

Integrated Surface Water – Groundwater Model for Vashon-Maury Island

Kyle - Comanor

W-Q-Q

Surface Water vs. Groundwater

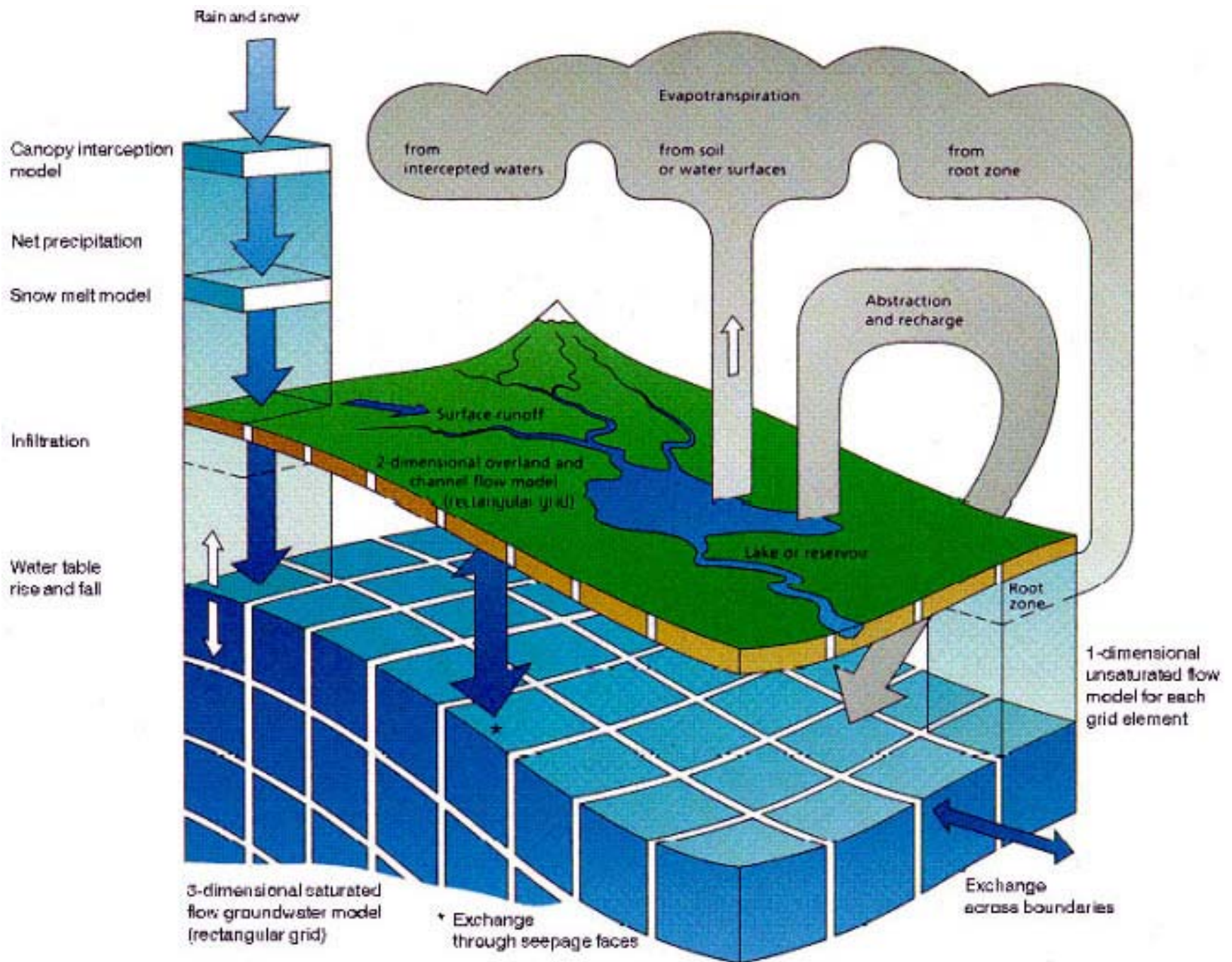
- Surface Water – Civil Engineering (dams, canals, “efficient” cross-sections, flooding)
 - “Just give me a number” types
- Groundwater – Geology, Earth Sciences (wells, earthen dams, dewatering)
 - “Hard drinking ‘get me outside’” types who happen to be good at math

