

Advances in Process and Parameterisation Studies at Scotty Creek

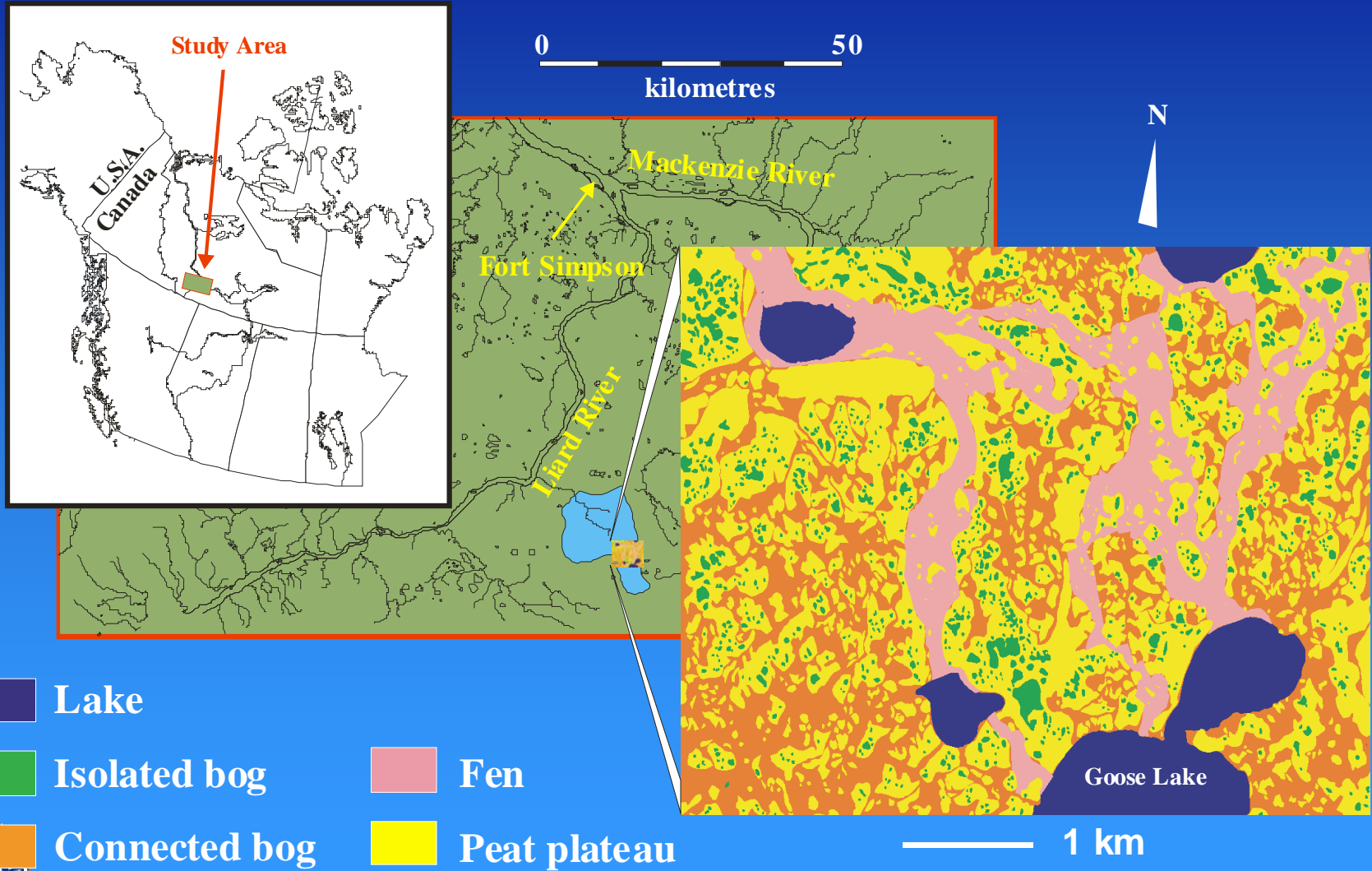
Preliminary findings and future directions

2nd Annual IP3 Meeting and Workshop, Cold Regions Research Centre, WLU, 8-10 Nov., 2007

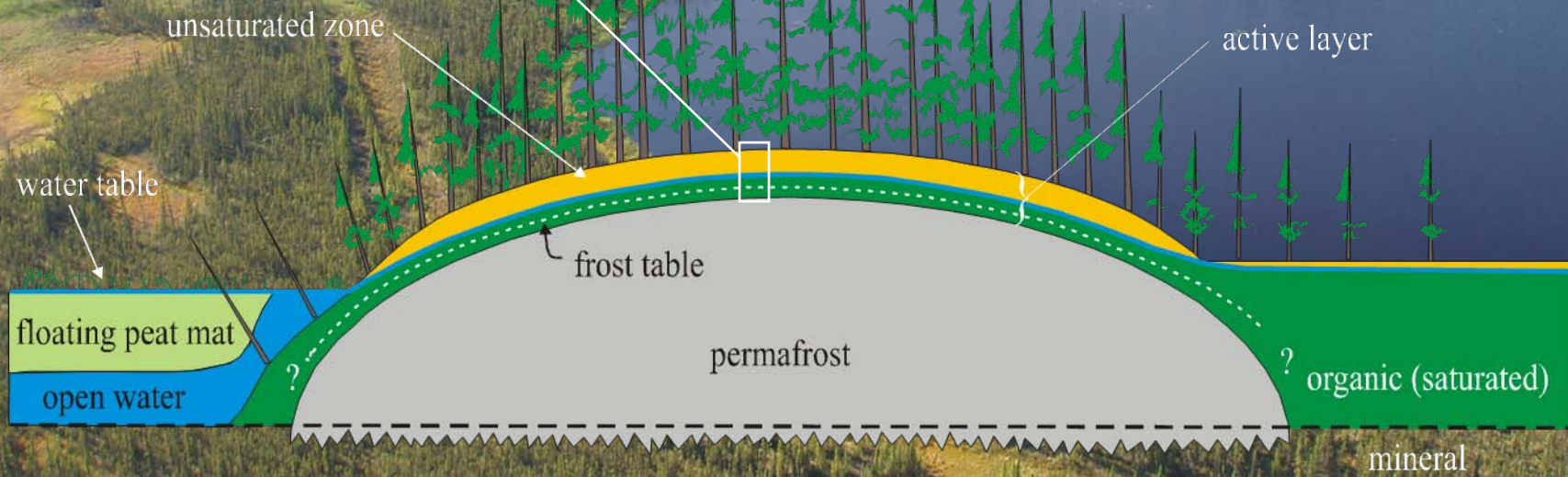
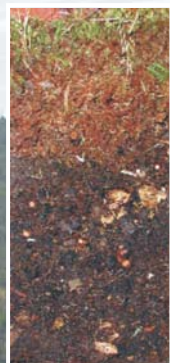
W. Quinton, M. Hayashi, N. Wright, E.D. Soulis,
R. Heck, T. Elliot, L. Chasmer, R. Bemrose,
R. Nagare, R. Schincariol, Y. Zhang, S. Carey,
T. Myers, P. Whittington



