

## **Preliminary assessment of groundwater contribution to the hydrology of an alpine lake in the Canadian Rockies**

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**Abstract** Groundwater storage and pathways in alpine headwater regions of the Canadian Rockies have not been well understood, although these processes may play a significant role in controlling the amount and timing of runoff in mountain streams. A field study was initiated in 2004 at the Lake O'Hara watershed in Yoho National Park, British Columbia, to examine the role of groundwater in the alpine hydrological cycle. The main objective of the first year of this study was to quantify the groundwater input to Lake O'Hara using a water balance approach, which consisted of weekly field measurements of inflow and outflow streams and lake water level, along with local meteorological data. Of all measurable terms in the water balance, surface water inflow and outflow were by far the largest components, while direct precipitation and evaporation were almost negligible. Surface water outflow was substantially greater than inflow, indicating that the groundwater residual (i.e. net groundwater inflow minus outflow) was a major component. Taking the groundwater residual as a minimum estimate of groundwater inflow to the lake, it was estimated that groundwater contribution was approximately 25–40% of total water inputs to the lake during the peak flow period (late June to early July) and 35–50% toward the end of the summer. This preliminary finding implies that groundwater processes play a much more important role in the hydrological cycle of alpine headwater regions than previously thought.

**Key words** glacier; Lake O'Hara; mountain hydrology; water balance

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