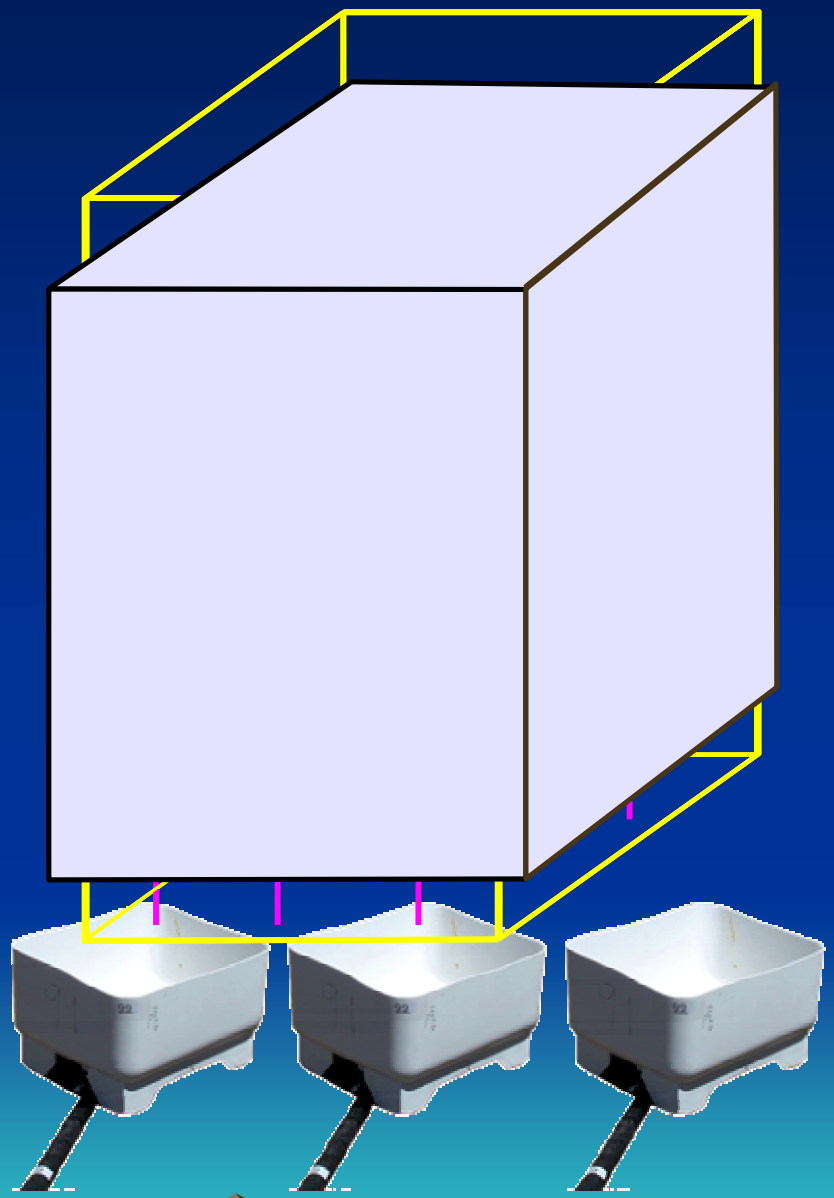
Characterizing Meltwater

1. Measure the basal meltwater discharge (snow lysimeters)
2. Measure the pathways directly (snow guillotine)



Objectives – Snow Lysimeter

- Determine the sampling area necessary to accurately estimate average meltwater discharge
- Determine whether snow depth is important in relating basal discharge to surface melt

