

Hydrological Process Studies at the Lake O'Hara Research Basin

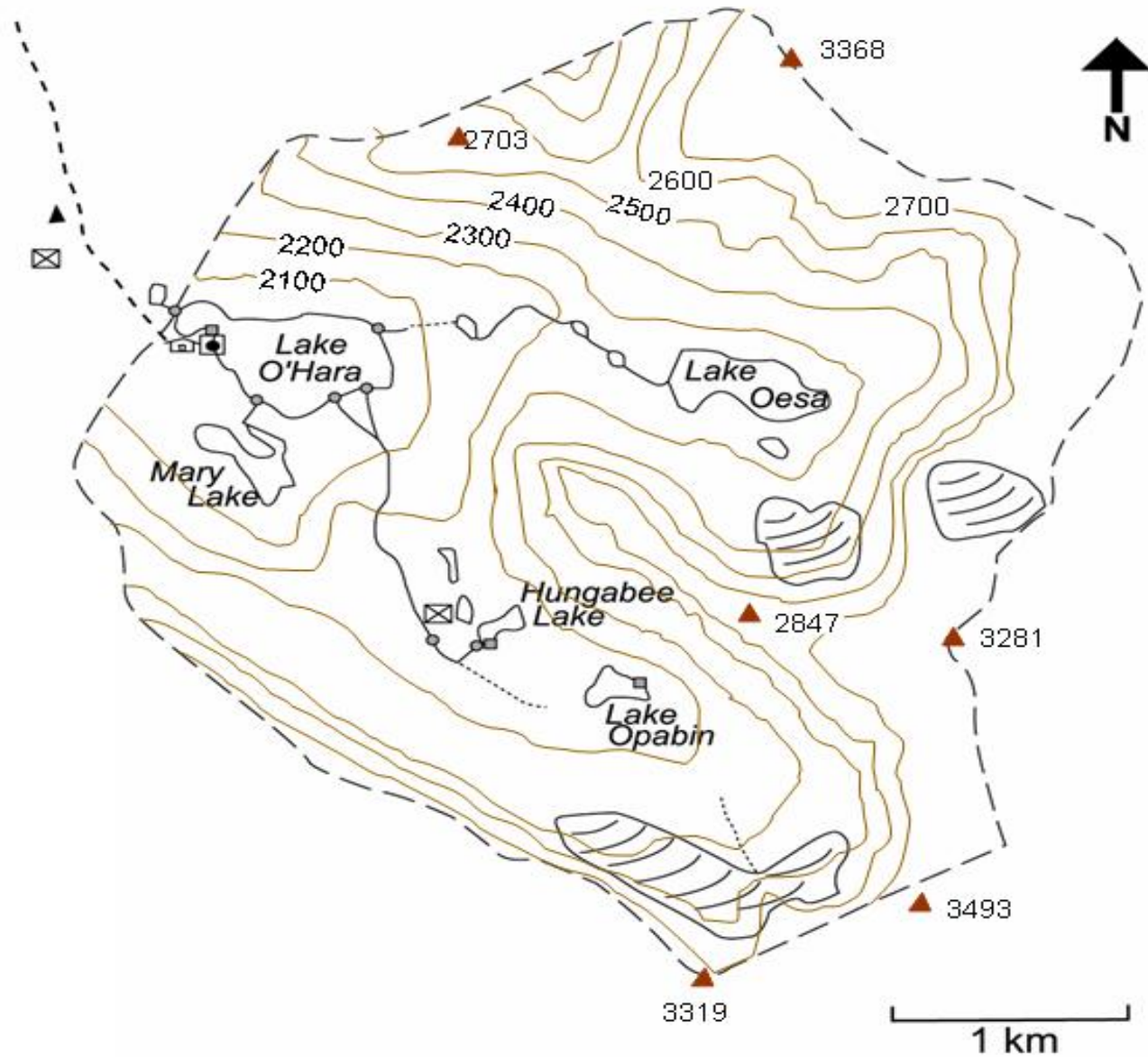
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Research Gaps

