Ground-water-flow model of the Shenandoah Valley

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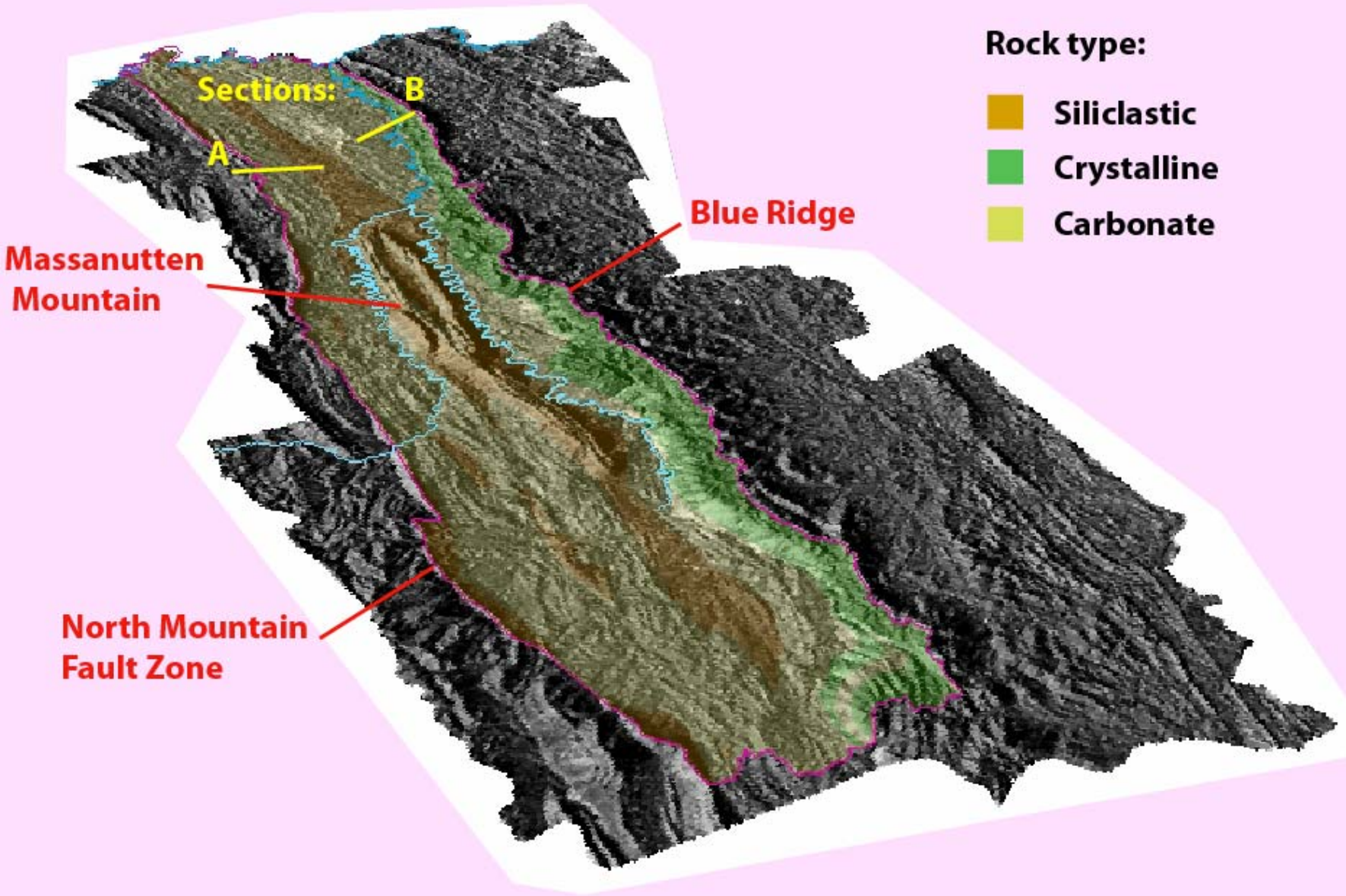
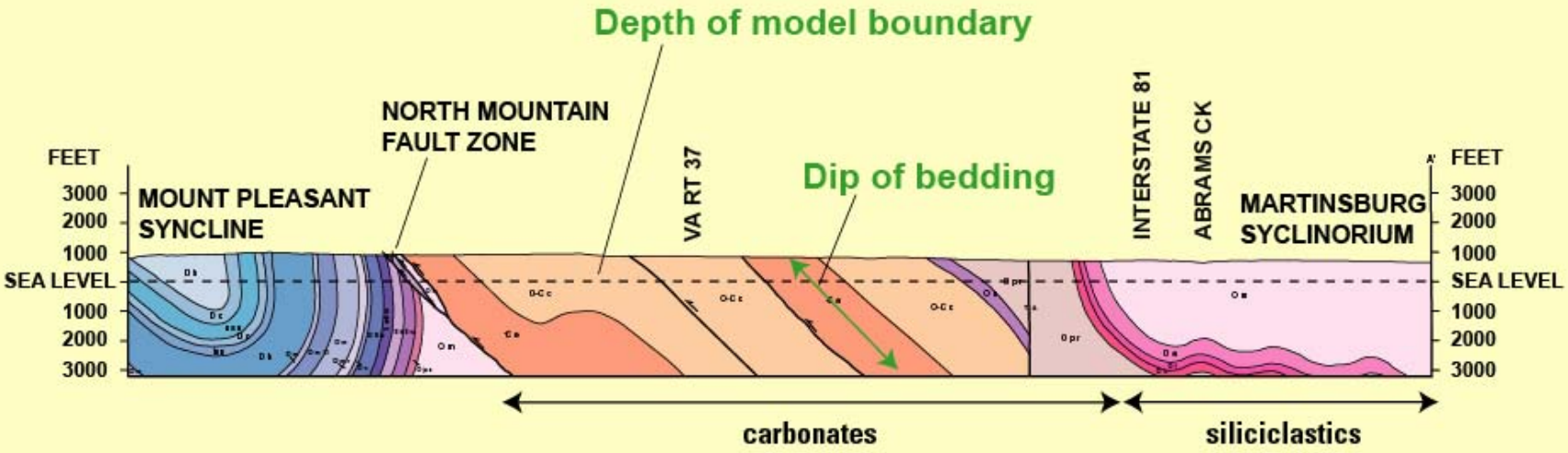
Objectives