Soddie Lysimeter Array

Data Collection

2001melt.c10 - Notepad

File Edit Format Help

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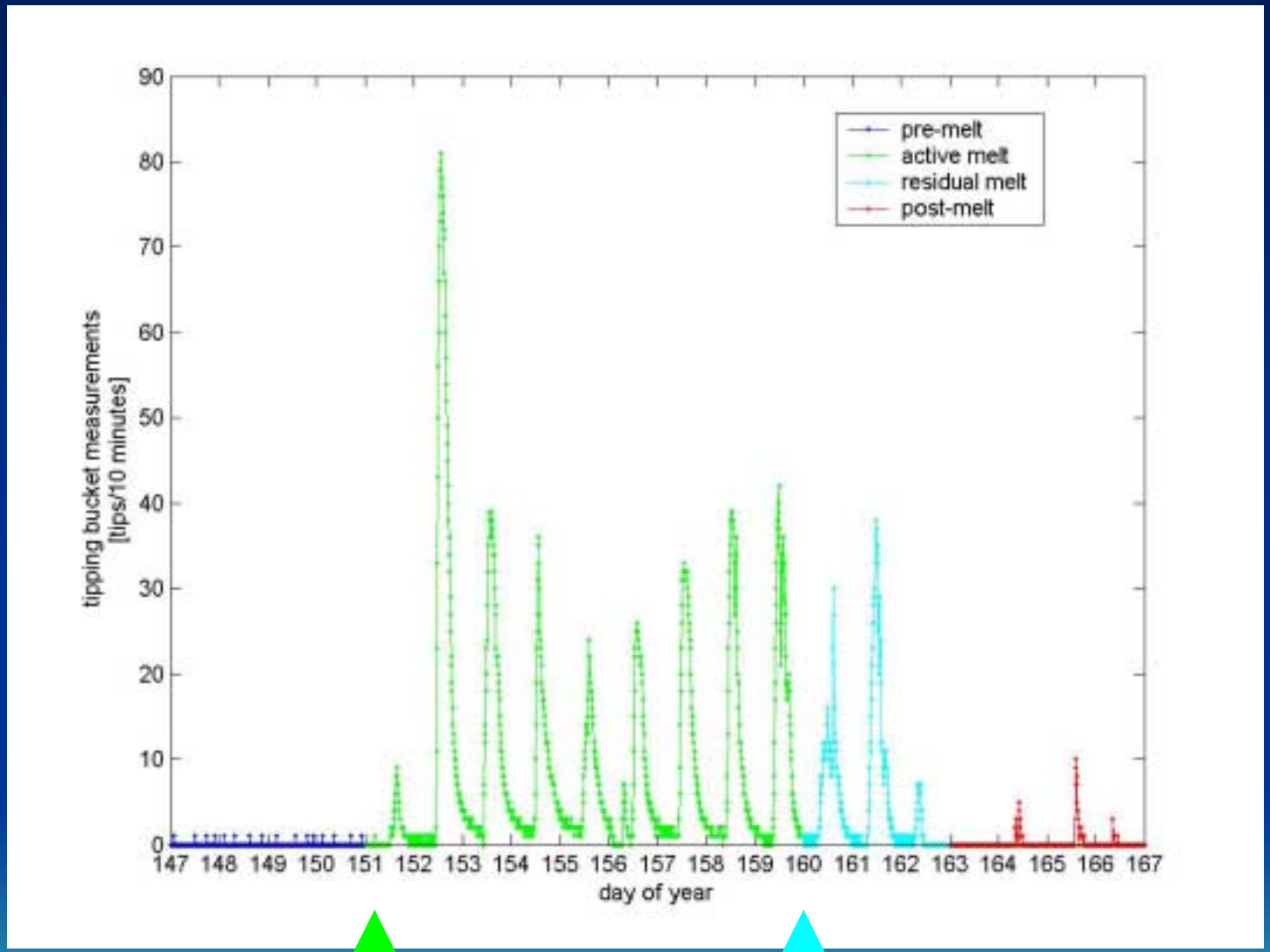
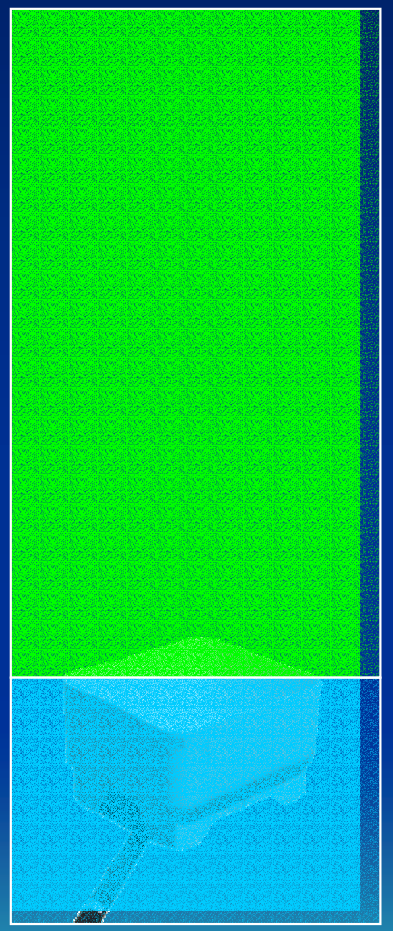
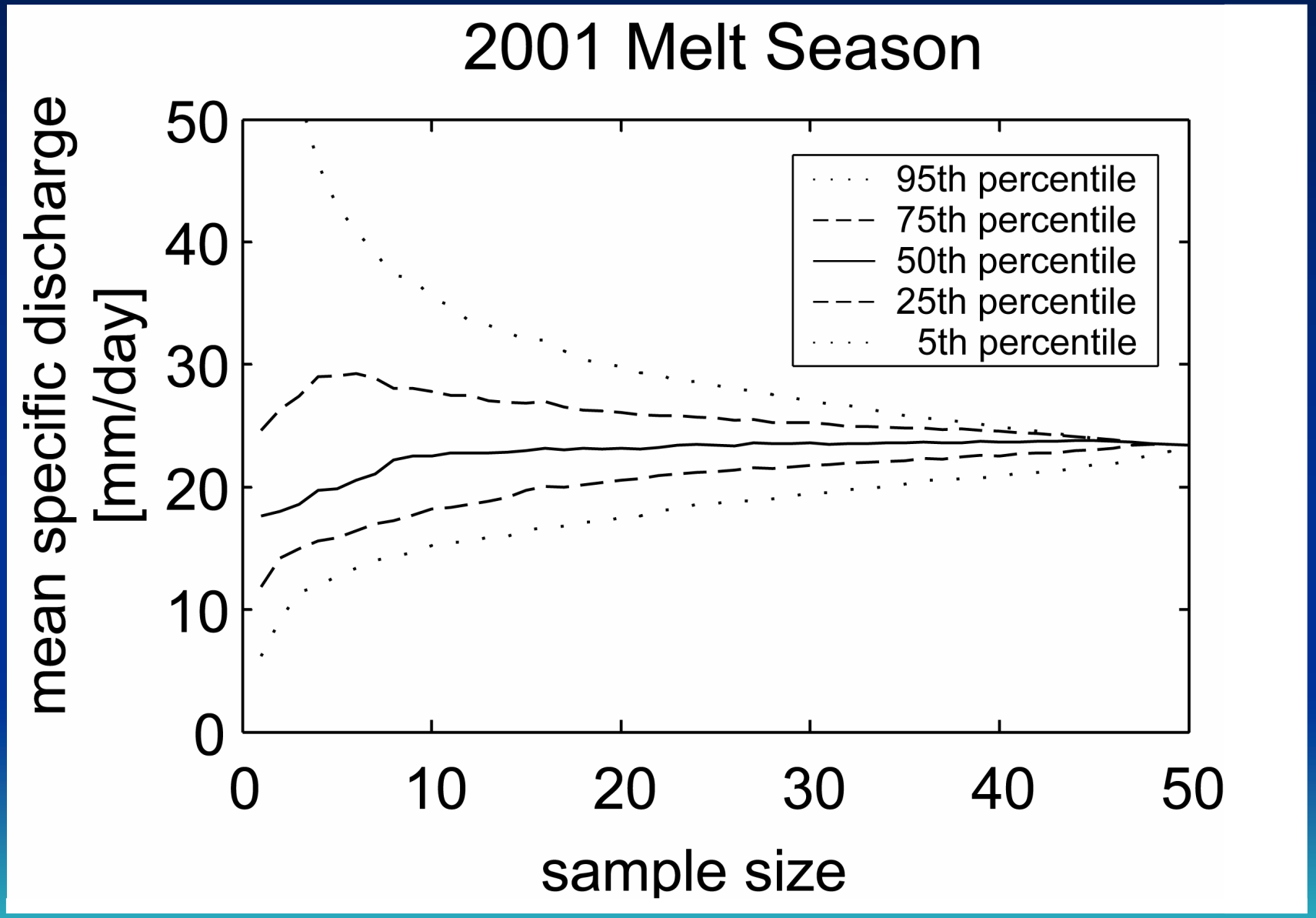
Meltwater Discharge Processing