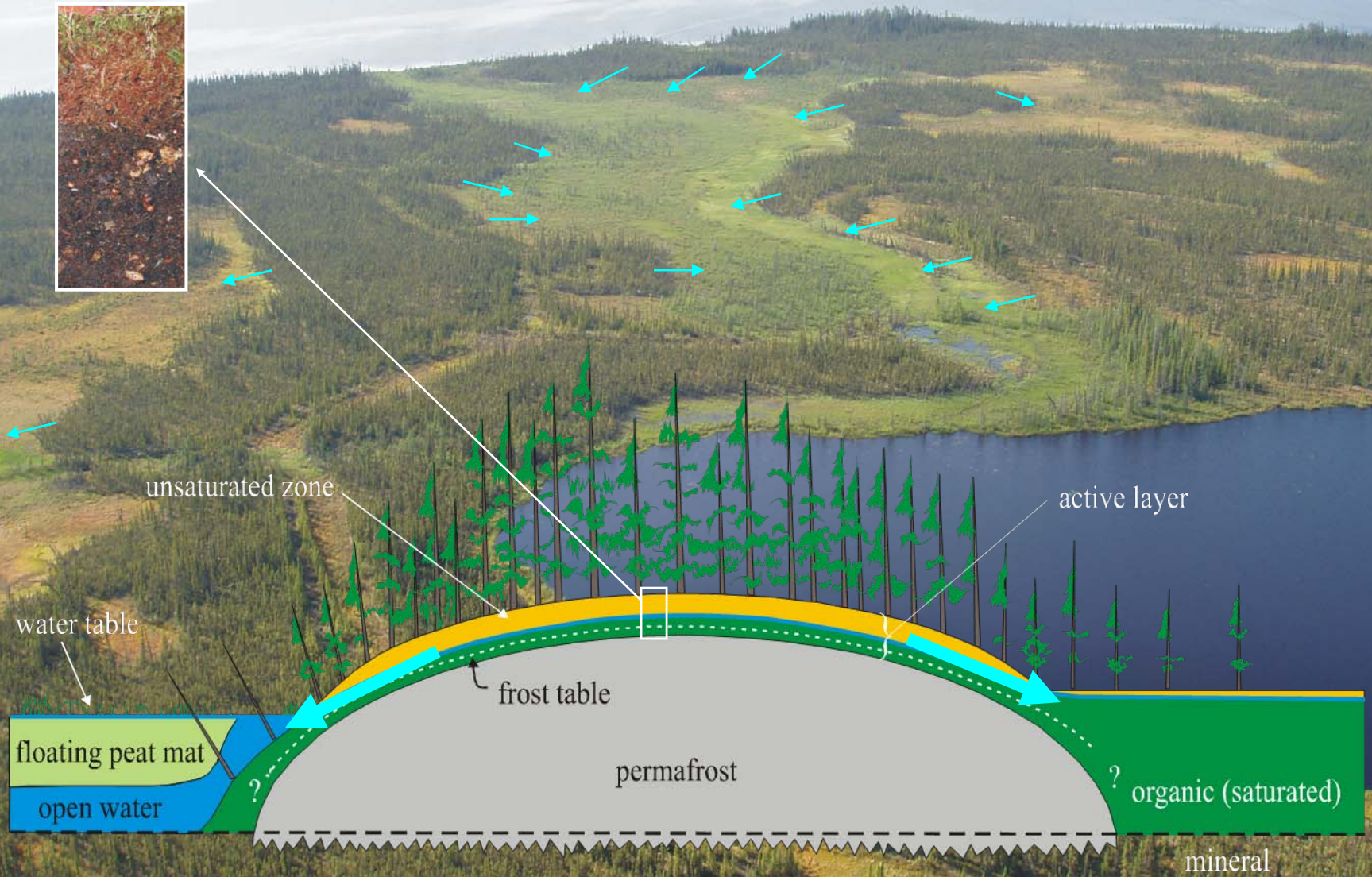
Scotty Creek, NWT, Canada:



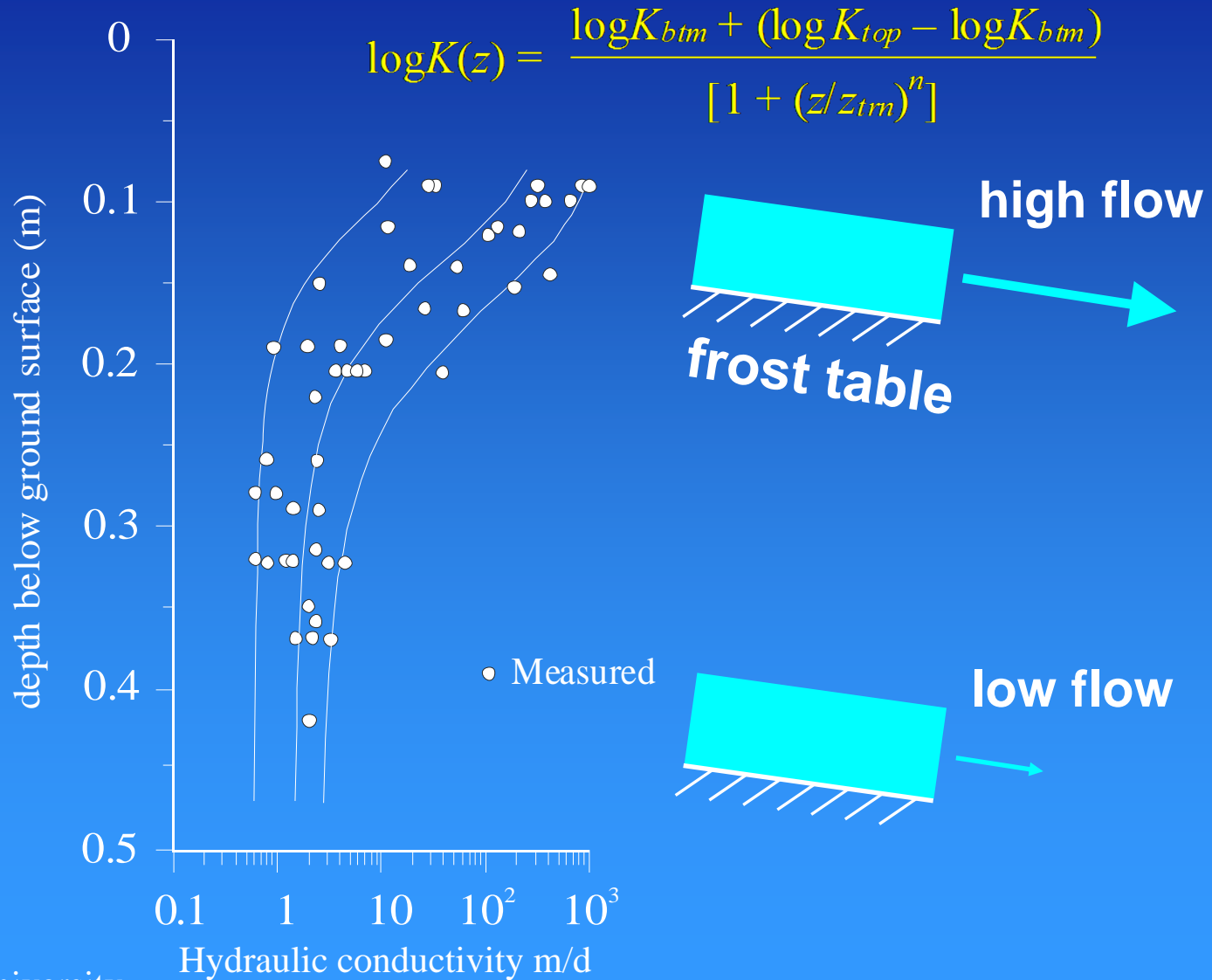
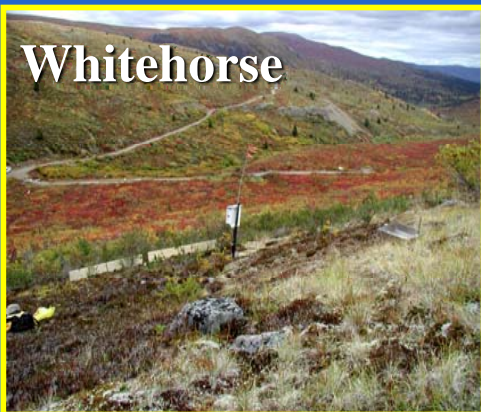
Hillslope Runoff:



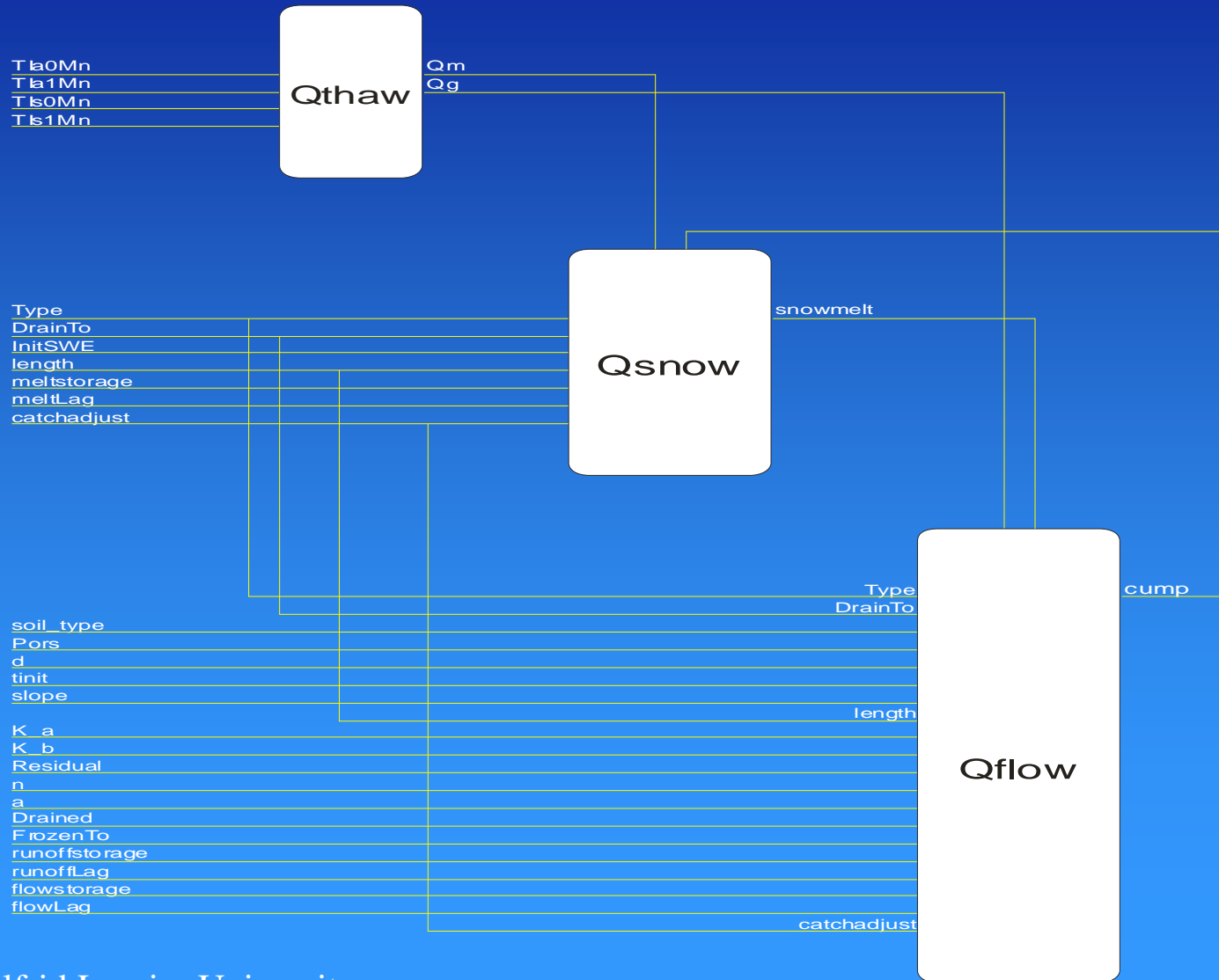
Hillslope Runoff:



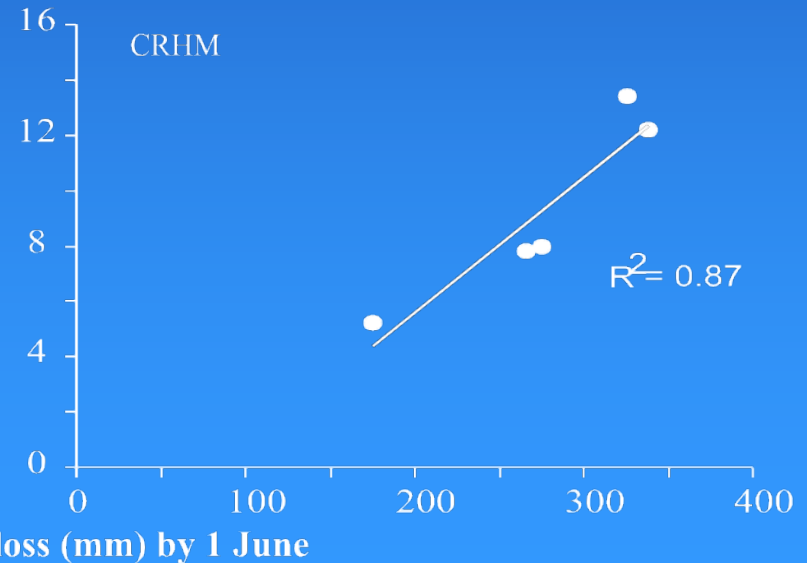
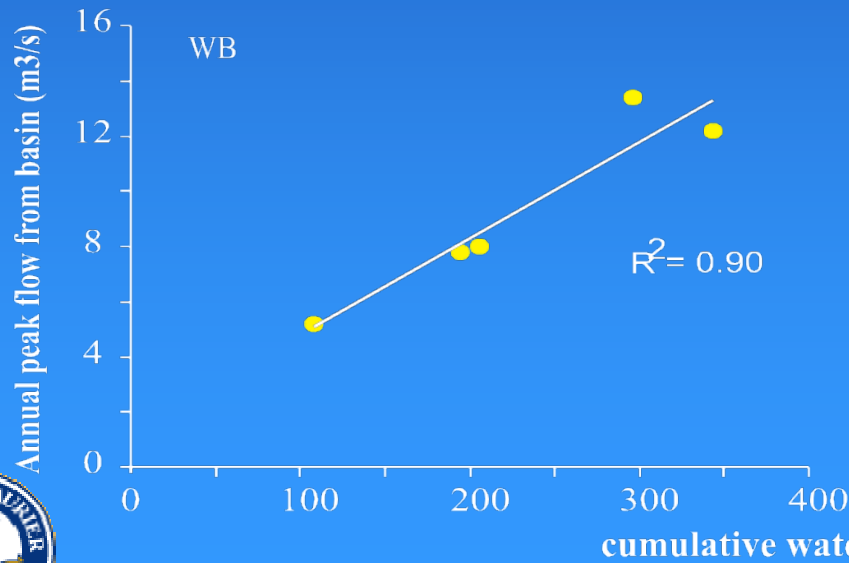
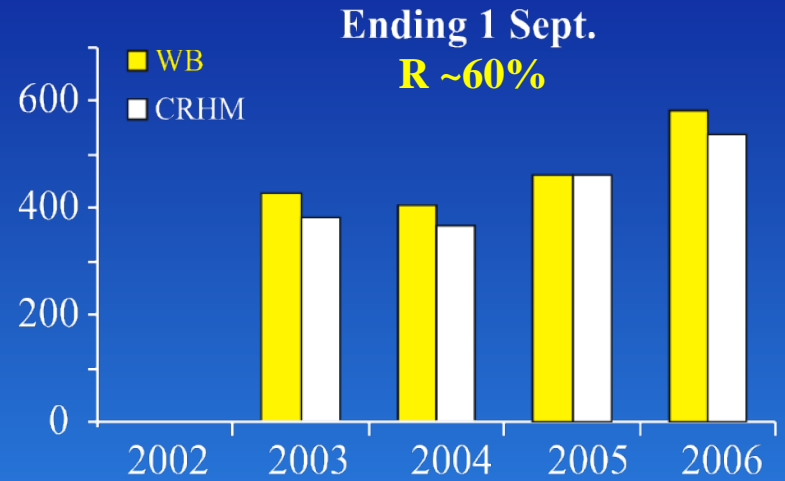
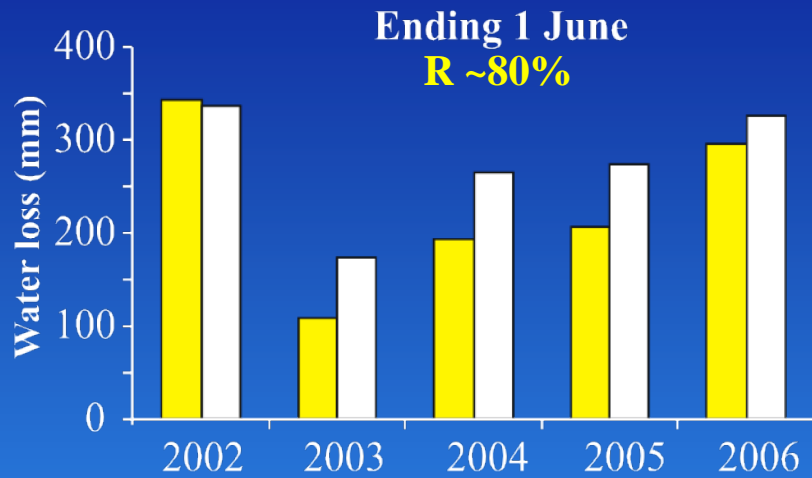
Subsurface drainage:



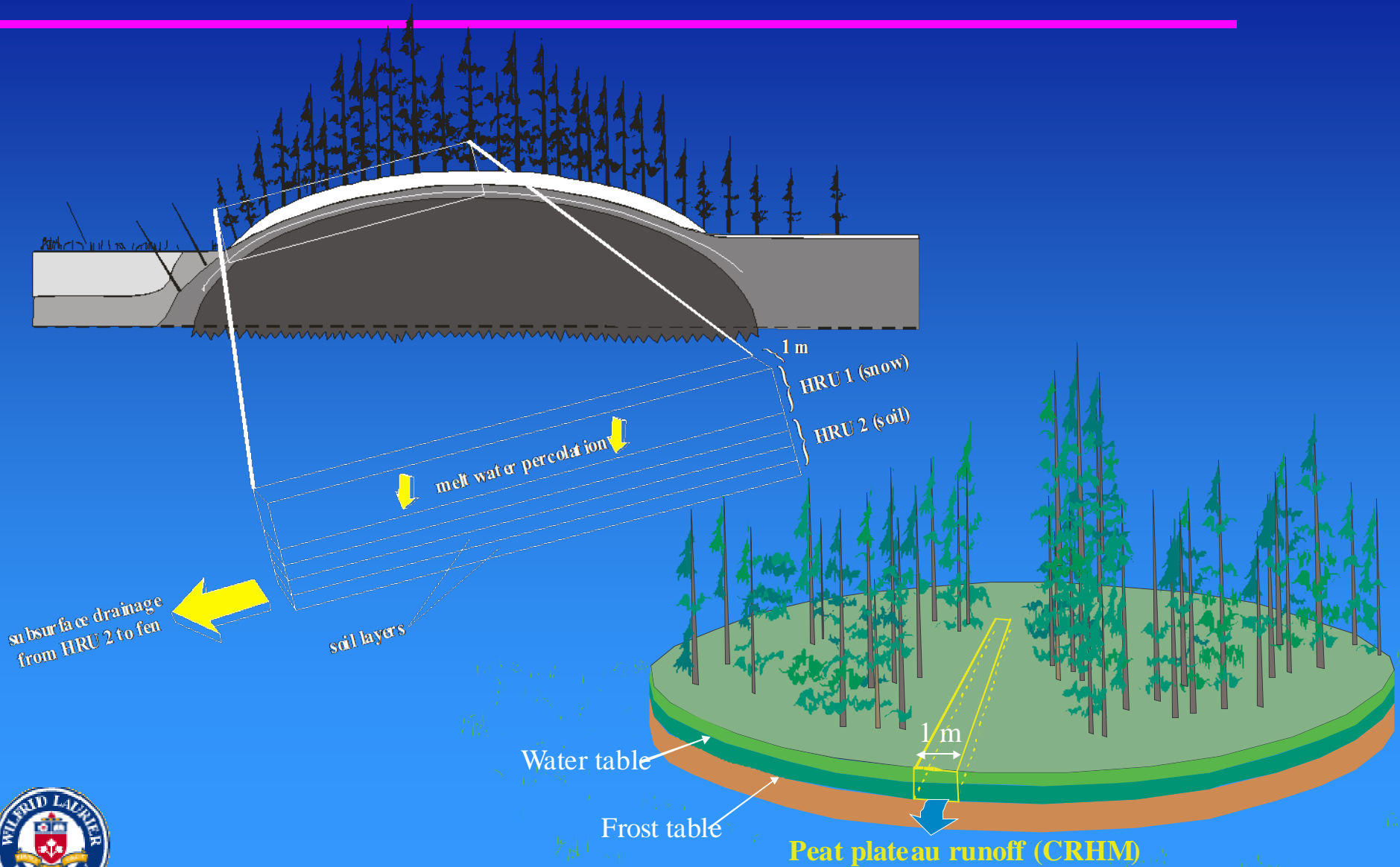
Cold Regions Hydrological Model:



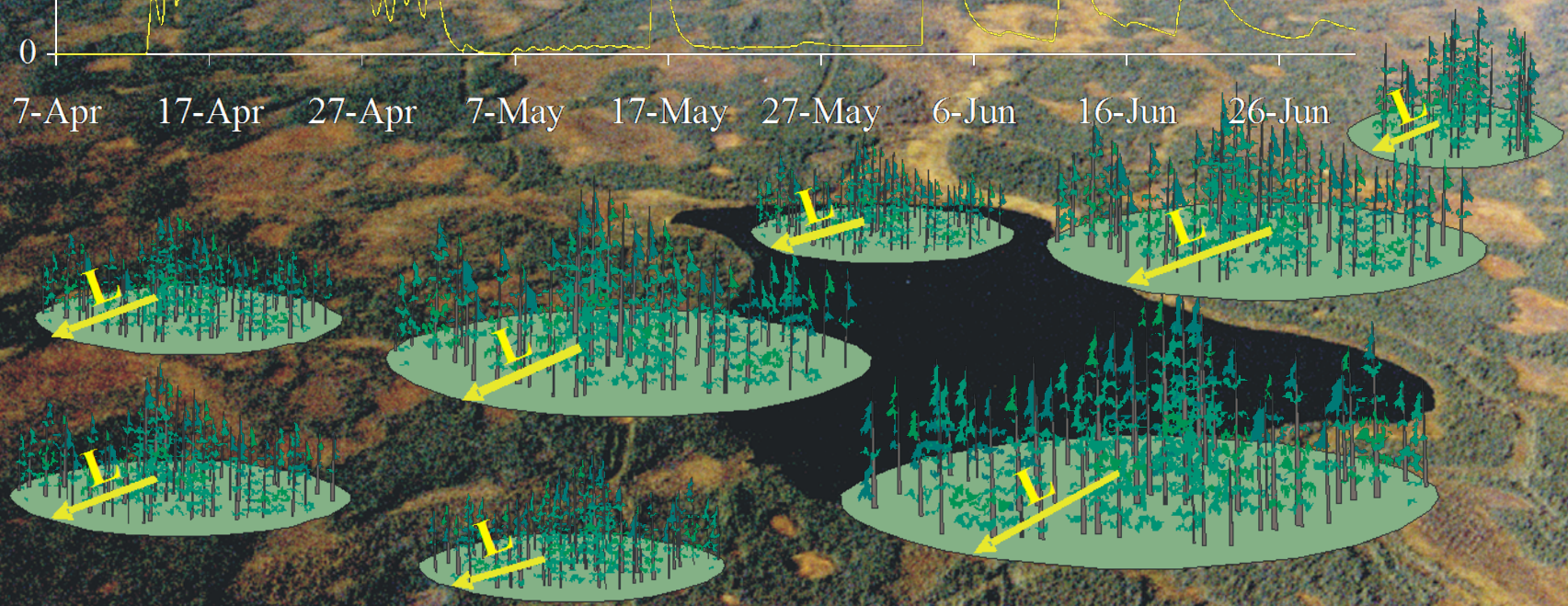
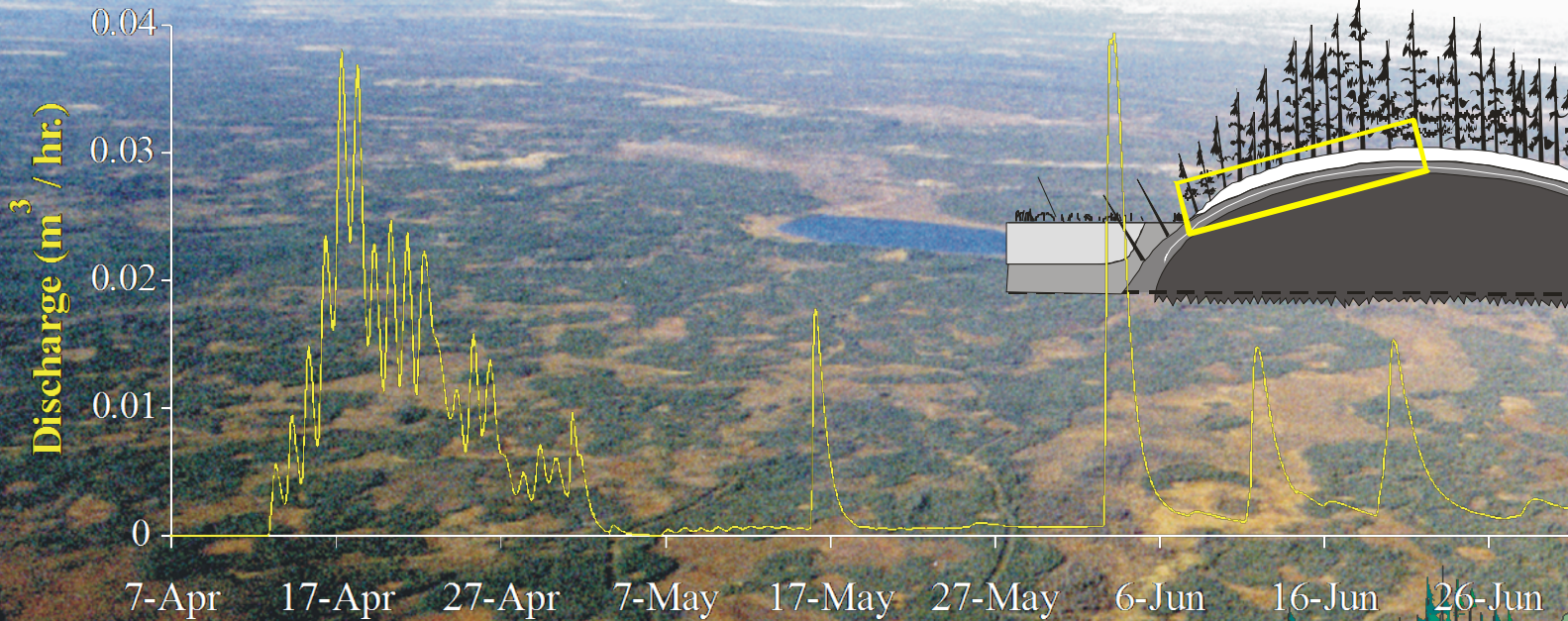
Total ($R_o + Et$) water loss:



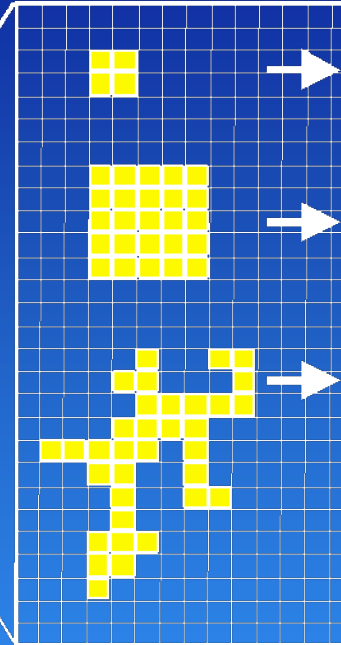
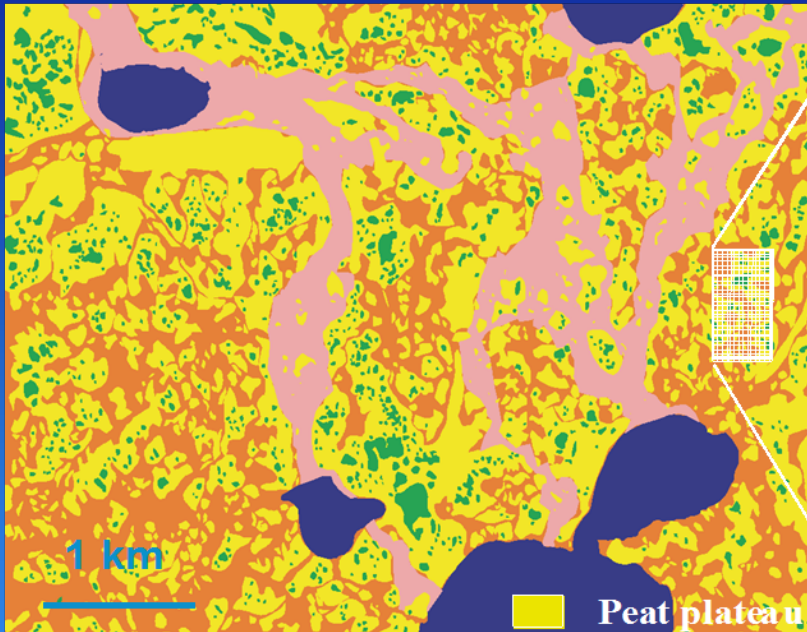
Extending CRHM to basins:



Hydraulic lengths (L) for composite hydrograph:



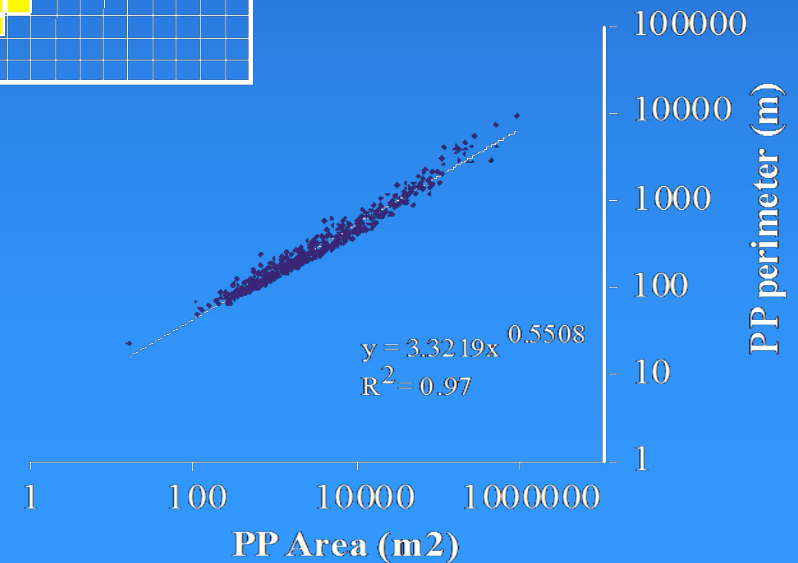
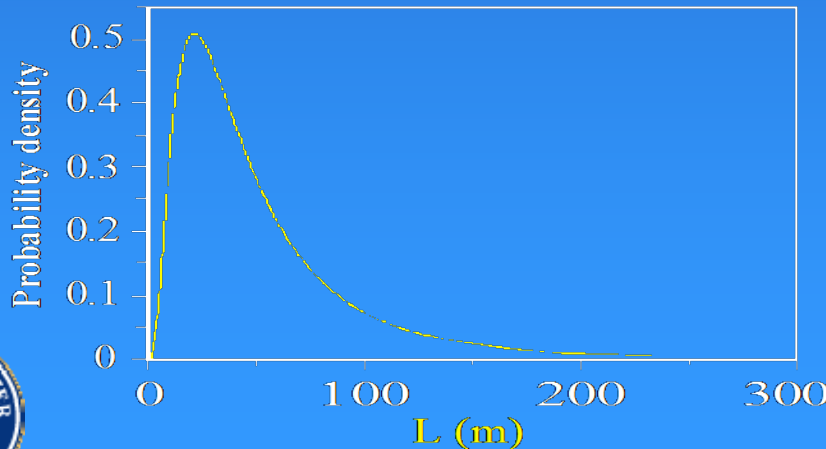
Spatial analysis of peat plateaus:



$L = 2 A/P$
 $L = 1 \text{ m}$

 $L = 2 A/P$
 $L = 2.5 \text{ m}$

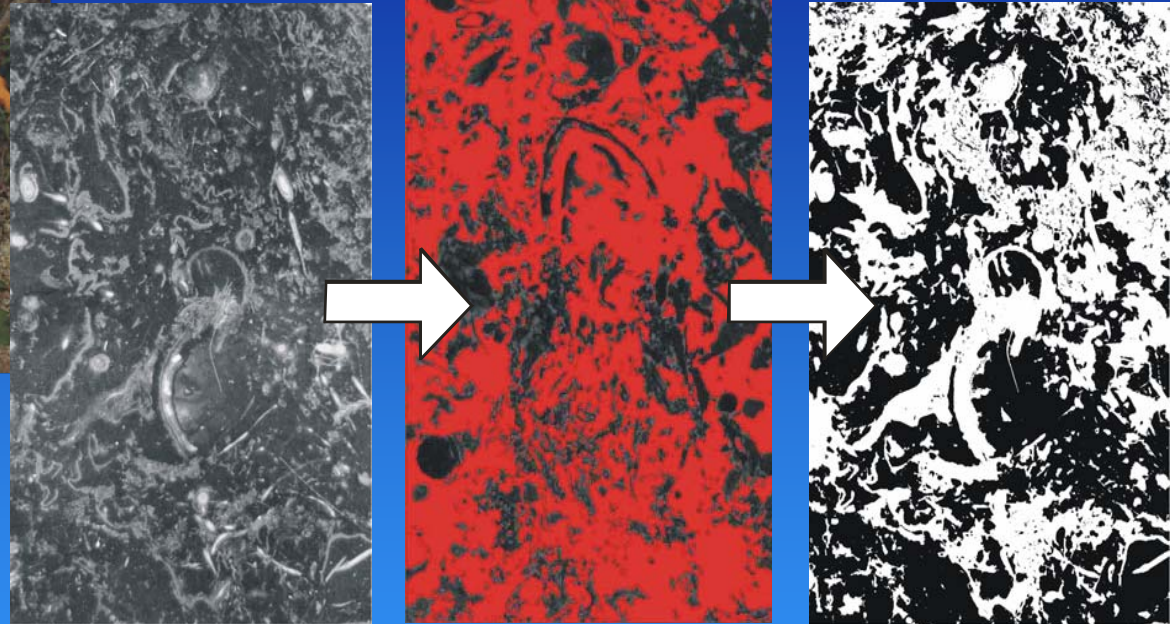
 $L = c A/P$
 $c = 1 - 2$
 $L = 0.56 - 1.11 \text{ m}$