- 1. Glaciologists have studied glacier mass balance, but little attention to the fate of melt water.**
- 2. Statistical analysis of stream flow records have revealed temporal and spatial trends, but little insight into physical processes.**
- 3. In general many great discoveries in hydrology were made in small-scale process studies.**
- 4. We need to conduct process studies in small, headwater catchments of the Rockies.**

Lake O'Hara Watershed



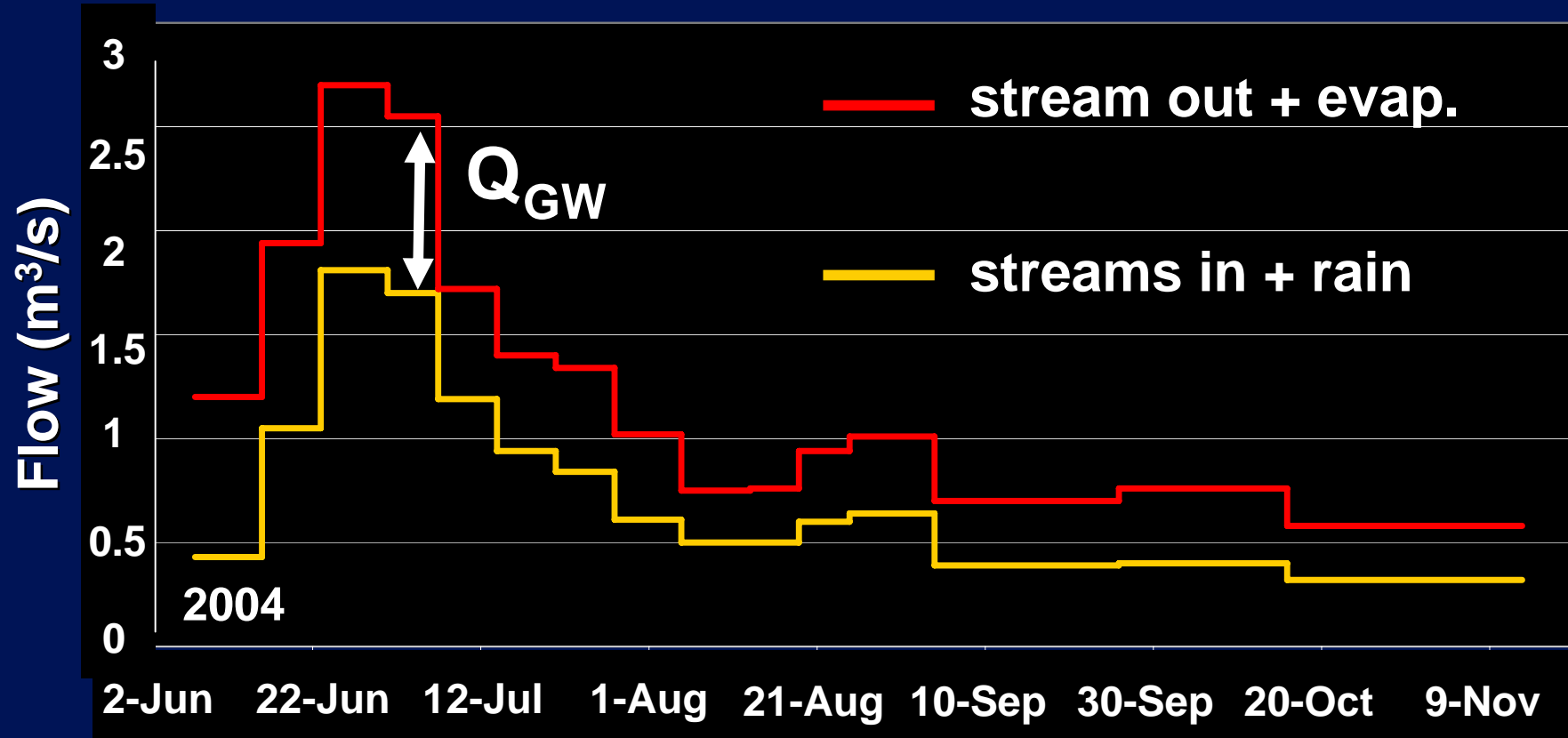
Research Approach: IP3 – WC²N Collaboration

- 1. Glacier processes by Shawn Marshall (WC²N, U of C)**
- 2. Snow accumulation processes by John Pomeroy**
- 3. Snowmelt and surface/subsurface flow by the Hydrogeology Research Group at U of C.**
- 4. Part of a larger, integrated eco-hydrology study.**

Lake O'Hara Water Balance

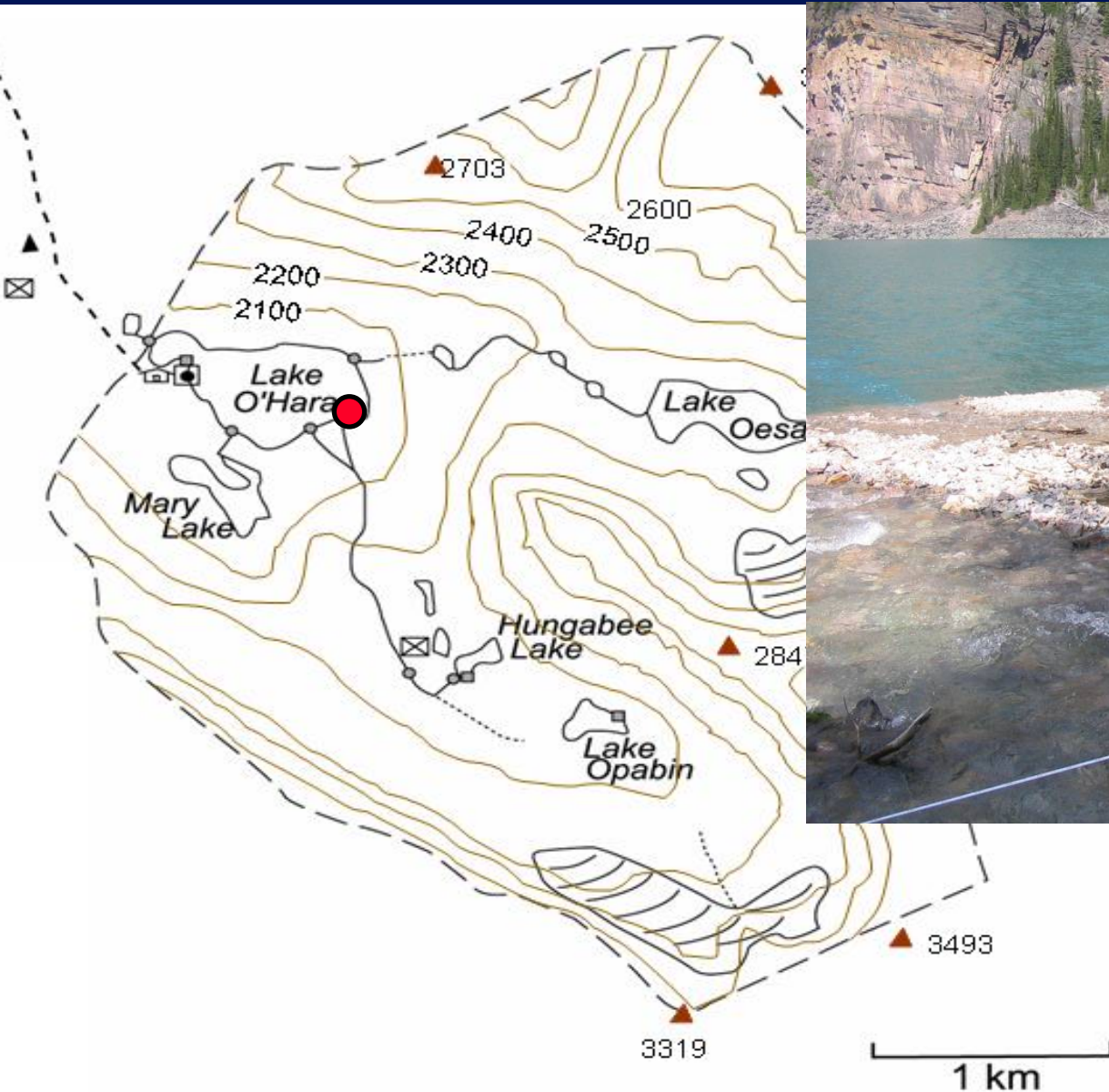


Lake has more outflow than inflow.

