large workshop on evaluation of CMIP6 climate models to derive forcing for ice sheet models.

Science Highlight



Centennial sea level background trend in control experiments due to model drift or transient initialization from the initMIP-Antarctic models, an effort that investigates uncertainty resulting from the initialization.

MISOMIP

Highlights

- A MISOMIP splinter meeting was held on 24 April as part of the European Geosciences Union (EGU) General Assembly 2017. The splinter meeting discussed primarily the progress to date and the upcoming deadlines for MISMIP+, ISOMIP+ and MISOMP1.

Future activities and developments

- Several publications analyzing MIP results are expected in early 2018.
- The third MISOMIP meeting is now set for May 7-9, 2018, in Abu Dhabi

Science highlight

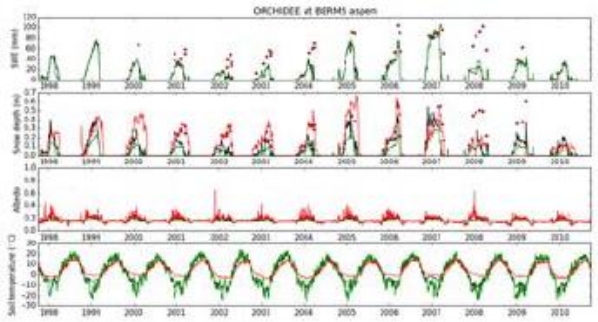
Zhang et al. (2016). A schematic of the different basal boundary masking schemes used by two Stokes ice sheet models. They find that FELIX-S (Elmer/Ice) grounding lines are relatively more retreated (advanced). They show this to be due to different choices in the implementation of basal boundary conditions in the two models.

ESM-SnowMIP

Highlights

- Site simulations for ESM-SnowMIP at a number of sites produced for most of the participating models.
- First evaluation, including reference simulations and modified parameter simulations (high snow conductivity, constant snow albedo) is underway.
- Meteorological forcing data for land-only global simulations for LS3MIP and ESM-SnowMIP are ready for use

Science Highlight



A preliminary evaluation of recently obtained model output at some selected snow sites immediately allowed to identify unrealistic model features, here underestimated winter soil temperatures in one version of the ORCHIDEE land surface model.

Future activities and developments

- Production phase for the LS3MIP global land-only and coupled simulations, while ESM-SnowMIP simulations are planned after this main CMIP6 period.
- A joint LS3MIP/LUMIP/ESM-SnowMIP workshop is planned September or October 2018 in conjunction with a CRESCENDO project meeting in Europe.

GlacierMIP

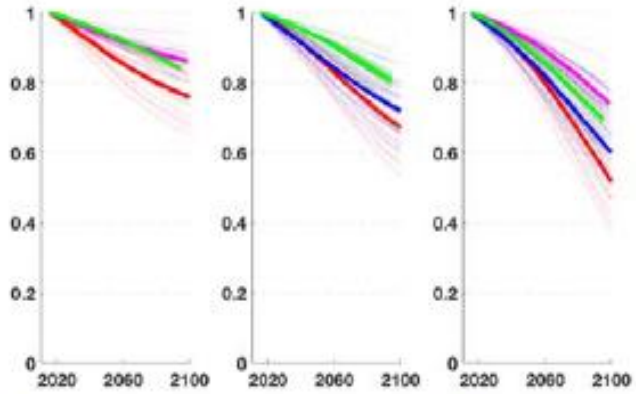
Highlights

- half-day GlacierMIP meeting was held at the IGS/IACS/CliC conference in Wellington in February2017
- Progress has been made towards a joint peer-reviewed publication comparing recent global glacier projections.

Future activities and developments

- A GlacierMIP meeting was held at the AGU conference in New Orleans in December 2017 and another meeting will be held at POLAR2018.

Science Highlight



Normalized volume evolution of all glaciers outside the ice sheets for three emission scenarios (left: RCP2.6, middle: RCP4.5, right: RCP8.5) and six different glacier models (colors). Thick lines show multi-GCM means and thin lines individual GCM runs (unpublished).

SIMIP

Highlights

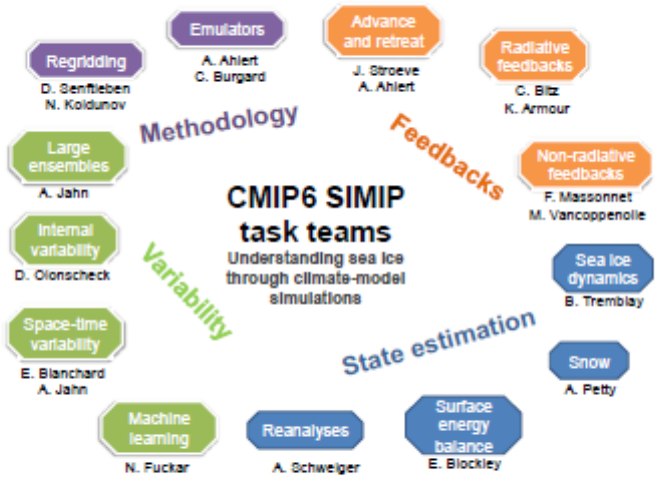
- Preparing analyses within the CMIP6
- Workshop on improved satellite retrievals of sea ice thickness and concentration and facilitate comparison with model simulations
- The insights gained at the workshop will benefit the planned analysis of the CMIP6 sea ice output.