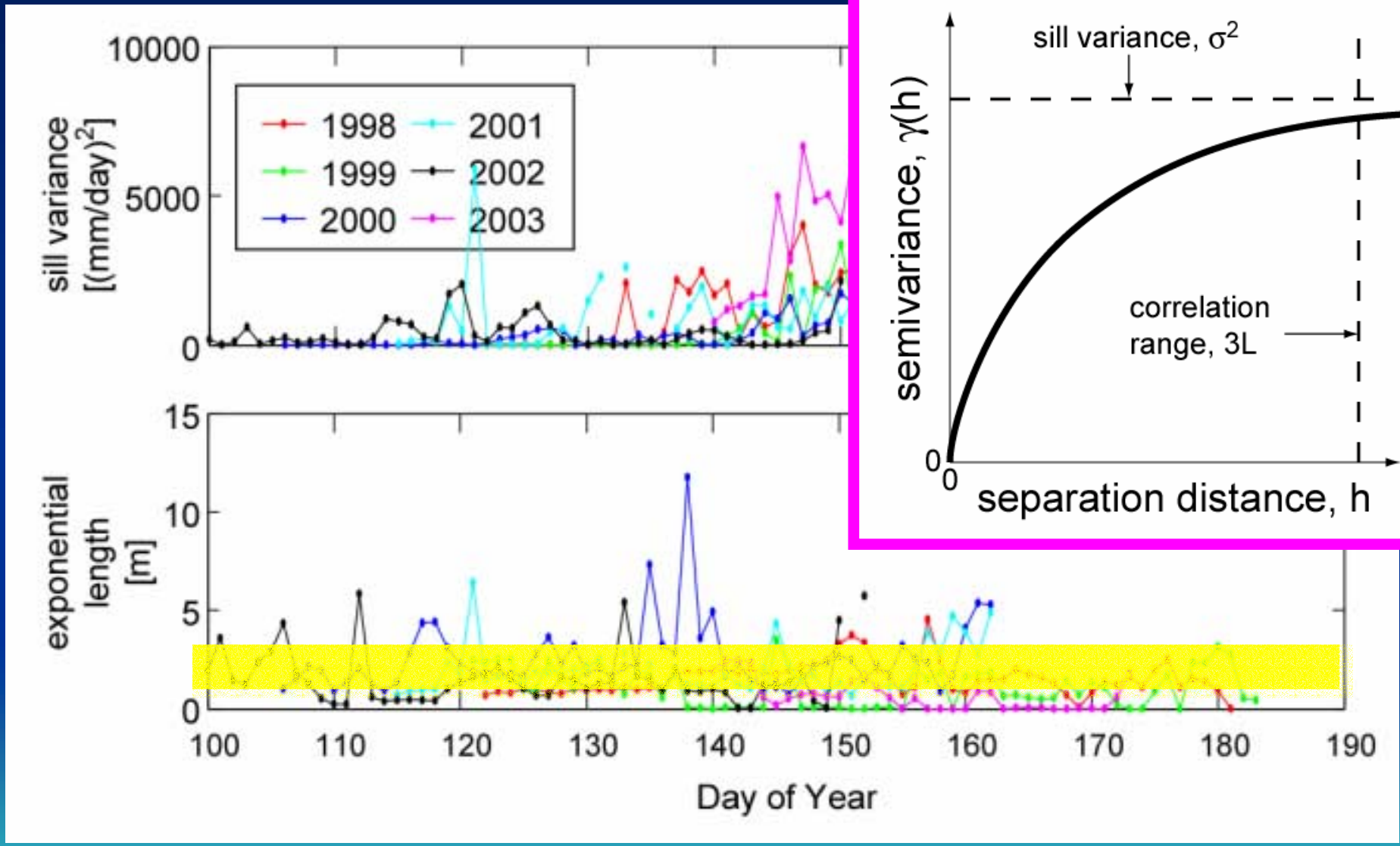




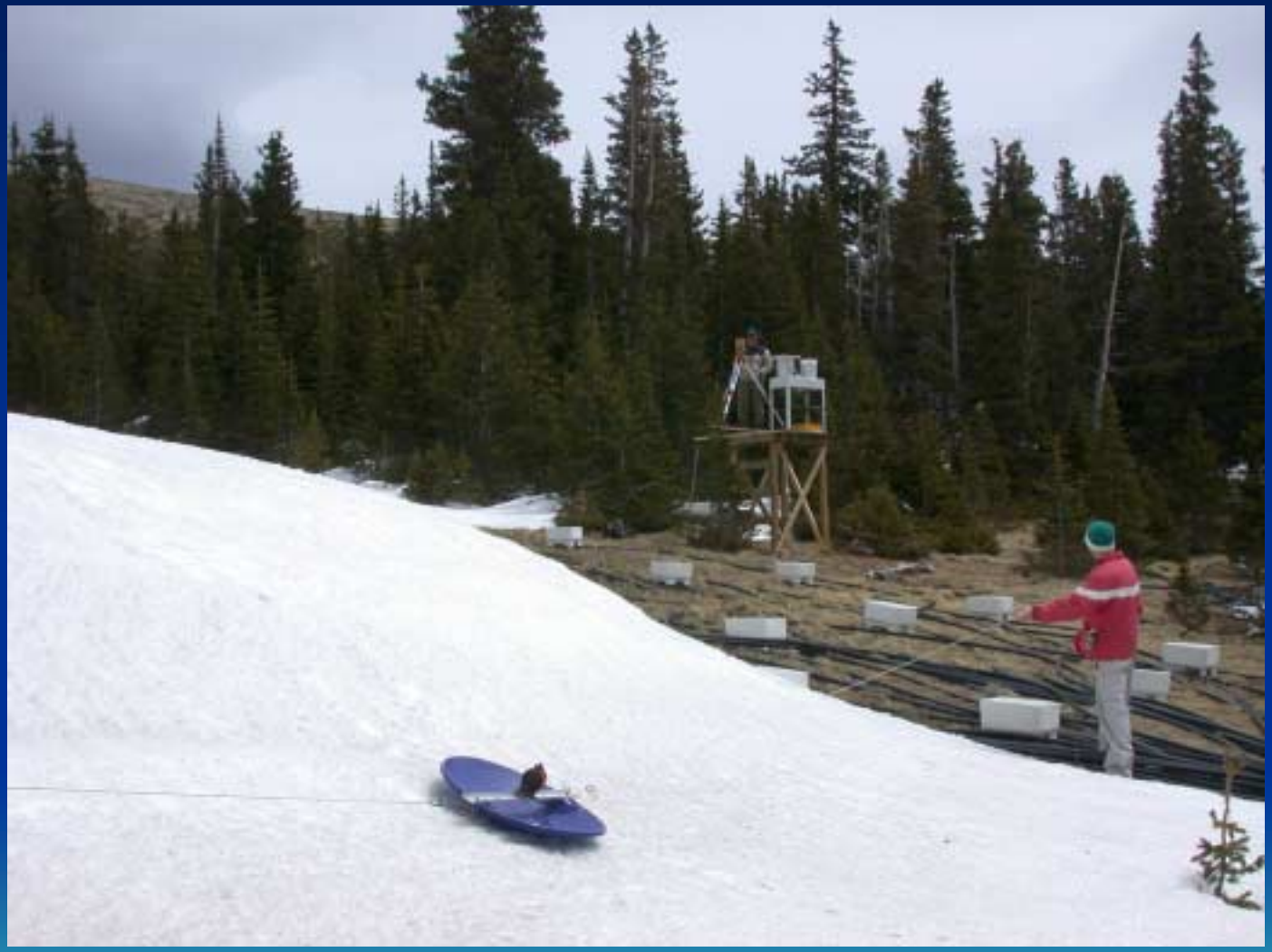
Effect of Sample Size



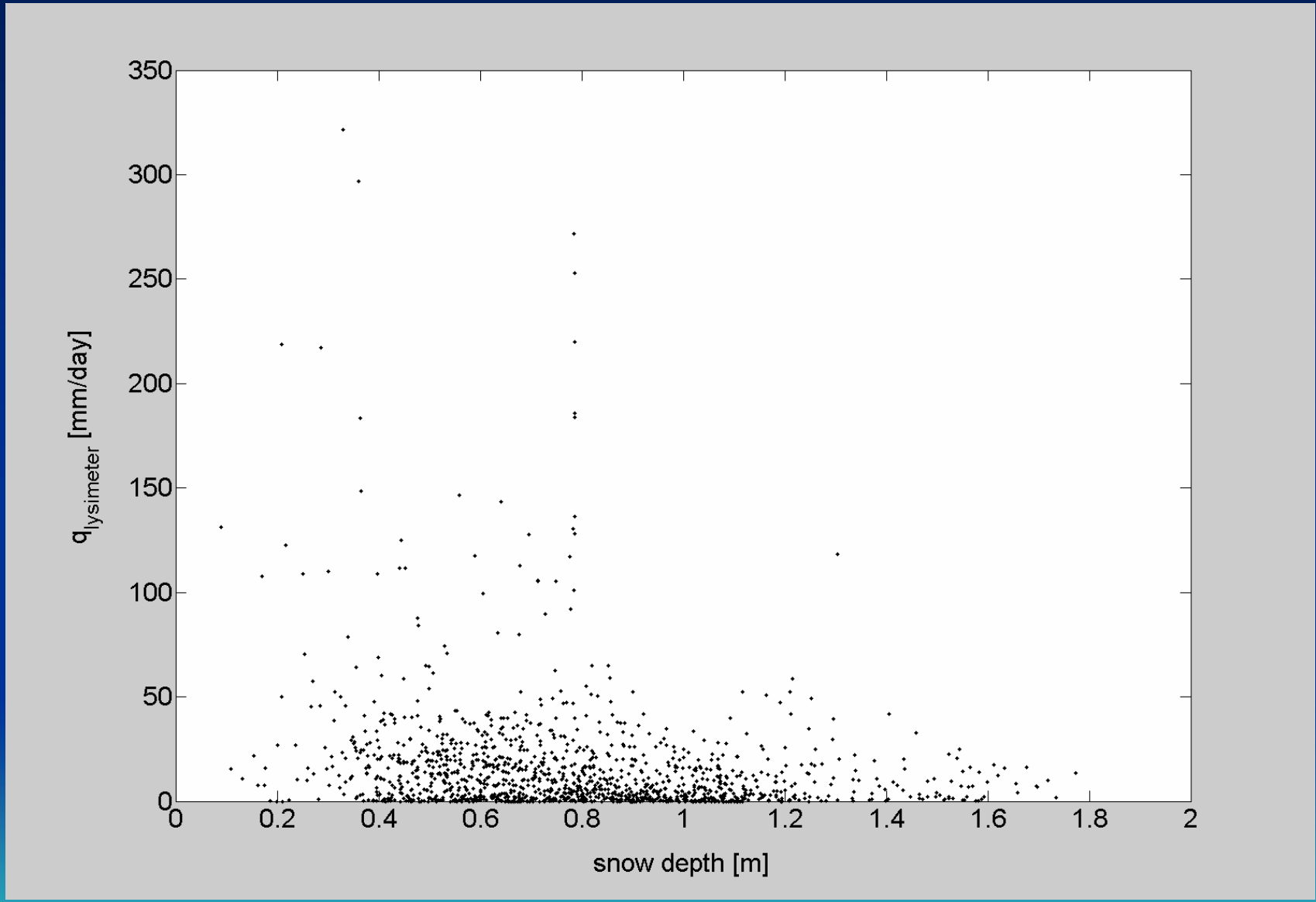