Compute water budget
Estimate bulk hydraulic properties
Identify information requirements

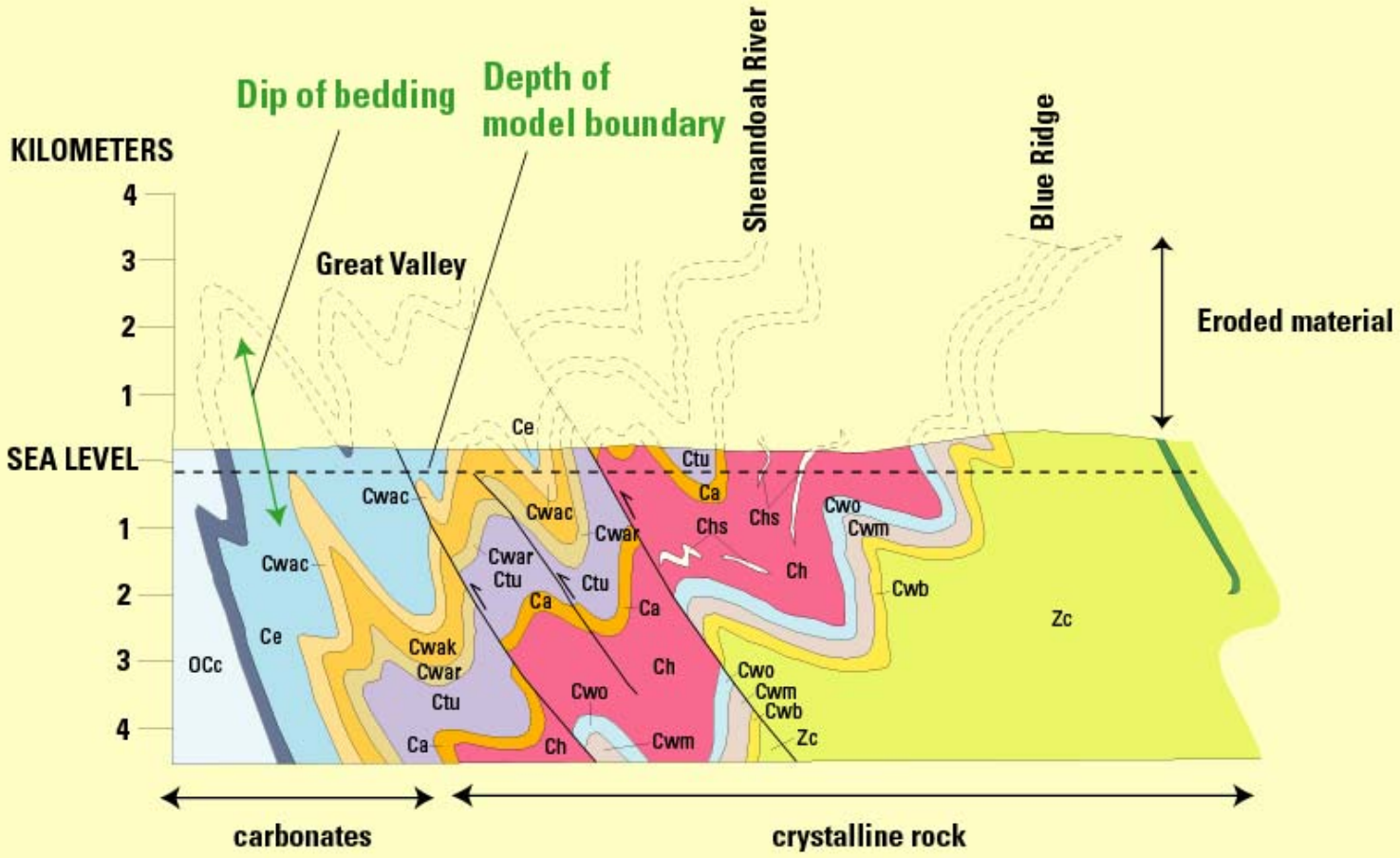