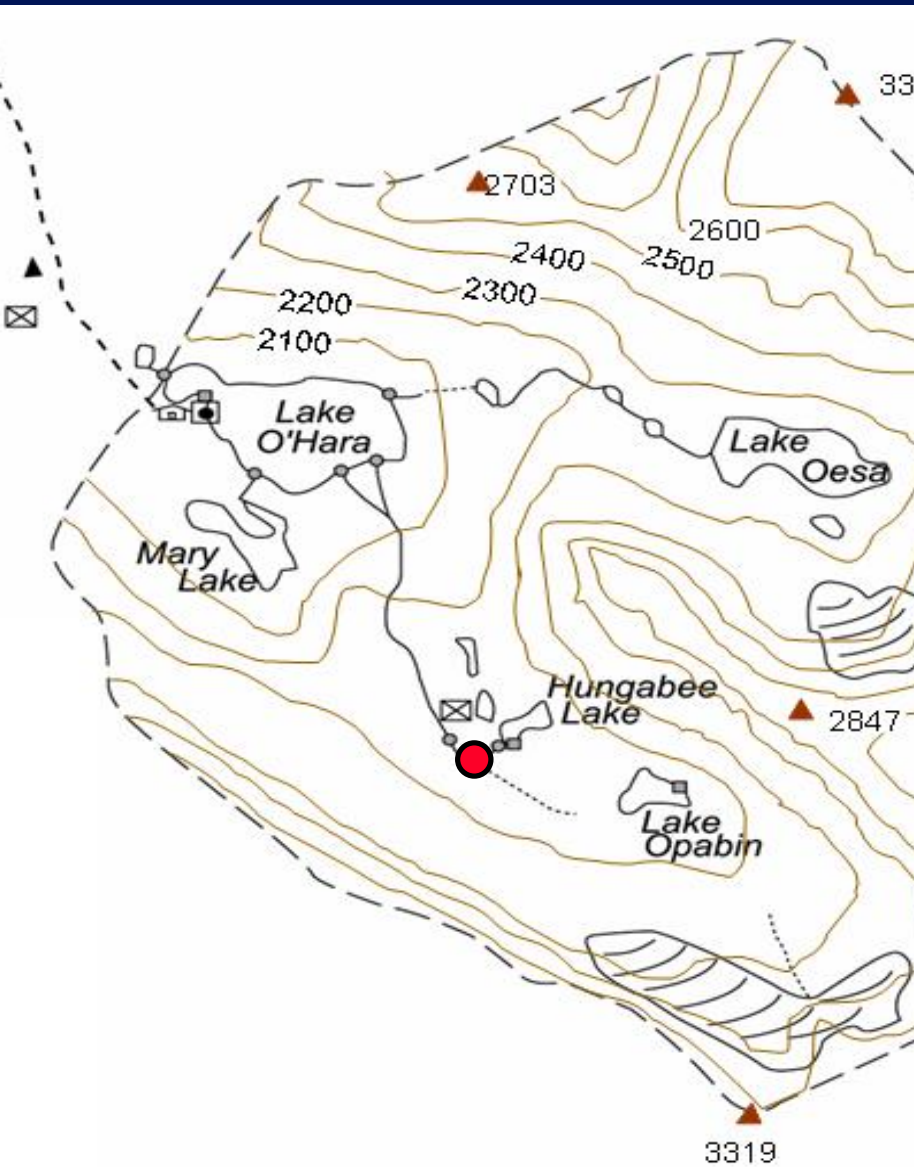


$Q_{\text{GW}} = \text{groundwater inflow} - \text{outflow}$

Where is the source of water in the stream?



