



Watershed and Groundwater
Modeling Solutions

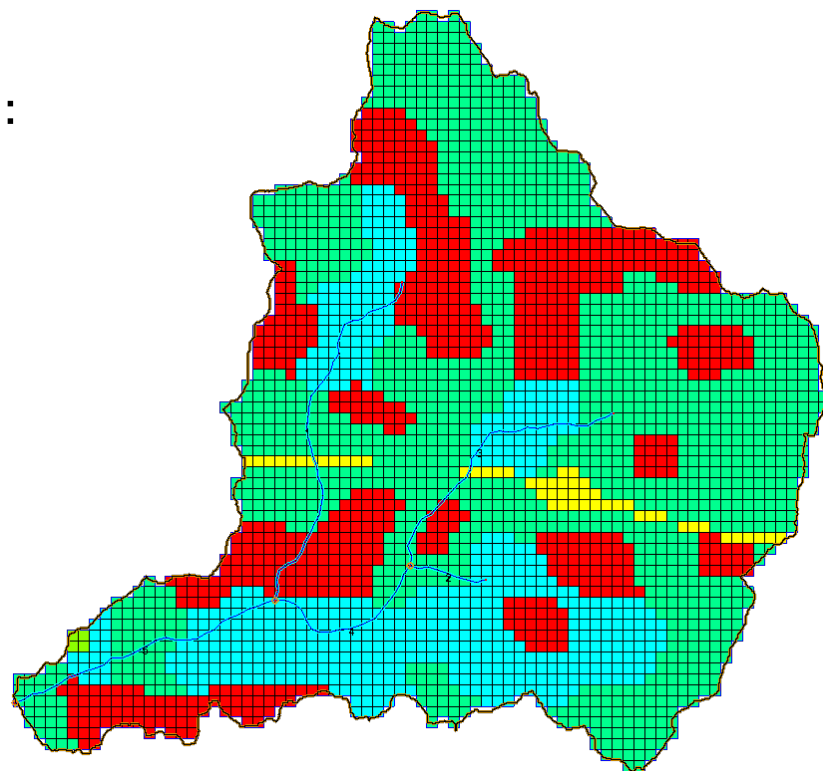
Long Term Simulations





Base Model

- We will continue working with the Judys Branch Watershed
- The base model that you will open has the following processes defined:
 - Event Precipitation
 - Distributed Infiltration
 - Distributed overland flow roughness
- You will change the precipitation to a gage file that has multiple storm events
- You will then add evapo-transpiration parameters necessary to run a long term simulation.
- You will use the Time Series Data Editor to process some of the input data





Data Requirement

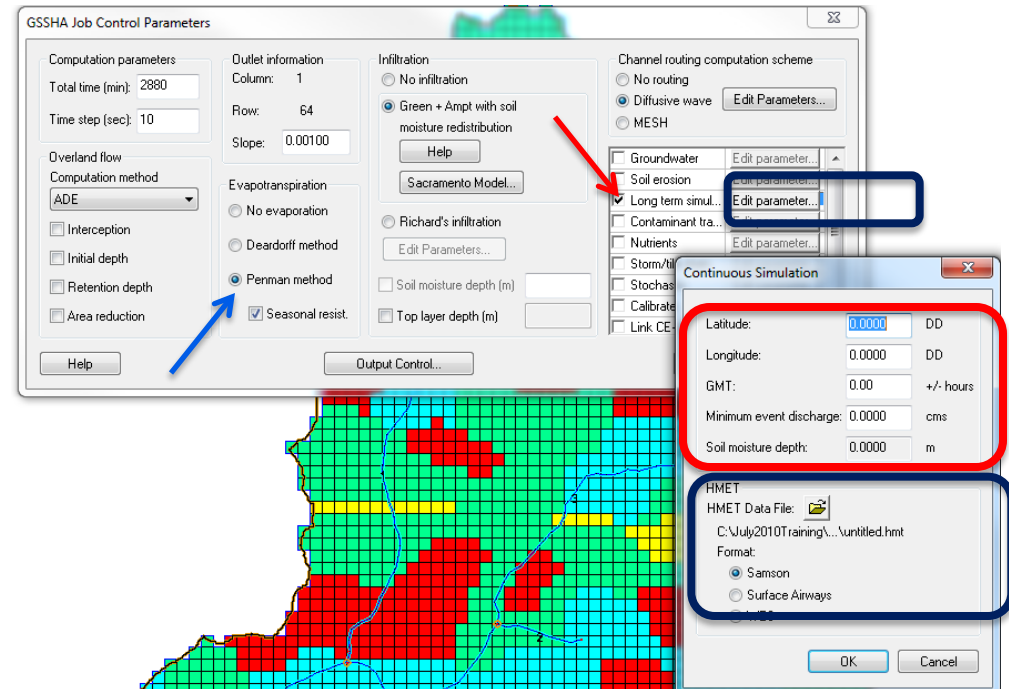
- You need the following data to run a long term simulation in GSSHA:
 - Precipitation data with multiple storm events
 - HMET data for the same duration of time as the precipitation
- These data need to be formatted to a format GSSHA can handle
- Evapo-transpiration parameters for the watershed