Shenandoah Model Area



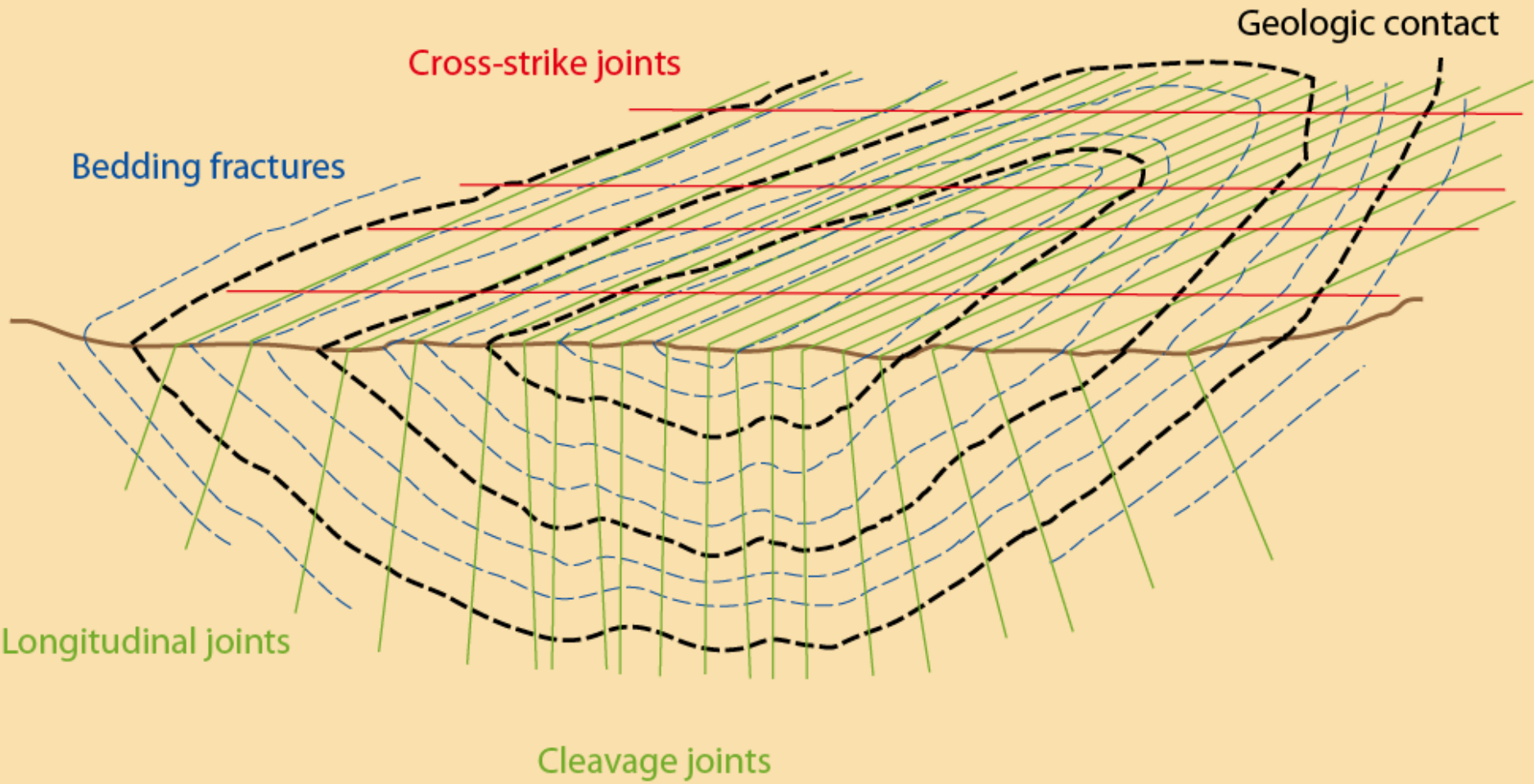
Geologic section A through west flank of synclinorium near Wincester VA