Groundwater feeds the Streams!



Glacier Melt and Groundwater

Opabin Glacier

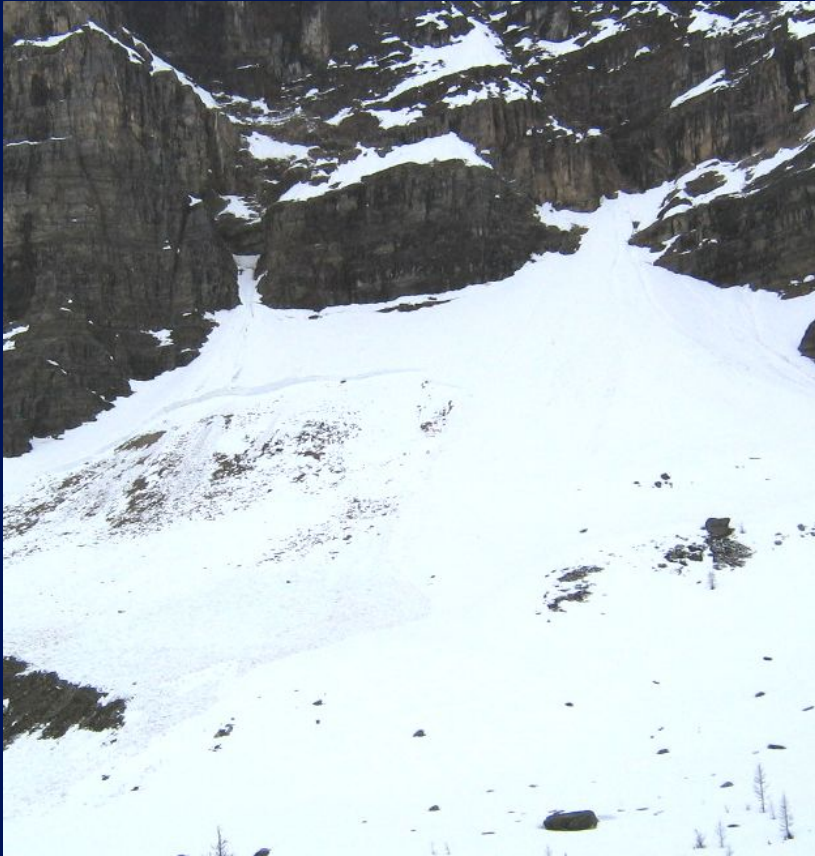
**Straight into the ground.
No stream.**



