Geol 588
-
GIS for Geoscientists II

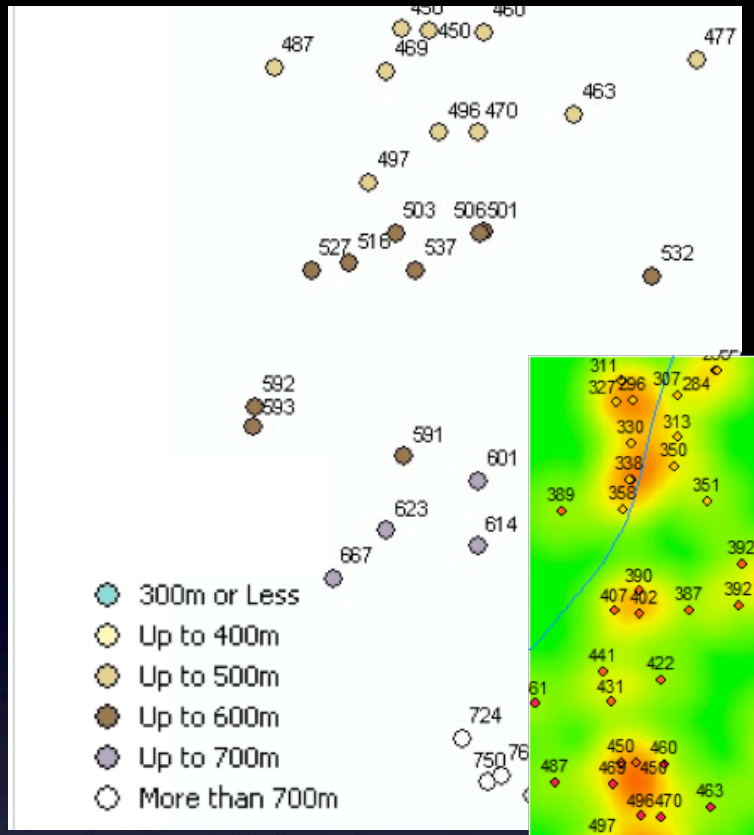
Lecture 7

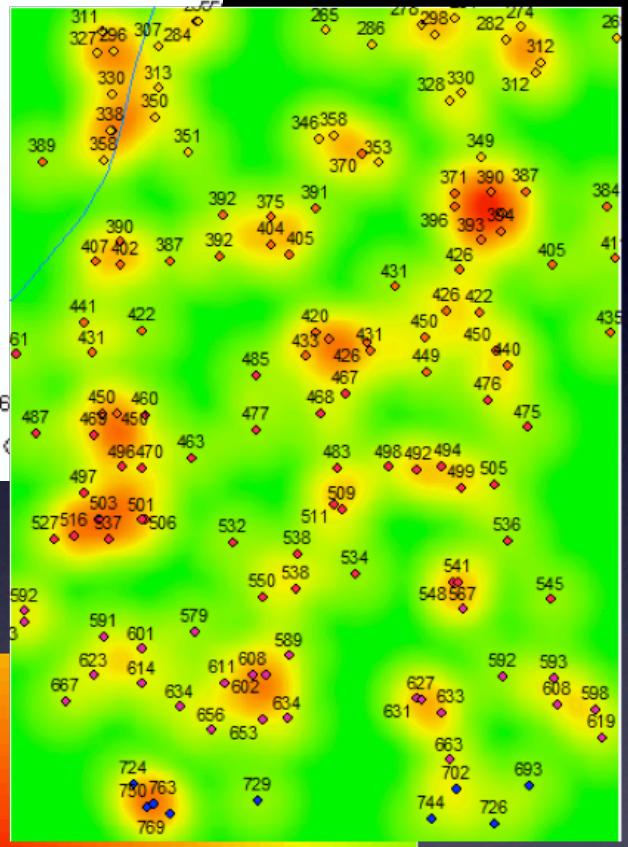
Today

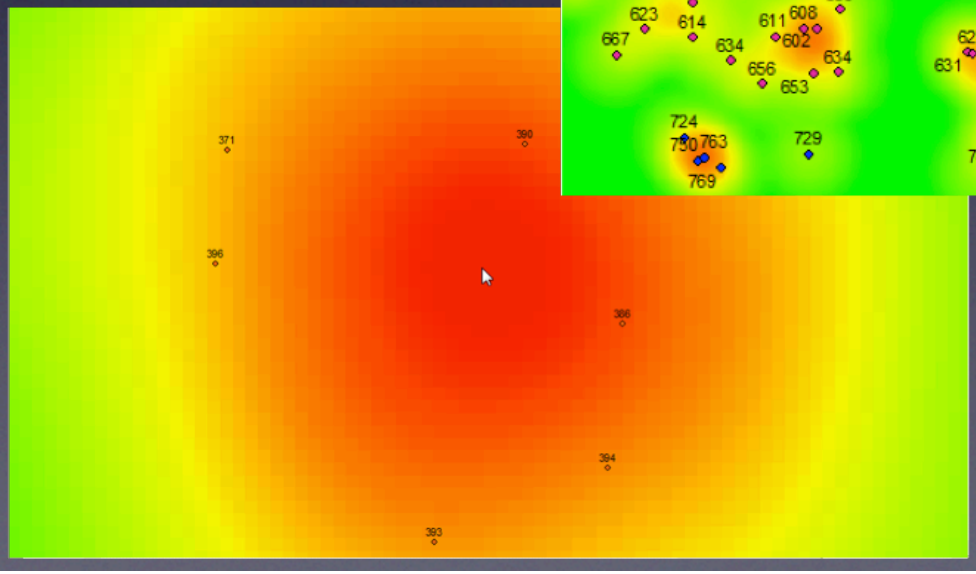
- Ex. 5 solution (interpolation)
- How to use the Model builder
- Notes:
  - No lab Tues. next week - but lecture
  - Midterm March 13 (no lab Mar. 11)
  - Final: Fri., May 9 9:45-11:45 ?

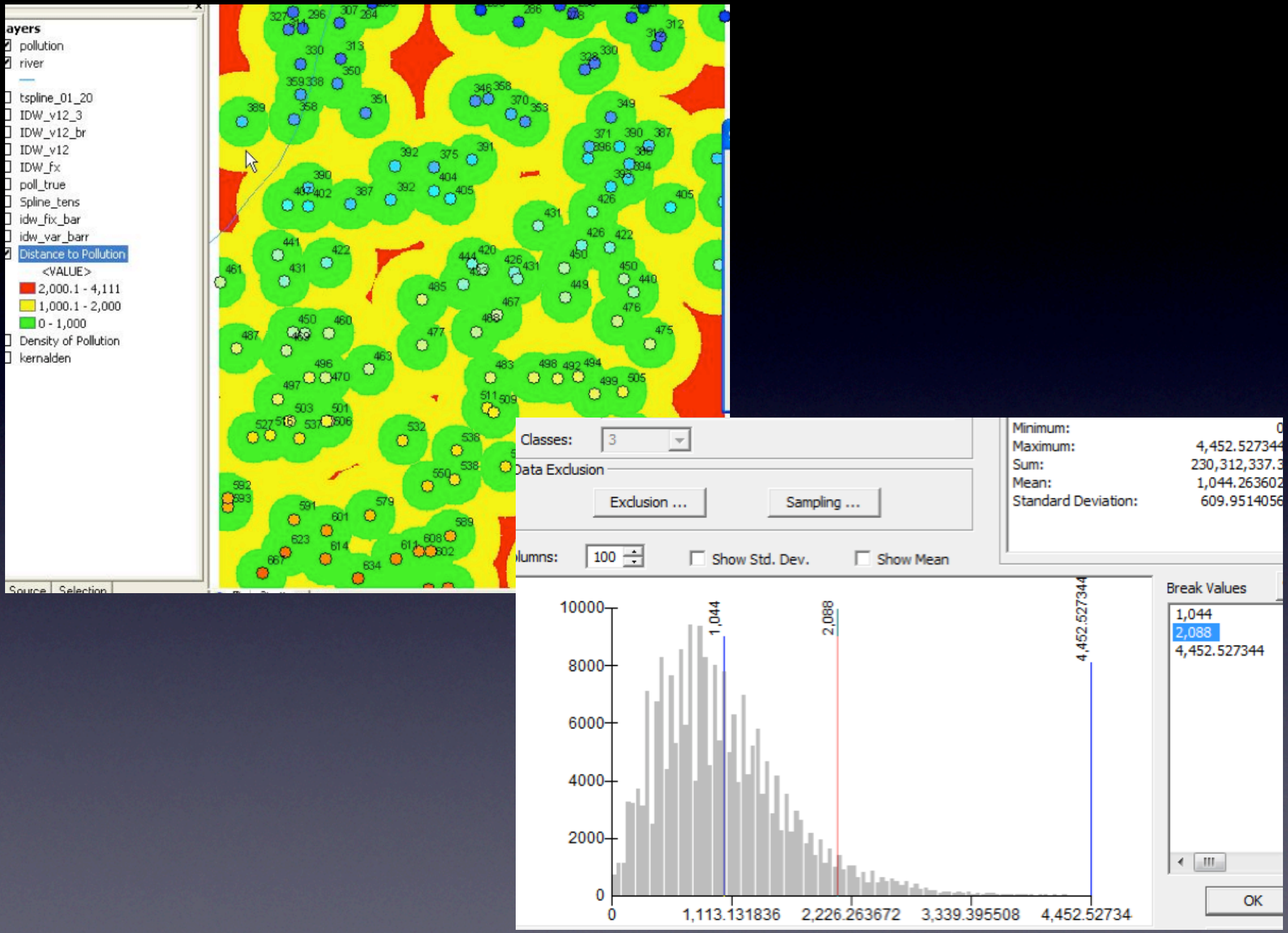
Ex. 5 - Interpolation from points

- Inital data: bedrock elevation points
- visualize elevation (same color scheme as interpolation for comparison)
- shorten labels: use int([elev]) in label expression (not in attribute table!)
- Where are samples "bunched up"?
- kernel density - histogram equalization for smooth color: bring out extremes
- no actual point at max. density!
- What's the average distance between samples? ~ 1050 m (max: 4500!)
- Good interpolation up to 1050 m