Discharge Variability vs. Time



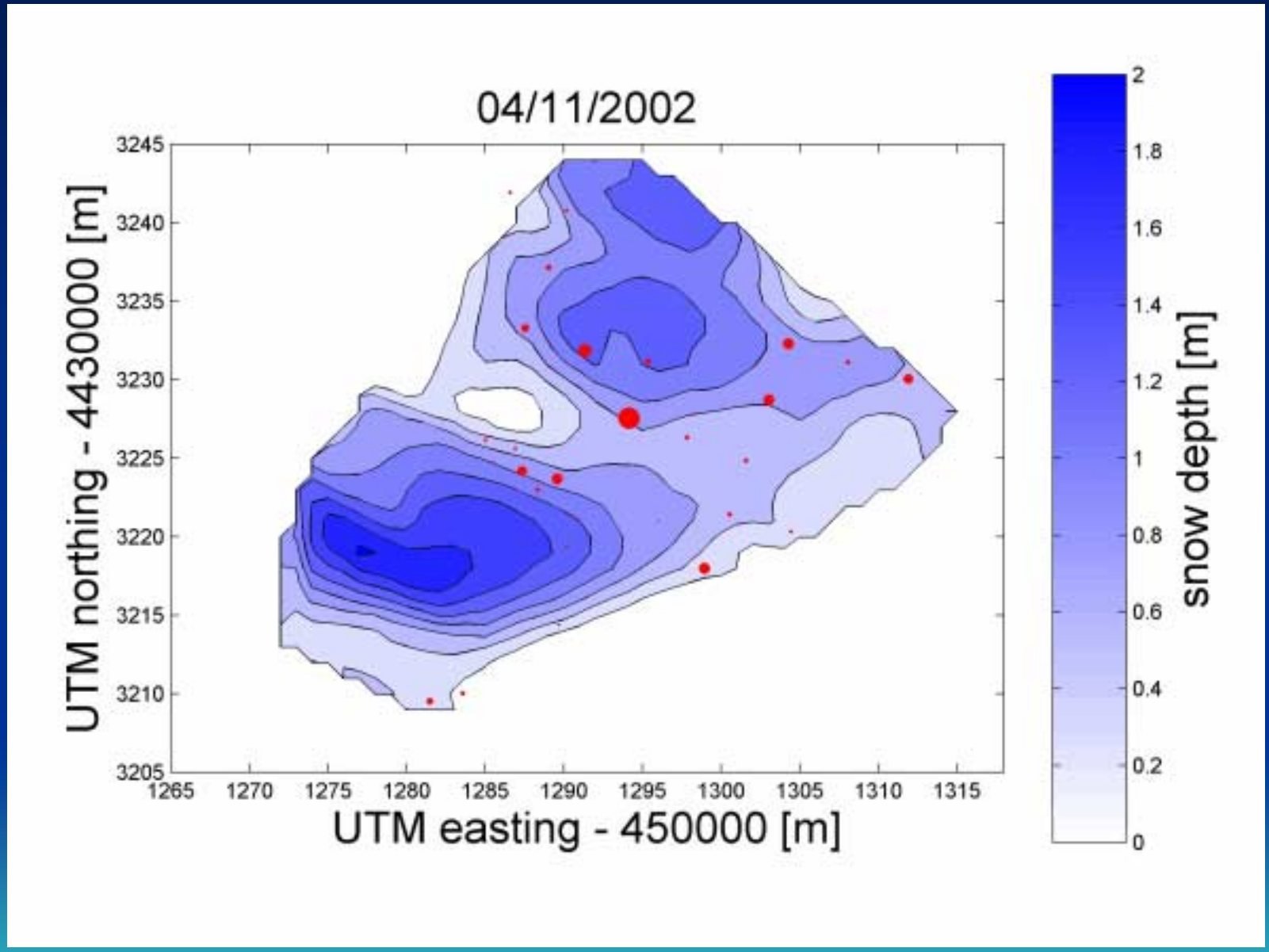
Snow Depth



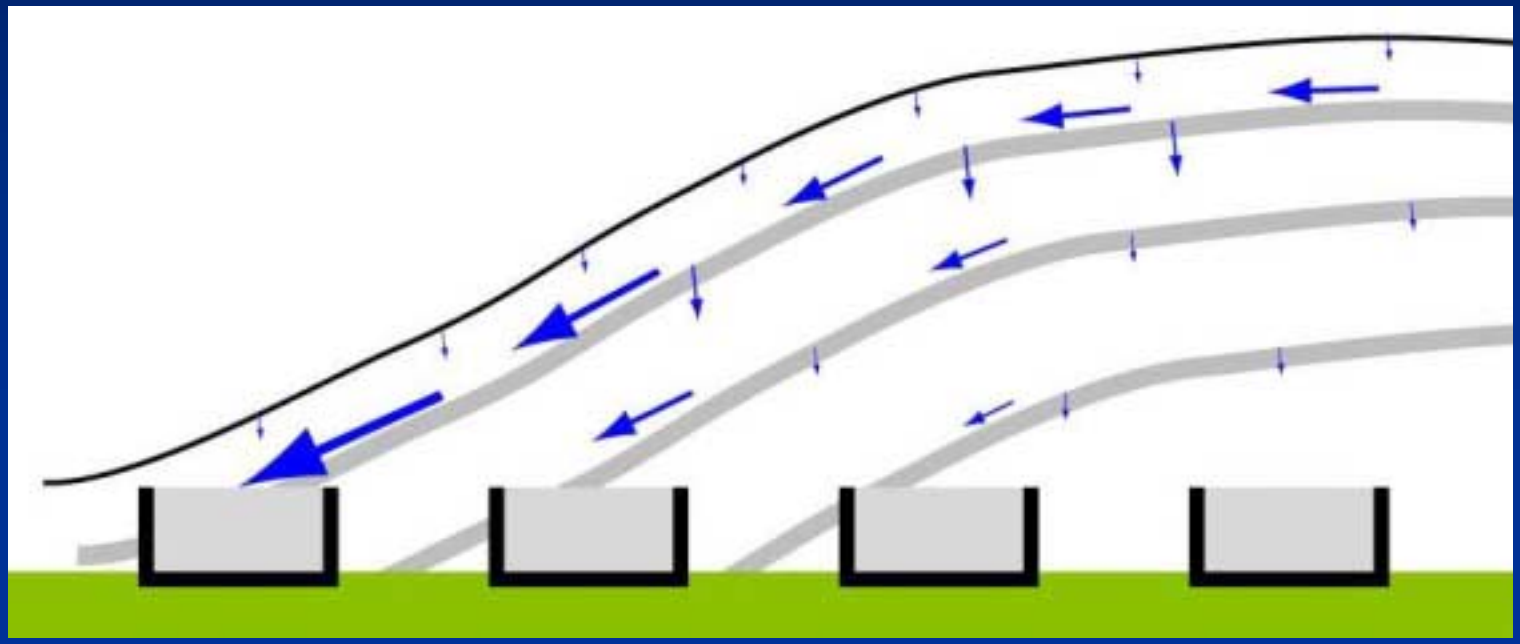
Discharge vs. Snow Depth