Snow Depth Monitoring on Avalanche Slope



Snow Depth Monitoring on Avalanche Slope

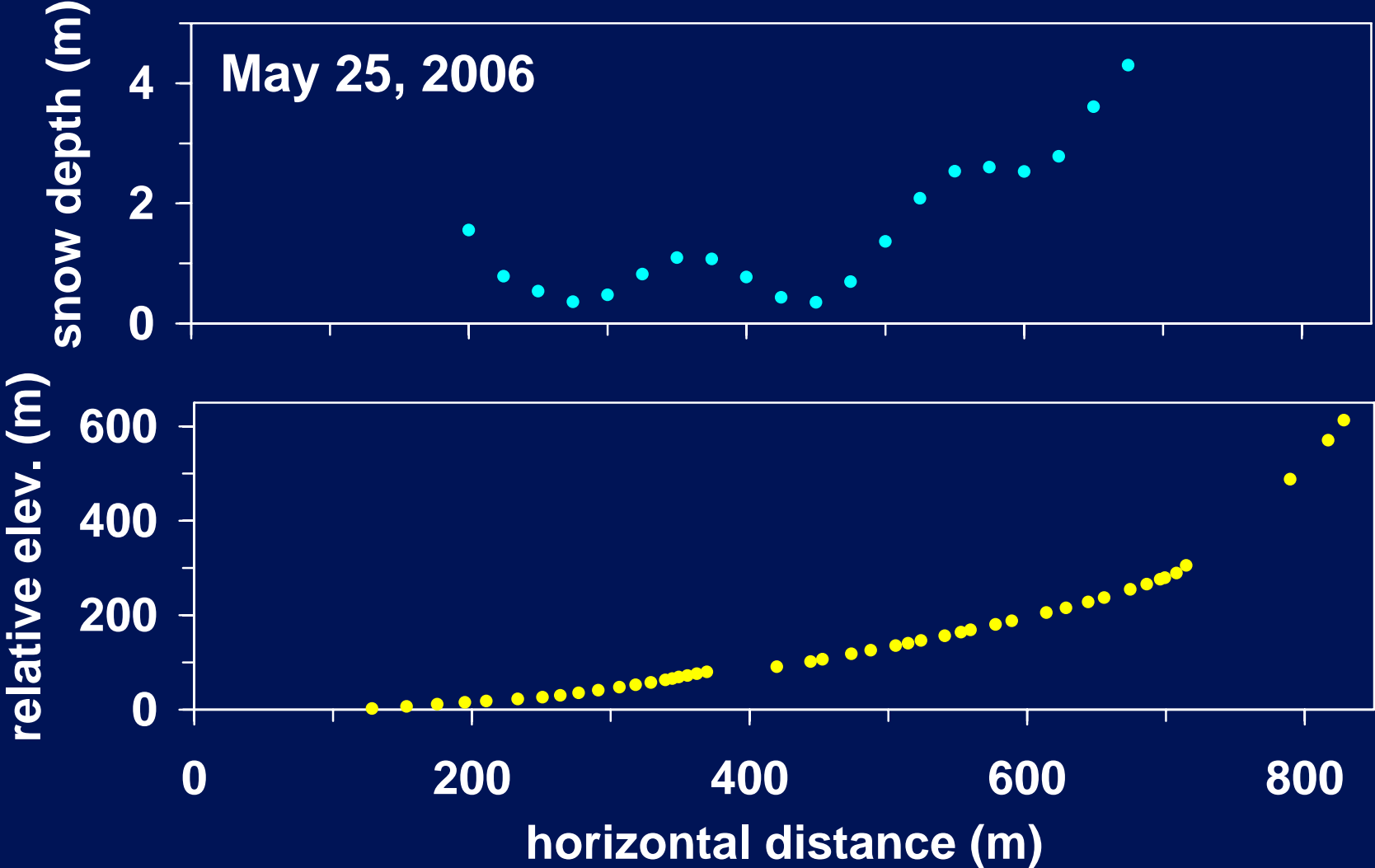


May 25, 2006



