



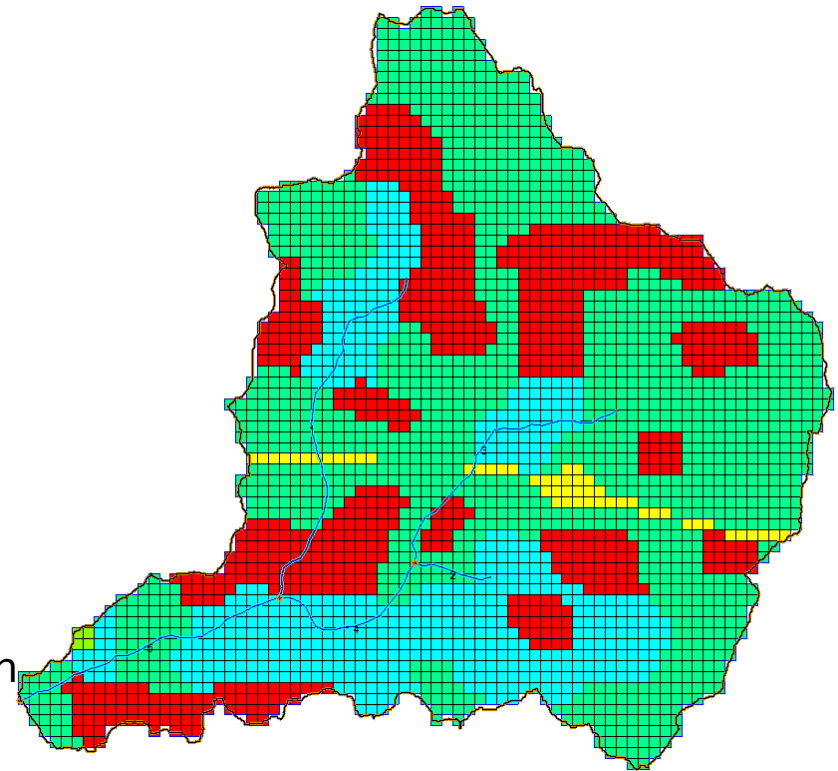
# Setting up Rainfall methods





# Base Model

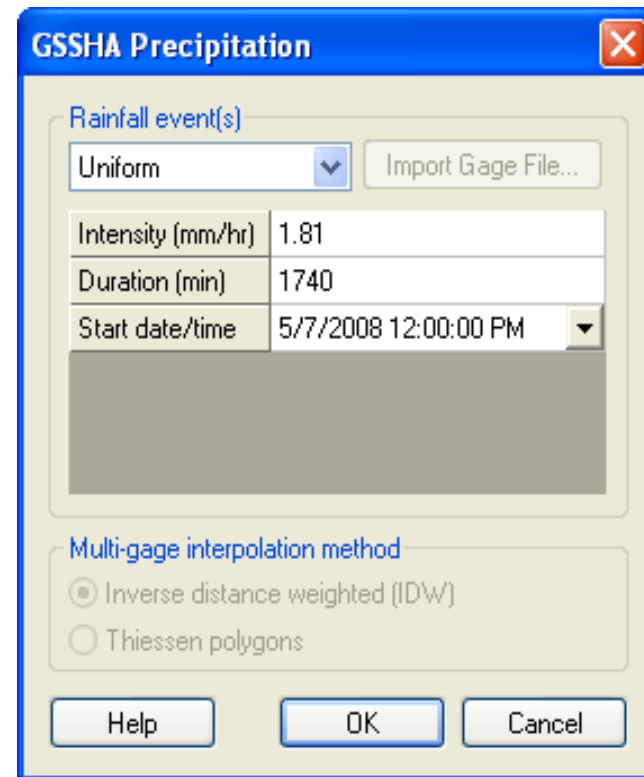
- We will continue working with the Judys Branch Watershed
- The base model that you will open has the following processes defined:
  - Uniform Precipitation
  - Distributed Infiltration
  - Distributed overland flow roughness
- You will change the precipitation methods to :
  - Uniform
  - Gage
  - Hyetograph
  - Nexrad Radar
- You will run the model with each of these precipitation methods and compare the results
- You will be using a real storm obtained from NOAA and use different temporal and spatial distributions
- The Nexrad Radar rainfall also corresponds to the same time period as gage data





# Using Uniform Precipitation

- The rainfall depth is uniformly distributed over time and is assumed to have same intensity all over the watershed
- Intensity: mm/hr
- Duration: min



The GSSHA Precipitation dialog box is shown, featuring a blue title bar with a close button. It contains two main sections: "Rainfall event(s)" and "Multi-gage interpolation method".