What about the models? (quantity, not quality)

- Surface:
 - Hydrologic: HSPF, DHSVM, TopModel – generally Rainfall/Runoff models
 - Hydraulic: HEC 2..n & RAS,
- Groundwater
 - Many flavors of MODFLOW (Visual, GMS, OF!)
- Fie on Wetlands, Lakes, Estuaries...

So what's with the hate?

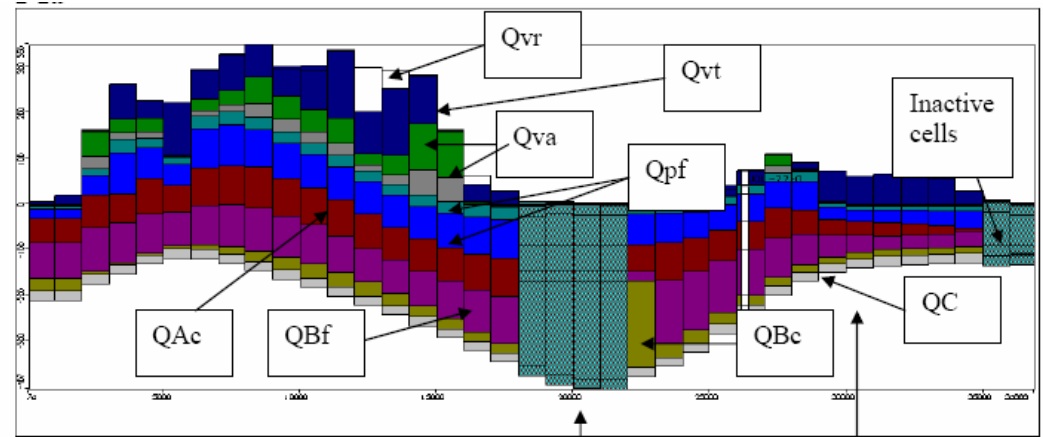
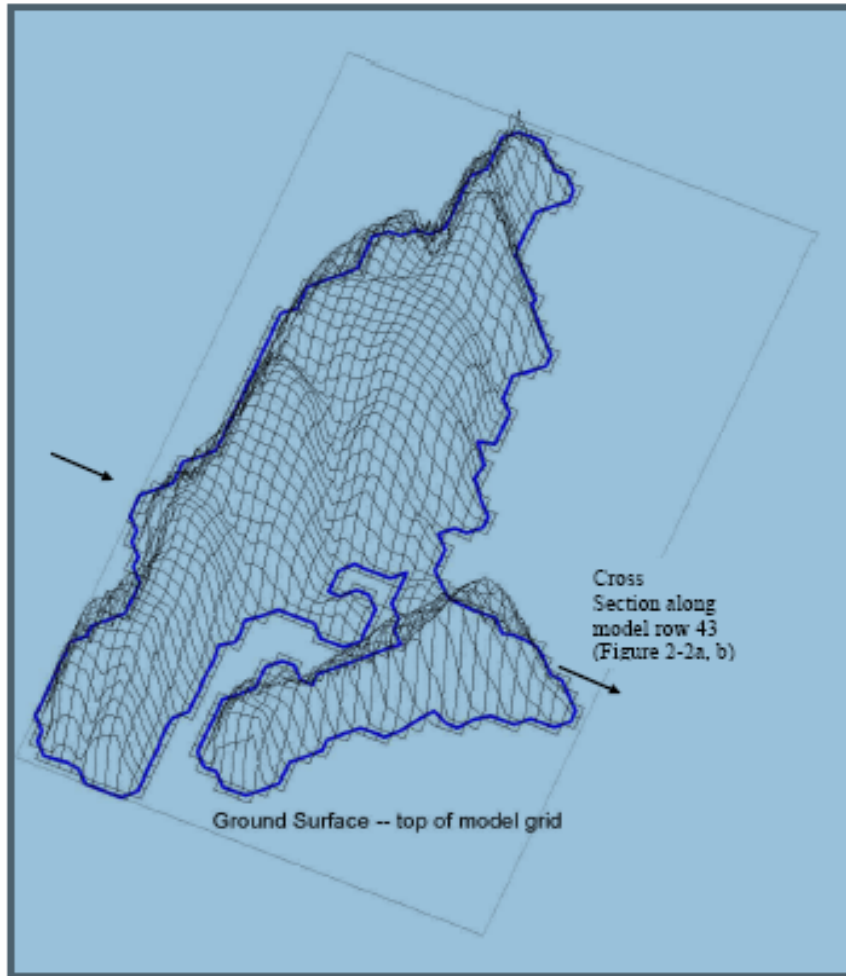
- Time frames vastly different for surface and subsurface models.
 - Surface time steps range from 30 seconds to an hour
 - Subsurface time steps range from days to months, annual and the infinite!! (Steady-State case)
- Solutions have been for each to include a simplification of the other.