Discharge vs. Snow Depth



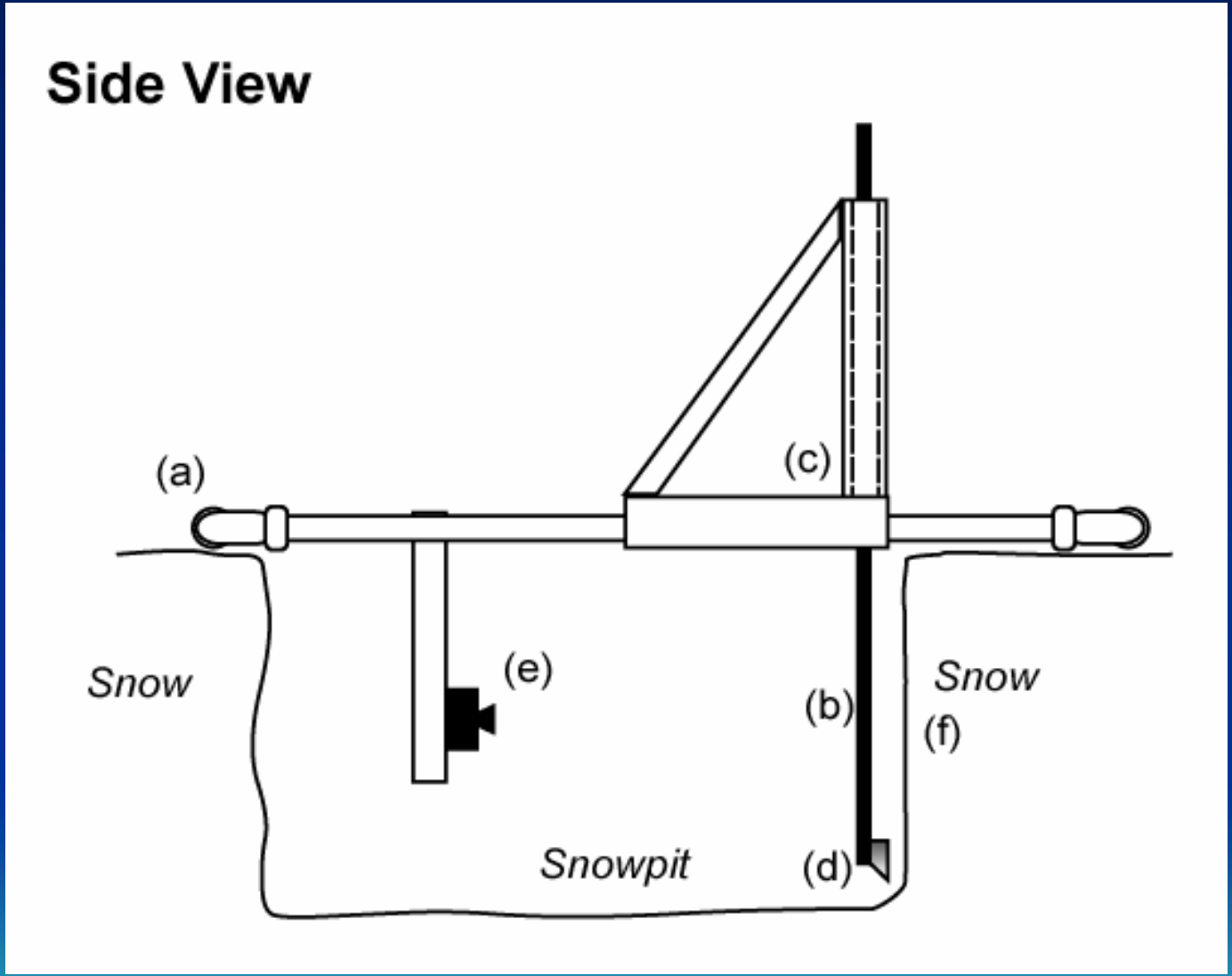
Flow Concentration



Meltwater Flowpaths Occurrence

- Meltwater flowpaths occur at a much finer scale than that measured by the snow lysimeters
- Dye applied at the snow surface has been used to identify meltwater flowpaths