**Rainfall event(s)**

Uniform (dropdown menu) Import Gage File...

Intensity (mm/hr)	1.81
Duration (min)	1740
Start date/time	5/7/2008 12:00:00 PM (dropdown menu)

**Multi-gage interpolation method**

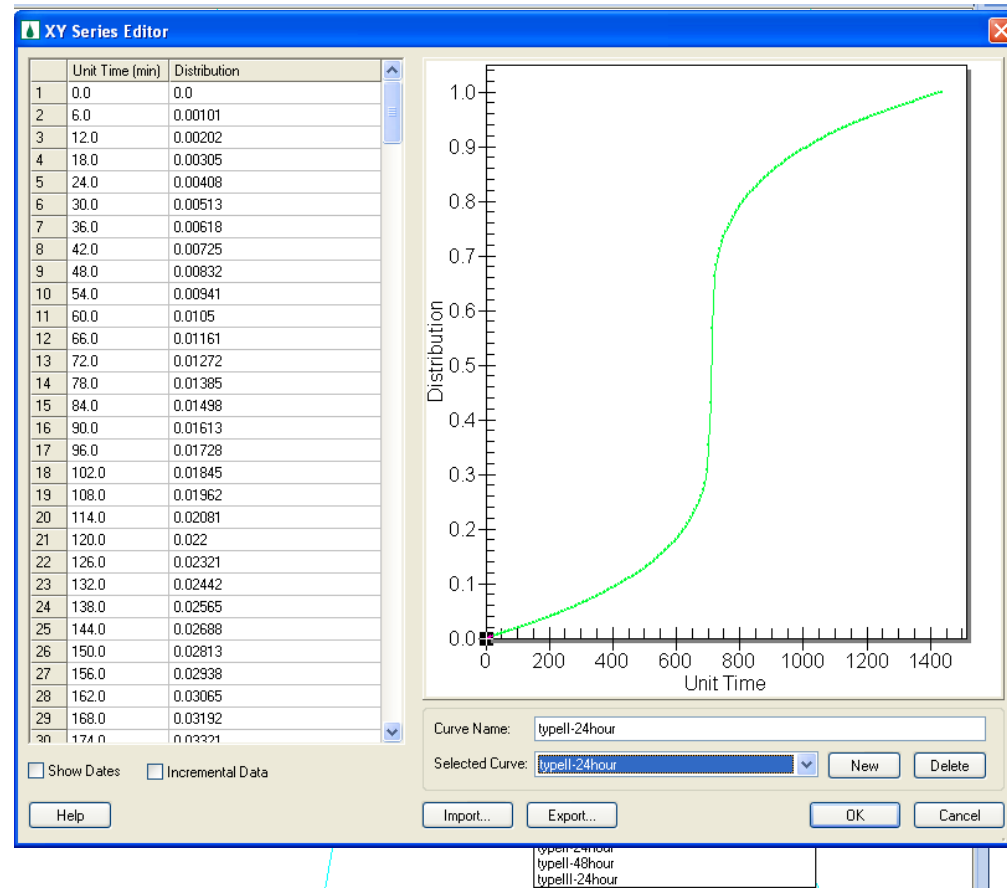
☒ Inverse distance weighted (IDW)  
☐ Thiessen polygons

Buttons: Help, OK, Cancel



# Using a design storm hyetograph

- This option is useful if the normalized temporal distribution is available (eg NRCS storms)
- The distribution is defined in the XY series editor and total storm depth(mm) is defined.
- This method can be used for multiple gages too





# Using Rain gages with IDW interpolation

- Multiple gages can be used but each gage must have the same temporal distribution of rainfall
- A rain gage coverage is created