Future activities and developments

- First science results coming out of CMIP6-SIMIP.
- Dedicated session at the POLAR2018 conference in Davos that will allow for the presentation of first results from these efforts.

Science Highlight

We have defined 13 sub-groups that will take the lead on analyzing different aspects of the CMIP6 sea ice output, once it becomes available. By defining these task groups before CMIP6 data becomes available, we hope to enable in-depth processes-based assessments of the CMIP6 sea ice simulations early in the process.



(Graphic: F. Massonnet)

PCN - Permafrost

Highlights

- Three science briefs developed:
  - What is the impact of permafrost carbon release on climate change?
  - What are the consequences of thawing permafrost on infrastructure?
  - What are the consequences of thawing permafrost on local ecosystem goods and services?
- https://www.arcus.org/search-program/arctic-answers

Future activities and developments

- The Permafrost Carbon Network organized its 7th Annual Meeting in New Orleans, Louisiana, December 10, 2017.

Science Highlight

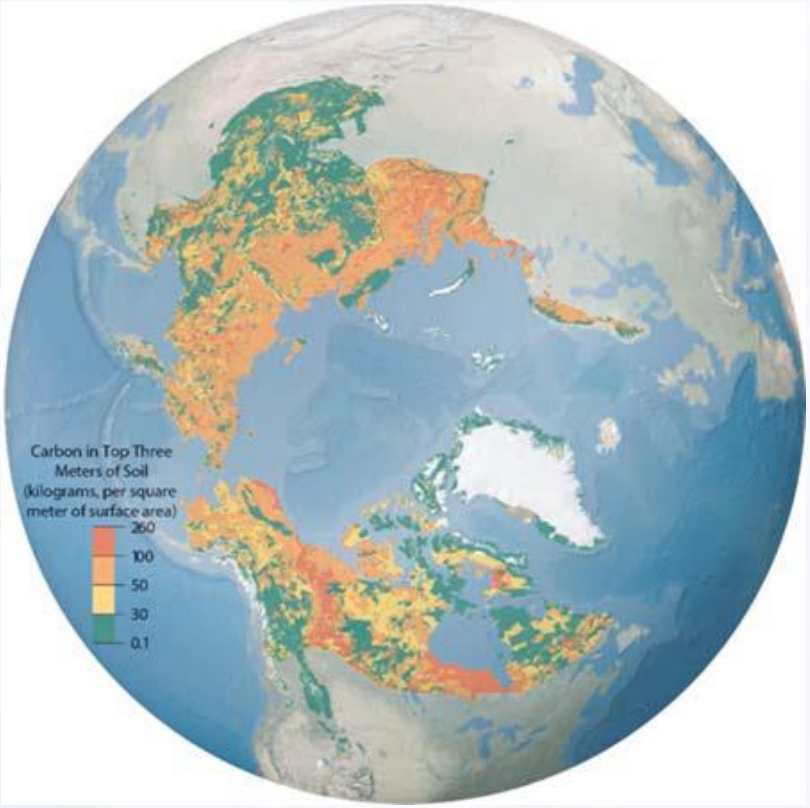


Figure: Carbon in the upper 3m of northern permafrost zone soils

CliC Arctic Sea Ice Working Group (ASIWG)

Highlights

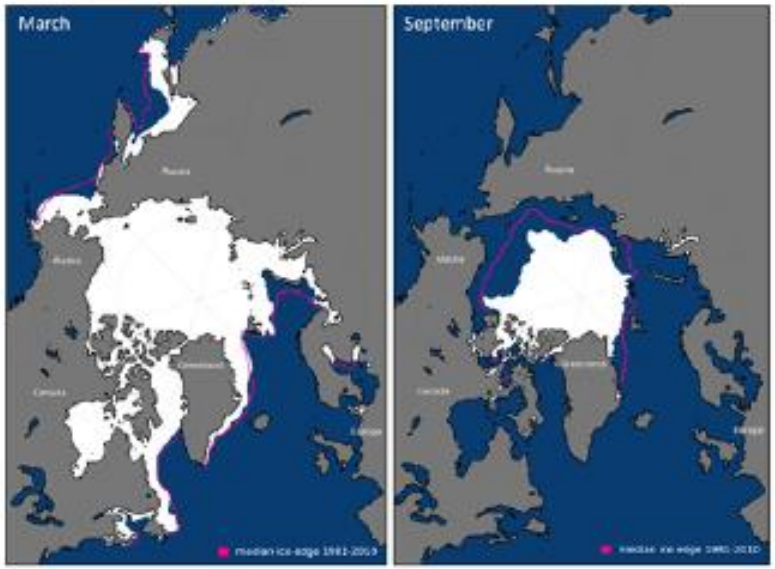
- ASSIST, the sea ice observation software, continues to be used on both research and tourist cruises.
- Contributions the Sea Ice Section of the NOAA Arctic Report Card and to the Bulletin of the American Meteorological Society State of the Climate issue.

Future

- Continue to integrate Arctic sea
- ice related activities into MOSAiC and the Year of Polar Prediction. Coordinating autonomous buoy
- deployments with YOPP and MOSAiC critical focus

Science Highlight

March and September 2017 ice extent from National Snow and Ice Data Center. The March maximum ice extent was the smallest in the satellite record. The ASIWG has contributed to codifying ice concentration satellite retrievals.



Biogeochemical Exchange Processes at Sea Ice Interfaces (BEPSII)

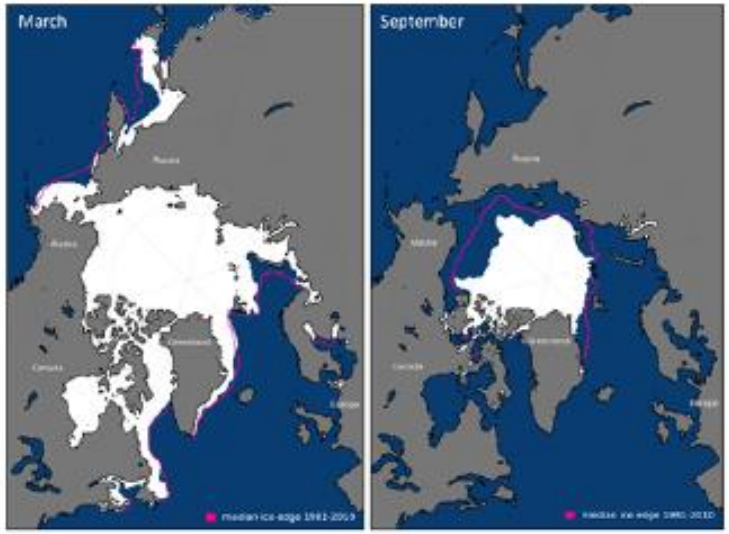
BEPSII, "Biogeochemical Exchange Processes at Sea-Ice Interfaces" started in 2011 with a focus on seaice biogeochemistry. BEPSII was a SCOR working group from 2012 until September 2016, and has since been endorsed as a SOLAS-CliC forum (2016), as a SCAR Action Group.

Future activities

- Expert contribution to ongoing discussions on the design of biogeochemistry and ecosystem components of MOSAiC.
- Model development an inter-comparison (links to CMIP6, SIMIP and FAMOS).
- Finalization of the 5-yr activity plan.
- Position Analysis on sea-ice biogeochemical response to climate change

Science Highlight

March and September 2017 ice extent from National Snow and Ice Data Center. The March maximum ice extent was the smallest in the satellite record. The ASIWG has contributed to codifying ice concentration satellite retrievals.



Antarctic Sea Ice Processes and Climate (ASPeCt)

2017

- Updated software and automatic cameras implemented to supplement ASPeCt visual observations and are being used for quality control and training of ice observers.

- Completed a manual for bridge based research quality sea ice observations

- Coordination of efforts between ASPeCt and the Arctic Ice Watch sea-ice observation programs (ASSIST). Observations recorded by ASSIST can now be archived in the ASPeCt data base.

Global Cryosphere Watch - WMO

GCW is an international mechanism for supporting all key cryospheric in-situ and remote sensing observations.

Contributes to WMO's space-based capabilities database (with the Polar Space Task Group).

Engaging in, and supporting, intercomparison of observation methods, including satellite products.

CliC is on the GCW Steering Group

www.globalcryospherewatch.org

Regional activities

SCAR/IASC/CliC Southern Ocean Region Panel (SORP)

- 13th meeting of the SORP be held 14-15 June 2018 in Davos, Switzerland in conjunction with the SCAR/IASC Open Science Conference (POLAR2018)

CLIVAR /CliC Northern Oceans Region Panel (NORP). New initiative.

- NORP will have its first face to face meeting of members during the SCAR/IASC Open Science Conference (POLAR2018), 14-15 June 2018 in Davos, Switzerland

Polar CORDEX

- Arctic: Process-evaluation of multi-model RCM ensemble, based on ASCOS 2014 observational data; preparation for MOSAiC activity. Antarctica: Multi-model RCM future projection runs driven by different CMIP6 GCMs; input to ISMIP6

Ongoing needs

- Consolidation and standardisation of various crysopheric-related data streams
- Multi-national/institutional data portals, including management, of derived data products (e.g. from MIPs)
- Big data curation: new observational products and model outputs, in addition to CMIP6.
- How to best facilitate model evaluations with observations?

Thank you!

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