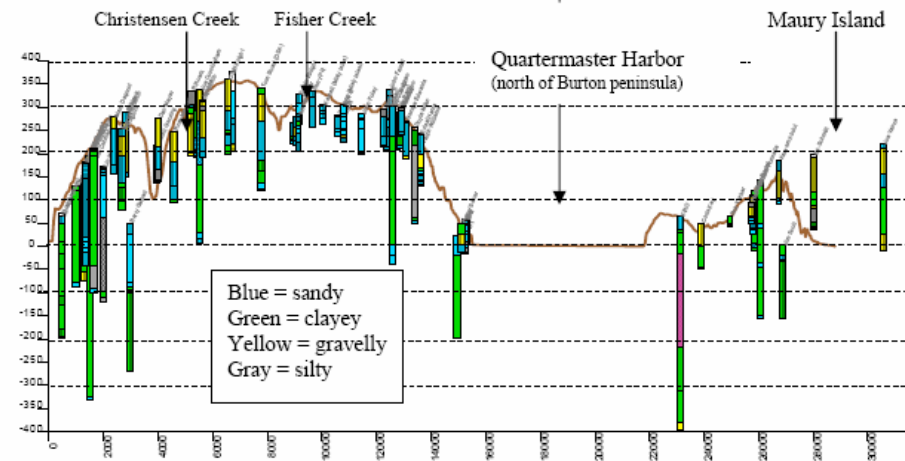
Wasn't this presentation supposed to be on Vashon-Murray Island?

- I'm getting there.
- VMI = Sole Source Aquifer
- Some history on the model might help.
In the beginning (aka Phase 1), there was steady-state MODFLOW.
- Incorporates most recent geologic data, LiDAR topography, pumping tests, well data (locations and pumping rates).
- Scale is 1000' square grid over island

