Engagement between Global Cryosphere Watch and Commission for Hydrology

Related to CHy-15/Doc. 3:

As noted in CHy-15/Doc. 3

(a) That Resolution 40(Cg-17), requested that concerted efforts continue to be made to engage technical commissions to improve services in high-latitude and high altitude regions by promoting observations and predictive capability on timescales from hours to centuries.

(b) That Resolution 43 (Cg-17), decided to mainstream and implement the Global Cryosphere Watch (GCW) in WMO Programmes as a cross-cutting activity and requested technical commissions to include this activity in their work programmes in order to fully accommodate the cross-programme nature of GCW;

Also acknowledging

(c) The growing demand for sustained observations from high-mountain regions, CG-17 identified the activities in Polar and High Mountain regions as one of the seven WMO priorities

(d) That Decision 51(EC-68) requested that the Executive Council Panel of Experts of Polar and High Mountain Observations, Research and Services (EC-PHORS) engage with relevant institutions and international projects and experiments in the high mountain cryosphere, and facilitate the development of high elevation cryosphere observation sites, for inclusion into CryoNet, with attention also to sites over 4000m,

Noting

(a) the significant contributions made by the experts of the Commission for Hydrology to the implementation of Arctic-HYCOS and HKH-HYCOS;

(b) the progress being made in the implementation of the GCW, including the development GCW observing system, and its core network, CryoNet, and of the GCW Data Portal;

(c) That changes in the high-mountain cryosphere has direct impact on the runoff and on water resources downstream, as a result, inter alia, of the shrinking of glaciers, changes in precipitation, and melting of snow and ice.

(d) Decision 50 (EC-68) endorsing the updated CryoNet concept and the speed-up of the operationalisation of the GCW Data Portal, expanding its interoperability with major data centres and all CryoNet stations/sites.

The delegation of ICELAND recommends that:

(a) the CHy and GCW explore joint activities that would allow the translation in practice of the CG-17 Resolutions regarding the high-latitude and high-altitude services, with a focus on observations and availability of data.

(b) the Arctic HYCOS Secretariat and GCW Project Office explore opportunities and propose a plan for collaboration, to their respective Steering Groups, for assessment, in 2017.
A collaboration between GCW and Arctic HYCOS will contribute to improvement in: i) methods of assessing changes in major Arctic ice masses; ii) determination of snow water equivalent of Arctic snow cover through surface-based observation and remote sensing; iii) ongoing evaluation of the effects of rapid changes in sea-ice cover and thickness on Arctic and global climate; and iv) improved monitoring of changes in Arctic permafrost and their effects on the climate system.

ANNEX:

**Arctic HYCOS** is the Arctic component of WMO’s World Hydrological Cycle Observing Programme (WHYCOS). The project aims to improve the monitoring of freshwater fluxes and pollutants into the Arctic Ocean with the objective of improving climate predictions in the Northern Hemisphere and assessing the pollution of Arctic coastal areas and the open Arctic Ocean. Arctic HYCOS has been under implementation since 2014 and according to the meeting summary of the 1st Arctic HYCOS workshop (Halifax, Nova Scotia 2012) the program is organized around three main activities:

1. Develop and optimal design for hydro-meteorological monitoring networks to capture the essential variability of the Arctic hydrological system and to enable accurate and efficient assessment of change.

2. Estimate uncertainty of available in situ and possible remote sensing data including analysis of accuracy and systematic errors of new observation technology.

3. Develop an integrated pan-arctic data consolidation and analysis system for the water cycle uniting data from various in-situ and other sources.

To attain these goals, improvement will be needed in the monitoring of runoff within the Arctic drainage basin. The Arctic Ocean receives 10% of the world’s river runoff but only about two thirds of the total terrestrial Arctic drainage area is monitored at present. In particular, a large part of runoff in Arctic Canada is ungauged, due to the region’s remoteness and inaccessibility.

Given the importance of snow and ice for the hydrological cycle in the Arctic, collaboration with programs with a strong focus on the cryosphere seems very important for Arctic HYCOS.

The **Global Cryosphere Watch (GCW)** is a new WMO programme supporting *in-situ* and remote sensing observations of all key components of Earth’s cryosphere. In the initial stages of its implementation, GCW has developed a network of surface observation sites, CryoNet, which builds partly on existing observing programmes. The current list of 31 approved CryoNet stations includes 9 stations within the Arctic drainage basin and additional stations are pending approval. These stations and associated research sites deliver data on solid precipitation, snow cover, river runoff, glacier/ice cap mass-balance and ground ice conditions, in addition to meteorological observations, thus providing key input to assessments of a rapidly changing Arctic climate system. Specifically, the Greenland Ice Sheet is presently believed to be the largest contributor of meltwater to ongoing sea-level rise and significant contributions are also believed to result from rapid melting of glaciers and ice caps in Arctic Canada, Alaska, Svalbard, the Russian Arctic islands, Iceland and Scandinavia - although large uncertainties still exist in some of the estimates.