July 26, 2006

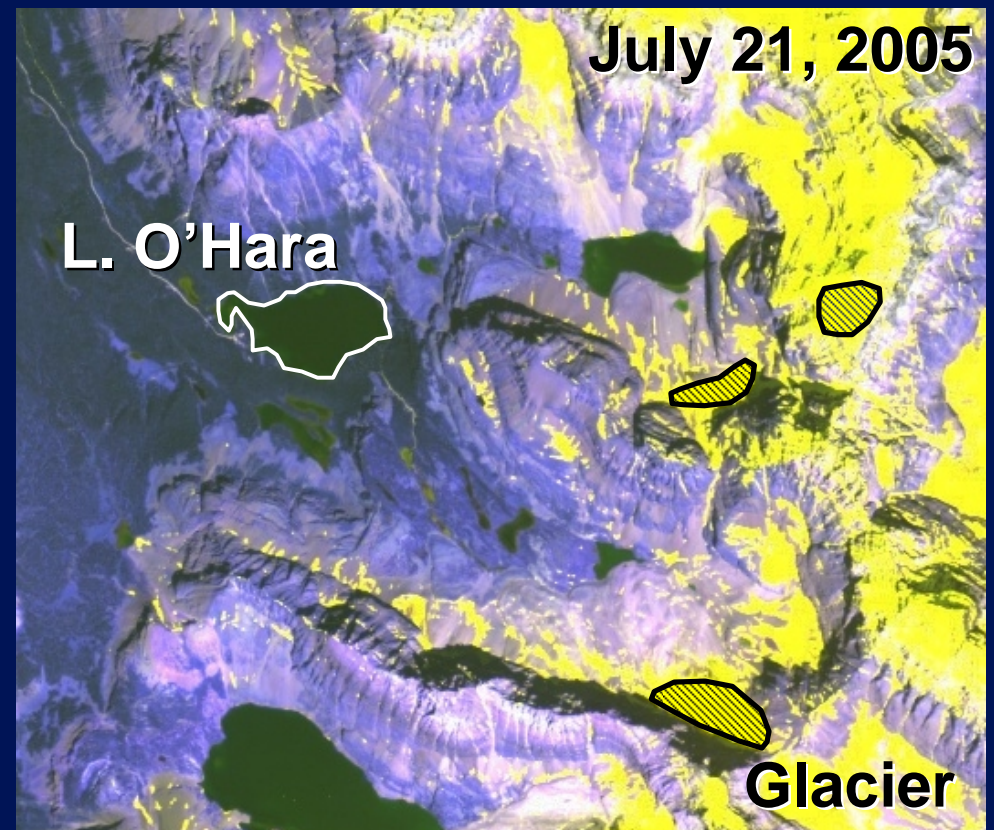
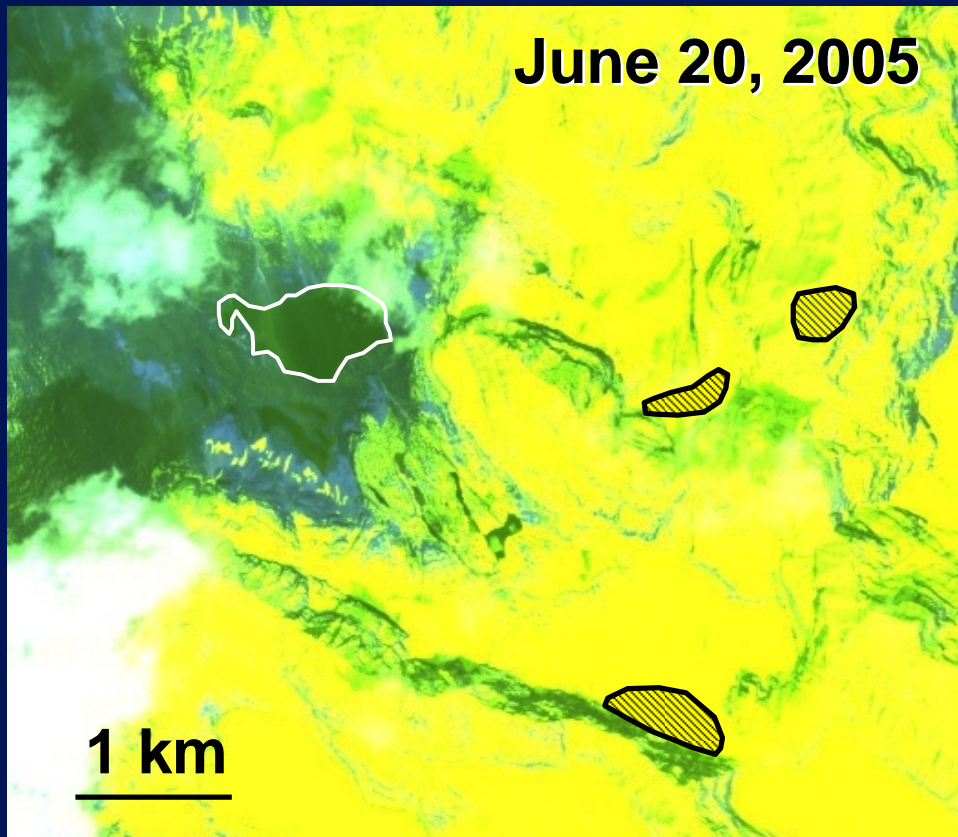
Snow Depth Monitoring on Avalanche Slope



