



Landscape and ecosystem influences on the energy and water cycles of the Mackenzie River basin

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The Mackenzie River basin is one of the world's major continental-scale catchments, covering an area of 1.8 million square kilometers. It is a major source of fresh water for the Arctic Ocean. It contains a variety of landscapes, including the Rocky Mountains, the Canadian Shield, prairie regions, boreal forest and tundra, as well as large numbers of lakes. Vegetation types include coniferous, deciduous and mixed forests; crop areas and grasslands; and tundra. Soils may be mineral or organic, or a combination of both, i.e. an organic layer underlain by mineral soil. Soil depths vary widely, from a few centimeters to several metres. 75% of the basin is underlain by continuous or discontinuous permafrost.

Such complex landscapes present a severe challenge to land surface modellers. This presentation will review recent related enhancements that have been made to CLASS, the Canadian Land Surface Scheme, which is used operationally in the Canadian global and regional climate models. Extensive testing has been done using data from the BOREAS and BERMS measurement programs. Particular attention has been paid to vegetation controls on evapotranspiration; the effect of soil characteristics on the soil moisture regime; the parameterization and evolution of the snow pack; and scaling strategies, in moving from single-point field sites to areas of mixed vegetation and soil characteristics. This presentation will provide an overview of the advances that have been made in each of these areas.