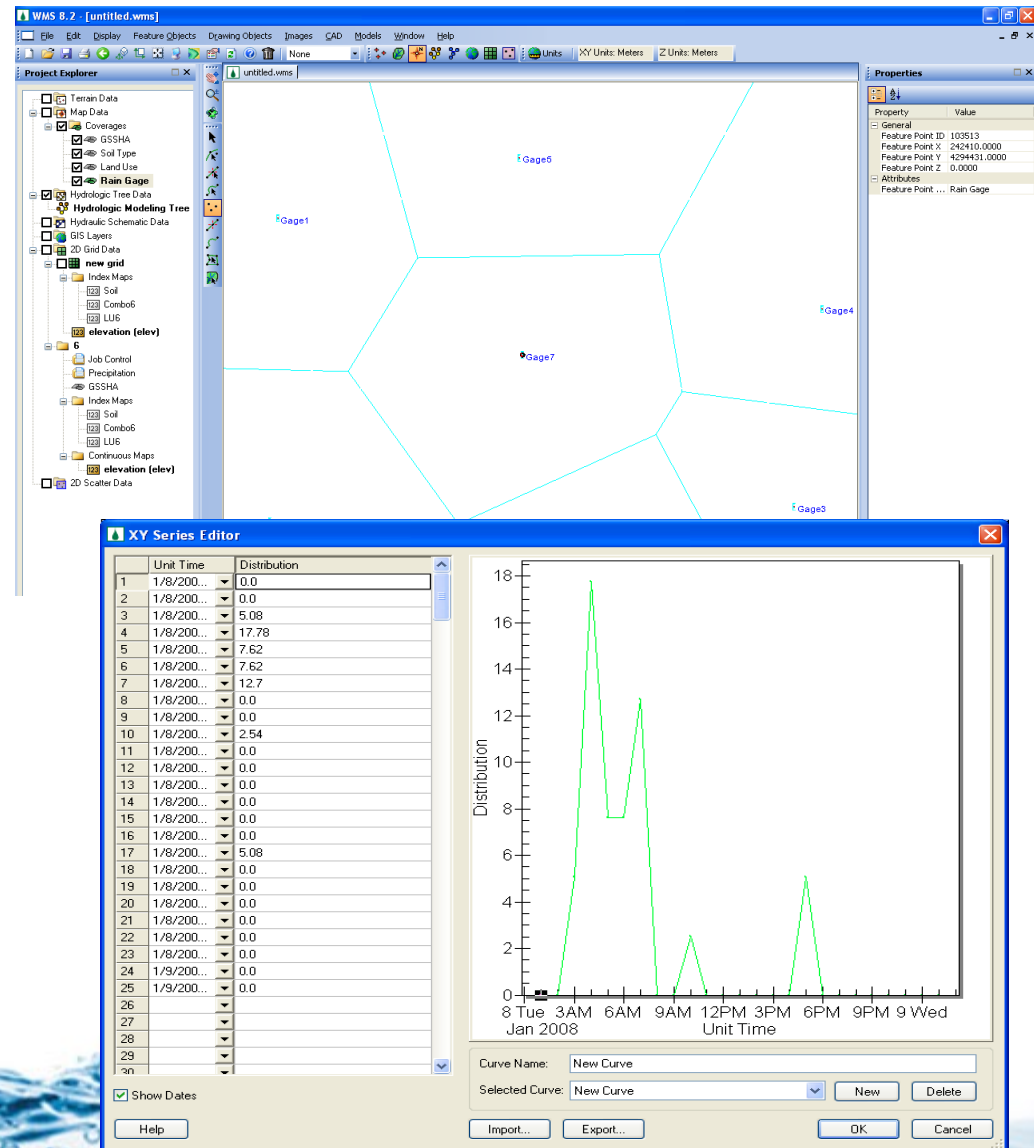
The screenshot shows the WMS 8.2 - [untitled.wms] application window. The 'Project Explorer' on the left lists various data layers, including 'Terrain Data', 'Map Data', 'Coverage', 'GS', 'Soil', 'Land', 'Hydrologic Tree Data', 'Hydrologic Modeling Tree', and 'Hydraulic Schematic Data'. A context menu is open over the 'Coverage' layer, showing options: 'New Coverage', 'New Folder', and 'Coordinate Conversion...'. The 'Properties' dialog box is also open, displaying a table of coverage properties.

Item	Value	Units
Coverage type:	Drainage	
Coverage name:	1D-Hyd Centerline	
Elevation:	1D-Hyd Cross Section	
	Area Property	
	CE-QUAL-W2 Branch	
Selected Coverage:	CE-QUAL-W2 Observation	
	CE-QUAL-W2 Segment	
Number of points:	Drainage	
Number of nodes:	Flood Barrier	
Number of arcs:	Flood Extent	
Number of polygons:	General	
	GSSHA	
	HY-8 Culvert	
All Coverages:	Land Use	
	MODRAT DPA Zone	
Number of points:	NSS Region	
Number of nodes:	Rain Gage	
	Rainfall Zone	
	Runoff Coefficient	
	Soil Type	
	Storm Drain	



# Using Rain gages with IDW interpolation

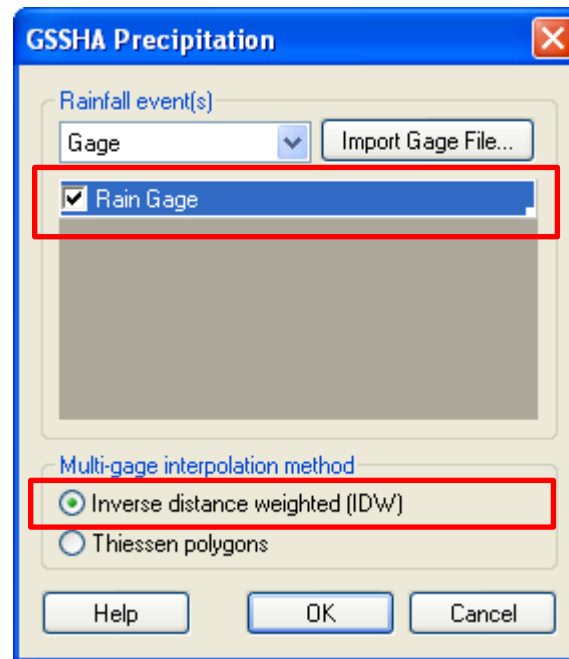
- Once the gages are created, they will be plotted and Thiessen polygons are generated automatically.
- The gages are created in the rain gage coverage
- You can then define the temporal distribution of the storms for each gage





# Using Rain gages with IDW interpolation

- Once all the gages are defined, go back to GSSHA | Precipitation and select "Rain Gage" coverage to be used to get the gage information

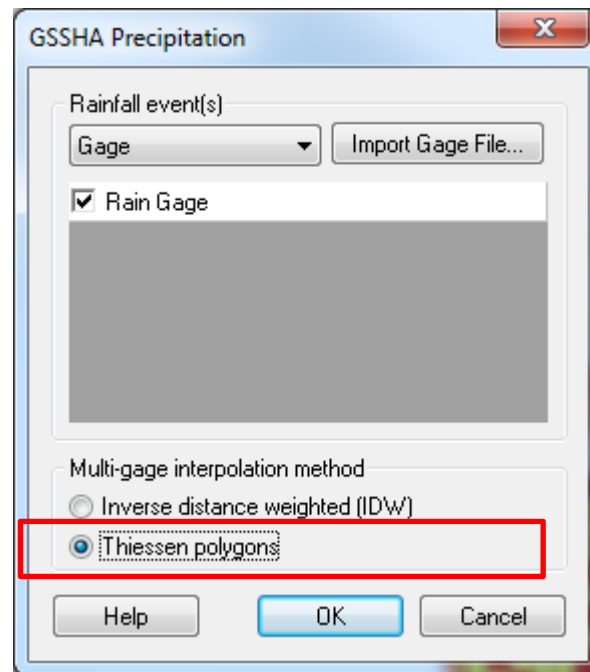






# Using Rain gages with Thiessen Polygon interpolation

- After running the previous model, go back to GSSHA | Precipitation and select "Rain Gage" coverage to be used to get the gage information and select *Thiessen polygons*
- Rerun the model

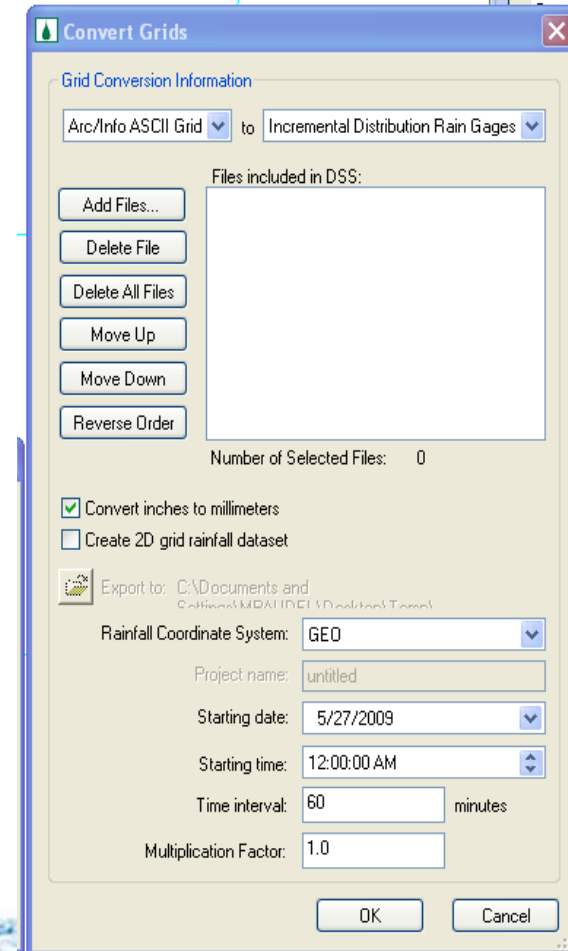
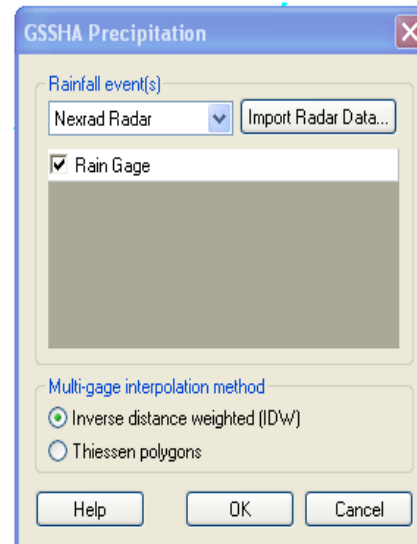




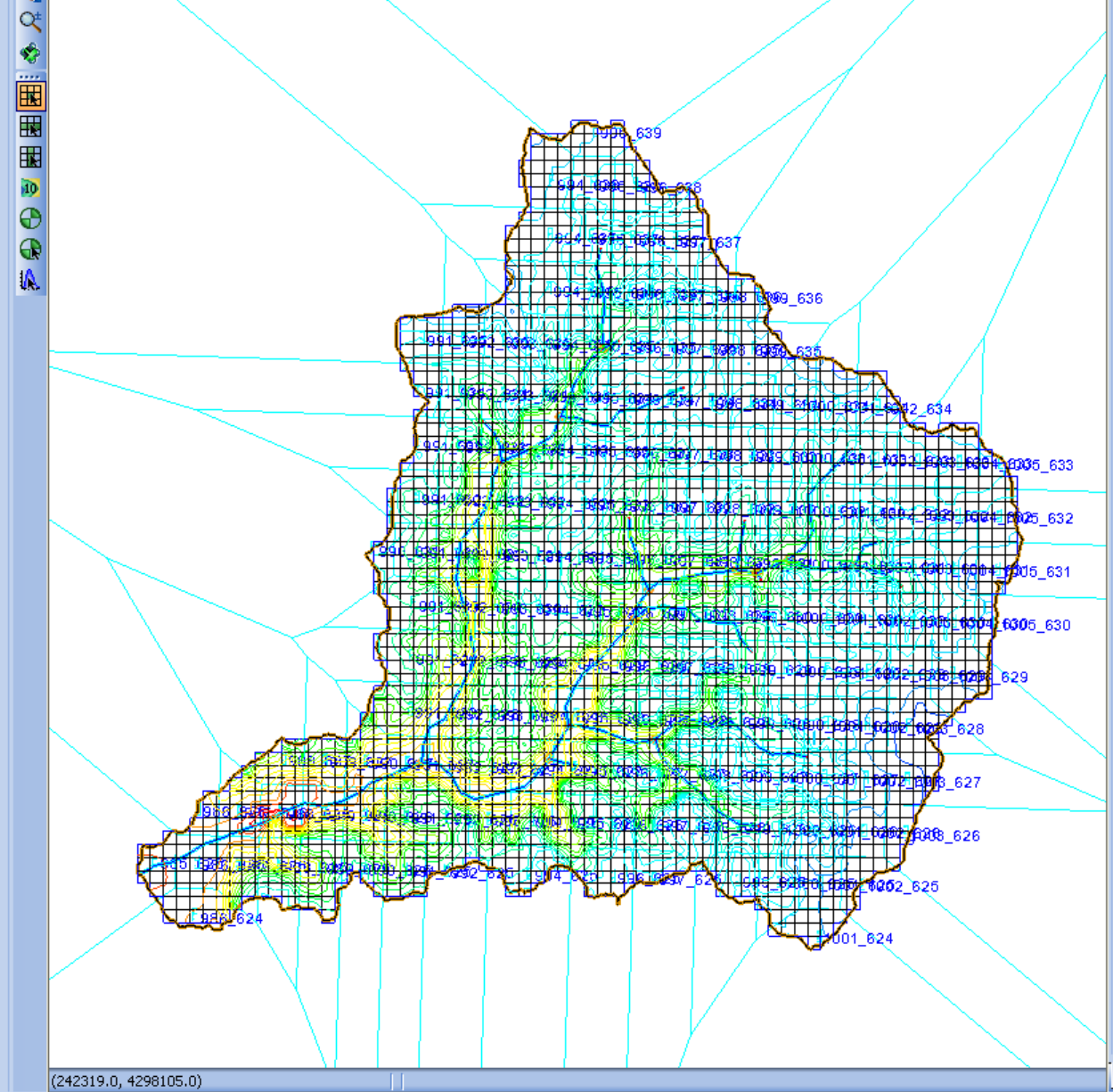


# Using NEXRAD Radar data

- NEXRAD radar data is used to define the spatially and temporally varying rainfall
- It involves more computation compared to previous methods.
- This will be discussed in more detail next.



