

IP3 & Beyond

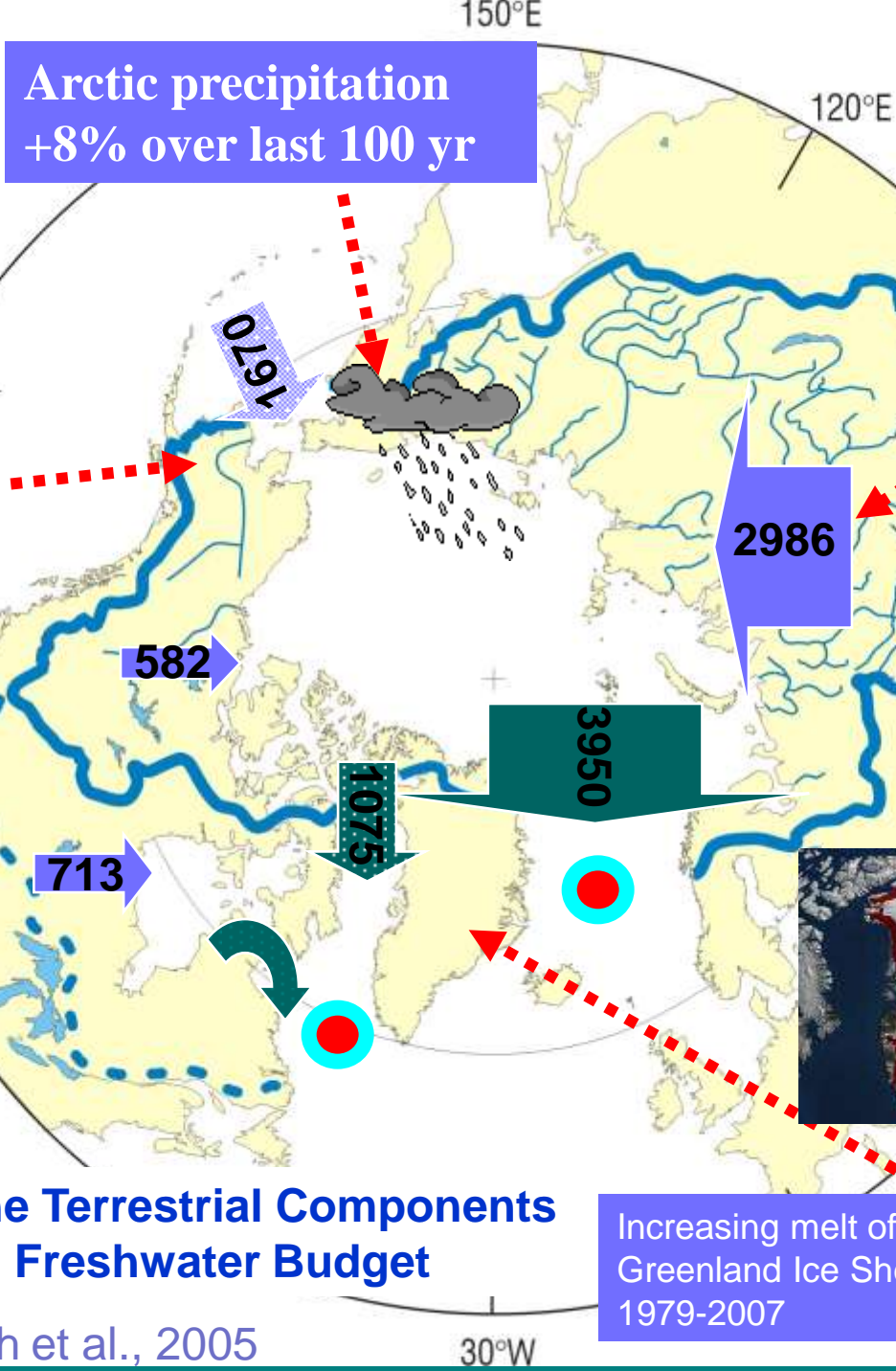
IP3 Network

Network Completion

- March 2009 – Users/Stakeholders Workshop (joint with WC²N)
- Fall 2009 –network workshop (joint with WC²N)
- May 2010 CGU-CMOS Ottawa scientific session
- June 2010 end of investigator spending, accounts closed
- Sept 2010 reports due
- Final report preparation, approval Oct-Nov 2010
- Network completed Dec 2010.
 - Secretariat dissolved, main account closed, data archive secured