Improved model hydraulics:



Lab analysis



Measurements:

- Area and Perimeter of all pores
- Hydraulic Radius ($R = A/P$), Active Porosity.



Unsaturated flows – CT Scans:

Field sampling



Lab sampling



Permeameter

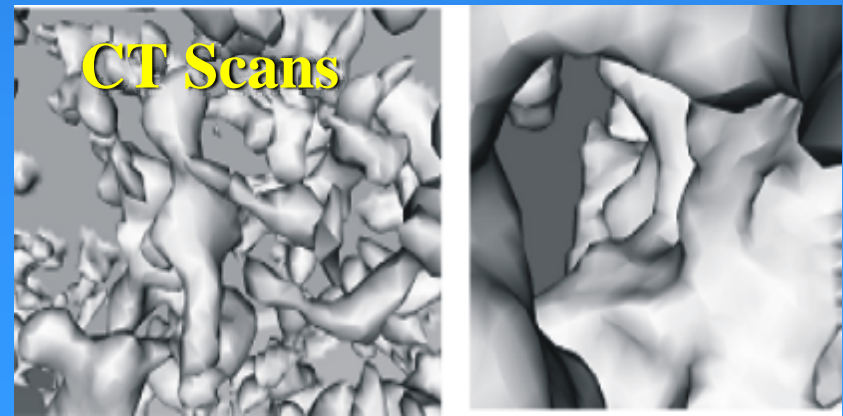
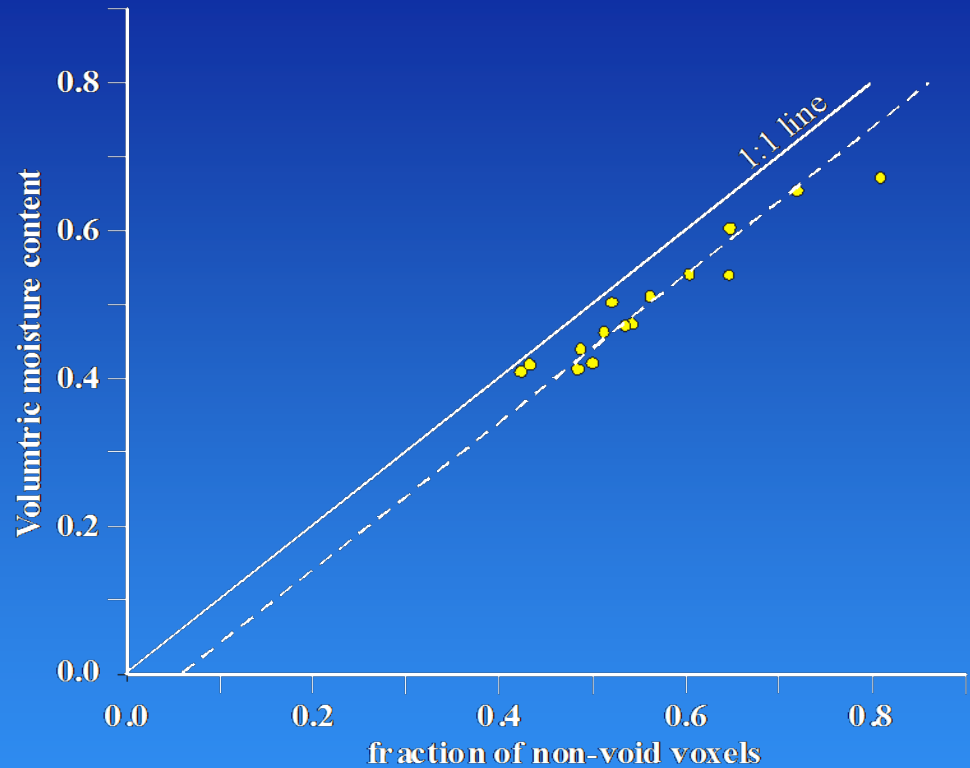


CT-Scan

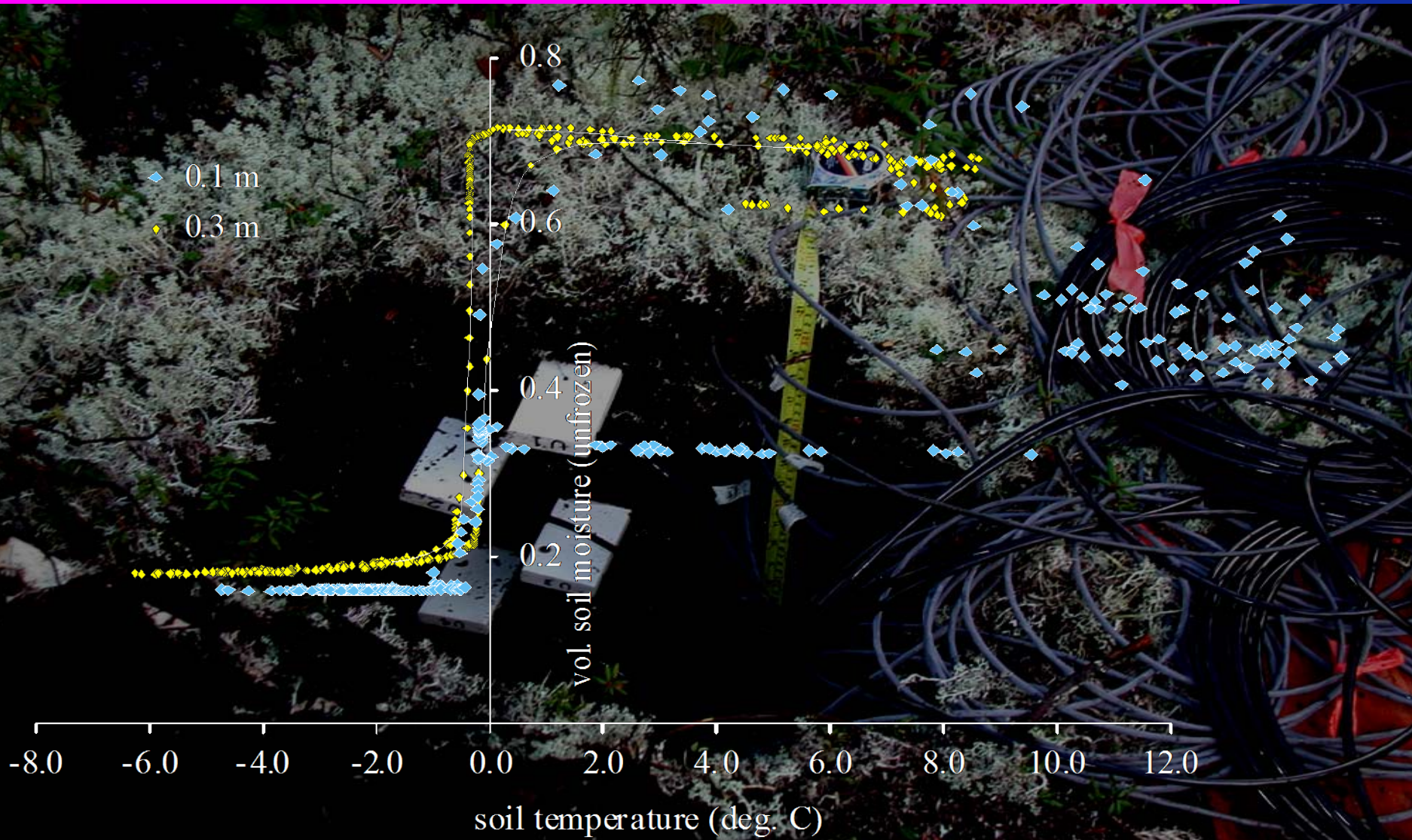


Preliminary assessment of CT:

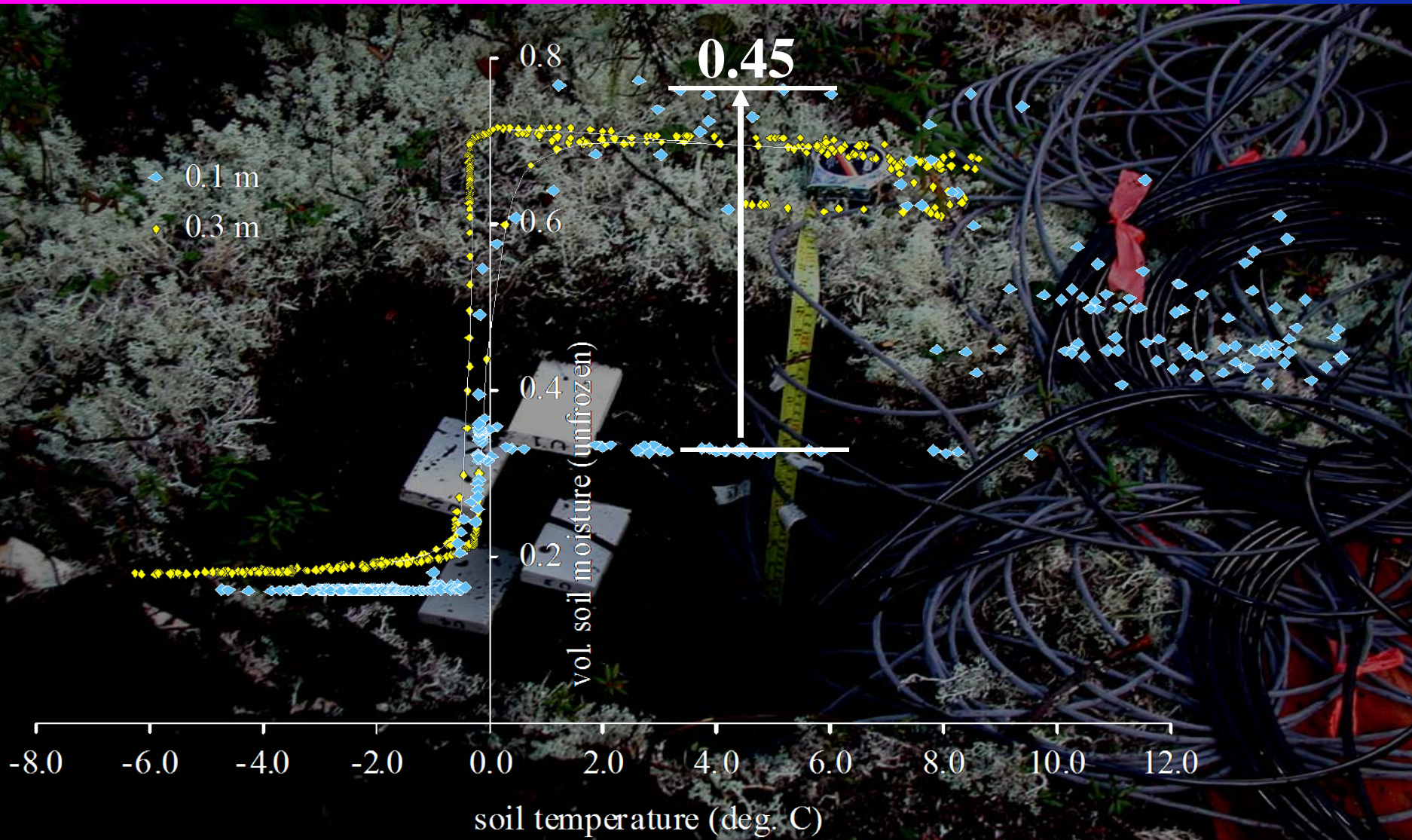
- Initial diagnostic: moisture content can be accurately estimated from CT-scan analysis.
- Inter-particle porosity can be treated as a single, large pore of variable aperture, rather than an assemblage of discrete pores.
- Inter-particle flowpath network:
 - measured connectivity, aperture vary with moisture content



Over-winter water flows:



Over-winter water flows:





Lichen,
Labrador Tea



Moss,
Labrador Tea



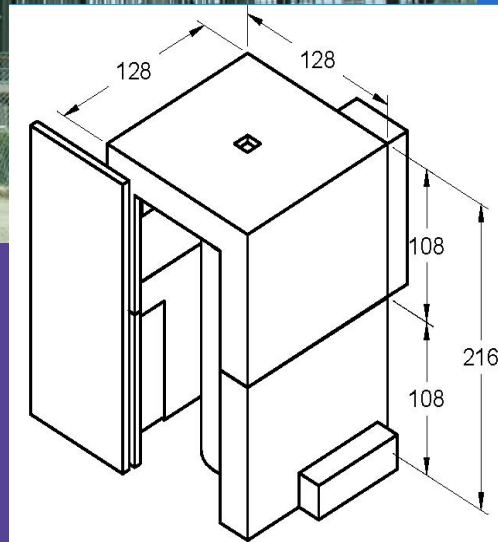
bandsaw
blade

clean
undisturbed
break on
bottom



Lab studies: internal moisture cycling

- ◆ An interdisciplinary controlled environment research facility focusing on critical environmental issues and biotechnology