- Terrain Data
- Map Data
  - Coverages
    - GSSHA
    - Soil Type
    - Land Use
    - Gridded Rainfall Gages
  - Hydrologic Tree Data
    - Hydrologic Modeling Tree
    - Hydraulic Schematic Data
  - GIS Layers
  - 2D Grid Data
    - new grid
      - Index Maps
        - 123 Uniform
        - 123 SoilType
        - 123 Land Use
        - 123 Combined
      - 123 elevation (elev)
    - nexrad
      - Job Control
      - Precipitation
      - GSSHA
      - Index Maps
        - 123 Uniform
        - 123 SoilType
        - 123 Land Use
        - 123 Combined
      - Continuous Maps
        - 123 elevation (elev)
    - 2D Scatter Data

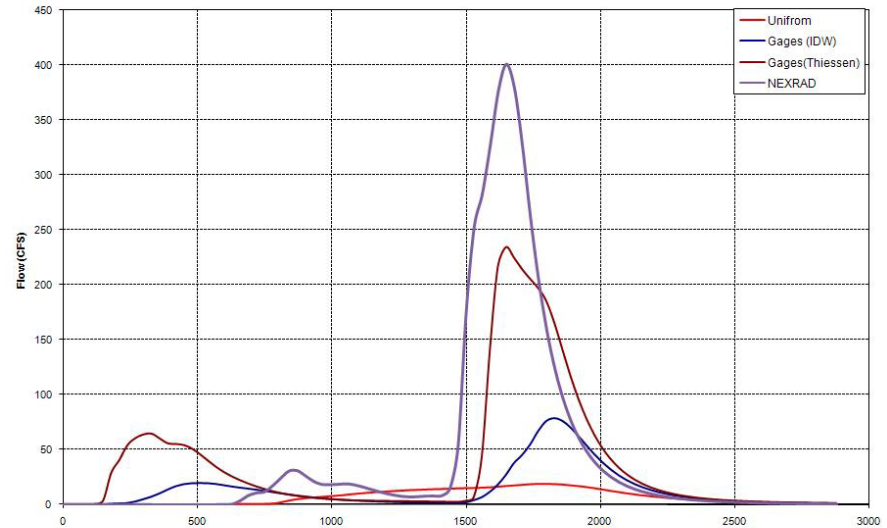


Property	Value
General	
Tree Name	Coverages

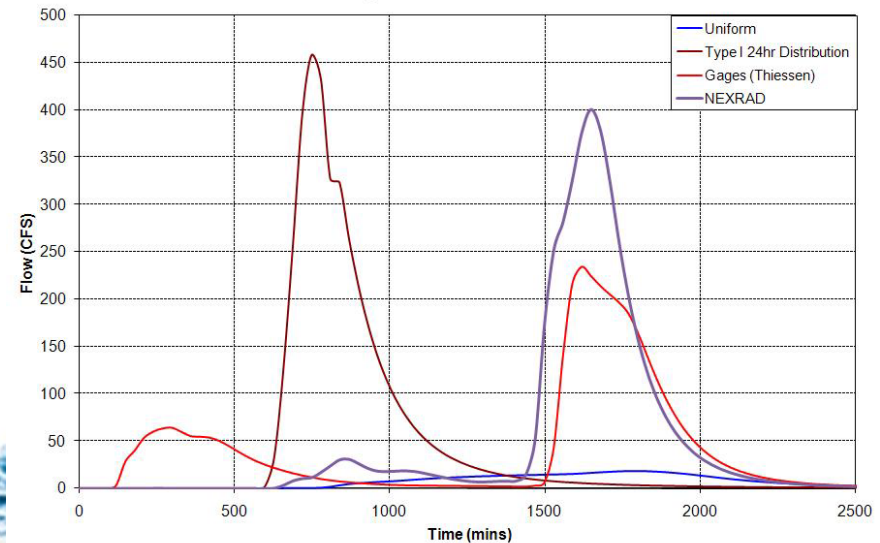


- At the end of each simulation run with a different precipitation method, you will copy the outflow hydrograph ordinates to a spreadsheet and compare the results