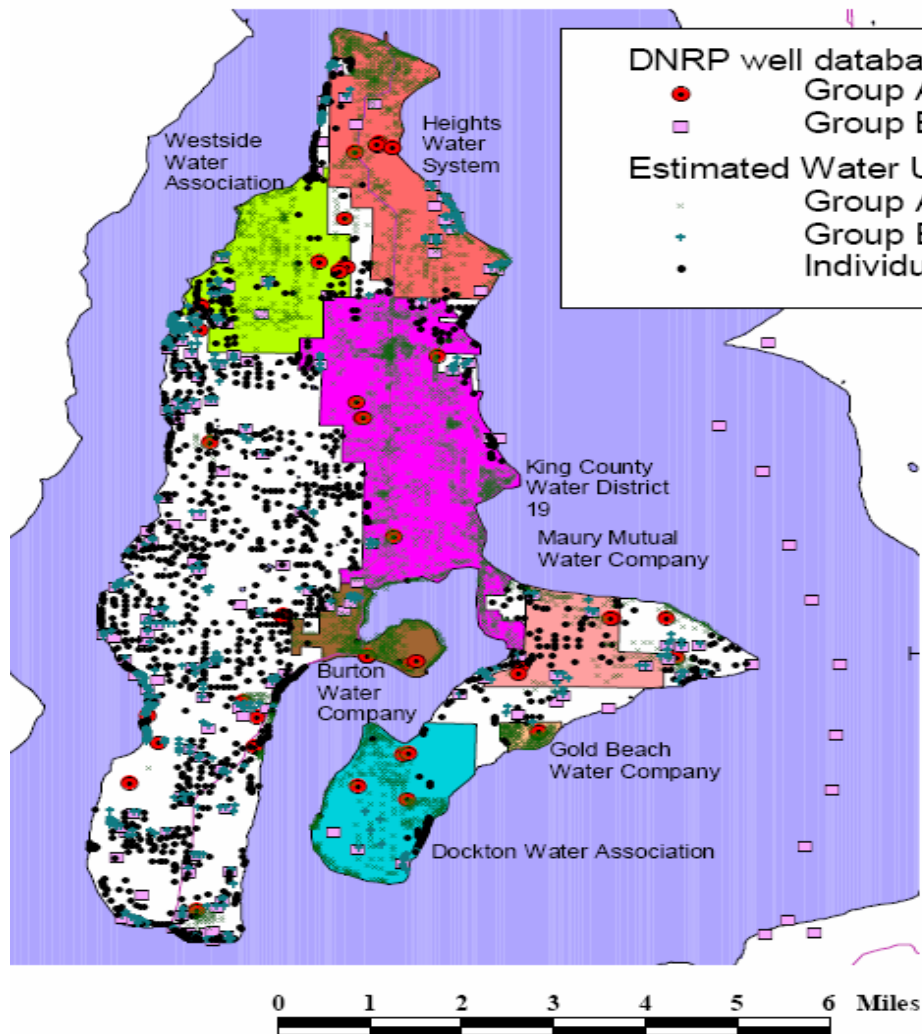
Impressive, nes pa?