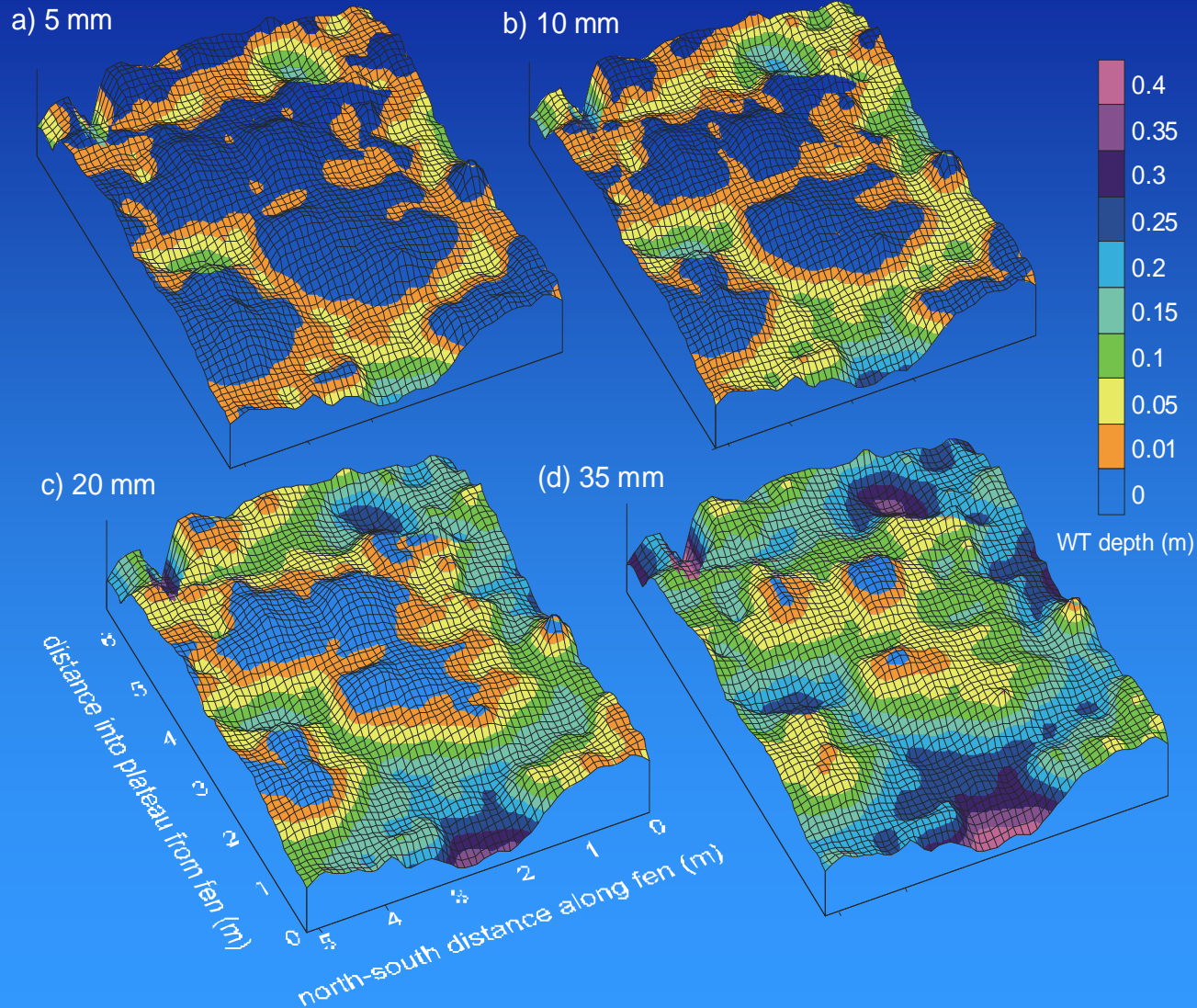


Environmental
Innovation

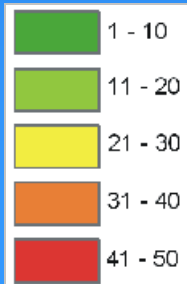
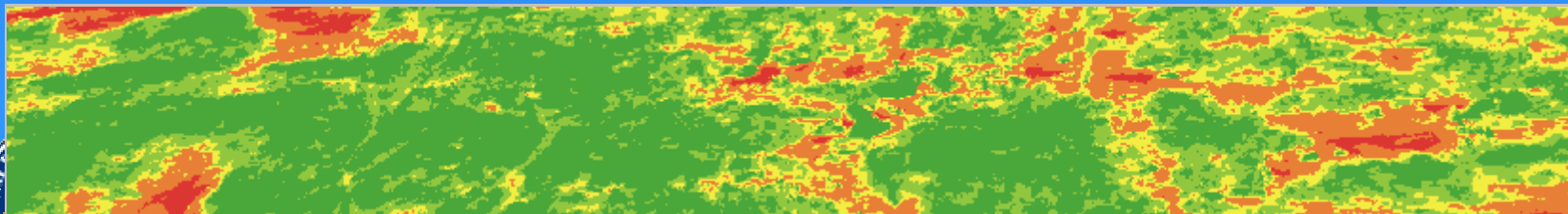
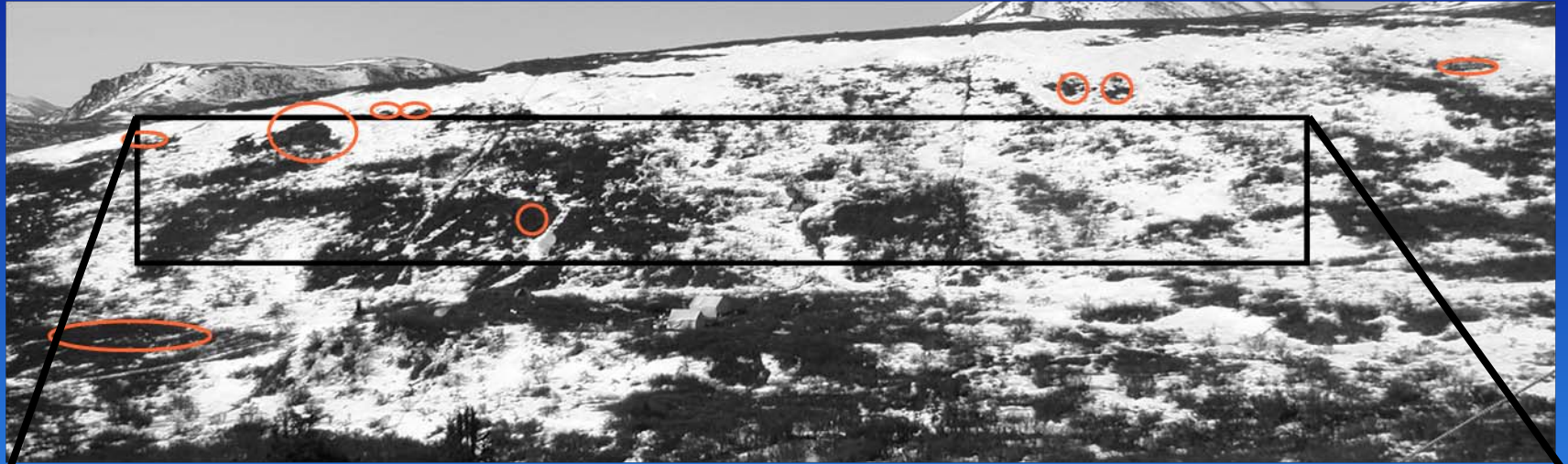
biotron for the future
experimental climate change research

BioChambers
INCORPORATED
A Subsidiary of Enconair Technologies Inc.

FT topography - runoff

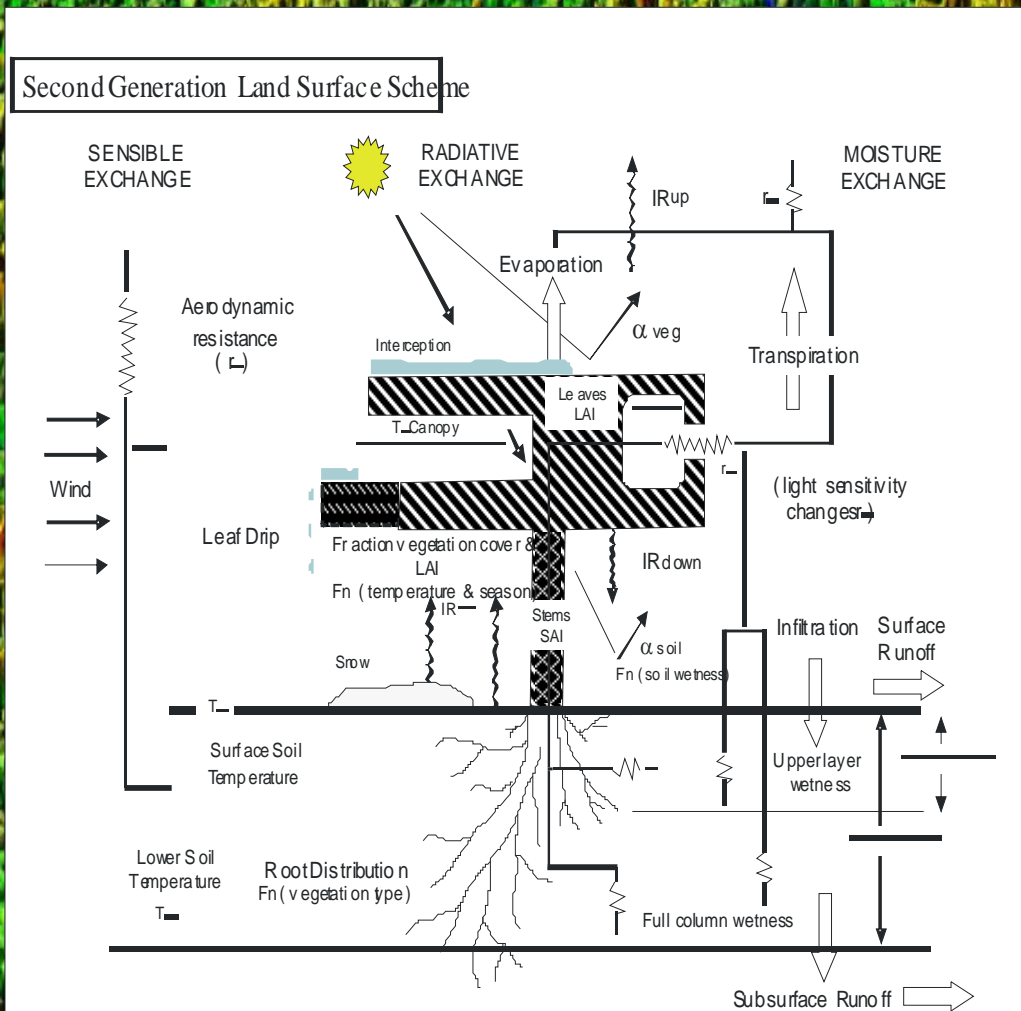


Variations in FT topography:



Lidar – canopy density

CLASS



Permafrost melt:

