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Climate and Cryosphere

(Submitted by Professor Konrad Steffen)

Climate and Cryosphere

This short update summarises the results of activities and plans of the WCRP Climate and Cryosphere Project and as well the activities under the WCRP/IOC crosscut on Sea-Level Variability and Change.

The CliC project's principal goal is to assess and quantify the impacts that climate variability and change have on components of the cryosphere and its overall stability, and the consequences of these impacts for the climate system.

The CliC Project was established by the WCRP in March 2000 to stimulate, support, and coordinate research into the processes by which the cryosphere interacts with the rest of the climate system. The Scientific Committee on Antarctic Research (SCAR) became a co-sponsor of CliC in 2004. In July 2008, the International Arctic Science Committee (IASC) joined as sponsor when they, together with WCRP and SCAR representatives, signed a Memorandum of Understanding to co-sponsor the CliC Project.

Since the completion of ACSYS at the end of 2003, the CliC Project

- has completed the IGOS-Theme on Cryosphere that provides consensus-based guidance on the development of cryospheric observations;
- initiated and completed many important IPY projects, setting the stage for several significant IPY legacies;
- was successful in facilitating the explosive growth of the cryospheric research and observations;
- initiated or was instrumental in establishing national, regional and global communities and activities in the cryospheric research.

CliC SSG wishes to thank the previous CliC leadership for that, and especially Barry Goodison.

Rapid developments in the WCRP, in its planning for the intermediate- and longer- terms, new requirements for climate science, such as the need to provide a foundation for the development of climate services, require that CliC moves ahead on several new directions. They were discussed at the 6th meeting of the CliC SSG in Valdivia, Chile, on 6-9 February 2010.

The SSG has agreed that the following major long-term objectives should be set for the project:

- Enabling prediction of the Arctic climate system;
- Enabling prediction of the Antarctic climate system;
- Enabling prediction of terrestrial cryosphere; and
- Enabling improved assessment of the past, current and future sea-level variability and change.

CliC will focus the project activities and will work with partners within and outside WCRP towards achieving these objectives, which are seen by the CliC community as key milestones in studying the predictability of the climate system and understanding the human effects on climate. The view of the CliC SSG was that it is on these directions that the input of CliC would be necessary and unique.

A range of shorter-term activities that will contribute to the achievement of the long-term objectives has been reviewed and endorsed. They include all the five initiatives that CliC SSG formulated at its Fifth SSG session in Geneva in December 2008:

- Freshwater budget of the Arctic Ocean and Southern Ocean;
- Carbon and permafrost;
- Cryospheric input to sea level;
- Hemispheric differences in sea-ice; and
- Regional climate modelling as forcing cryospheric models.

In addition to the planned and ongoing activities, new initiatives were formulated and endorsed:

- review of passive microwave sea ice products and community-generated sea ice concentrations and ice extent products;
- extension of permafrost studies in continental shelf areas;
- improvement of sea-ice parameterization for the Arctic- and Southern- Oceans;
- support for a new Arctic System Reanalysis;
- focus on the explanation of causes and prediction of the Arctic sea-ice loss involving a CMIP5 diagnostic subproject, including the ARctic Climate HIndcasting, Modelling and PrEDiction ExperimentS (ARCHIMEDES); and
- continuing the Southern Ocean Observing System development and reinvigoration of the Southern Ocean Physical Oceanography and Cryosphere Linkages (SOPHOCLES) initiative.

CliC will approach the Arctic Ocean Sciences Board with a proposal to join forces to study the role of Northern Seas in the climate system with a view towards an Arctic / Sub-Arctic Ocean data synthesis.

Enabling assessment and prediction of cryospheric sources of fresh water is becoming a key requirement for climate science. Decadal scale, regional climate predictions will be required in the future. CliC will initiate activities to develop climate modelling and downscaling techniques on spatial scales that would allow prediction in alpine, glaciated regions leading to an assessment of freshwater resources.

CliC has assumed the coordinating role for the WCRP research on sea-level rise. This will be organized through the WCRP/IOC Task Group on Sea-Level Variability and Change. In addition CliC will continue its research aimed at estimation of changes in the mass balance of the terrestrial cryosphere, especially ice sheets, including their dynamics and the role of ice shelves in these changes. This research will encompass both observations and modelling.

Through contributions to the Polar Prediction initiative and participation in the WCRP Polar predictability workshop, and in consultations with WGSIP, CliC will explore of cryospheric factors of climate predictability for a range of time scales.

Cryospheric observations will continue their development under the coordination of the IGOS Theme on Cryosphere. CliC recommends continuation of the IPY Space Task Group after the completion of the IPY. CliC recommends to WCRP to take part in the preparation of the potential International Polar Decade to ensure that the prediction of the polar climate on decadal time scales would be adequately addressed.

CliC will continue its regional activities, such as the Asia-CliC project and, following the successful Conference "Ice and Climate Change: A View from the South" (Valdivia, Chile, 1-3 February 2010), which was cosponsored by CliC and the International Glaciological Society, will undertake a range of activities in South America.

In order to ensure continuous attention to the multitude of the new and ongoing project activities, CliC will expand its Executive Committee, which will include the Project Chair, Vice-Chair, representatives of CliC IPO, JPS and three representatives of the CliC SSG. In the weeks following the JSC-31, this committee will undertake efforts to prepare a working structure of the CliC Project, and invite active and knowledgeable scientists to lead the projects activities as members of the SSG or CliC Panels of Experts.