2-2b

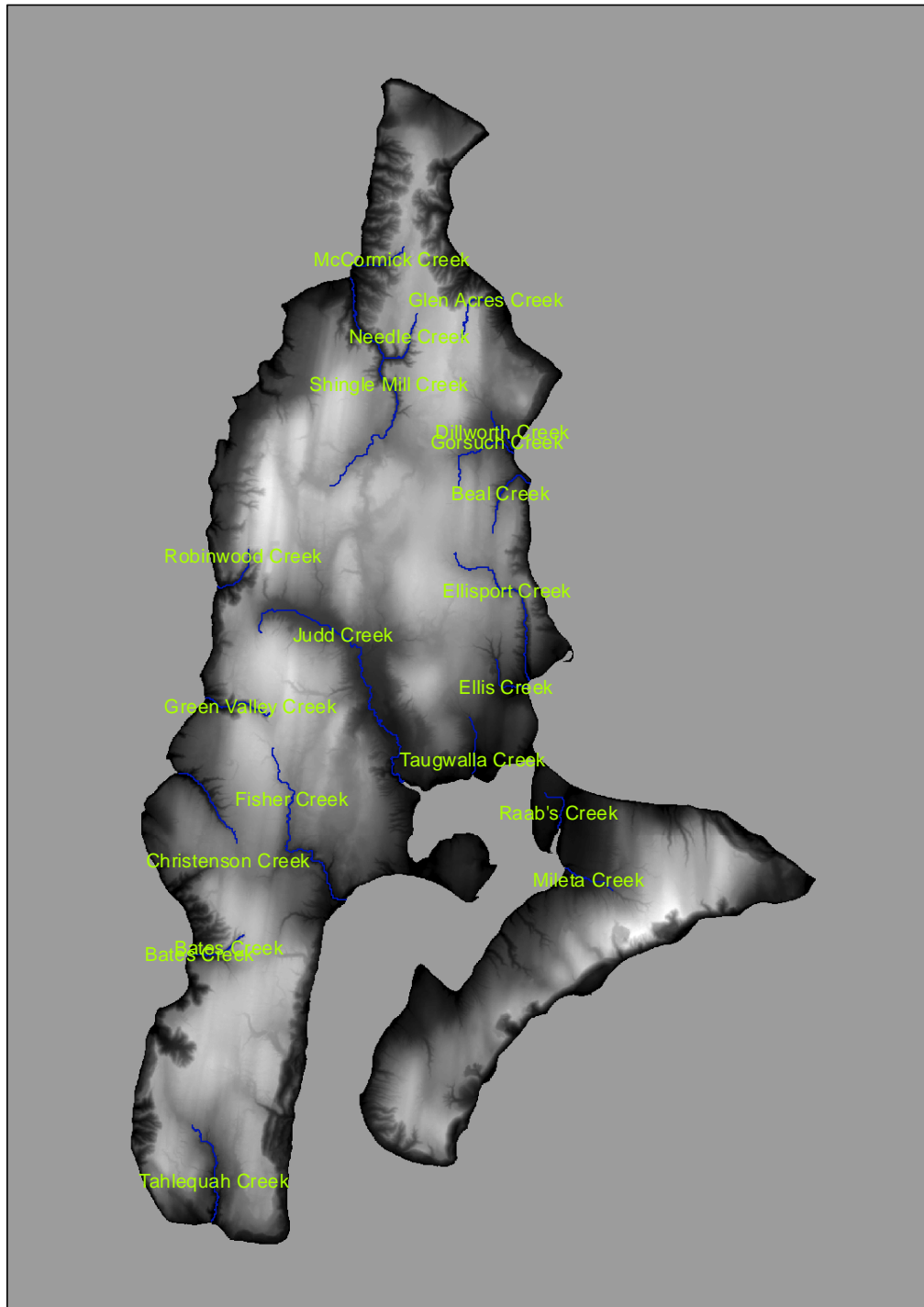


About those wells...