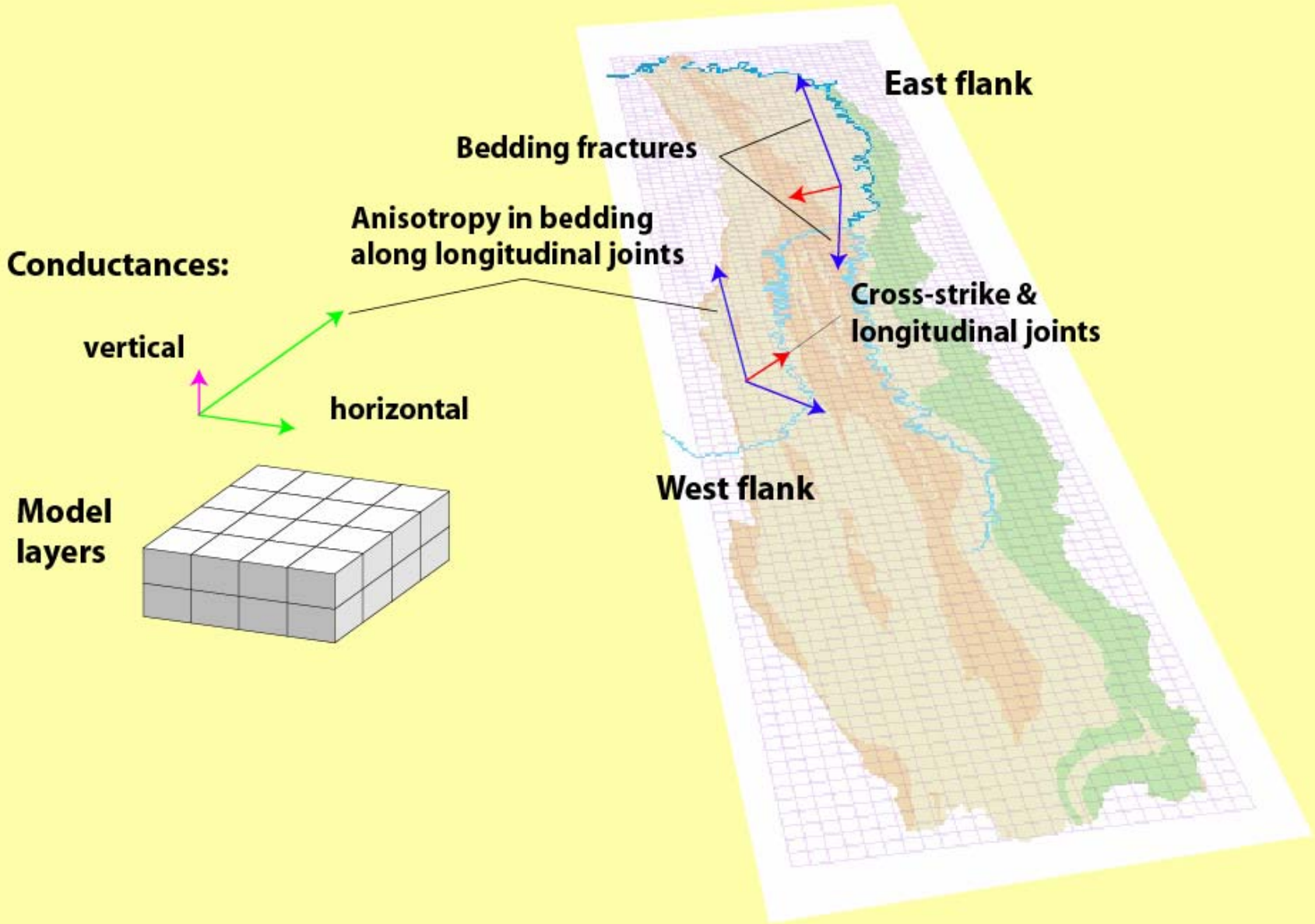
Geologic section B through east flank of synclinorium near Wincester VA