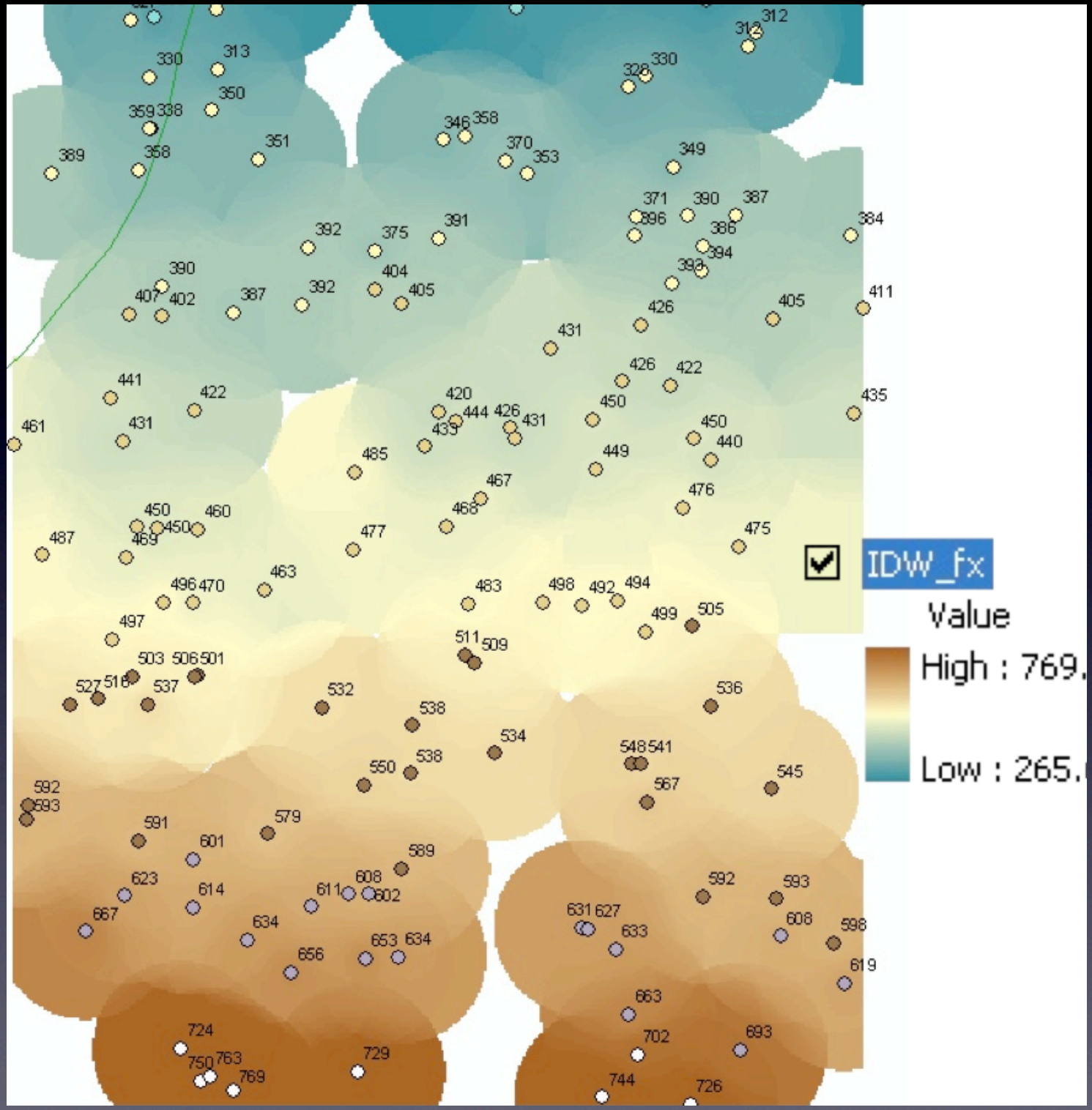


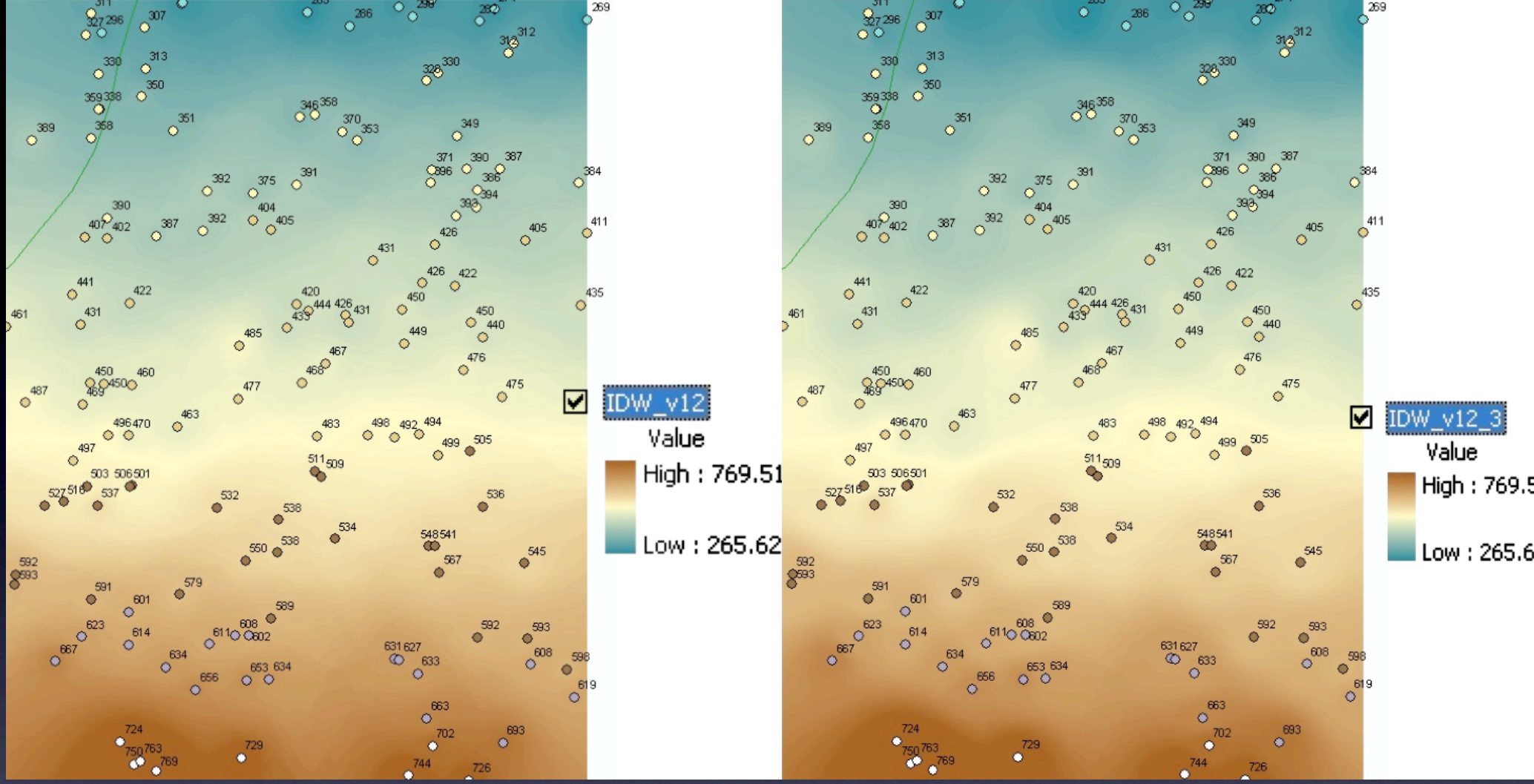



ayers
pollution
river
tspline_01_20
IDW_v12_3
IDW_v12_br
IDW_v12
IDW_fx
poll_true
Spline_tens
idw_fix_bar
idw_var_barr
Distance to Pollution
<VALUE>
2,000.1 - 4,111
1,000.1 - 2,000
0 - 1,000
Density of Pollution
kernalden
Source
Selection
Classes:
3
Data Exclusion
Exclusion ...
Sampling ...
lumns:
100
Show Std. Dev.
Show Mean
Minimum:
Maximum:
4,452.527344
Sum:
230,312,337.3
Mean:
1,044.263602
Standard Deviation:
609.9514056
10000
8000
6000
4000
2000
0
1,044
2,088
4,452.527344
0
1,113.131836
2,226.263672
3,339.395508
4,452.52734
Break Values
1,044
2,088
4,452.527344
OK

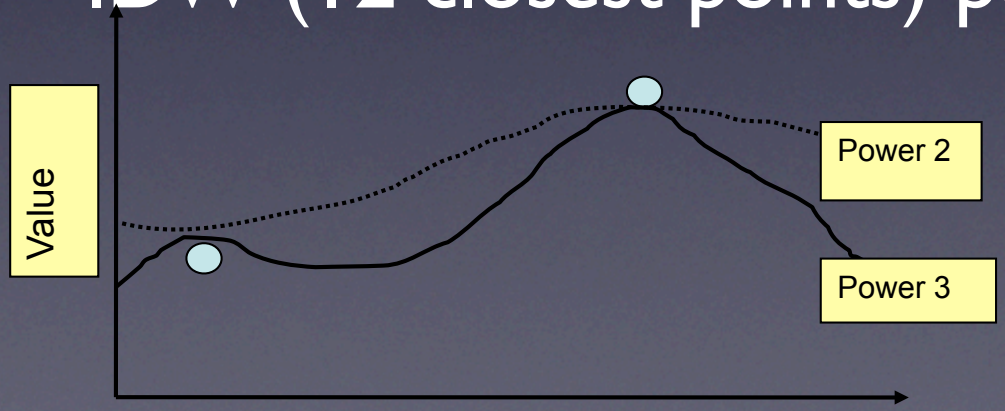
IDW with fixed radius (~2100 m)

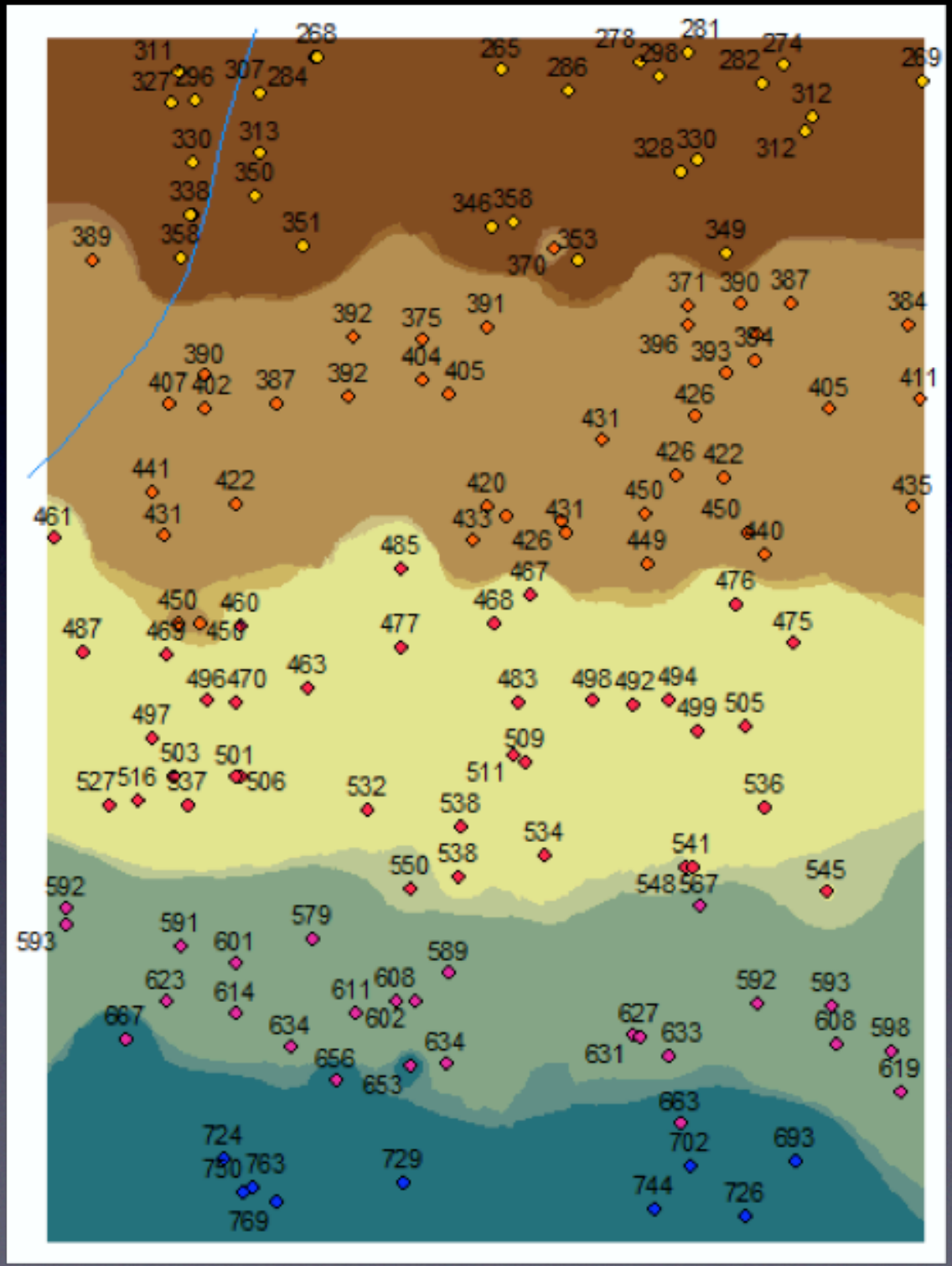
NoData assigned for cells beyond 2100 m away from any sample! ("our comfort zone")

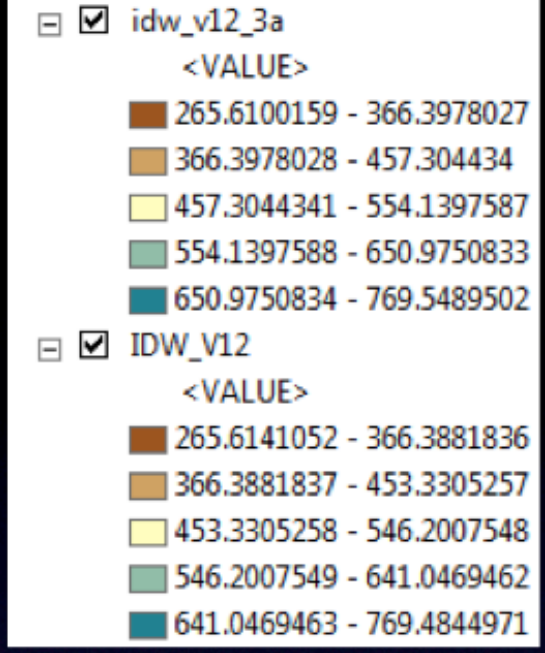




IDW (12 closest points) power 2 vs power 3





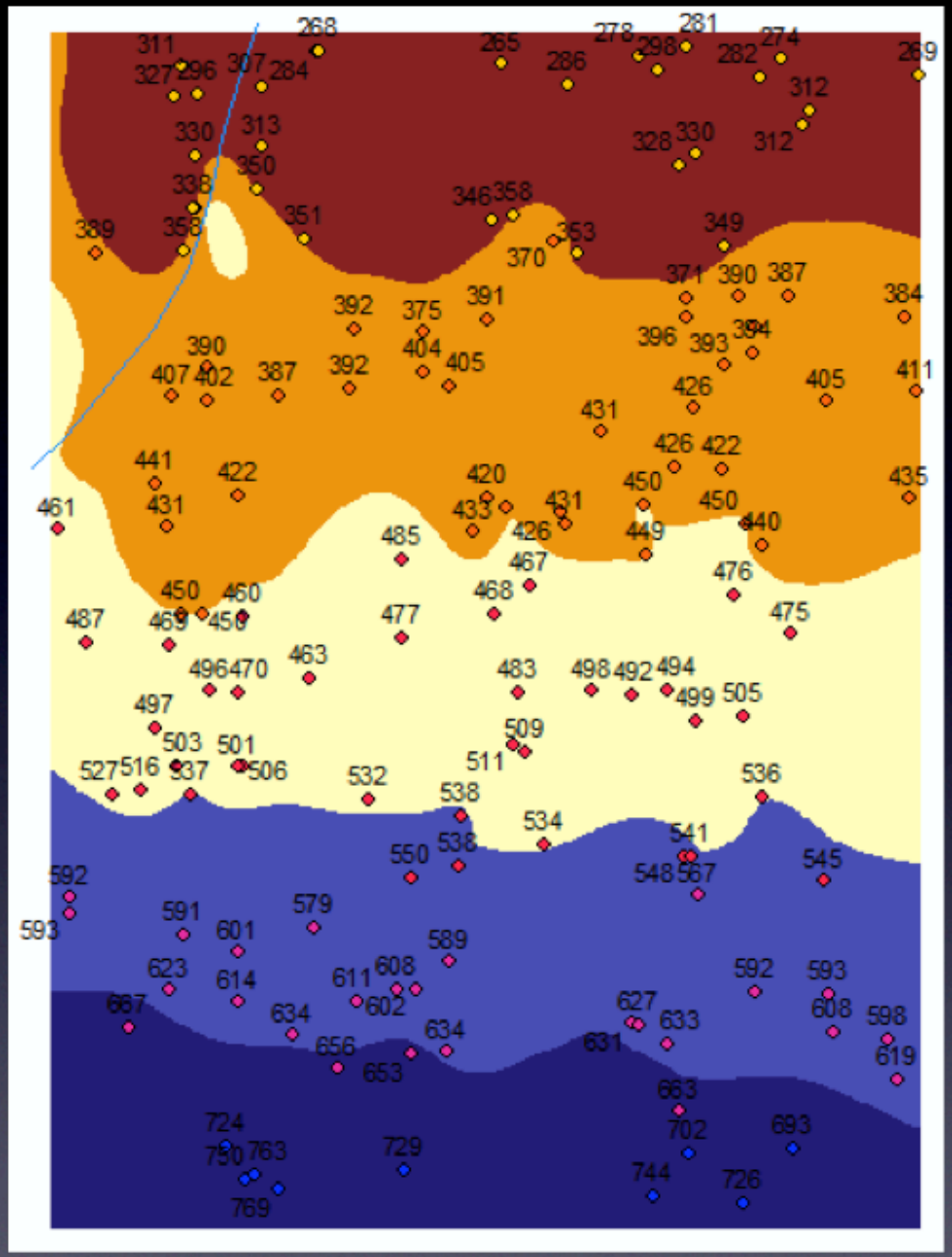


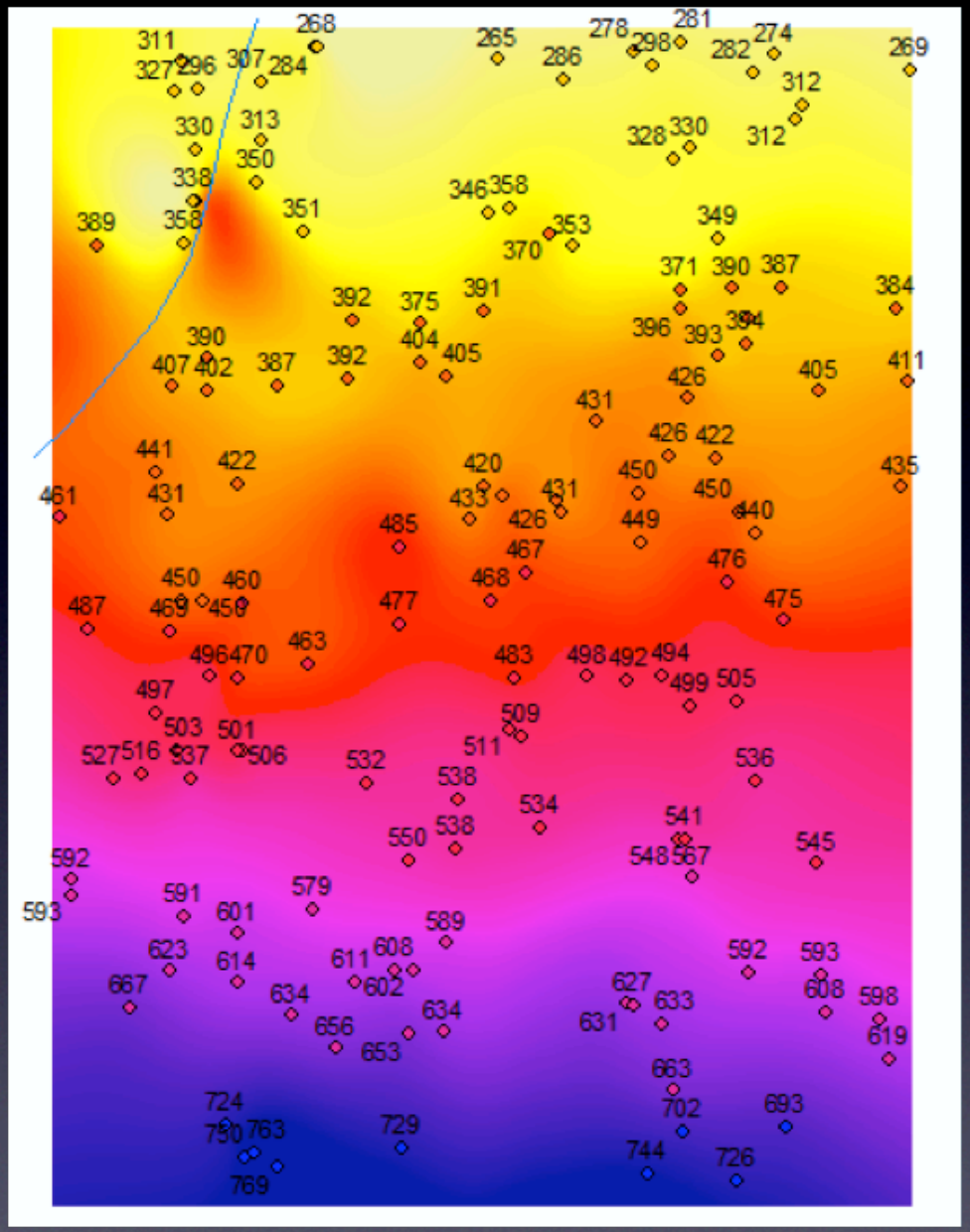
- power = 2:
- a sample that 10 m away is "worth" 1 / (10 * 10) = 1/100

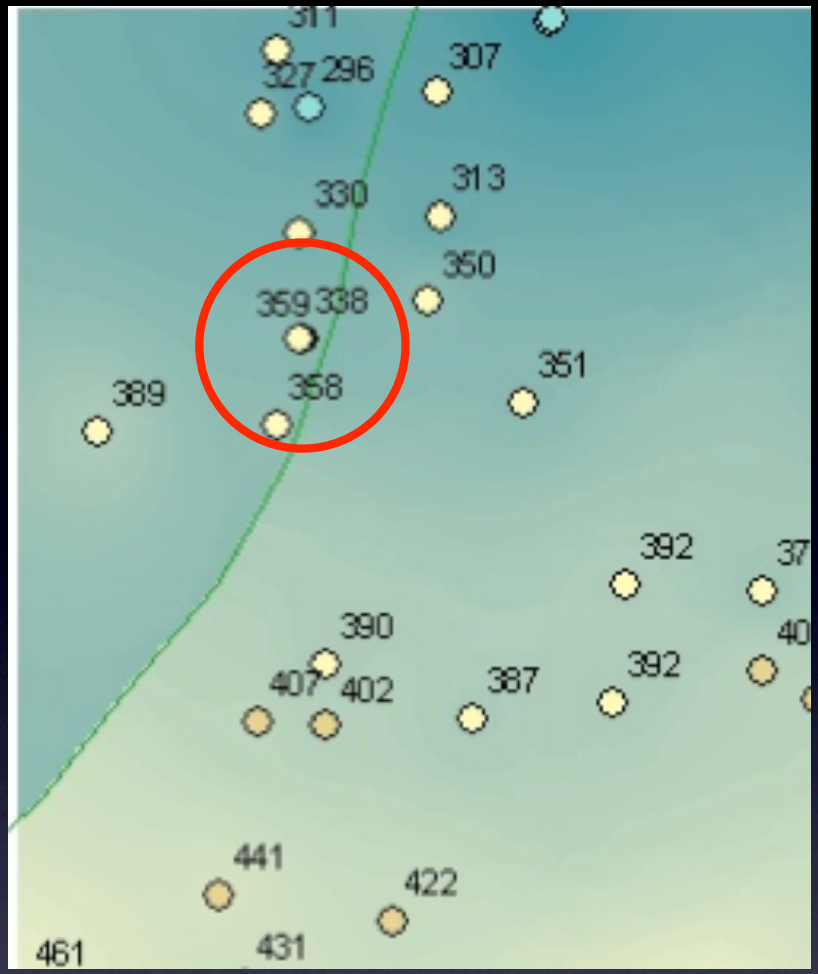
- power = 3:
- same sample (10 m away) now is "worth" only 1 / (10 * 10 * 10) = 1/1000

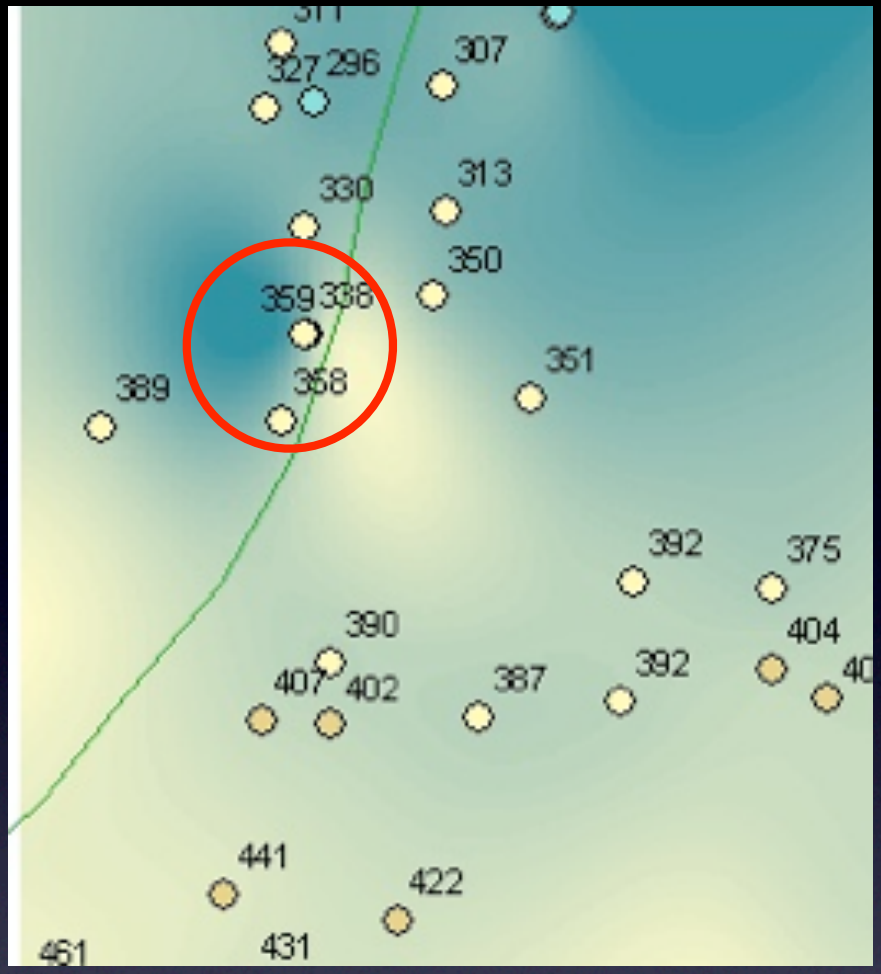
- result:
  power=2 puts less emphasis on far away samples

- power=2 interpolations "drop off" faster from the sample locations









IDW with break line vs. Tension spline

Close (duplicate?) points with different elevation!

IDW just “averages”, spline tries to “optimize” - and “freaks out”

TSpline - IDW (simple subtraction)

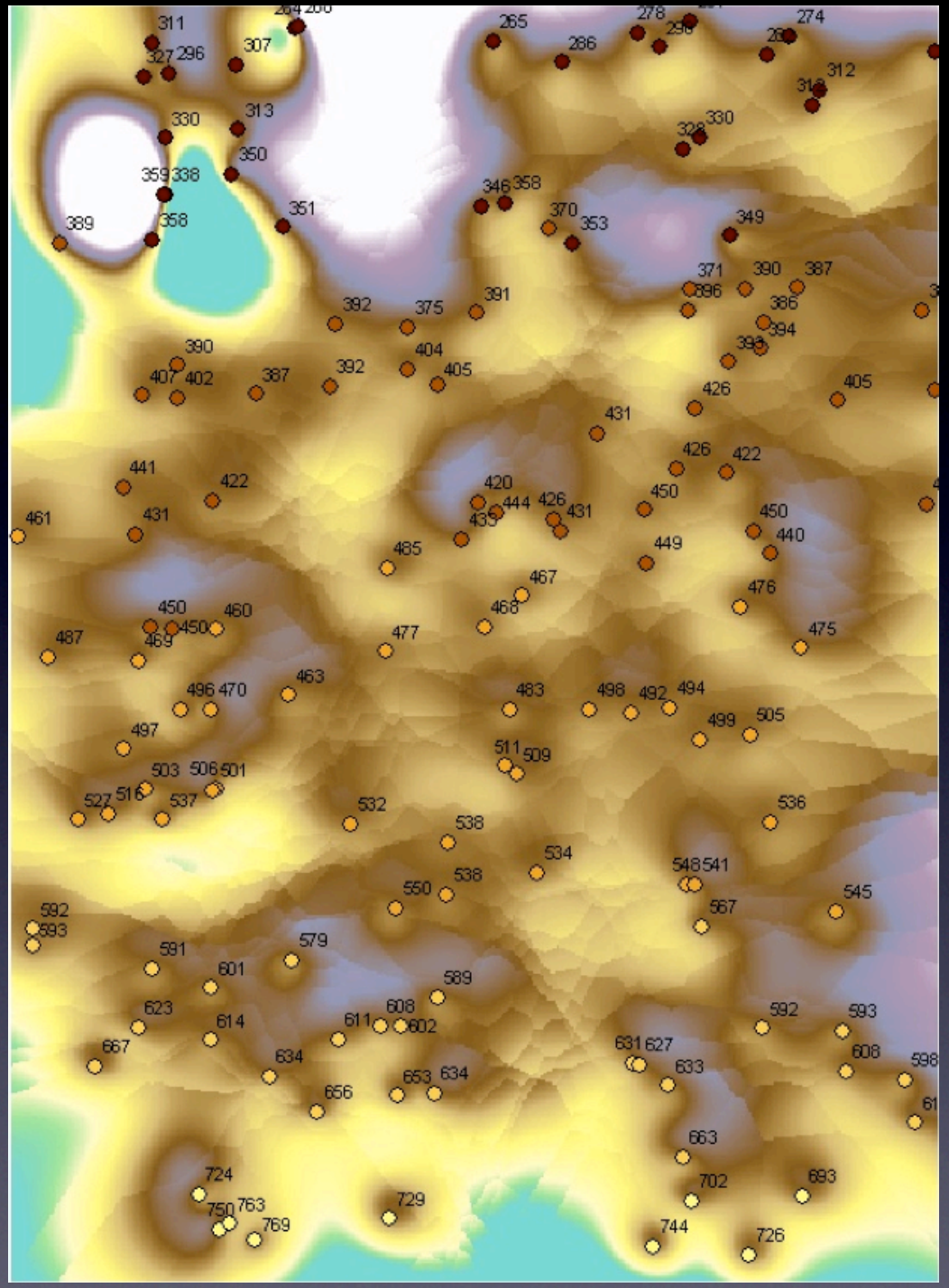
Better: absolute difference
abs(Tspline - IDW) or
Root-Mean-Squared (RMS)

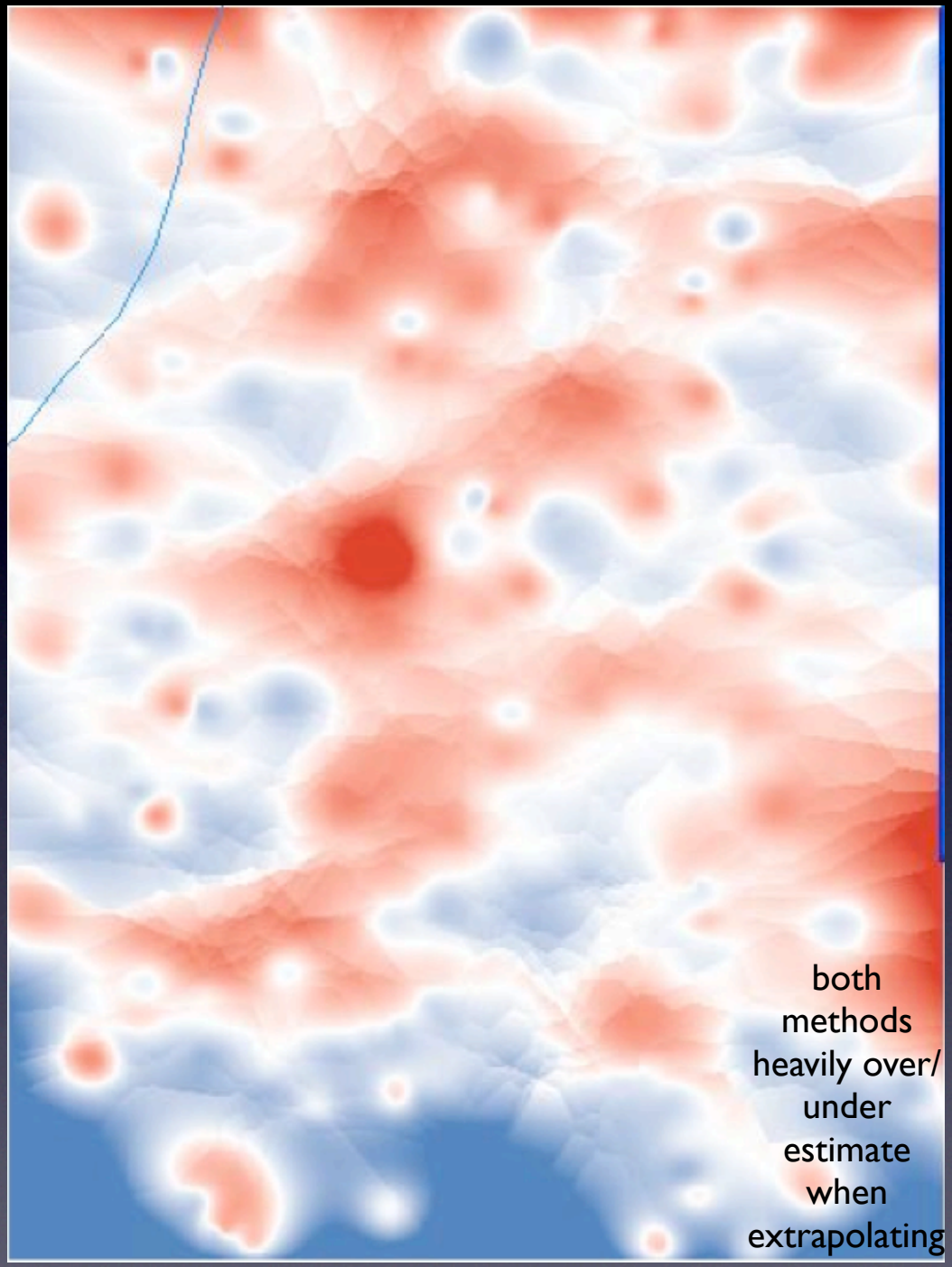
Or: difference of the total sum of all cell values (How?)

equivalent to comparing averages of abs(TS - IDW)

