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Arctic-HYCOS: a Large Sample observing system for estimating freshwater fluxes in the drainage basin of the Arctic Ocean

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The Arctic region is an important regulating component of the global climate system, and is also experiencing a considerable change during recent decades. More than 10% of world's river-runoff flows to the Arctic Ocean and there is evidence of changes in its fresh-water balance. However, about 30% of the Arctic basin is still ungauged, with differing monitoring practices and data availability from the countries in the region. A consistent system for monitoring and sharing of hydrological information throughout the Arctic region is thus of highest interest for further studies and monitoring of the freshwater flux to the Arctic Ocean.

The purpose of the Arctic-HYCOS project is to allow for collection and sharing of hydrological data. Preliminary 616 stations were identified with long-term daily discharge data available, and around 250 of these already provide online available data in near real time. This large sample will be used in the following scientific analysis: 1) to evaluate freshwater flux to the Arctic Ocean and Seas, 2) to monitor changes and enhance understanding of the hydrological regime and 3) to estimate flows in ungauged regions and develop models for enhanced hydrological prediction in the Arctic region. The project is intended as a component of the WMO (World Meteorological Organization) WHYCOS (World Hydrological Cycle Observing System) initiative, covering the area of the expansive transnational Arctic basin with participation from Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden and United States of America. The overall objective is to regularly collect, manage and share high quality data from a defined basic network of hydrological stations in the Arctic basin. The project focus on collecting data on discharge and possibly sediment transport and temperature. Data should be provisional in near-real time if available, whereas time-series of historical data should be provided once quality assurance has been completed.

The initial stages of the project will focus on collecting data on discharge and revise station selection criteria. For monitoring freshwater flow to oceans, stations close to the mouths of rivers and immediately inland for back-up purposes will be preferred. For studies of change emphasis is placed on hydrological regime stations located in headwaters small sub-catchments, including pristine basins. Stations outside the Arctic Ocean basin, such as at the mouth of the Yukon River, Baltic Sea and Hudson Bay, can also be considered to allow a better understanding of hydrological processes occurring in the general region. Countries shall facilitate, to the extent possible, access to their data currently published online, and also access to those not yet regularly published on the web. At a later stage data exchange standards such as WaterML2.0 will be implemented. The project will also perform pan-Arctic hydrological modelling (geo-statistical, deterministic and probabilistic methods) for the assessment and integration of observational and modelled data to improve estimates of ungauged discharge and the overall estimates of freshwater flux to the Arctic Ocean, as well as understanding of hydrological processes.