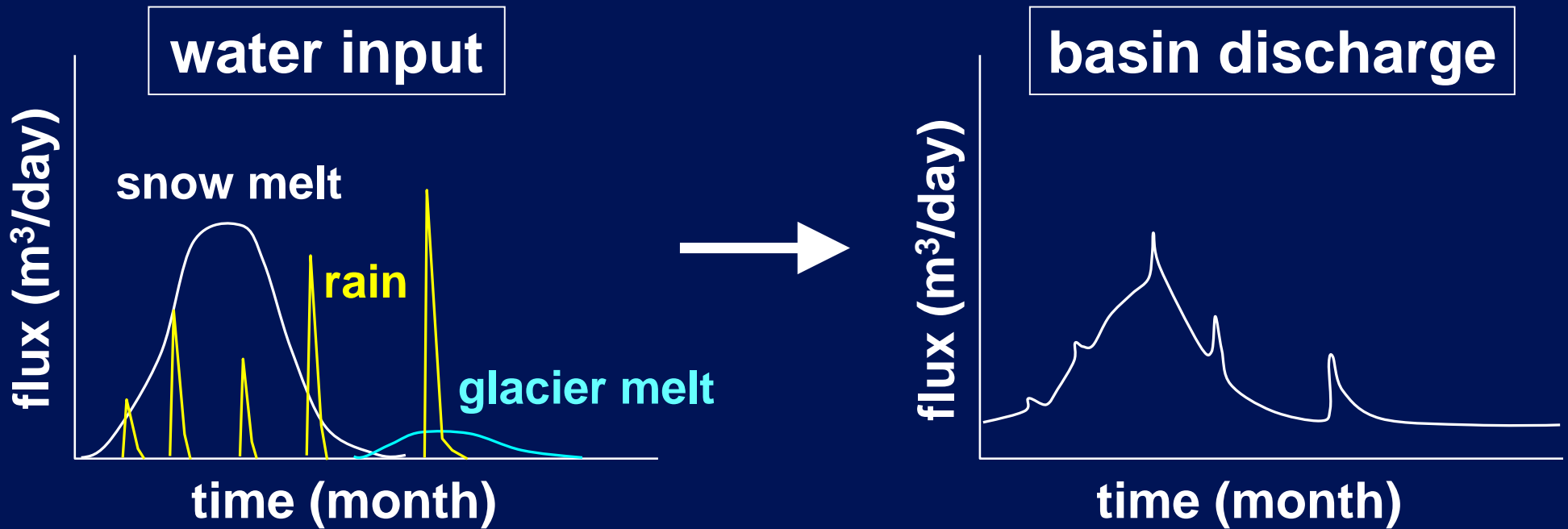
SPOT5 Satellite Multispectral Images

Collaboration with Derek Peddle, U of Lethbridge

Yellow indicates snow and ice.



Water Input and Output in the Alpine Headwater



Understanding hydrological process
Development and testing of model algorithms
Parameterization of basin-scale models