Spatial Variations - GSSHA



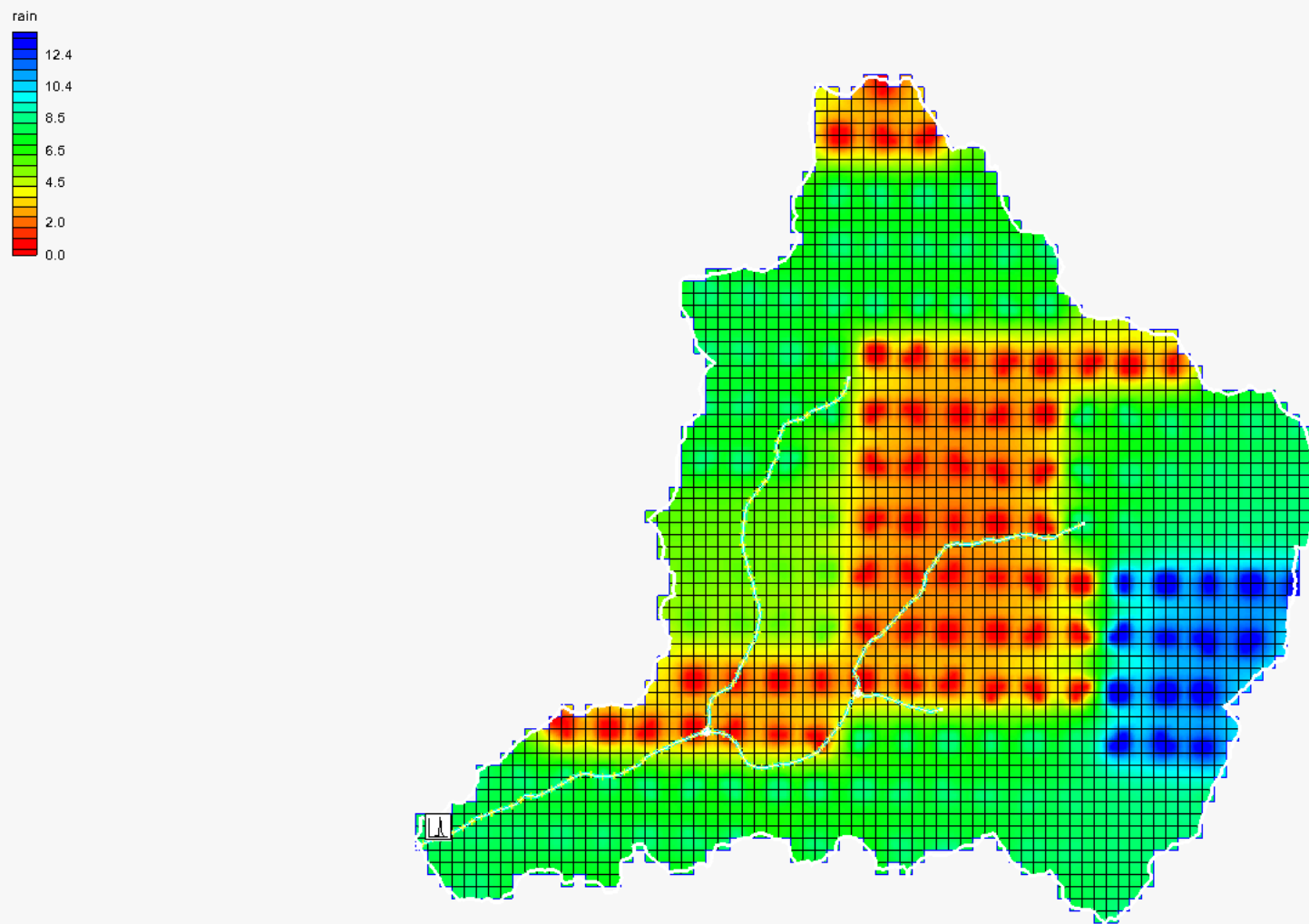
Temporal Variations - GSSHA





# Visualizing the Rainfall Data

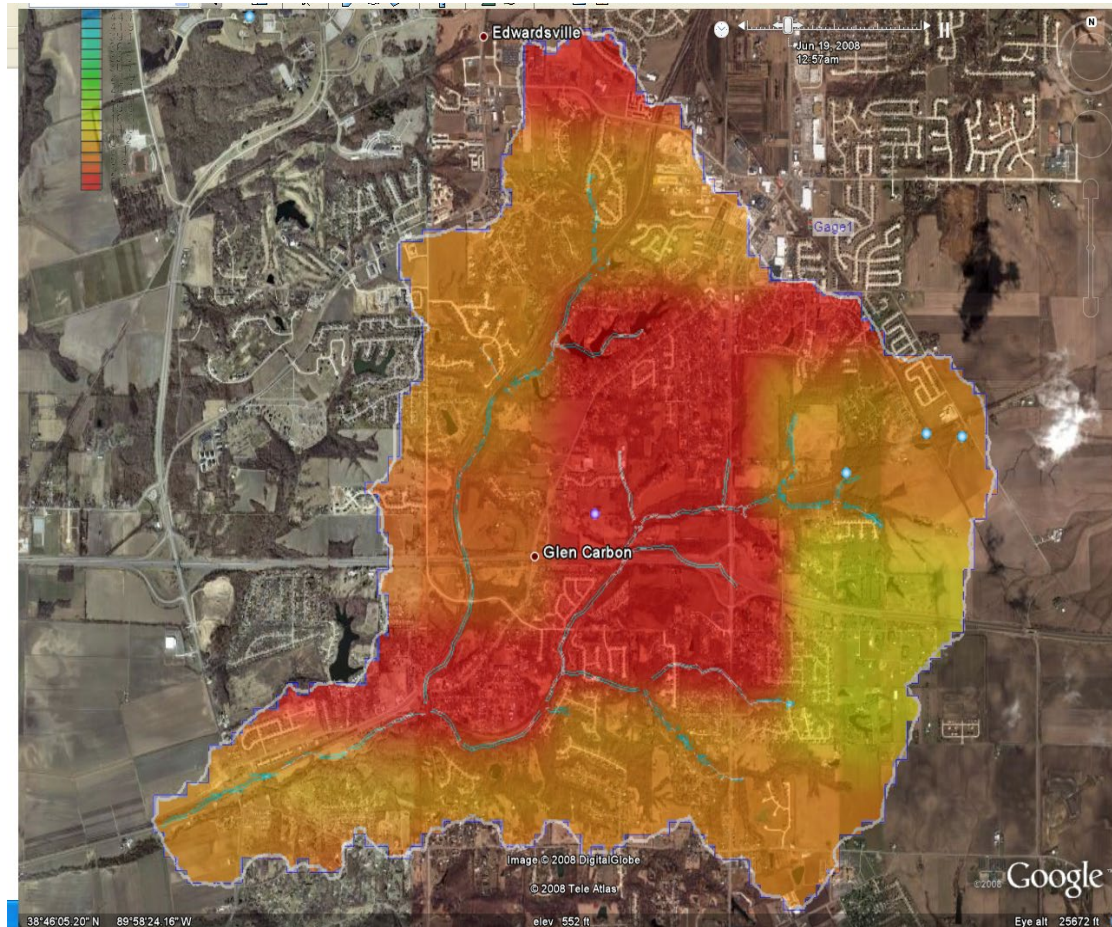
- The spatial variation of the precipitation can be animated in WMS





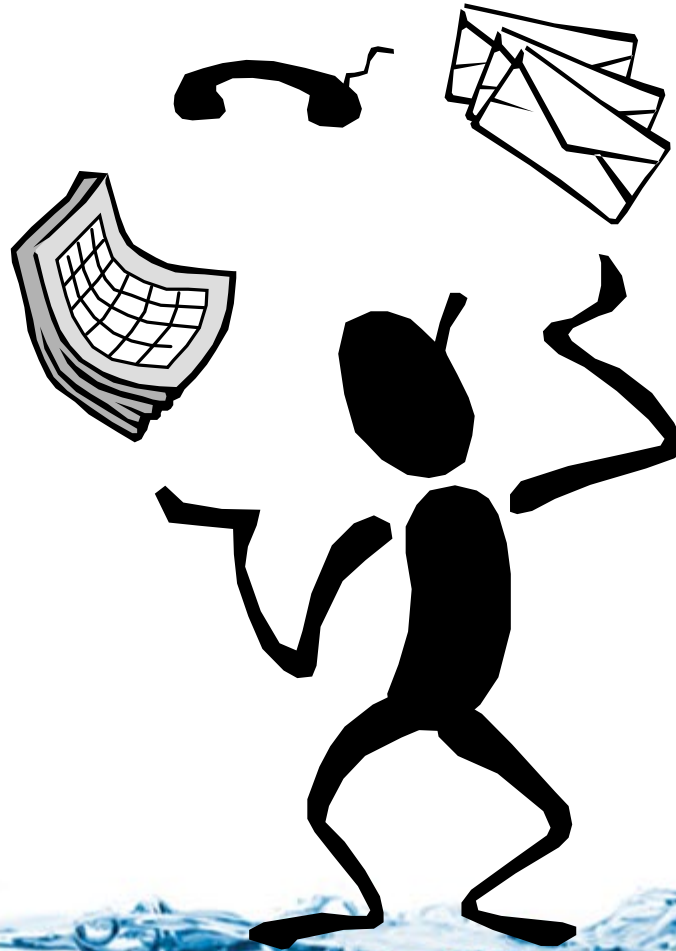


# Animations in Google Earth





# Demonstration





# Workshop