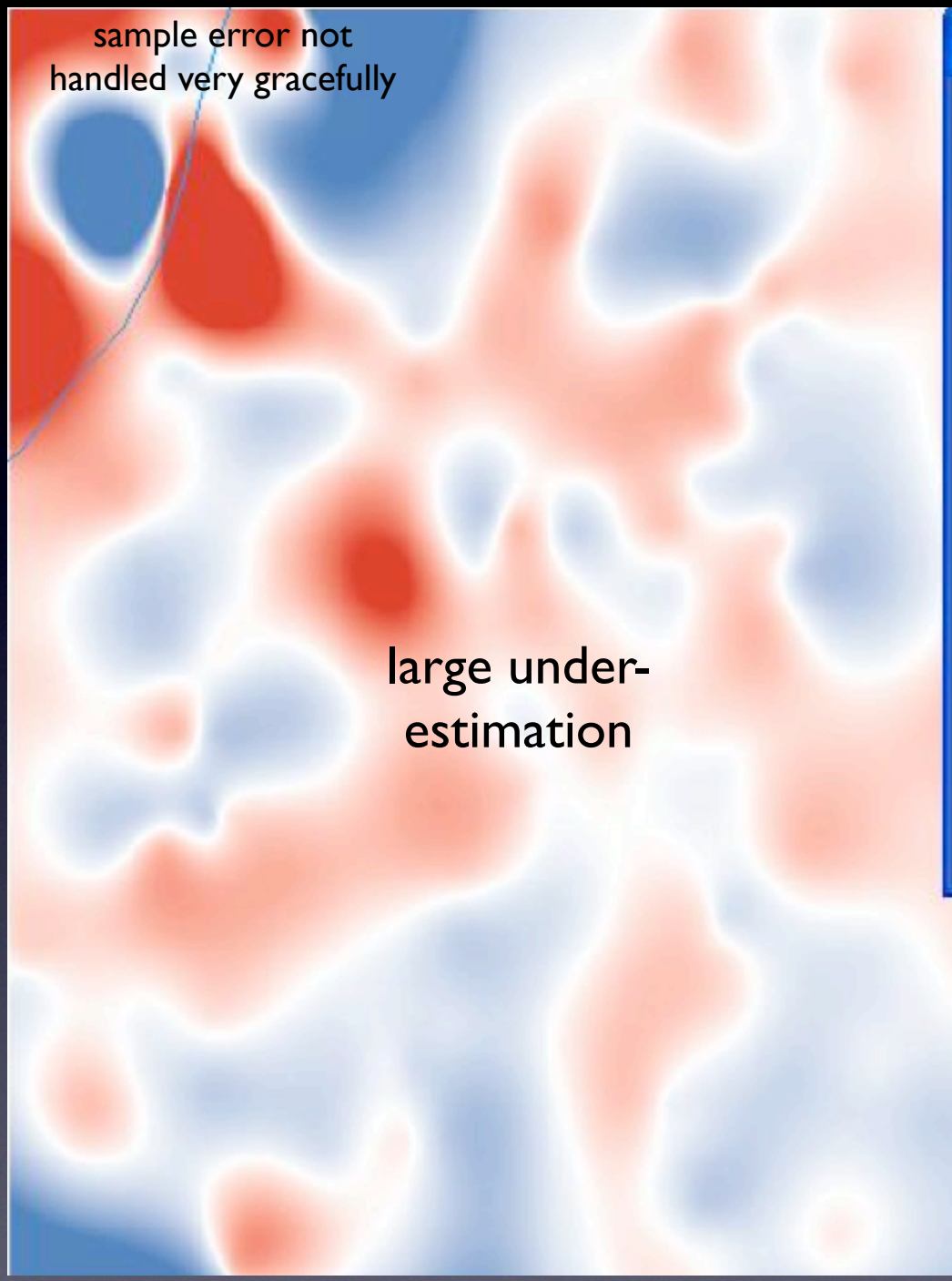
Shows smooth (spline) vs IDWs “linear patters” (why?)

Better measure of interpolation quality: subtract each from the true values and compare (compare **residuals)**





true - IDW (non-abs avg. = -12.1)

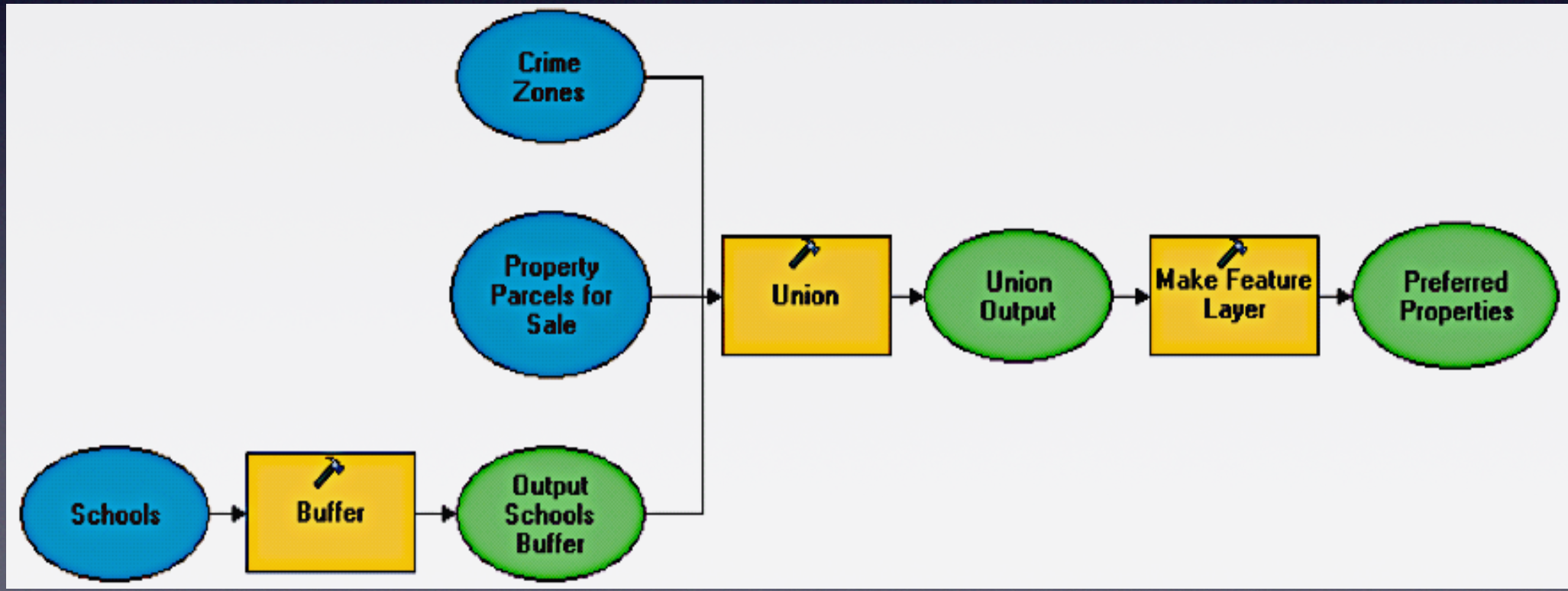


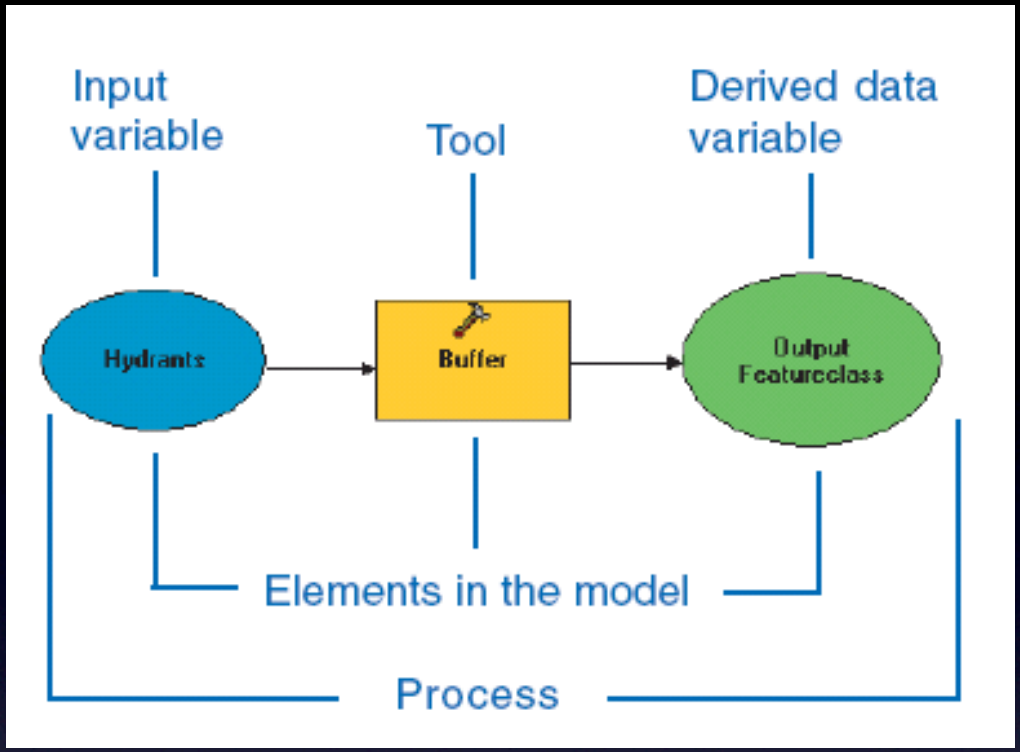
true - Spline (non-abs avg. = -14.1)

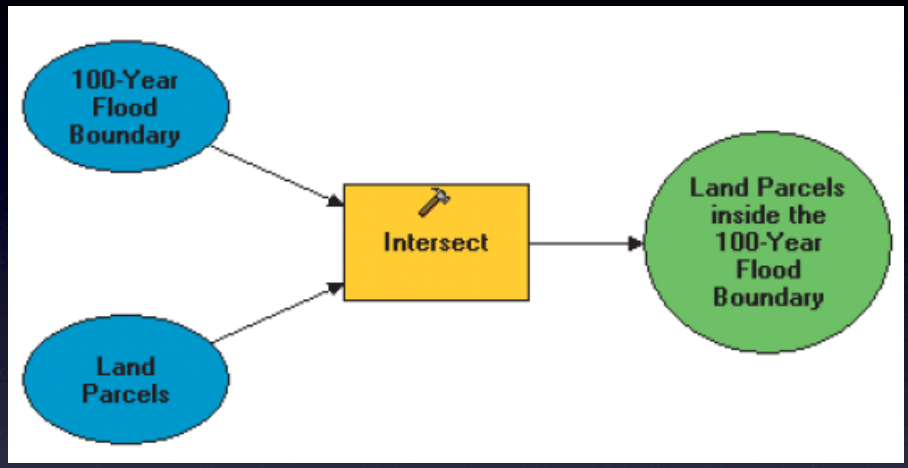
5 min pause

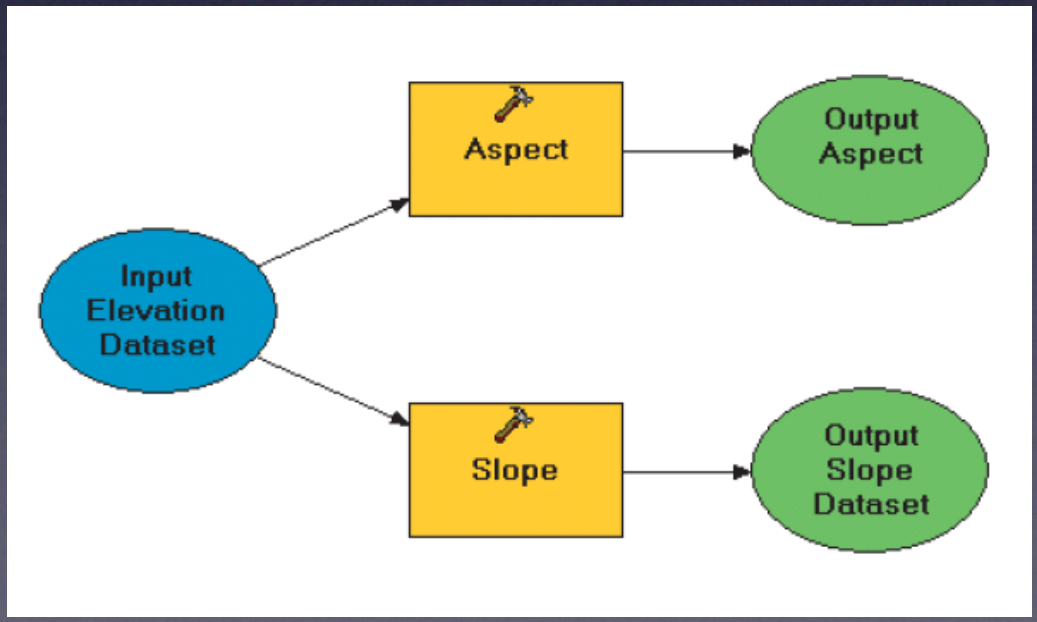
Model Builder

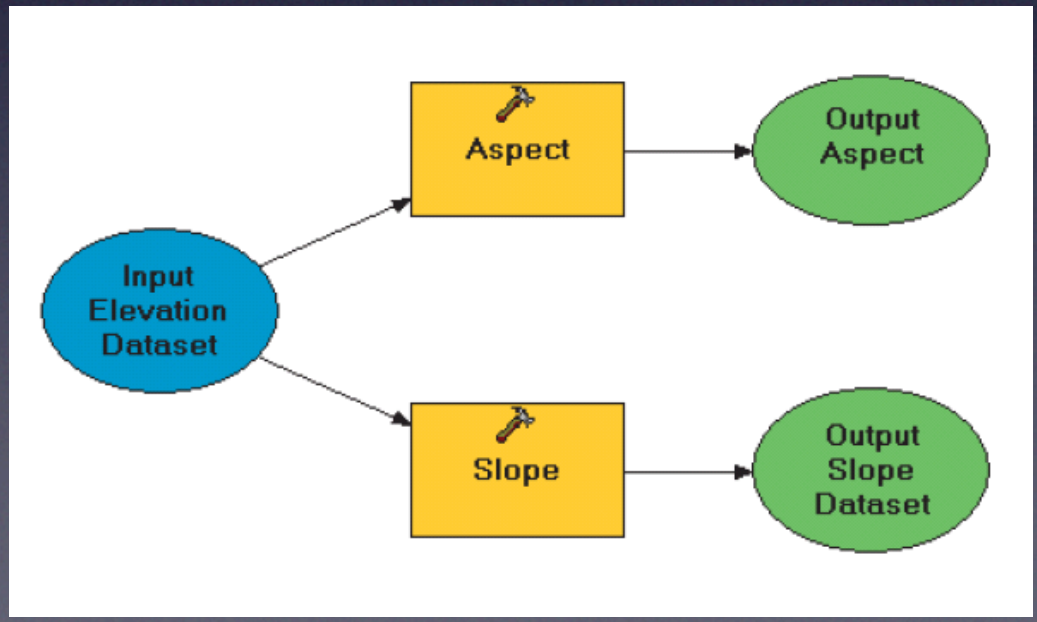
- Sequence of geoprocessing tools
- Flowchart story of geoprocessing operations
- Allows parameters for flexible models
- Allows to to show a process (on a poster)



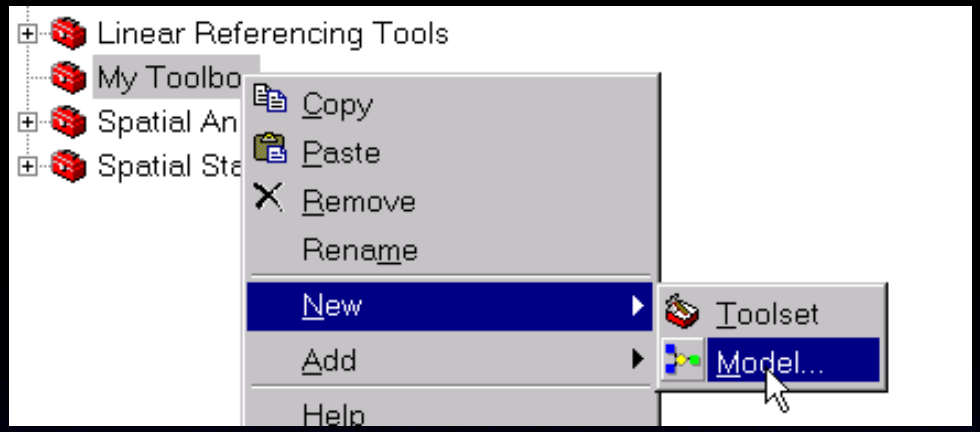

Input variable
Tool
Derived data variable
Hydrants
Buffer
Output Featureclass
Elements in the model
Process

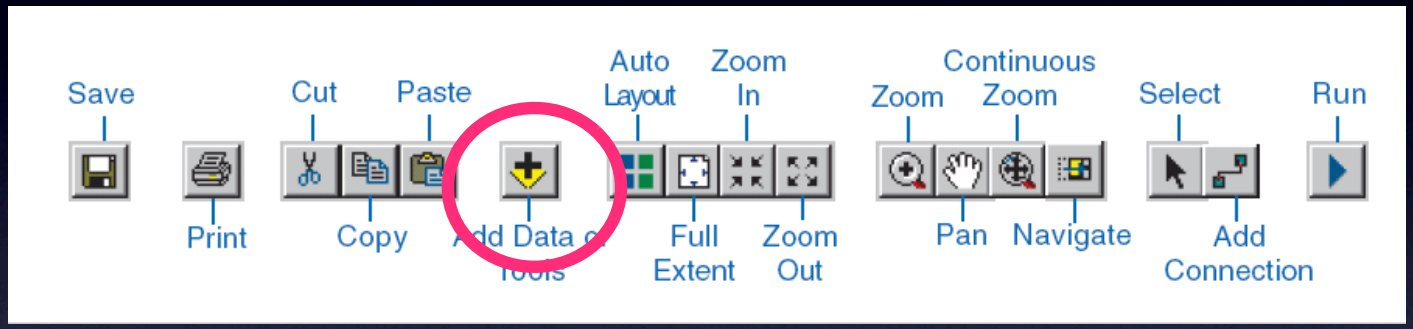

100-Year Flood Boundary
Land Parcels
Intersect
Land Parcels inside the 100-Year Flood Boundary


Input Elevation Dataset
Aspect
Output Aspect
Slope
Output Slope Dataset

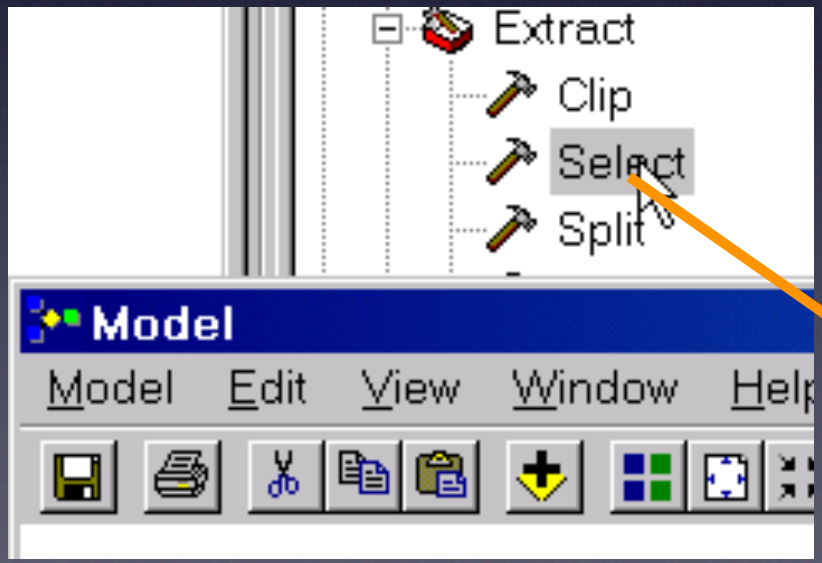

Input Elevation Dataset
Aspect
Output Aspect
Slope
Output Slope Dataset

Creating a new toolbox and Model





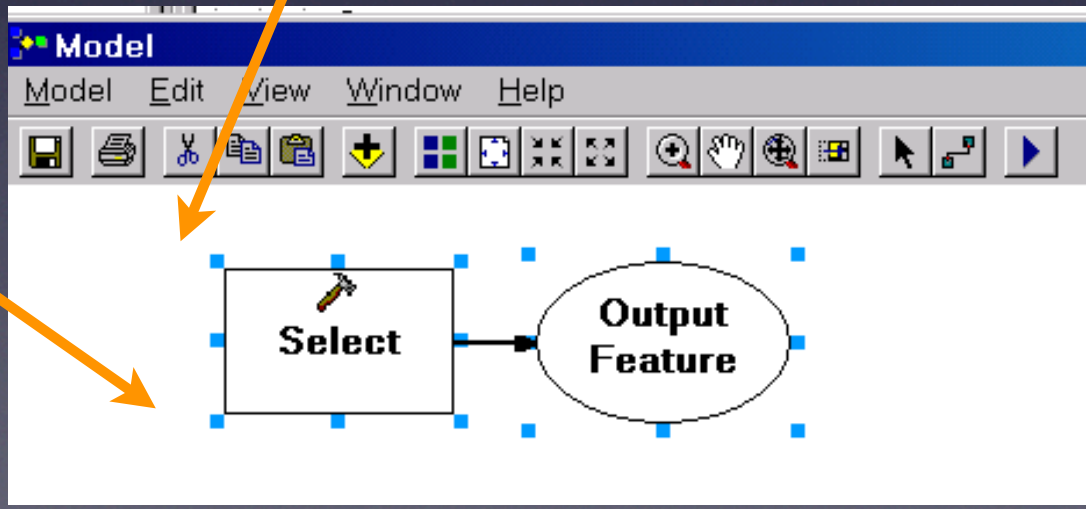
Add data

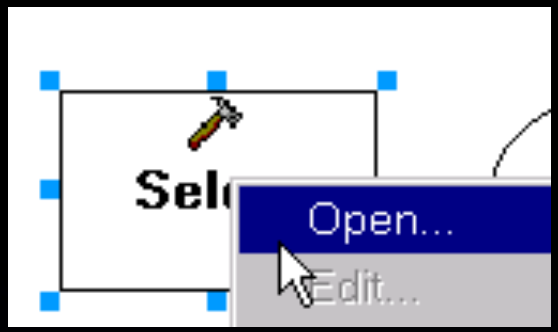


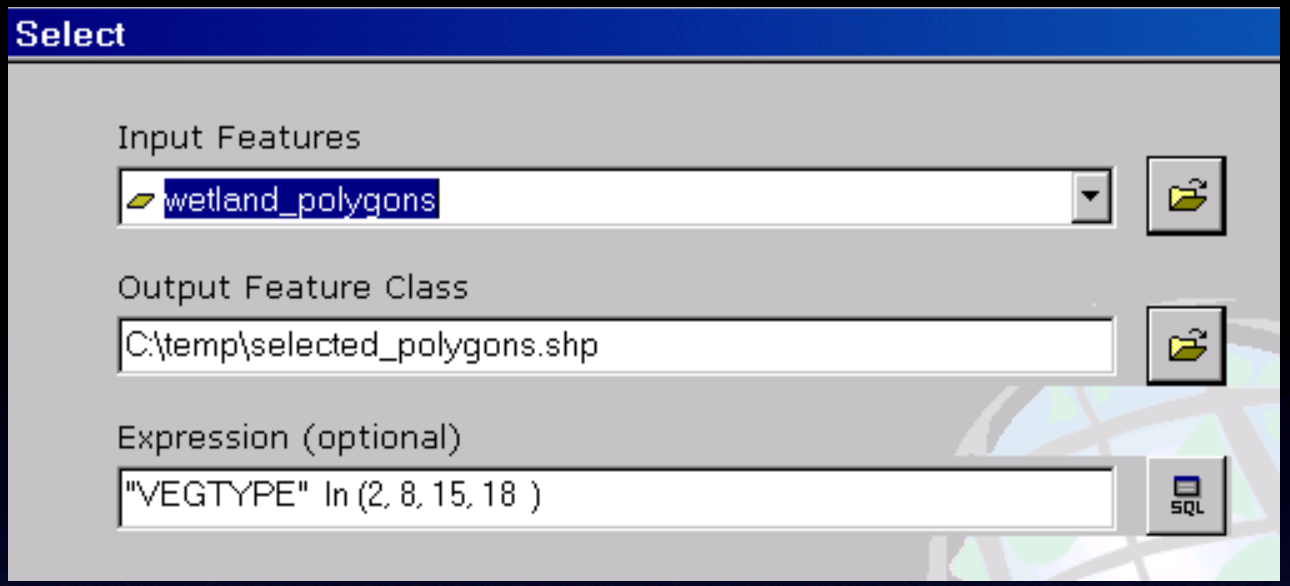
drag

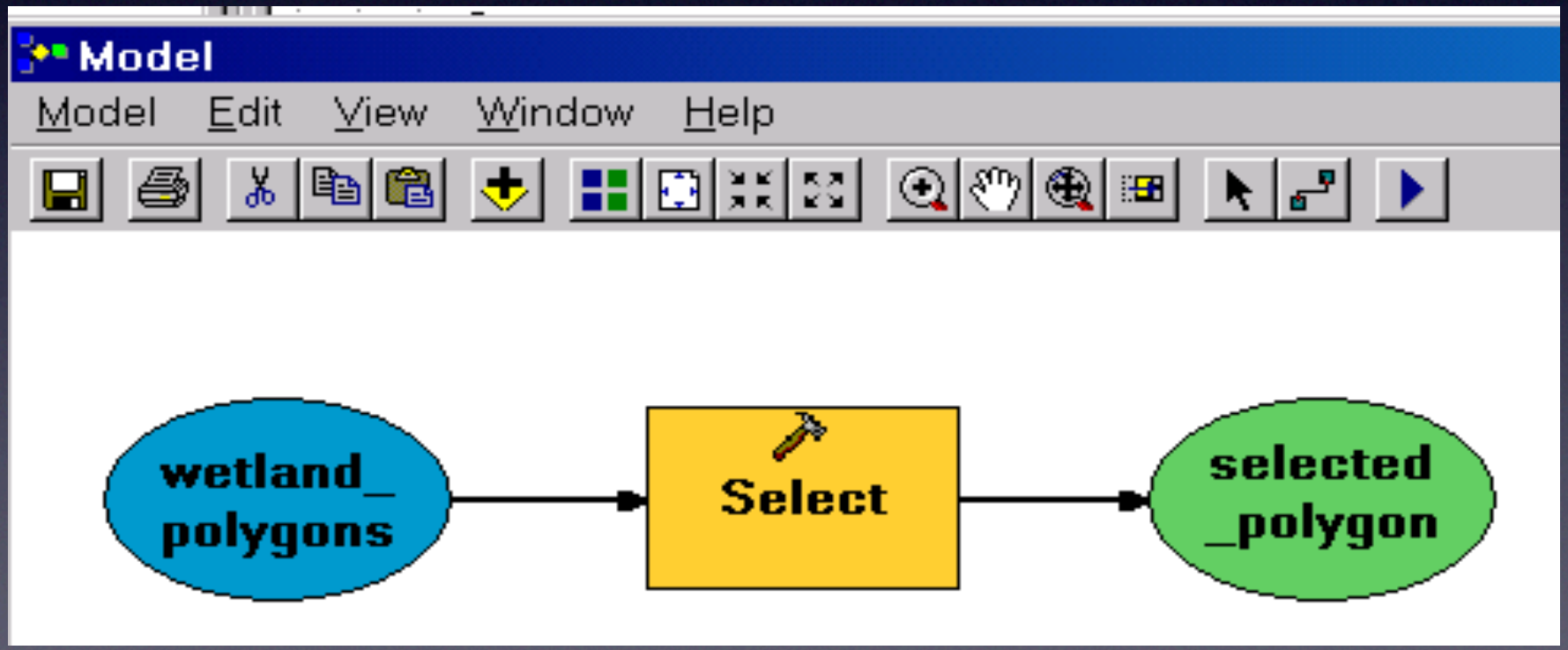
tool

drag layer from TOC

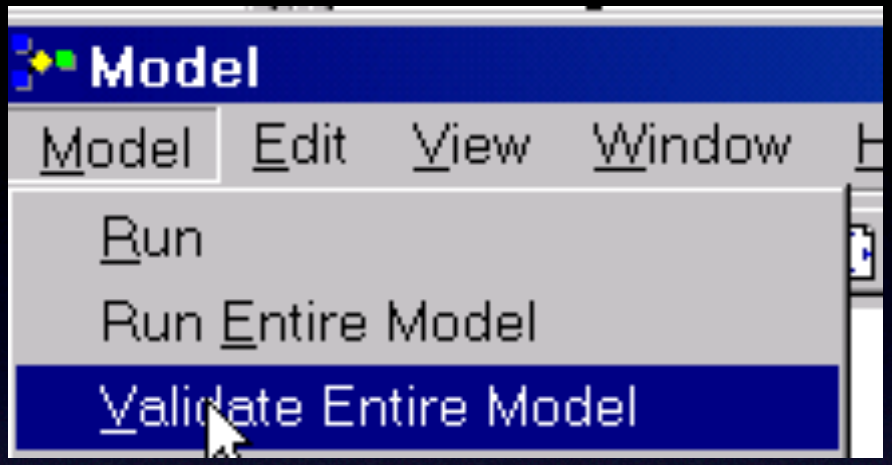


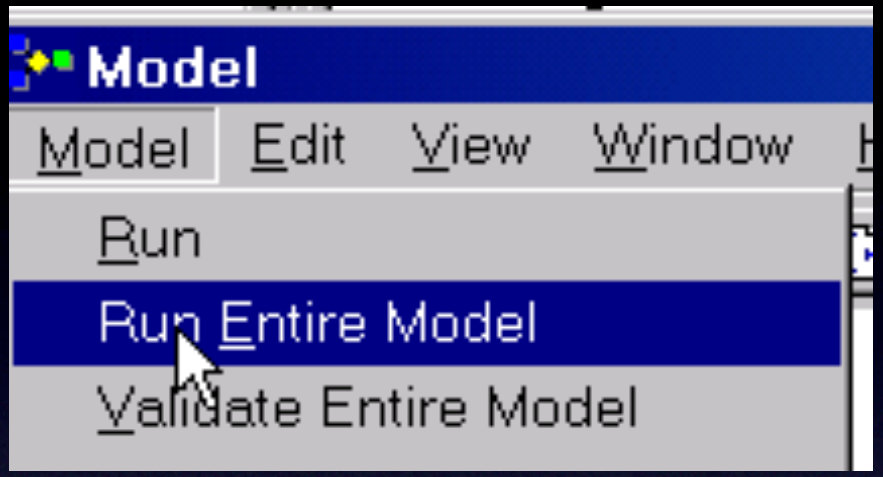

Sel
Open...
Edit...

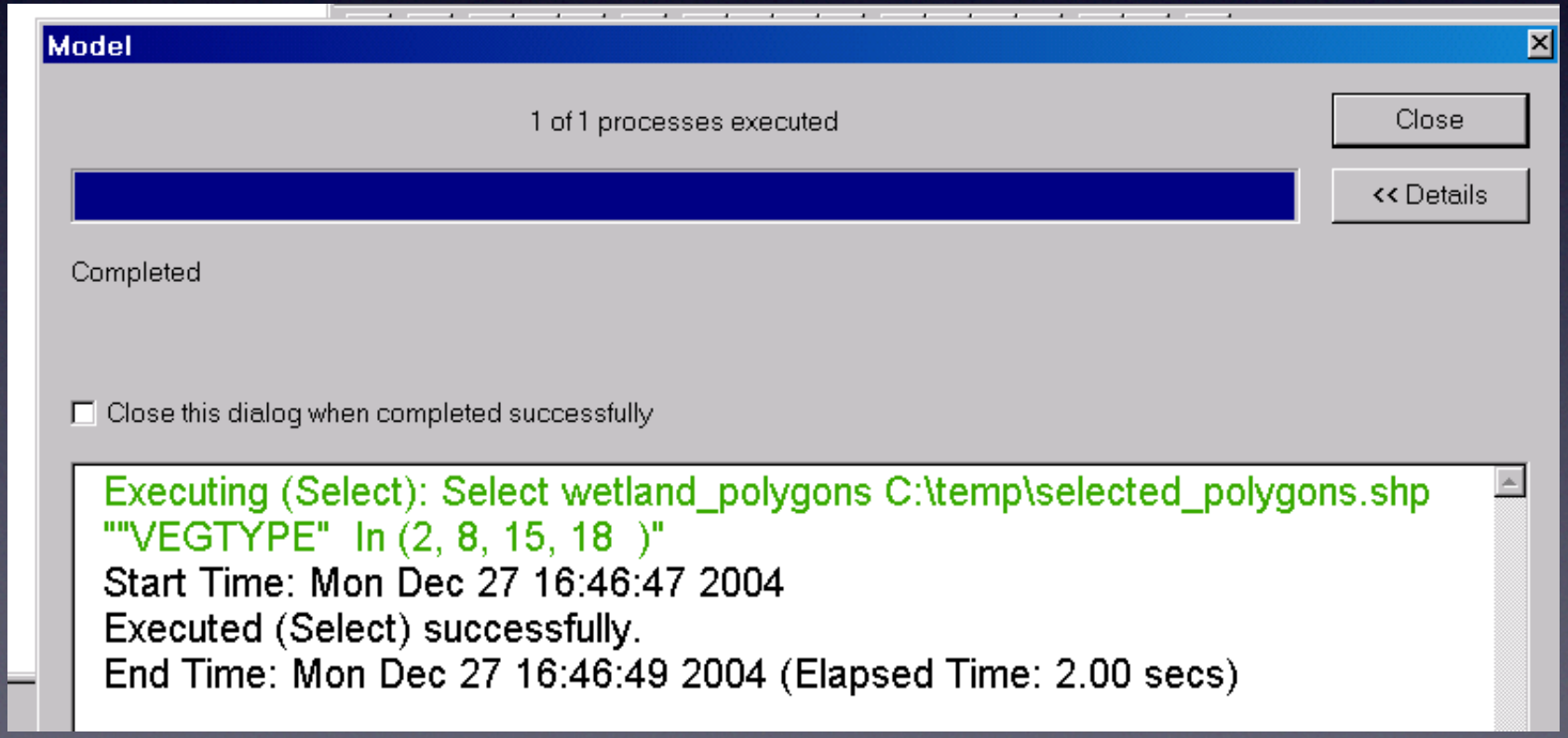

Select
Input Features
wetland_polygons
Output Feature Class
C:\temp\selected_polygons.shp
Expression (optional)
"VEGTYPE" In (2, 8, 15, 18)
SQL