Conceptual fracture network for syncline



Relation between fracture network and model conductances

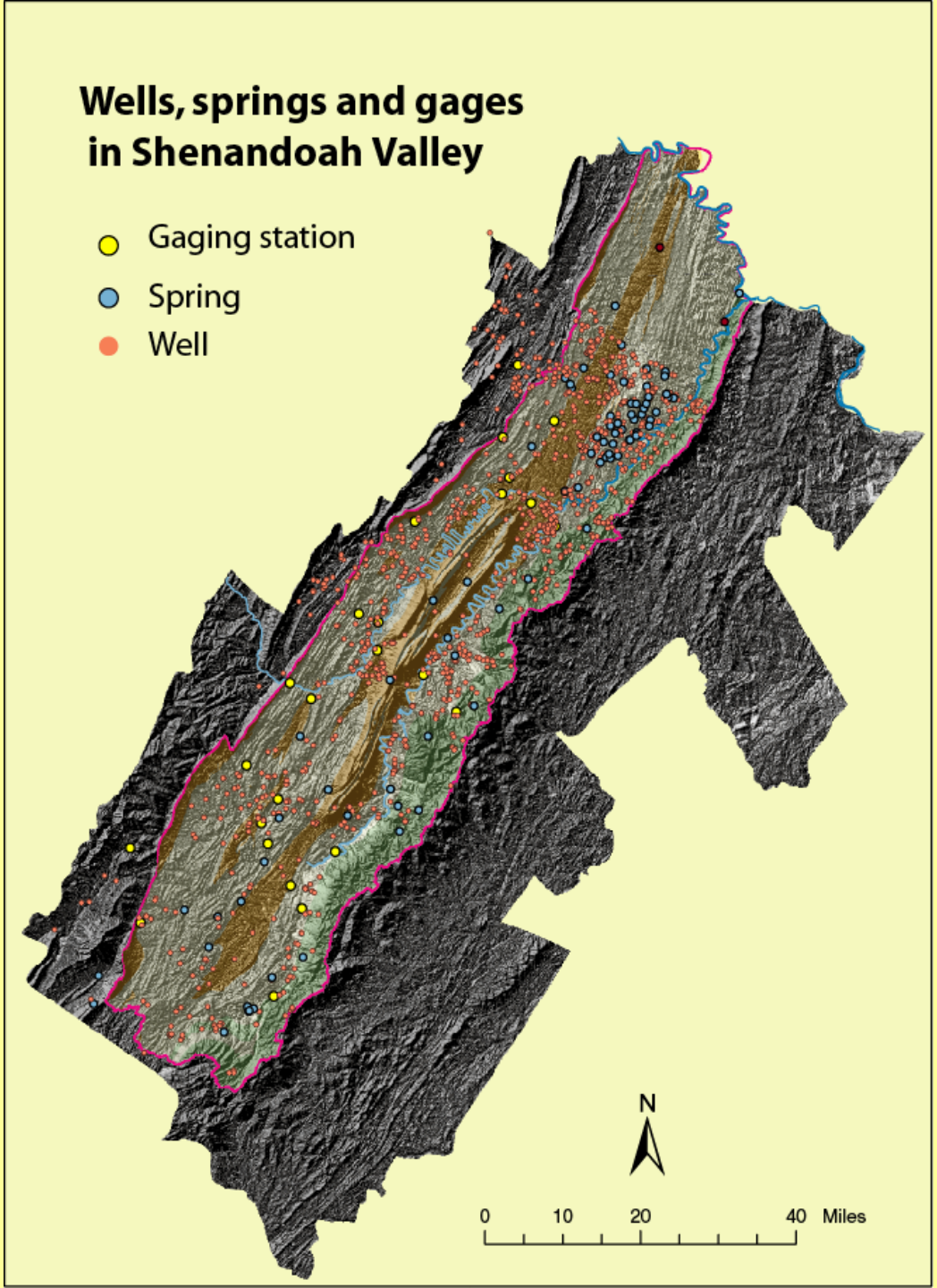


Available data

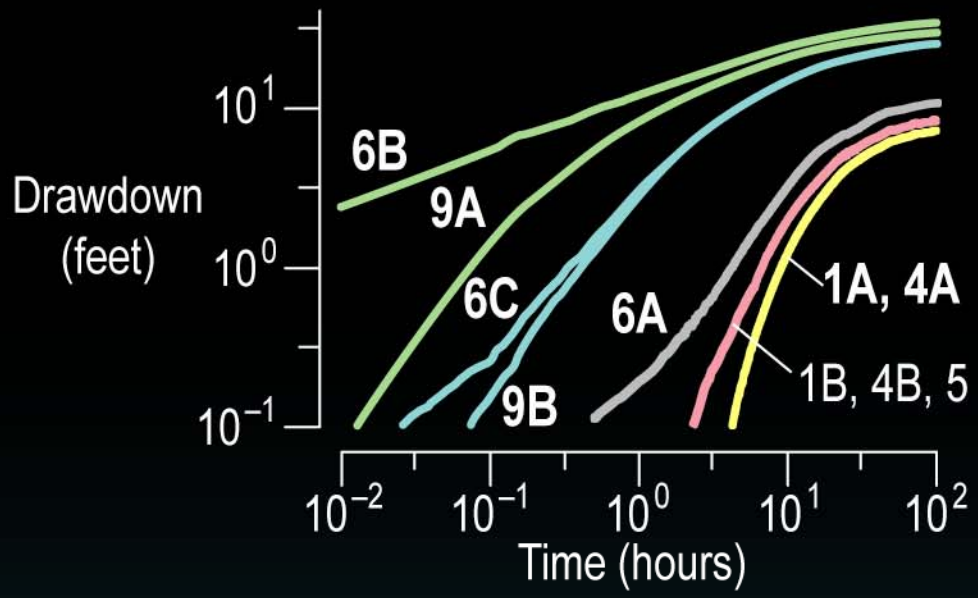
- Water levels in open boreholes
- Well yields and specific capacity
- Measurements of stream baseflow
  - & spring discharge
- Geologic structure