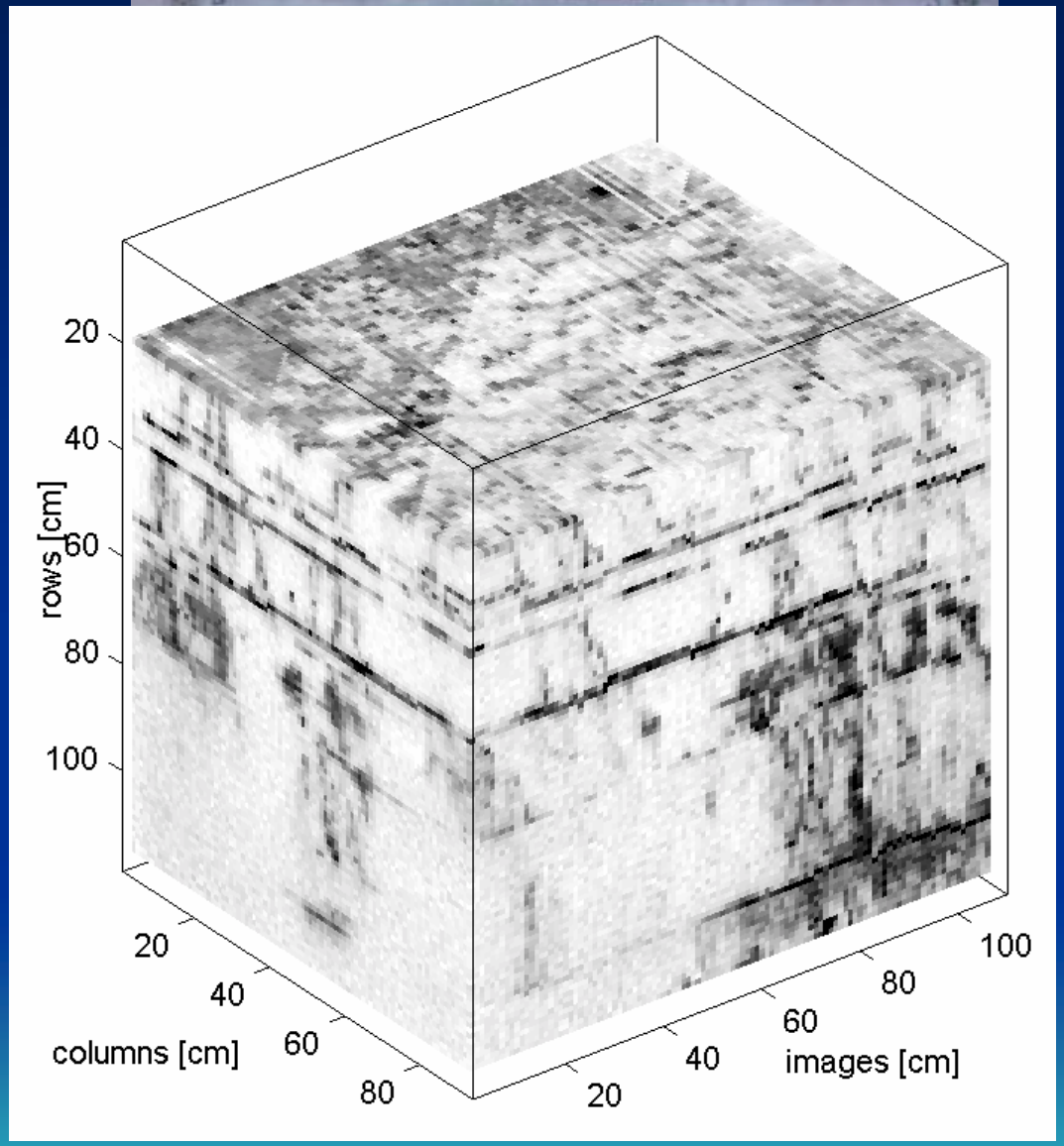
The Snow Guillotine



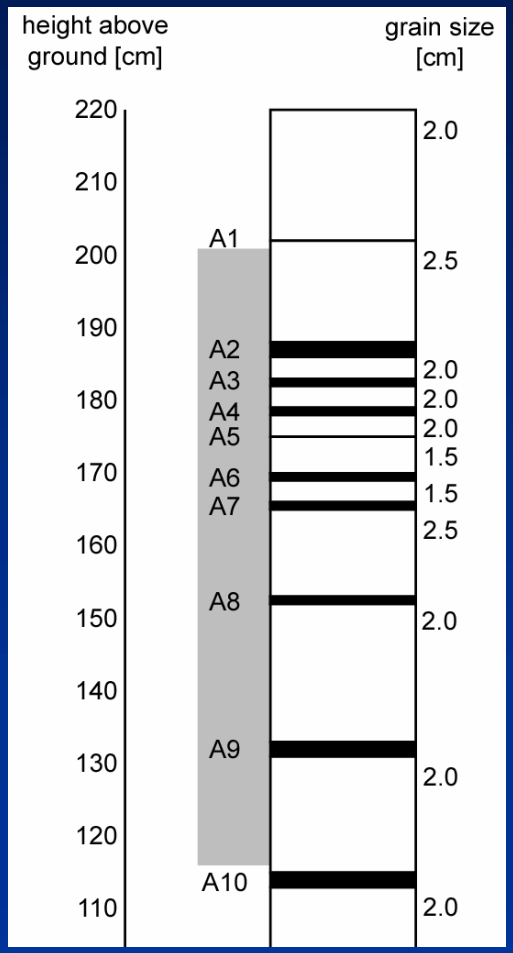
The Snow Guillotine

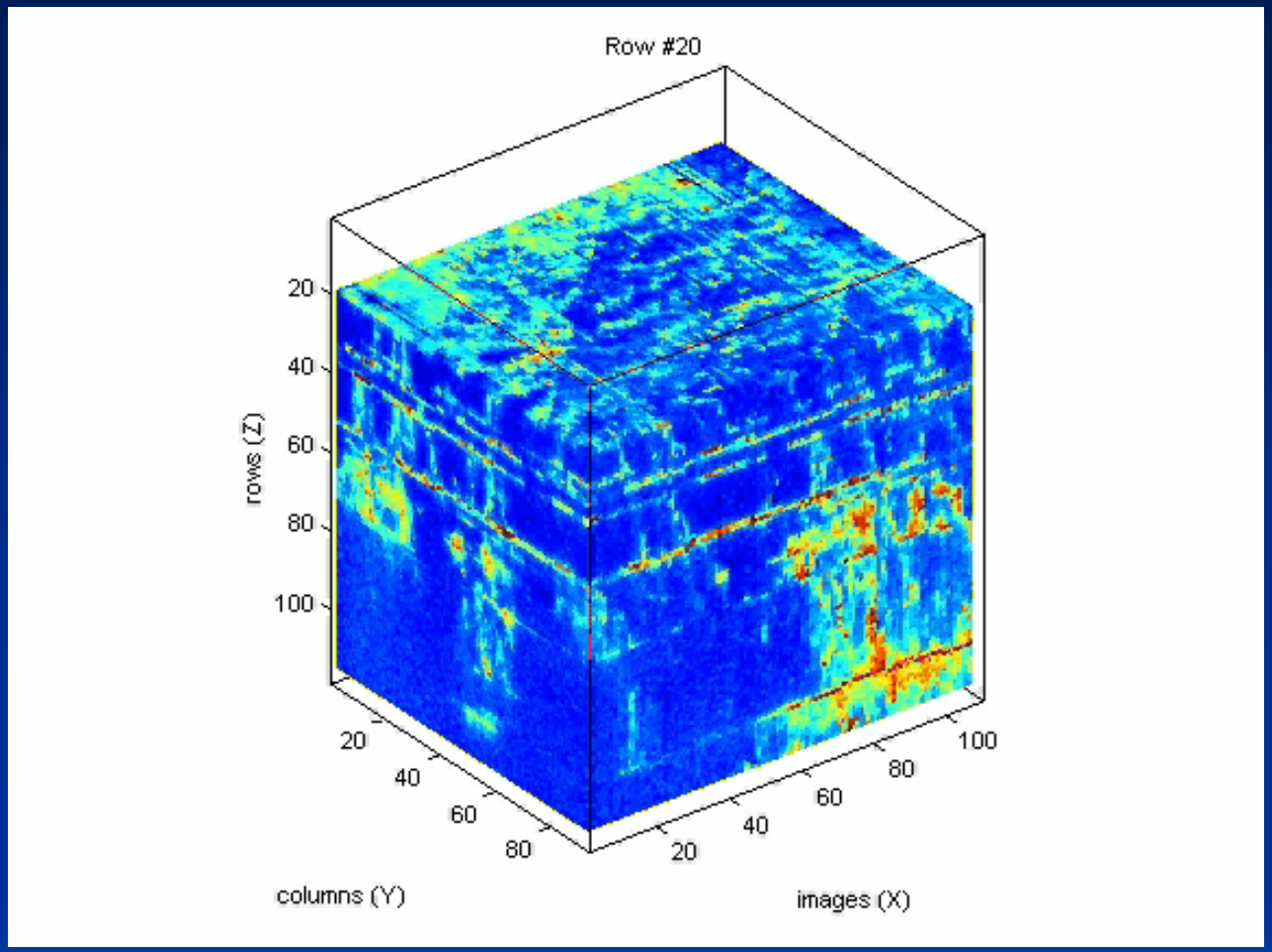
Image Processing

- Original Image
- Georeferenced
- Band Ratio
- Data Cube



3-Dimensional Data

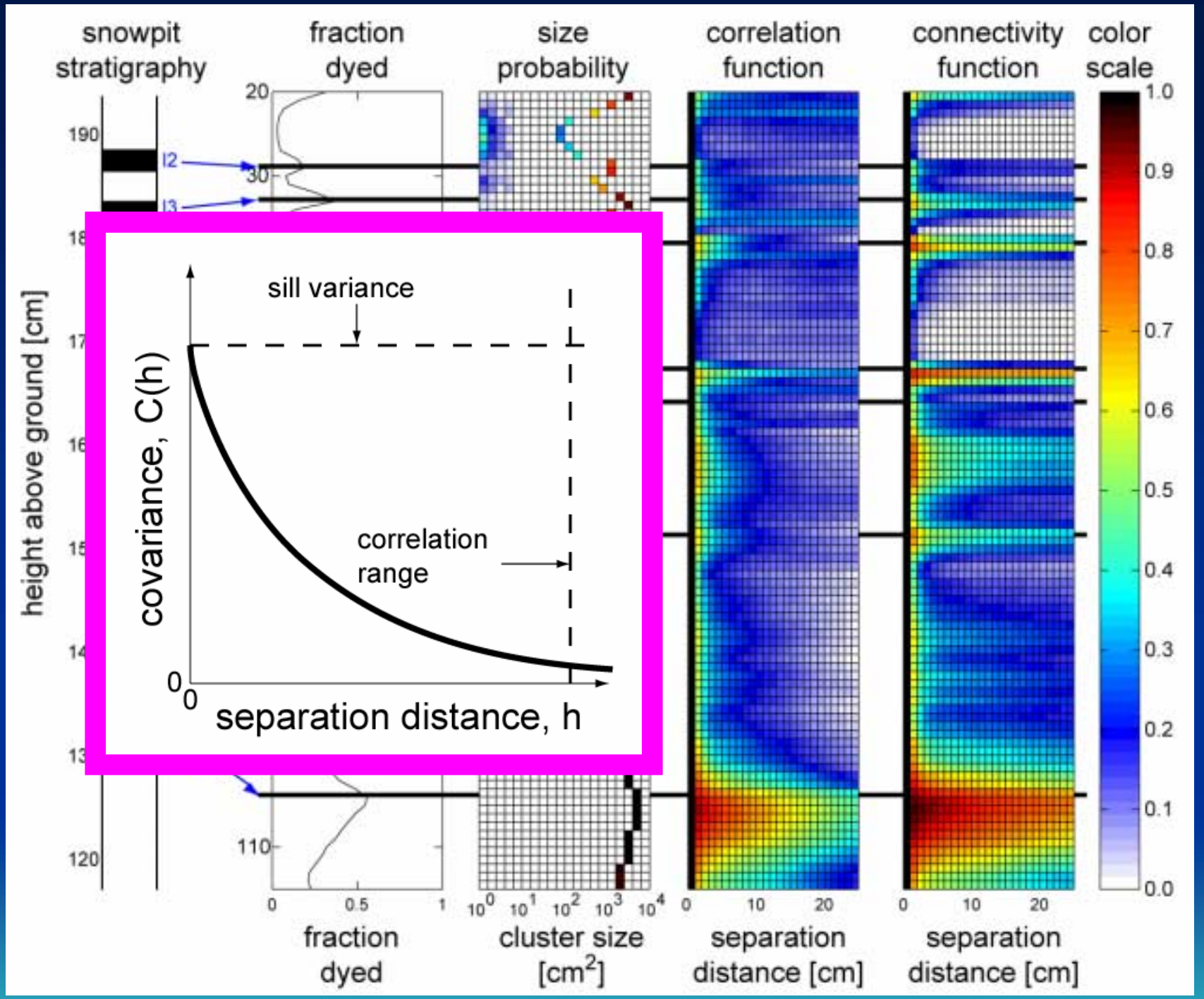




Relative dye concentration:

low

high


snowpit stratigraphy
fraction dyed
size probability
correlation function
connectivity function
color scale
height above ground [cm]
I2
I3
sill variance
covariance, C(h)
correlation range
separation distance, h
fraction dyed
cluster size [cm²]
separation distance [cm]
separation distance [cm]

Meltwater Summary ($1m^3$ scale)

- The snow guillotine enables the collection of high-resolution 3-D datasets of meltwater flowpath occurrence
- The horizontal distribution of meltwater flowpaths is strongly affected by stratigraphic interfaces in the snowpack
- Well-defined vertical pathways are more prominent near the surface