Model
Model
Edit
View
Window
Help
wetland_ polygons
Select
selected _polygon

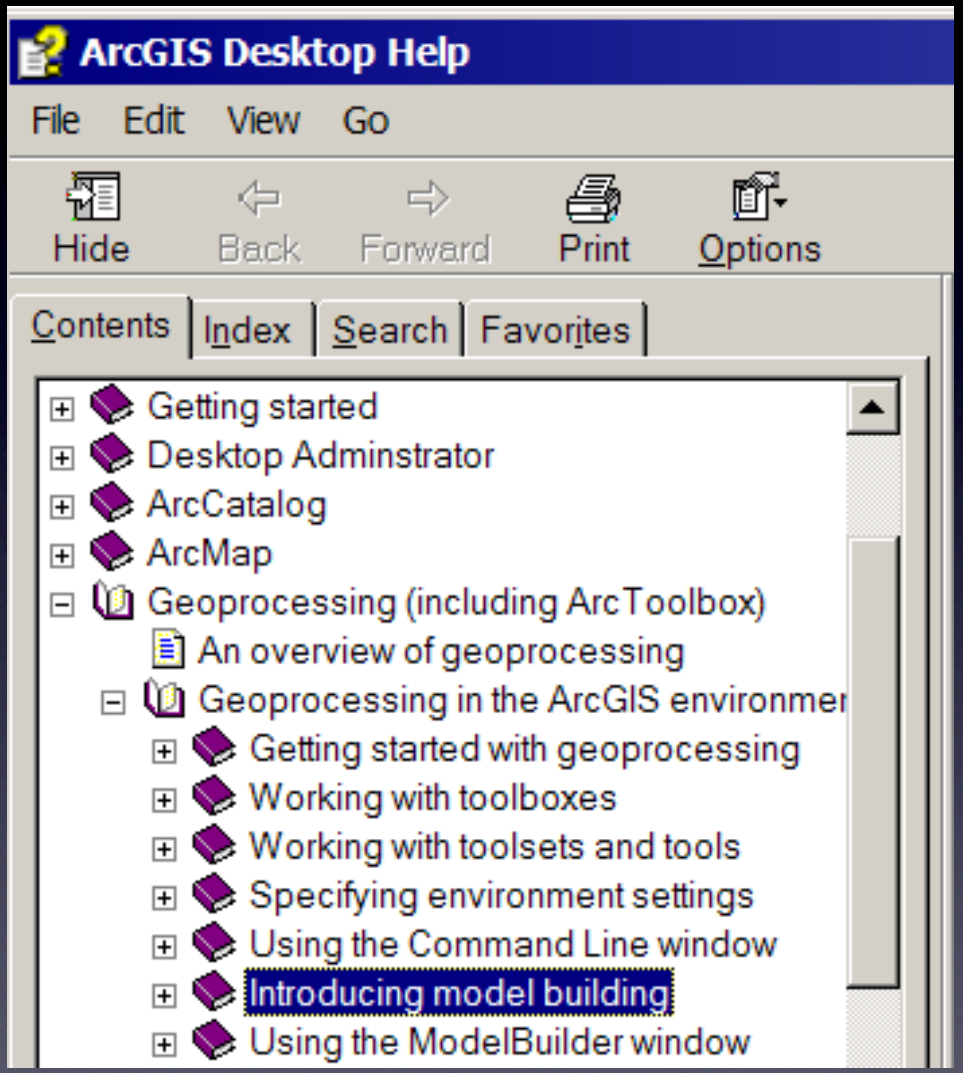
Validate & Run

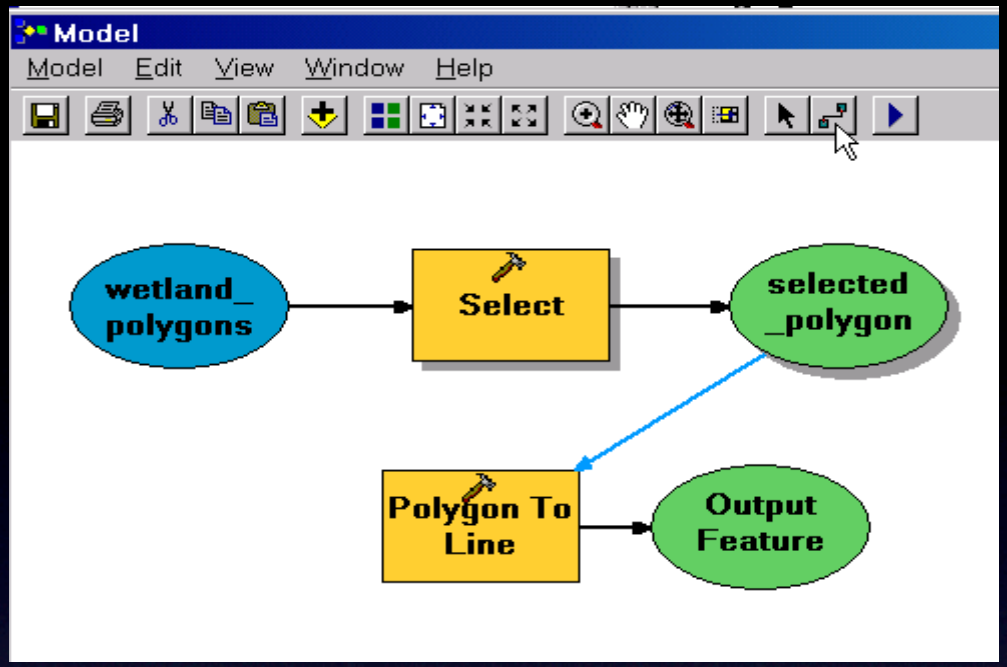


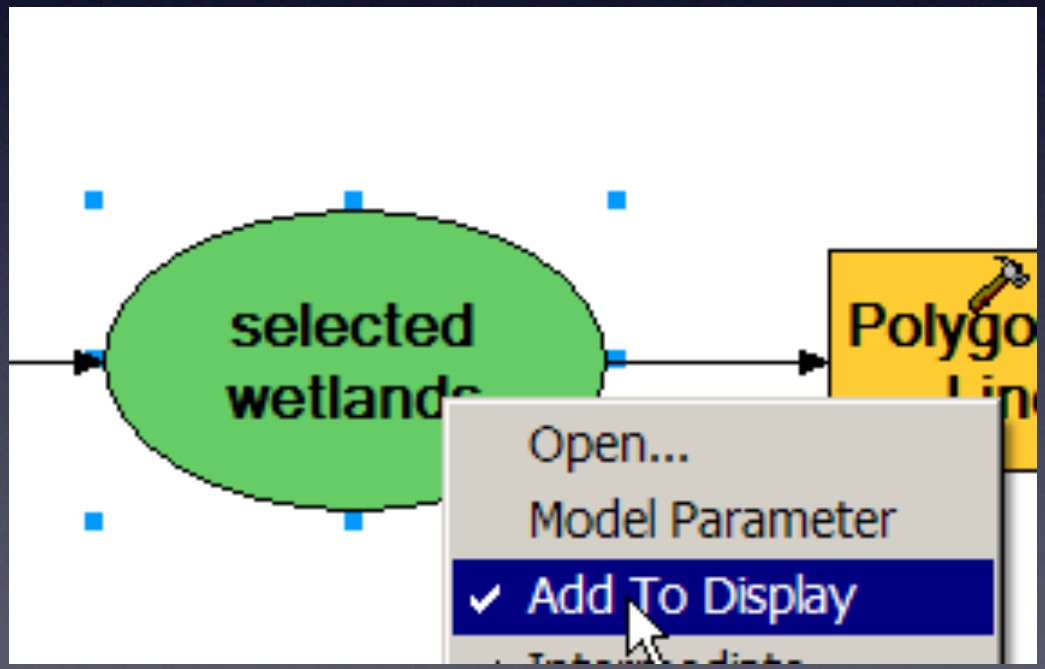




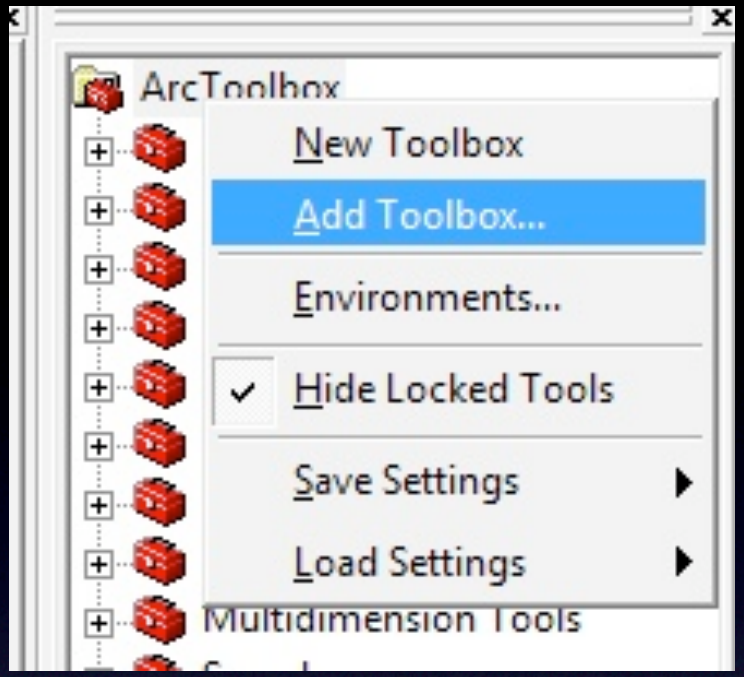
Connect graphically

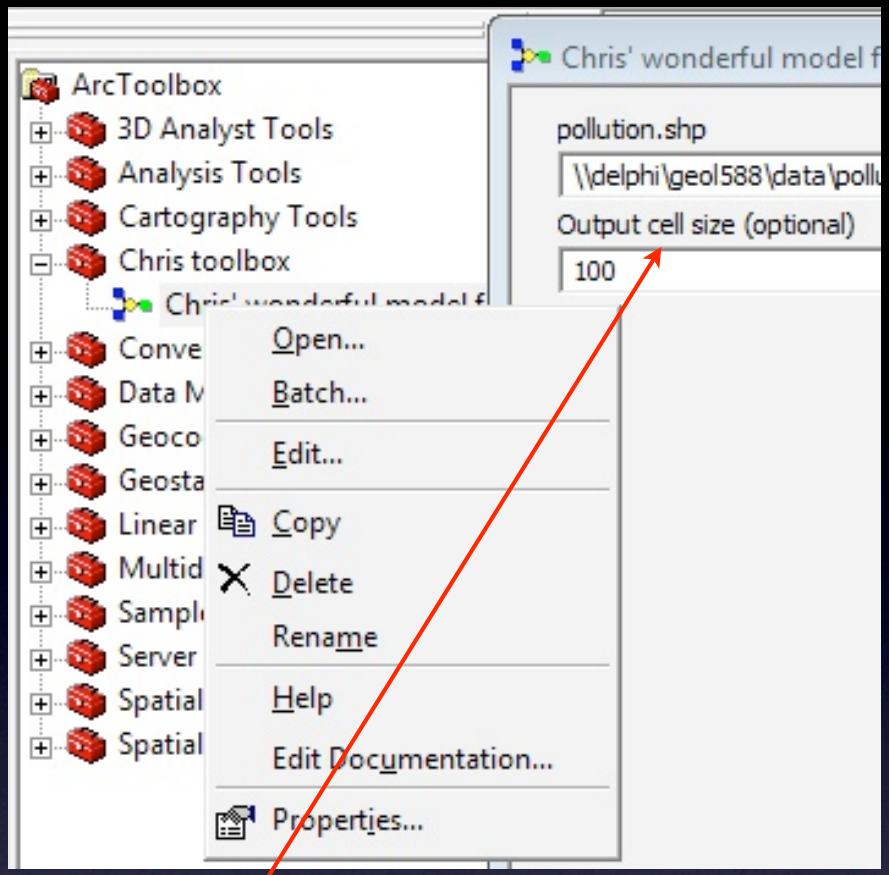




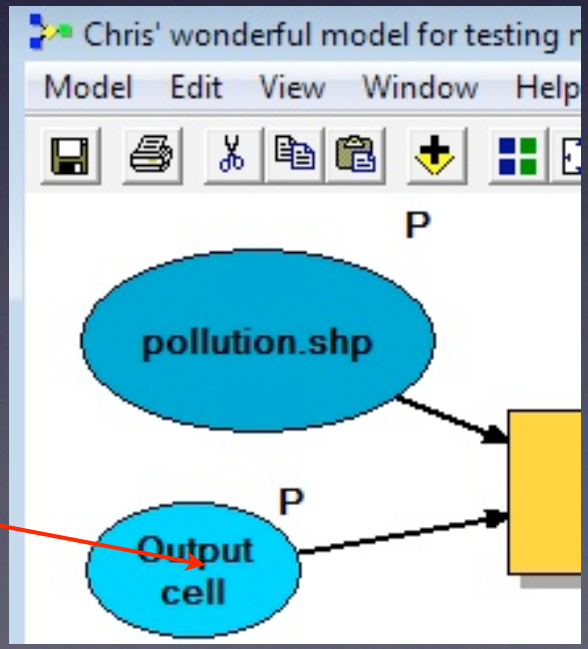


Add to display and TOC





- Need New Toolbox for your tools
- Tools must be saved/loaded from a Toolbox (folder)
- Open (2 x click) runs the tool (like internal tool)
- tool window Parameters (P) in graphic
- To change the internal program, use Edit



- ESRI support web help (Model builder)
- “What I wish I had known about ModelBuilder before I started using it”
- http://blogs.esri.com/Support/blogs/mappingcenter/archive/2009/02/19/10-things-I-wish-I-had-known-about-ModelBuilder-before-I-started-using-it.aspxhyperlink

Model Builder: practical case

- create a Modelbuilder folder in your student folder, add pollution points shape file
- change location for storing your tools in your folder (Tools > Options > Geoprocessing > My Toolboxes)!
- check: "overwrite output of geoprocessing operations"
- new ArcToolbox, (MyTools)
- new Model (Name: Interp_tool, Label: My Interpolation Tool, Store Relative path names!)
- Interpolate from bedrock_elevation points (different schemes and parameters) (call: samples
- Spatial Analysis Tools > Interpolation > IDW
- Connect Samples to IDW
- configure IDW tool, make sure output is saved locally (call IDW_result)

- output > Add to display (show changes). Save Tool and run model
- play with different IDW parameters(will overwrite!)
- Sp. A. Tools > Math > Minus Tool
- connect to IDW result
- add dem_steep, subtract IDW result from it
- check order: 2. input - 1. input
- Add result of subtraction to display
- Next: zonal statistics: sum of differences (= thickness)