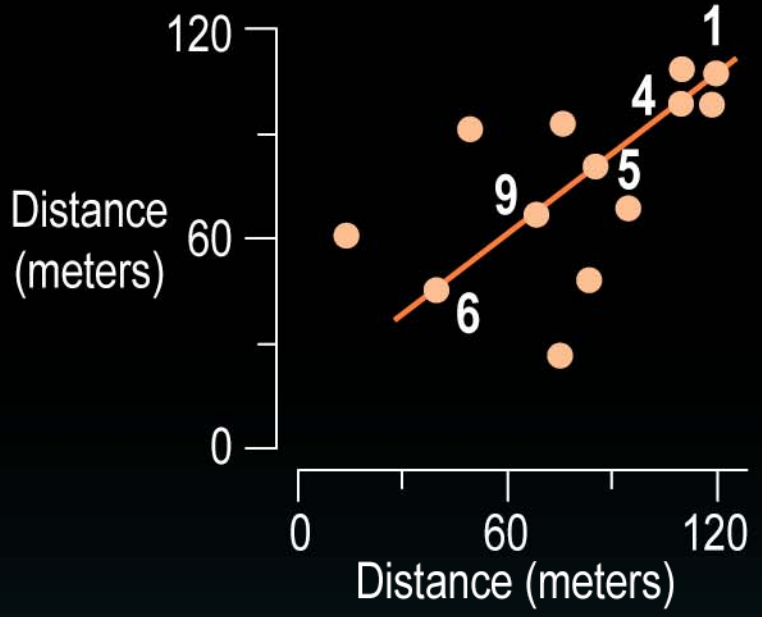
Model parameters

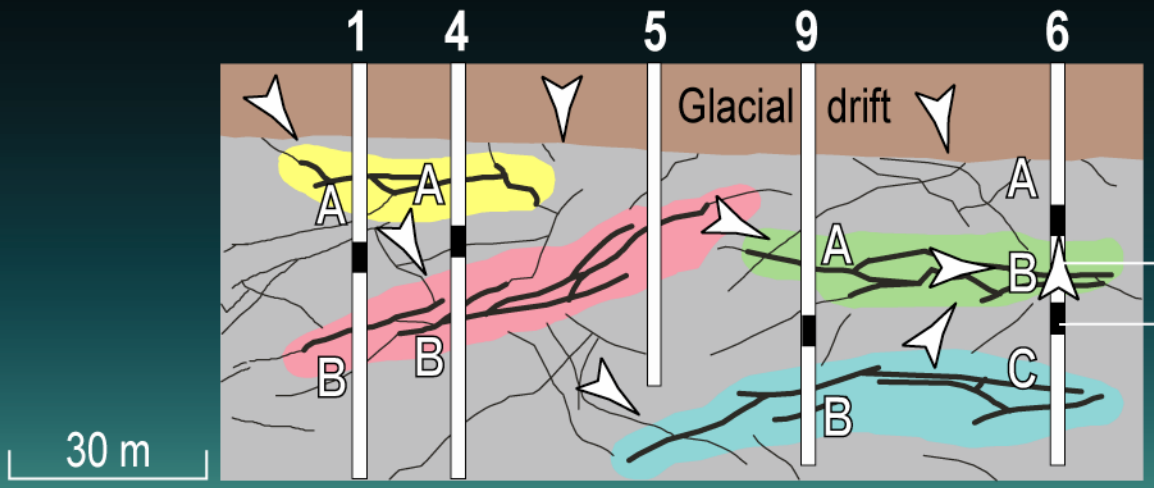
- Recharge
- Hydraulic conductivity / transmissivity
- Anisotropy:
  - horizontal - within bedding
  - vertical - bedding dip


Wells, springs and gages
in Shenandoah Valley
Gaging station
Spring
Well
N
0
10
20
40
Miles