Job Control Setup

- You will need to turn on the Evapotranspiration
- and then the Long Term simulation options in the Job Control
- Edit parameters for Long Term simulation and enter the following data
 - Lat and Long for the HMET station
 - Time with reference to GMT
 - An HMET file





Map Tables

Update the parameters in the mapping tables for Evapotranspiration

GSSHA Map Table Editor

Soil Erosion Contaminants Nutrients **Continuous Maps** Groundwater
Roughness Interception Retention **Evapotranspiration** Infiltration Initial Moisture

Using index map: Land use

Generate IDs Add ID Delete ID

Evapotranspiration					
ID	11	14	16	21	41
Description1	Evapotrans ...	Evapotrans ...	Evapotrans ...	Evapotrans ...	Evapotrans ...
Description2
Land-surface albedo	0.150000	0.220000	0.220000	0.220000	0.200000
Wilting point (m ³ /m ³)	0.100000	0.100000	0.100000	0.100000	0.100000
Vegetation height (m)	0.080000	0.100000	0.500000	1.000000	17.000000
Vegetation radiation coeff	0.700000	0.500000	0.350000	0.200000	0.150000
Canopy stomatal resistance (s/m)	20.000000	20.000000	50.000000	86.000000	100.000000

Help Import Table... Export Table... Job Control Done



Formatting Precipitation Data

- The raw precipitation data generally comes in a format that cannot be used in GSSHA directly.
- The Time Series Data Editor will be used to process the data which helps you export it in a format GSSHA needs
- Open the raw data in the time series data editor which will open in the File Import Wizard

	Column1	Column2	Column3	Column4	Column5
▶	# 05588710	Judy's Branch ...			
	# Date	Time	Precipitation ...		
	# (yr/mo/dy)	(hr:mn)	(inches)	(---, missing v...	
	20010823	0000	0.00		
	20010823	0005	0.00		



Formatting Precipitation Data

- Switch to Fixed width and split the columns as necessary
- Map each of the columns as
- Then the data will show up in the time series data editor plot window as well as in the project explorer

Column	Mapping Data
Column 0	Year
Column 1	Month
Column 2	Day
Column 3	Hour
Column 4	Minute
Column 5	Value