- 18 Group A wells
- 89 Group B wells
- 192 Ag wells
- 495 “Individual” wells

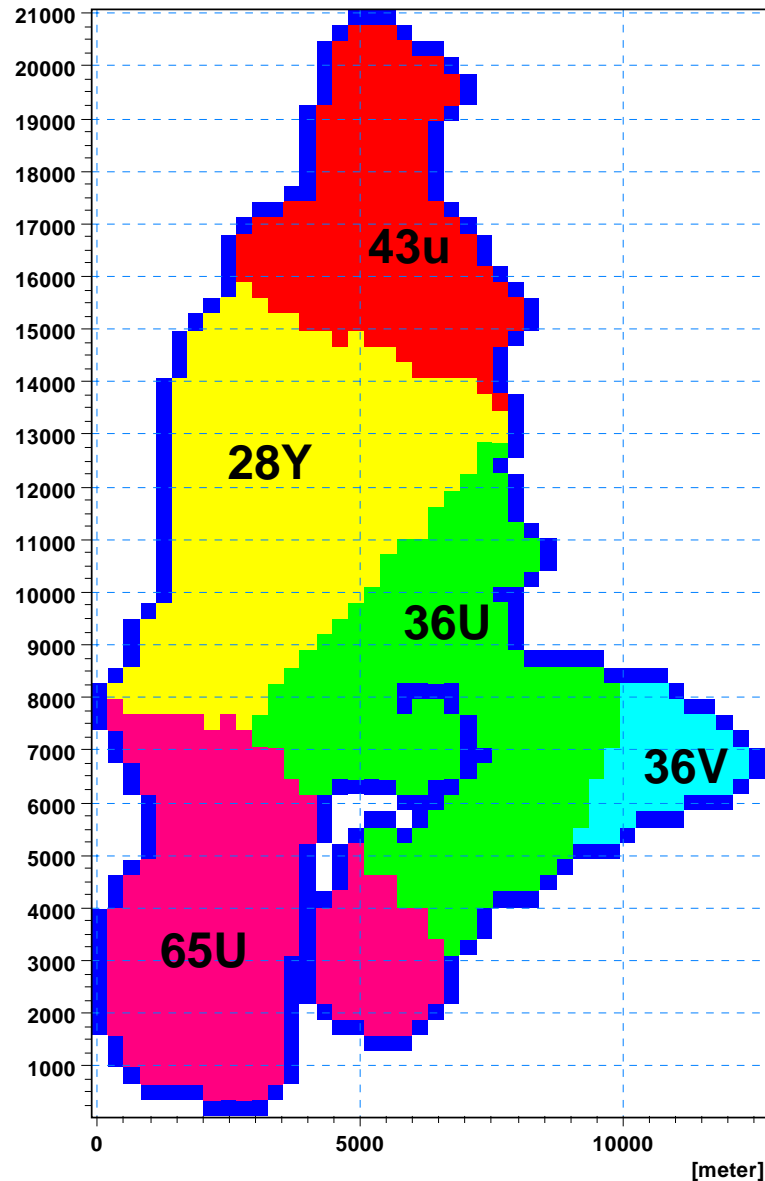
Adding the surface to the model



- Precipitation
- Potential Evapotranspiration
- 19 explicitly defined rivers/streams
- Land cover*
- Soil type*