Hydraulic testing over tens of meters



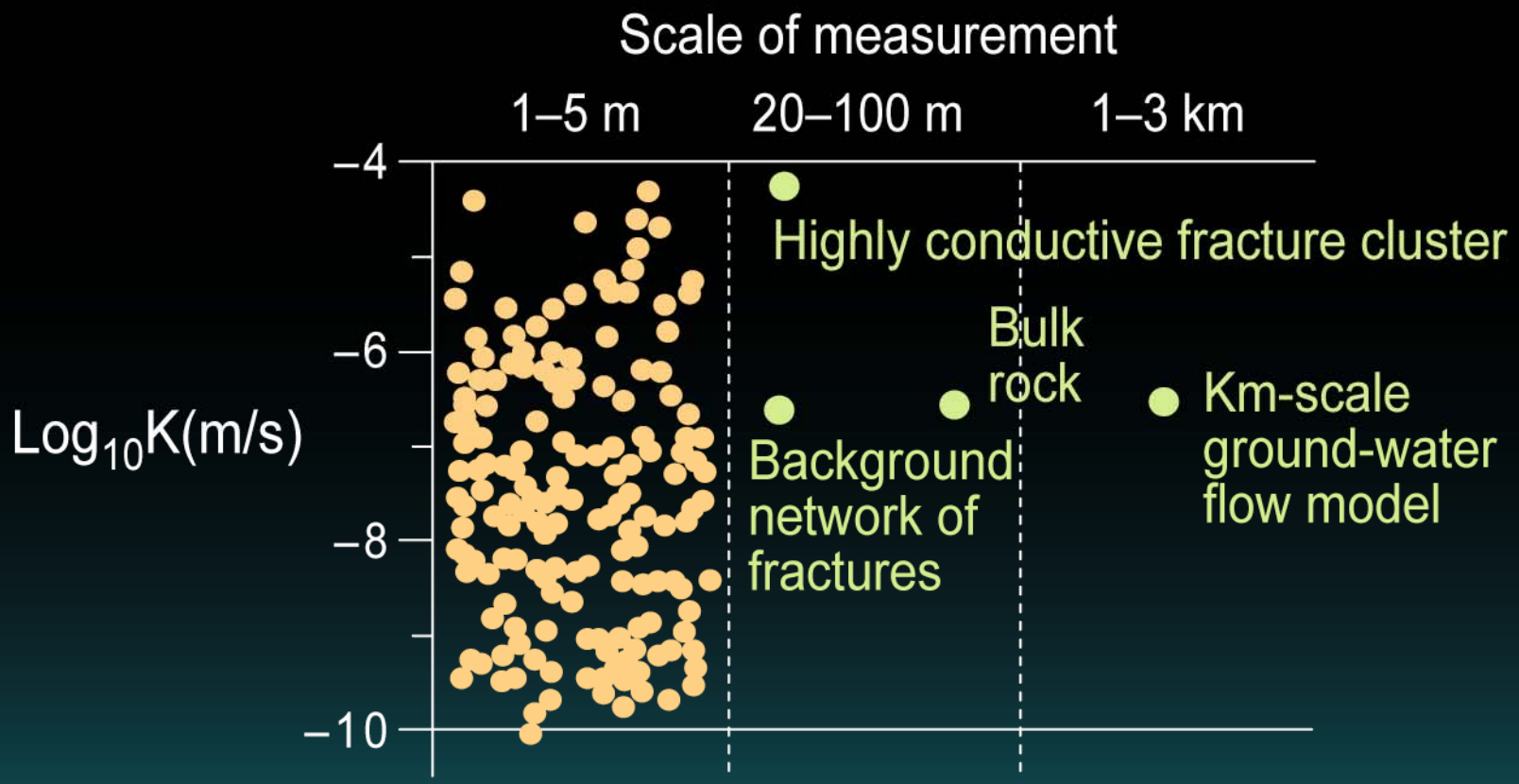




Shapiro and Hsieh, 1996
Hsieh et al, 1999

USGS

Hydraulic conductivity
Results from the Mirror Lake research site



Hsieh, 1998

USGS

Questions

- Depth of active flow system?
- Vertical head profile?
- Ground-water discharge to:
  - Potomac R?
  - karst features?

Additional data

- Borehole geophysics & packer tests
- Multi-piezometer completions
- Vertical profiles of:
  - hydraulic head
  - geochemistry