Preface

In the mid-1970s, hydrologists from eight circumpolar countries established what is known as the Northern Research Basins (NRB). This group has held 14 symposium/ workshops, with one taking place every 2–3 years at various interesting high latitude locations. The outgrowth of one of their working groups was an effort to synthesize water balance data for northern experimental research basins. The challenge was to write a successful proposal to hold a 1-week workshop designed to address the topic of water balance determinations for existing northern experimental watersheds, synthesize collectively results from these watersheds, and then publish the results from this effort. We originally envisioned that 12–15 researchers would take part in this exercise. In 2002, a successful proposal was accepted by the United States National Science Foundation (NSF).

Although numerous contacts had been made through NRB before submitting the research proposal, interest in this pursuit immediately increased once funding was secured from NSF. Interest in this quest came not only from those carrying out water balance studies at high latitudes, but also from organizations that were willing to provide further support for the water balance endeavour. Both the International Arctic Science Committee (IASC) and Meteorological Service of Canada, Environment Canada, were willing to provide supplementary financial support for the water balance workshop. This was greatly appreciated, particularly due to the increased travel cost of additional participants and the extra publication costs of additional papers. Because of scheduling conflicts and this doubling of interest, the workshop was delayed from the autumn of 2003 until the spring of 2004. Ultimately, 34 researchers, plus some students, convened at the University of Victoria from 15–19 March 2004.

Logistical support for both the workshop and this publication was provided by the University of Alaska Fairbanks (Water & Environmental Research Center) and the University of Victoria (BC, Canada, Water and Climate Impacts Research Center). The World Climate Research program (WCRP), Climate and Cryosphere (CliC) contributed moral support, as this effort fits very nicely with their goals. We appreciate the contributions made by each of the participants to this publication.

Presentations on water balance results were made for research watersheds in United States, Canada, Japan, Russia, Norway, Greenland, and Finland. In total, results from 39 watersheds were presented at this workshop, representing over 500 years of water balance data. Still, the results presented here are not comprehensive. Most of these results are derived from studies that are still ongoing, with investigators that have a strong interest in contributing to the advancement of our knowledge on high latitude hydrology. There are past water balance studies where the participants are no longer available and therefore did not contribute here. Also, a few ongoing studies were not reported, because the investigators had other conflicting obligations.

There are numerous approaches to making water balance computations at the watershed scale. Ideally, each component in the water balance equation is measured in the field. However, there are generally many obstacles to making such measurements. Thus, researchers often rely on other techniques for deriving estimates of storage

volumes or flux rates. Most water balance determinations are made seasonally or yearly, as geography, extreme climate conditions, and limited funding render it too challenging to make the number of measurements required for shorter time periods. It is clear that the accuracy of water balance computations decreases with shorter time periods. A quick perusal of these papers will clearly demonstrate that a variety of methods were used to derive the water balance in each case.

We are striving to understand climate change and the role that hydrology plays in climate variability. We are presently engaged in using large-scale models for climate prediction. Flux and storage data from relatively small experimental watersheds are some of the best data we have available for verifying the appropriateness of the output from these climate models. In addition to expanding our present knowledge of high latitude hydrology, we hope that these results will also be used to improve climate modelling predictions.

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