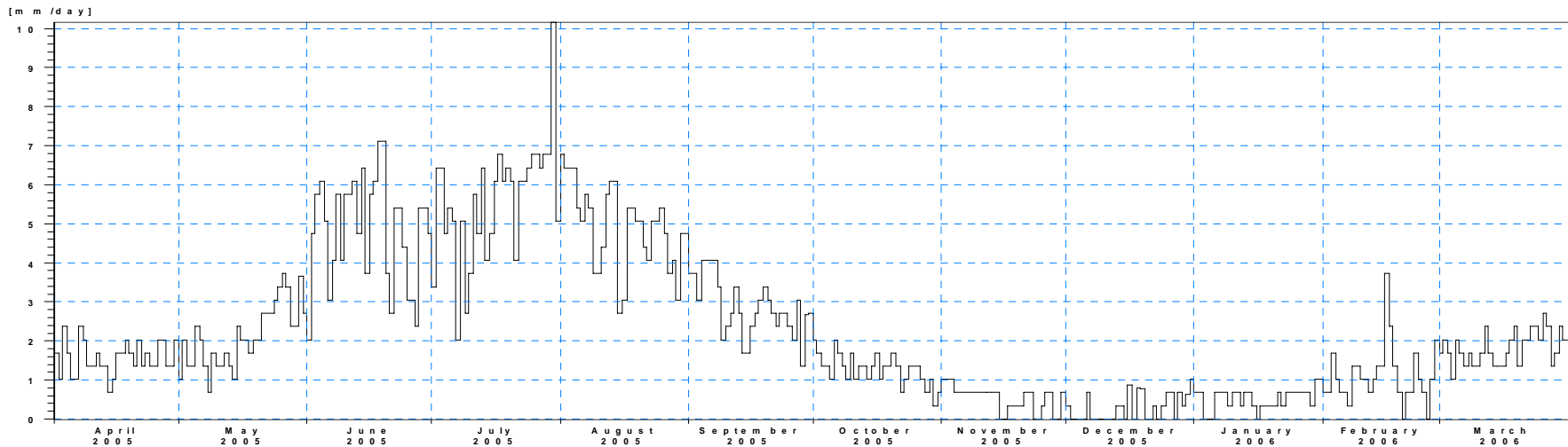
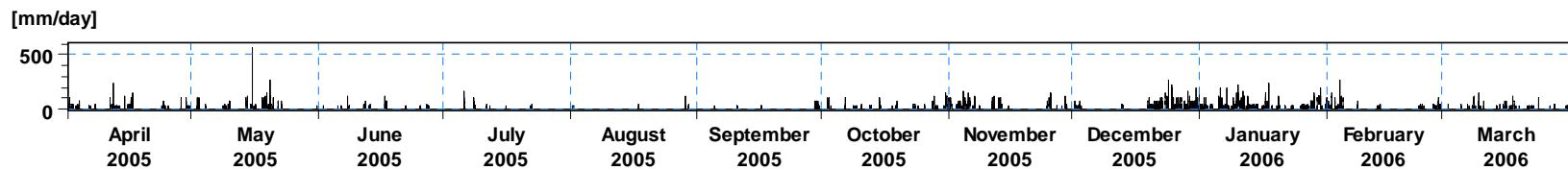
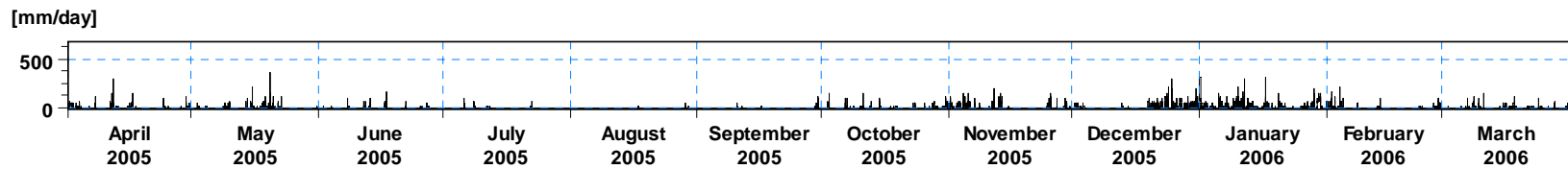
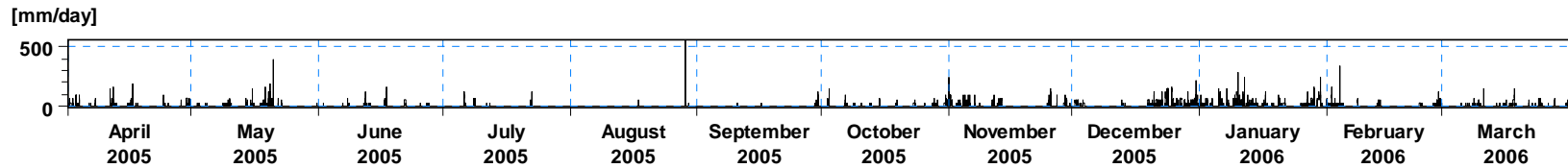
*Punt