0

05588710

Date Time

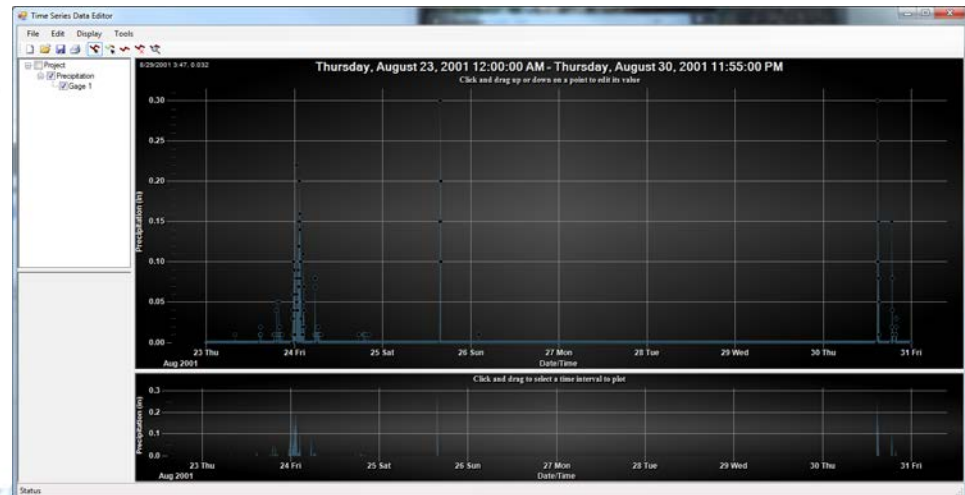
(yr/mp/dy)

20010823

20010823

20010823

20010823

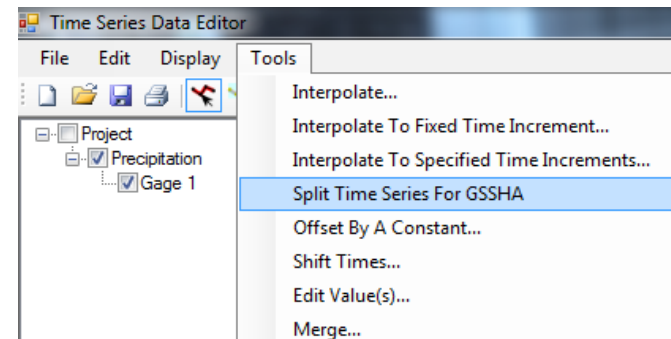
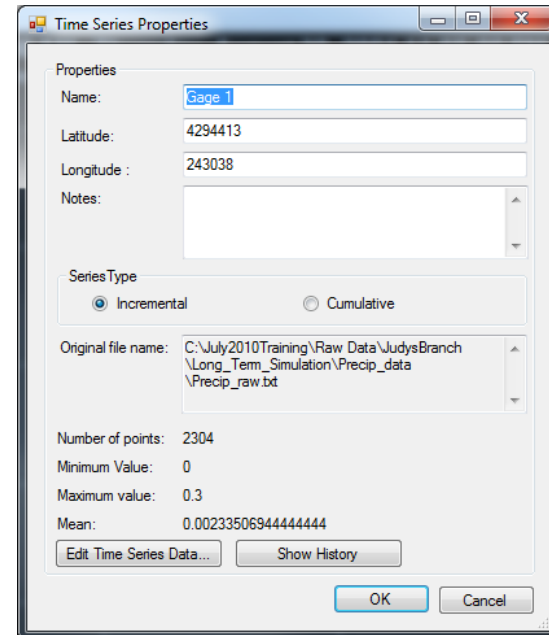




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Formatting Precipitation Data

- Edit the properties of the precip data and enter the rain gage coordinates
- The raw needs to be split into individual storms.
- We are assuming that if there is no rainfall for longer than 12 hours (720 minutes) then additional precipitation defines a new storm
- Use time series data editor to split the storms





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Formatting Precipitation Data

- Save the file as a GSSHA *.gag file

```
Precip_formatted.txt - Notepad
File Edit Format View Help
EVENT 'Storm Event # 1'
NRPDS 439
NRGAG 1
COORD 243038 4294413
GAGES 2001 8 23 7 45 0
GAGES 2001 8 23 7 50 0.254
GAGES 2001 8 23 7 55 0
GAGES 2001 8 23 8 0 0
GAGES 2001 8 23 8 5 0
GAGES 2001 8 23 8 10 0
GAGES 2001 8 23 8 15 0
GAGES 2001 8 23 8 20 0
GAGES 2001 8 23 8 25 0
GAGES 2001 8 23 8 30 0
-----
```



