



Canadian Foundation for Climate  
and Atmospheric Sciences (CFCAS)

Fondation canadienne pour les sciences  
du climat et de l'atmosphère (FCSCA)

# background

## **The IP3 Network for Improved Prediction, Measurement and Use of Water in Cold Regions**

IP3 (Improved Processes and Parameterization for Prediction) is a Canada-wide research network devoted to improving the understanding of surface water and weather systems in cold regions, particularly in Canada's Rocky Mountains and western Arctic regions. Water resources, which include run-off, surface and underground water, provide an essential resource for agriculture, urban development, industrial processing and ecological health. Canada's water supply is closely linked to weather factors which are subject to changing global weather patterns.

IP3 will provide a better understanding of cold regions hydrometeorology and help test advances in atmospheric and hydrological prediction in the Rocky Mountains and western Arctic. The network is being funded by a grant of \$2.5 million from the Canadian Foundation for Climate and Atmospheric Sciences (CFCAS).

IP3 is headquartered at the University of Saskatchewan's Centre for Hydrology and is slated to operate from 2006-2010. It is a Canadian component of International Polar Year (2007-08), the Global Energy and Water Cycling Experiment (GEWEX) and the International Decade for Prediction of Ungauged Basins. There are eight university partners in IP3, along with strong collaboration with Environment Canada, Indian and Northern Affairs Canada, Natural Resources Canada, Parks Canada, Alberta Environment, Yukon Environment, Diavik Diamonds, Northwest Territories Power, the USDA Agricultural Research Service, and universities in the United States and United Kingdom.

### **Objectives of the IP3 Research Network**

Recent changes to mountain and northern snow, glacier and water resources, new resource development in northern Canada and increasing demand for water in western Canada have created a need for improved prediction of weather, snow and water in cold regions.

The Network will:

1. **Improve understanding the key climate system processes** relating to the hydrometeorology of cold regions;
2. **Determine the parameters of land surface hydrology processes** that control the atmospheric-hydrological system in cold regions; and

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3. **Validate and improve computer models for weather, water and climate systems** leading to better prediction and simulation of atmospheric impacts on water resources and surface climates in cold regions.

Through their work, the members of the IP3 consortium will enhance weather and climate predictions, improve estimates of stream flow from ungauged basins and better predict changes in Rocky Mountain snow and water supplies. They will also help calculate freshwater inputs to the Arctic Ocean and contribute to policy development for sustainable management of mountain and northern water resources.

Knowledge gained will be vital to creating models to help policy makers responsibly manage water resources in the face of changing climate and economic demands.

### **Prairie Provinces Water Apportionment Agreement**

Water naturally flows from west to east in the Prairies; snowmelt from the eastern slopes of the Rockies flows primarily along the North and South Saskatchewan River systems. The Prairie Provinces Water Board (PPWB) oversees an agreement for apportioning this natural water flow among Alberta, Saskatchewan, Manitoba and the rest of Canada. The agreement states that 50% of natural flows from Alberta must reach Saskatchewan and 50% of what Saskatchewan receives must reach Manitoba. Natural flows as calculated by Canada and the provinces are the stream flows that would occur without withdrawals for urban use, for agricultural, or for other uses.

Natural water flow impacts significantly on industry and people. It is a life-line for farmers, particularly for crop irrigation; it is needed in the potash mines and is essential in the process of oil extraction from water injection into wells. Natural flows supply water to residents of Calgary, Edmonton, Saskatoon, Regina, Red Deer, Medicine Hat, Prince Albert and Moose Jaw. Should Alberta fall short of its 50% agreement obligations or use close to 50% of the natural flow originating in the province, it would compromise the resources for Saskatchewan and Manitoba. This situation has already come close to happening, due to low mountain snow pack. There needs to be a more precise and reliable system to predict fluctuations in natural water flow.

### **Oil and Diamond Industries and Their Impact on Northern Water Resources**

The Mackenzie Valley Pipeline will have hundreds of ungauged stream crossings; where the pipeline crosses streams, the structure must be designed so that floods won't damage the pipeline. Diamond and other mine developers must build water retention systems so that mine operations will not damage the environment.

Freshwater flows into the Arctic Ocean are currently unpredictable. They heavily influence ocean temperatures, circulation and global climate. The IP3 network will permit better prediction of water flows in these northern environments and will be increasingly important as resource development proceeds.

For more information, please visit: [www.usask.ca/ip3](http://www.usask.ca/ip3) or contact the network leader Dr. John Pomeroy.