Precipitation

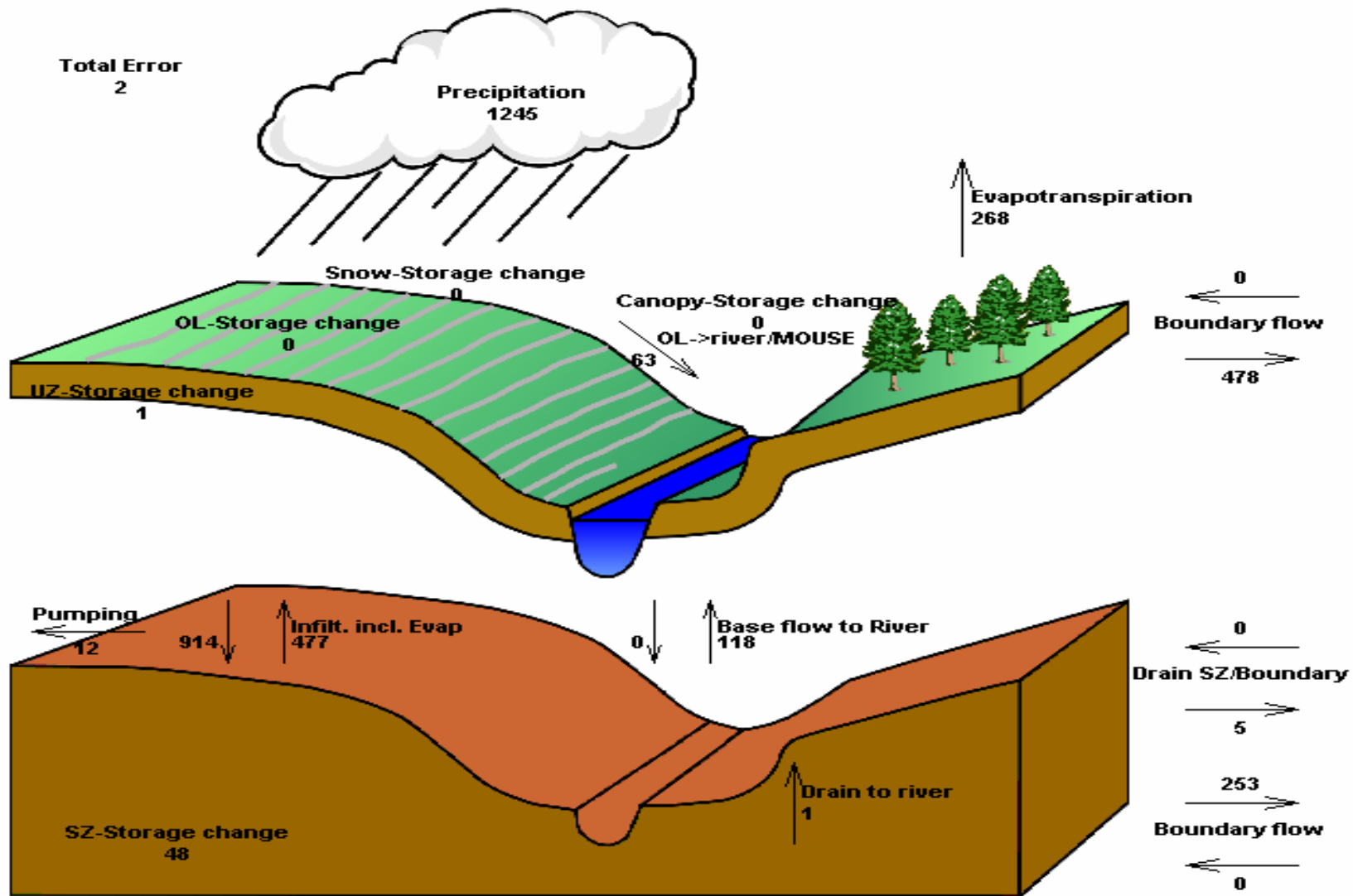


- Five stations:
36V, 36U, 28Y,
43u & 65U
- Dates of overlap
– 4/1/05 – 12/1/06
- Dates used
– 4/1/05 – 3/31/06
- 48.8 inches

Precipitation and PET



Enough with the input, what's the output look like?



The numbers, please

- Precipitation = 100%
- ET = 21% (too low)
- Recharge = 73% (okay, but...)
- Overland = 38% (SOF from Recharge)
- Rivers = 15% (65% base flow)

- Needs work.....but lets move on to

Scenarios

- Climate change
 - Future looks just like Apr 05 – Mar 06
 - But PET increased by 20%
- Population growth
 - Future looks just like Apr 05 – Mar 06
 - But pumping doubled from Group A wells

Scenarios 2

Liverpool 1

- Climate change
- ET +10%
- Recharge -5%
- Rivers + 3% (huh?)
- Population Growth
- Pumping +25%
 - Perspective:
 - Base pump 0.96%
 - Pop. Growth 1.2%
- No significant change

Happy Nevada Day!