Formatting HMET

- As discussed in the previous lecture, an HMET file needs the following data
- The raw data file has all these information but in a different order and at different locations
- So we will use the time series data editor again and get the HMET file formatted the way GSSHA needs

Date
Hour
Barometric Pressure
Relative humidity
Sky Cover
Wind Speed
Temperature
Direct Radiation
Global Radiation

	A	B	C	D	E	F	G
1	Date	Time	Wind	Sky (8ths)	Temp (C)	RH%	Altimeter (Inches)
2	20010823	0000Z	19011KT	7	32	54	29.90
3	20010823	0100Z	20007KT	4	29	61	29.92
4	20010823	0200Z	20007KT	4	27	73	29.93
5	20010823	0300Z	21006KT	4	27	73	29.92
6	20010823	0400Z	23007KT	4	26	78	29.93
7	20010823	0500Z	22004KT	4	26	78	29.94

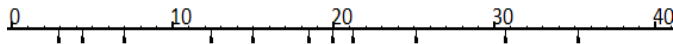
	A	B	C	D	E	F
1	year	mo	day	hr (Z)	direct rad	total global rad
2	2001	8	23	00	0	41.99586496
3	2001	8	23	01	0	0
4	2001	8	23	02	0	0
5	2001	8	23	03	0	0
6	2001	8	23	04	0	0
7	2001	8	23	05	0	0



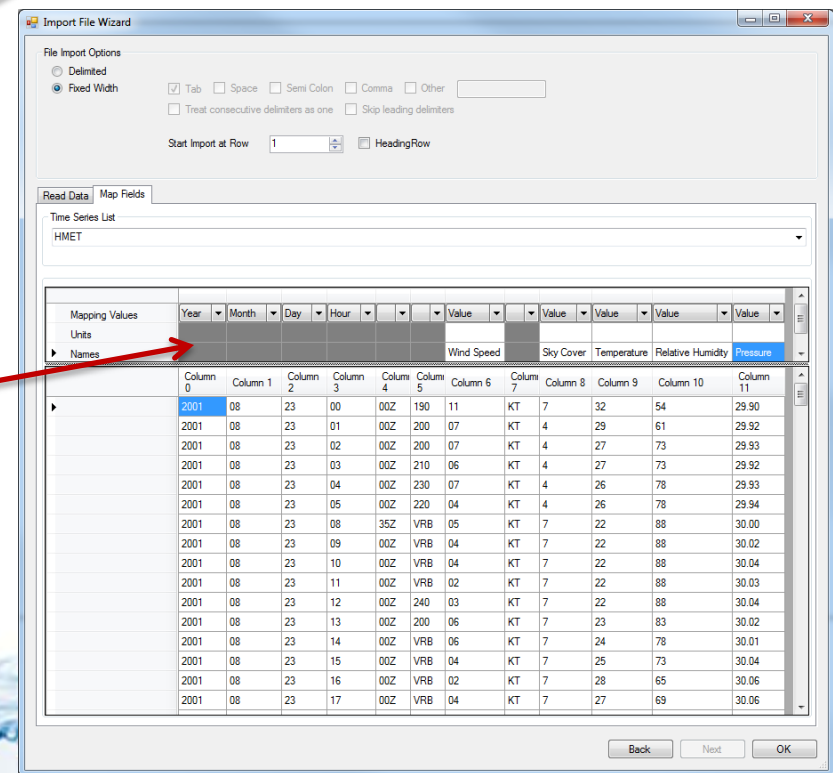


Formatting HMET

- As shown in previous slide, the raw data has two different time series which need to be imported into the time series data editor separately
- Use file import wizard, switch to Fixed Width and split the columns as required
- Map the data into the proper parameter names



Date	Time	Wind	Sky (8ths)	Temp (
20010823	0000Z	19011KT	7	29.90
20010823	0100Z	20007KT	4	29.92
20010823	0200Z	20007KT	4	29.93
20010823	0300Z	21006KT	4	29.92
20010823	0400Z	23007KT	4	29.93