rapid retreat of glaciers: Alaska ~1/2 of global loss



Arctic precipitation +8% over last 100 yr



Eurasian discharge increased at ~2 km³/yr 1936-99

Inflow km³/yr

Outflow km³/yr

1670

2986

582

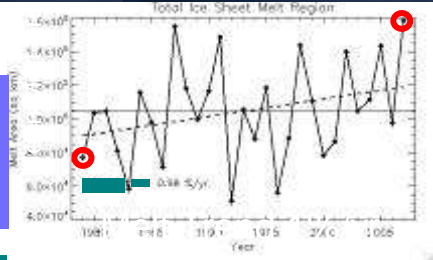
3950

713

1075



Increasing melt of Greenland Ice Sheet 1979-2007



IPY: Changes In The Terrestrial Components Of The Arctic Freshwater Budget

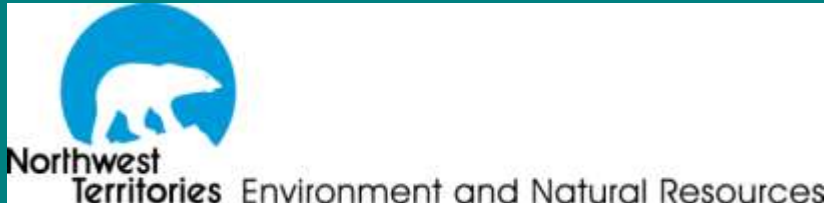
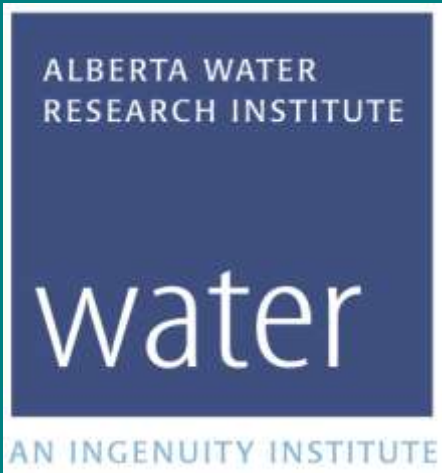


Canadian
Rockies are
the
Hydrological
Apex of
North
America

IP3 Follow-on Activity?

- Proven link between high altitude and high latitude hydrology, meteorology and climate – international interest
- International linkages, CliC, GEWEX, GEO
- National linkages, glaciers, prairies, coast?
- Approach: hydrology, cryospheric science, atmospheric science, water resources

Improving Water Security through Integrated Observation and Prediction Methods



Coldwater Collaborative

The Coldwater Collaborative will aid in the development of enhanced, integrated observations and predictions in mountain and Arctic watersheds to couple key issues relating to:

- Dynamics of snow, glaciers, groundwater, permafrost, wetlands and streams,
- Downstream flooding, drought and water supply
- Long term water supply change
- Transboundary Waters

Coldwater Strategic Goals

- i) *determine where new monitoring capacity should be established at high latitudes and altitudes.*
- ii) assess the long term sustainability of western and northern Canadian water resources.
- iii) improve, understand and share information to help prepare for water supply changes.
- iv) providing new information on water resources that can underpin decision-making and policy development in western and northern Canada.

Coldwater Overall Science Goals

- Advance our understanding and prediction of water and energy cycles in the western mountains and adjacent cold regions of Canada
- Improve our ability to assess change and predictive uncertainty in mountain and cold regions headwaters that arise from changing climate and land use
- *Ultimately* – contribute to the assessment of the long term sustainability of western and northern water resources

Coldwater Strategic Objectives

- i) Generate comprehensive information on the state of western and northern water supply in the form of interactive databases and watershed-based assessments, predictions and policy-relevant analyses.
- ii) Predict and assess short and long-term changes in water supply and streamflow through a series of watershed-based studies on water and climate interactions that will inform the development and application of enhanced climate and land use change impact assessments in support of sustainable water management policies.
- iii) Communicate scientific findings and develop and provide training and professional upgrading on advanced hydrological methods useful to governments, communities, and industry.