Import File Wizard

File Import Options

☐ Delimited

☒ Fixed Width

☒ Tab ☐ Space ☐ Semi Colon ☐ Comma ☐ Other

☐ Treat consecutive delimiters as one ☐ Skip leading delimiters

Start Import at Row: 1 ☐ Heading Row

Read Data | Map Fields

Time Series List

HMET

Mapping Values	Year	Month	Day	Hour	Value	Value	Value	Value	Value
Units									
Names					Wind Speed	Sky Cover	Temperature	Relative Humidity	Pressure

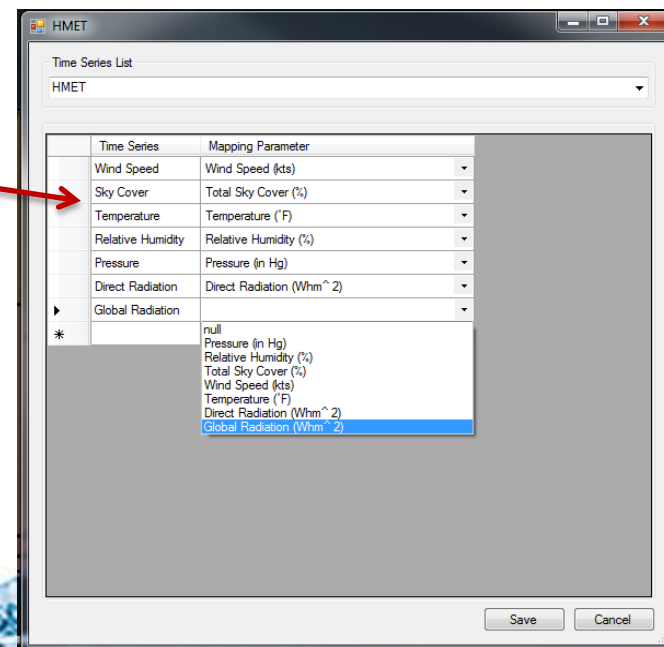
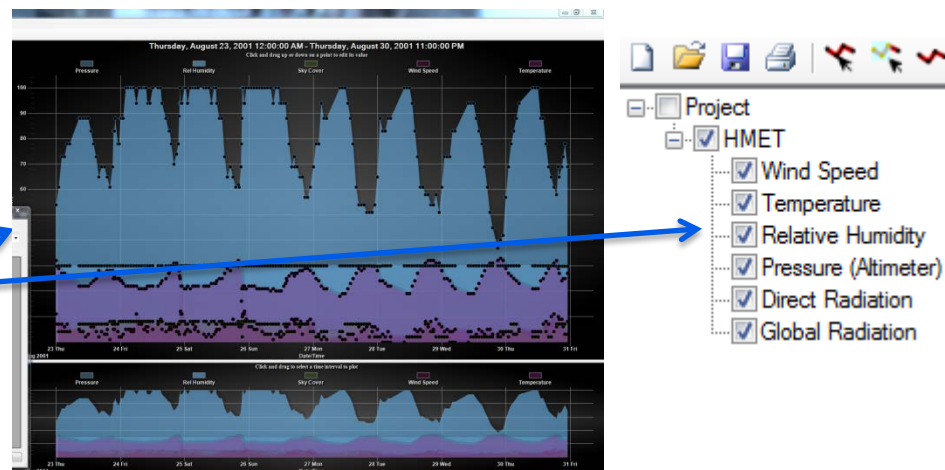
	Column 0	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11
	2001	08	23	00	00Z	190	11	KT	7	32	54	29.90
	2001	08	23	01	00Z	200	07	KT	4	29	61	29.92
	2001	08	23	02	00Z	200	07	KT	4	27	73	29.93
	2001	08	23	03	00Z	210	06	KT	4	27	73	29.92
	2001	08	23	04	00Z	230	07	KT	4	26	78	29.93
	2001	08	23	05	00Z	220	04	KT	4	26	78	29.94
	2001	08	23	08	35Z	VRB	05	KT	7	22	88	30.00
	2001	08	23	09	00Z	VRB	04	KT	7	22	88	30.02
	2001	08	23	10	00Z	VRB	04	KT	7	22	88	30.04
	2001	08	23	11	00Z	VRB	02	KT	7	22	88	30.03
	2001	08	23	12	00Z	240	03	KT	7	22	88	30.04
	2001	08	23	13	00Z	200	06	KT	7	23	83	30.02
	2001	08	23	14	00Z	VRB	06	KT	7	24	78	30.01
	2001	08	23	15	00Z	VRB	04	KT	7	25	73	30.04
	2001	08	23	16	00Z	VRB	02	KT	7	28	65	30.06
	2001	08	23	17	00Z	VRB	04	KT	7	27	69	30.06

Back Next OK



Formatting HMET

- Once you import both HMET series, they will show up in the time series data editor's plot window as well as on the project explorer
- Save the data as a *.hmt file which will ask you to map the parameters
- Time Series data editor will try to map the parameters looking at the names you defined while importing them, you need to make sure and change if necessary





Formatting HMET

- The formatted HMET data will look like this

2001	8	23	0	29.90	54.00	88	11.00	32.00	0.00	42.00
2001	8	23	1	29.92	61.00	50	7.00	29.00	0.00	0.00
2001	8	23	2	29.93	73.00	50	7.00	27.00	0.00	0.00
2001	8	23	3	29.92	73.00	50	6.00	27.00	0.00	0.00
2001	8	23	4	29.93	78.00	50	7.00	26.00	0.00	0.00
2001	8	23	5	29.94	78.00	50	4.00	26.00	0.00	0.00
2001	8	23	6	99.999	999 999 999	999 99999.99	99999.99			
2001	8	23	7	99.999	999 999 999	999 99999.99	99999.99			
2001	8	23	8	30.00	88.00	88	5.00	22.00	9999.99	9999.99
2001	8	23	9	30.02	88.00	88	4.00	22.00	0.00	0.00
2001	8	23	10	30.04	88.00	88	4.00	22.00	0.00	0.00
2001	8	23	11	30.03	88.00	88	2.00	22.00	0.00	0.00
2001	8	23	12	30.04	88.00	88	3.00	22.00	1.57	39.68
2001	8	23	13	30.02	83.00	88	6.00	23.00	28.07	157.48
2001	8	23	14	30.01	78.00	88	6.00	24.00	107.81	322.95
2001	8	23	15	30.04	73.00	88	4.00	25.00	172.81	455.41
2001	8	23	16	30.06	65.00	88	2.00	28.00	231.28	562.09
2001	8	23	17	30.06	69.00	88	4.00	27.00	253.07	616.55
2001	8	23	18	30.05	69.00	88	3.00	27.00	260.92	635.77
2001	8	23	19	30.04	65.00	88	5.00	28.00	299.16	652.75
2001	8	23	20	30.04	61.00	100	1.00	28.00	216.25	553.11