Action Plan i)

Generate New Information

Improve the reliability of strategic information and its collection in support of water stewardship through pure and applied research on hydrology, glaciology, climatology and ecosystem interactions in mountain and northern headwater watersheds and critical downstream environments by:

- Improving the understanding and description of the governing factors for mountain and northern water supply through intensive process studies in representative research basins,
- Analysing current observational arrays and supplementing these in collaboration with government agencies or if necessary on their behalf.
- Demonstrating the value of observations in supporting predictive capacity.
- Enhancing the use of earth observations by providing a mountain test site for development of Group on Earth Observations (GEO) water, snow, glacier and climate products,
- Advancing observation methods and best practises for monitoring through research, development and testing of new instrumentation, methods, informatics and application of existing technology for water and climate observation, including earth observation and reconstructing past conditions.

Action Plan ii)

Assimilation & Prediction

Encourage the greater use of monitoring data by the development and application of enhanced numerical techniques for water resource and related ecosystem and climate assessment and predictions.

- Integrating and assimilating surface, subsurface and remote sensing data into information products,
- Developing an improved suite of predictive models based upon improved numerical descriptions of processes,
- Using these information products and improved models to predict future water security through estimating the impacts of land use and climate change on watersheds,
- Reconstructing past and future climate and land use scenarios for water resources assessments,
- Predicting water resource dynamics in ungauged basins.
- Predicting streamflow and water temperature regimes in relation to aquatic ecosystem requirements

Action Plan iii)

Collaboration & Demonstration

Coordinate a collaborative approach to information collection and application for western and northern water supply issues.

- Provide science, interpretation and information sharing support for the Western Water Stewardship Council members,
- Demonstrate water resource applications, improved technology, adaptation strategies and best practises for water assessments and forecasts,
- Demonstrate the ecosystem and economic services of watersheds under various management scenarios,
- Coordinate with a broad range of international programmes such as those under the auspices the World Climate Research Programme and the International Association of Hydrological Sciences and through bilateral relationships with the United States and European Union,

Action Plan iv)

Outreach

Enhance training and in-house knowledge translation and communication for students, practitioners, and policy makers.

- Organize workshops and conferences for partners that promote the sharing of new techniques, research outcomes and advanced synthesis of emerging knowledge,
- Promote the training of students and professional upgrading with Canadian university graduate credit courses on advanced Canadian and cold regions hydrology and water resource techniques in collaboration with the Canadian Water Resources Association,
- Translate knowledge from technical forms into concepts that can be readily applied in support of policy development and sustainable water management,
- Prepare websites, books, brochures and popular works that interpret hydrology, climatology and related sciences for students, practitioners, and the Canadian public.

Methodologies

- Establish intensive clusters of point and areal observations of hydrological processes in strategically located research basins (<200 km²).
- Promote the enhancement of observational networks for streamflow, snowpack, glaciers, groundwater, and meteorology.
- Integrate remote sensing (satellite, airborne, ground-based) with basin observations through data assimilation.
- Use a two-way nested modelling strategy employing the European Union, “Open MI” standards <http://www.openmi.org> to move information from large to small scale and in reverse.
- Use dynamical and statistical scaling
- Develop assessments of the uncertainty in hydrological predictions.
- Demonstrate water resource and climate predictions with user groups.
- Hold conferences to permit application of this technology in western and northern Canada.

Support Request

- The Coldwater Collaborative is seeking the following:
- Letters of support for a Natural Sciences and Engineering Research Council grant application to create a strategic research network that will study present and future water supply and related snow, glacier and permafrost issues in the mountain West and Arctic
- Suggestions as to where to look for funding to support activities of the Collaborative that cannot be funded through NSERC programs
- Participation on the Board of Directors of The Coldwater Collaborative by representatives of the western provinces and northern territories.

Discussion



NSERC Strategic Networks Grant LOI Due 20 June 2009
-INVESTIGATORS, COLLABORATORS, SUPPORTERS
IF SUCCESSFUL, Workshop, then Application June 2010
IF SUCCESSFUL, Start April 2011

- How to Bridge to CFCAS Networks?
- Can we avoid being the Avro Arrow of water and cryosphere prediction?
- Comments