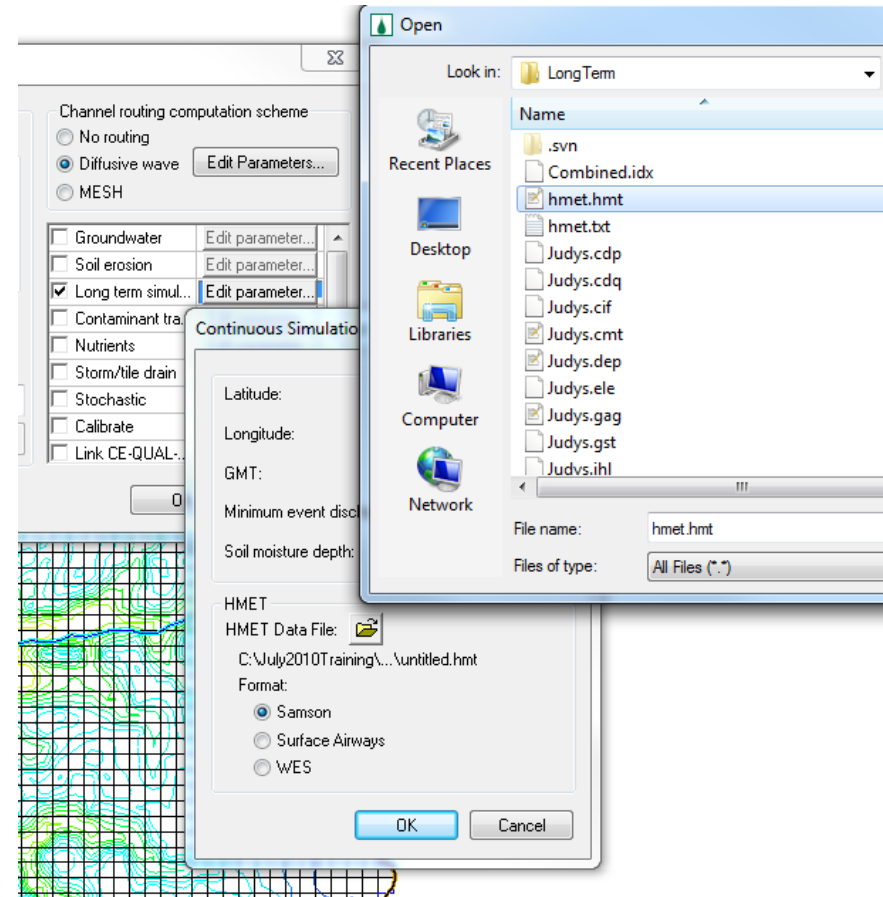
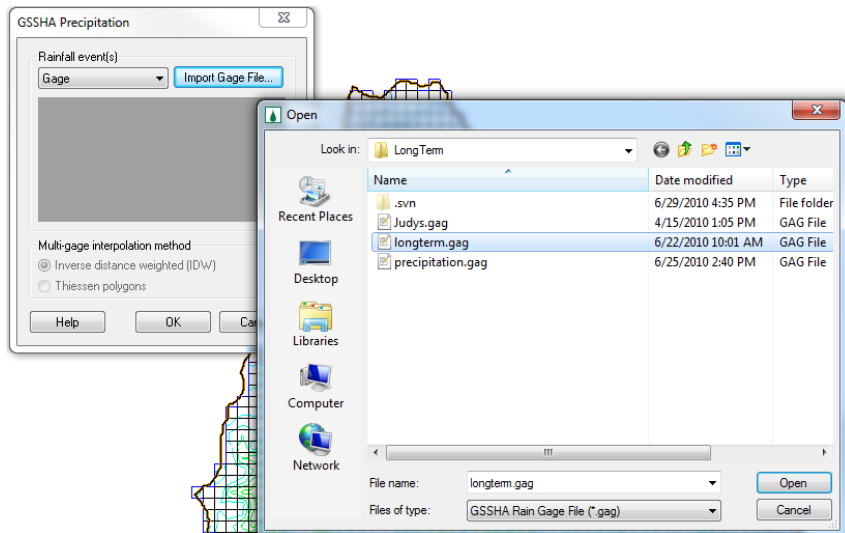
- All 99's represent no data





Import .gag and .hmt files

- You will now import the gage file as well as the .hmt file into your model

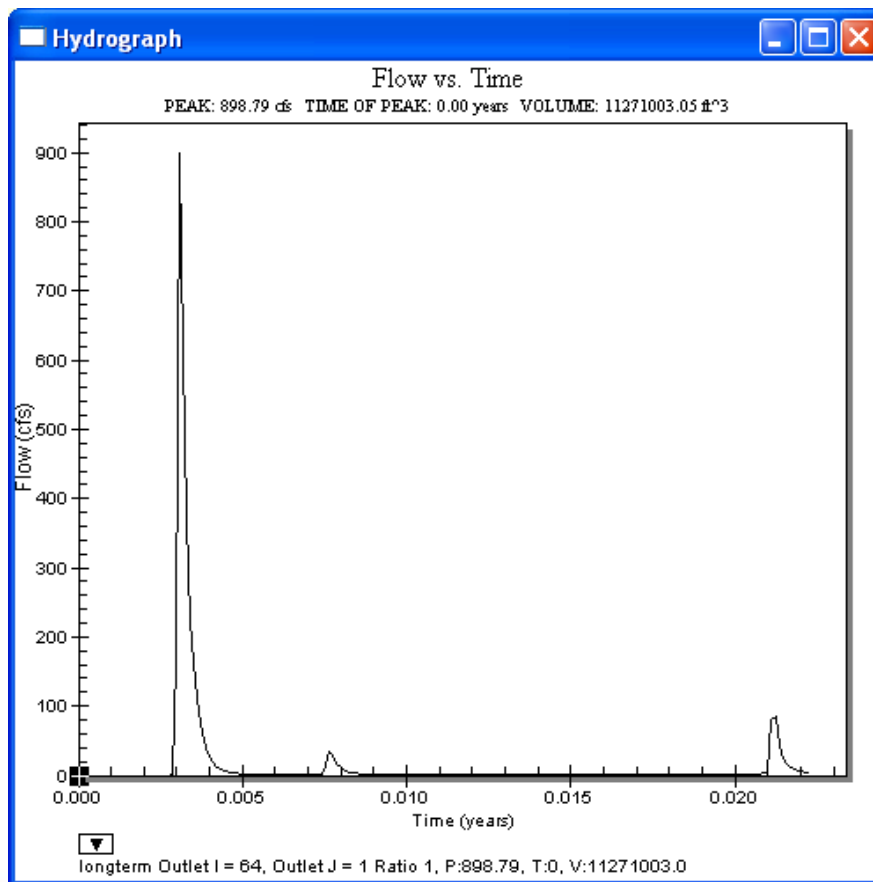




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Save and Run the Model

- You are now ready to save and run the model

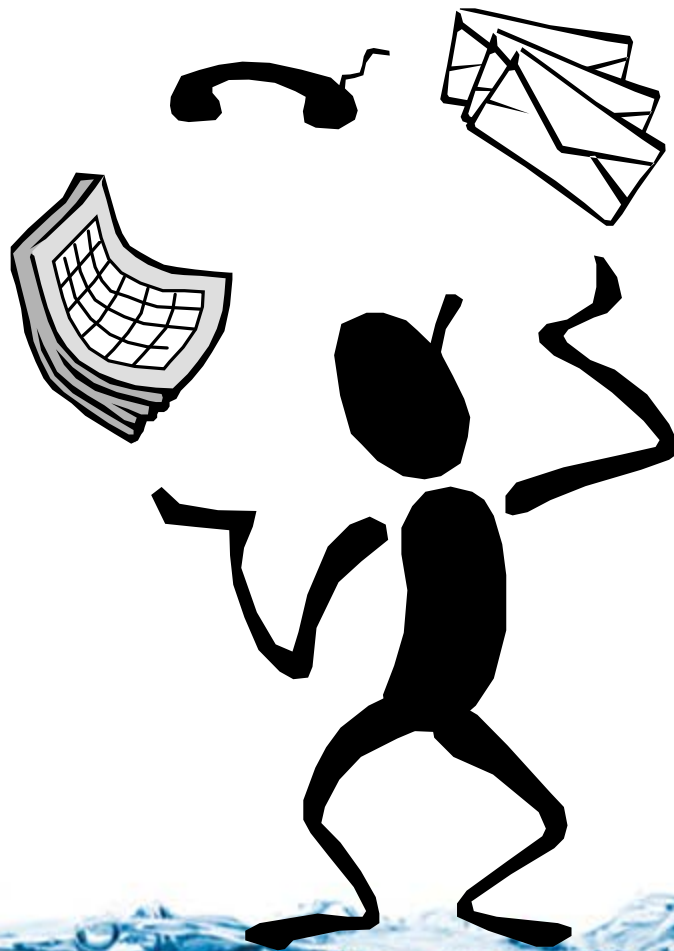


- Sample output hydrograph



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Demonstration





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Workshop

