







## **Base Model**

- We will continue working with the Eight Mile Creek Watershed
- The base model that you will open has the following processes defined:
  - Long Term Simulation
  - Distributed Infiltration
  - Distributed overland flow roughness
- You will add Sediment Transport parameters and run the model
- You will also add stream erosion and re-run the model
- As an output, we will create an erosion–deposition map for the watershed







- To start soil erosion and sediment transport process, you need to turn it on from the job control
- Turn on Soil Erosion

GSSHA Job Control Parame	ters		
Computation parameters	Cutlet information	<ul> <li>Infiltration</li> </ul>	Channel routing computation scheme
Total time (min): 2000	Column: 56	O No infiltration	O No routing
	Dawn CC	Steen + Ampt with soil	Diffusive wave     Edit Parameters
Time step (sec): 60	HOW: 66	moisture redistribution	O MESH
	Slope: 0.01000		
Overland flow		Help	🗖 Groundwater 🛛 Edit parameter 🔥
Computation method	- Evapotranspiration	Sacramento Model	Soil erosion Edit parameter
ADE 🗸			✓ Long term simul Edit parameter
	<ul> <li>No evaporation</li> </ul>	O Richard's infiltration	Contaminant tra Edit parameter
Interception			Nutrients Edit parameter.
Initial depth		Edit Parameters	Storm/tile drain
Determine deeth	Penman method	Soil depth (m) 0.25	
Area reduction	🗹 Seasonal resist.	Top layer depth (m) 0.25	
Help		utput Control	
		acpar control	







### **Adding Sediments**

Typically three sediment sizes are used to describe the soils

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- Sand
- Silt
- Clay





ERDC

#### **Soil Erosion Parameters**

oughness   Interception   Hete	ntion   Evapotra	anspiration   Infi	Itration   Initial M	foisture Soll El	osion Contami	nants Nutrient	s Continuous	Maps   Groundv	vater	
Ising index map: Combined	-									
		Generate IDs Add ID Delete ID								
Soil Erosion		-								
ID	1	2	3	4	5	6	7	8	9	
Description 1	Silt Ioam	Loam	Loam	Silt Ioam	Loamy sand	Silt Ioam	Sandy loam	Loam	Sandy loam	
Description2										
Transport coefficient	0.285000	0.285000	0.285000	0.285000	0.285000	0.285000	0.285000	0.285000	0.285000	
Transport index	1.300000	1.300000	1.300000	1.300000	1.300000	1.300000	1.300000	1.300000	1.300000	
Crit. transport capacity	0.000200	0.000200	0.000200	0.000200	0.000200	0.000200	0.000200	0.000200	0.000200	
Rain splash coeff	1200.000000	1200.000000	1200.000000	1200.000000	1200.000000	1200.000000	1200.000000	1200.000000	1200.000000	
Runoff detachment coeff	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	
Runoff detachment index	0.400000	0.400000	0.400000	0.400000	0.400000	0.400000	0.400000	0.400000	0.400000	
Runoff detachment crit. shear	0.005000	0.005000	0.005000	0.005000	0.005000	0.005000	0.005000	0.005000	0.005000	
Erodibility coeff	0.650000	0.650000	0.650000	0.650000	0.650000	0.650000	0.650000	0.650000	0.650000	







- There are different output options available for sediment transport
- Select the ones that you are more interested in
- Select the net sediment transfer to see areas of erosion and deposition
- Loading all output parameters creates several datasets making the solution results big and WMS will take time to load the solution

Gridded data sets		Link / Node data sets	
Data type: General		🔽 Channel depth	
	_	🔽 Channel flow	
Infiltration rate	*	Channel velocity (avg)	
Surface soil moisture	_	💌 Sediment flux	E
Groundwater elevations	-	🔽 Net sediment transfer	
Incremental groundwater r	re	Flood (max) depth	
Cumulative groundwater re	e	Water surface elev	
Volume suspended sedime		F Pipe flow	
🗹 Sedment flux		Pipe node depths	
Net sediment transfer		F Pipe node in/out flow	
Flood (max) depth		Stream nitrite (NO2-)	in.
Write frequency			
Write frequency Write frequency: 180	(min)		
Write frequency Write frequency: 180 Gridded data set ouput format	(min)		
Write frequency Write frequency: 180 Aridded data set ouput format Binary O ASCII	(min) Çi Gi	RASS 🔿 XMDF	
Write frequency Write frequency: 180 Gridded data set ouput format Binary OKASCII Hydrograph	(min) Ç/ Gl	RASS O XMDF	
Write frequency Write frequency: 180 Sridded data set ouput format Binary ASCII Hydrograph Write frequency: 180	(min) © Gl	RASS O XMDF Other Suppress screen printing	



#### **Result Visualization**

- Outlet Sedimentgraph
- Stream Sediment Flux
- Animations / Google Earth







# **Erosion Deposition Map**

- GSSHA produces adjusted grid elevation data set based on erosion or deposition that occurred during the Erosion and transport process
- You can then subtract this adj\_elev map from original elev map and get an erosion/deposition map
- You can also get this information by selecting the "net sediment transfer" output in the output control.
- The erosion/deposition map is created as a new dataset in the 2D grid data
- If the difference is negative, there is deposition, if it is zero there not change and if it is positive, it the erosion.
- You can also look at the net sediment erosion maps





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## **Changing contour options**

- You can modify the contour display option for the erosion/ deposition map
- Right click the new dataset and go to contour options
- Select *Color Fill*
- Select Specify Each Color
- Select Specify a range and check off Fill below and fill above options
- Under contour interval, change the drop down to Specified values
- Change number of contours to 3
- Edit the values in the list so that you have three range min to zero, zero and zero to max
- Change the color as red for negative, green for zero and blue for positive.
- Click OK

Jontour Method		Contour Interval						
Color Fill 👻			cified Values	3				
Specify Each Color 🔹	Populate Values Populate Colors.,.							
		F	Start Value	End Value	Color			
Nata Bange		1	-5.0	0.0	-			
Data set: default (elev)		2	0.0	0.0				
Data set	Timestep	3	0.0	10.0	-			
Min: 10	00	- 100						
Millin 1.0	0.0							
Max: 1.0	0.0							
Max: 1.0	0.0		ill continuous c	olor range				
Max: 1.0 Specify a range Min: -5.0	0.0	12) F	ill continuous c	olor range				
Max: 1.0 Specify a range Min: -5.0 May: 10.0	0.0 D.D Fill below	I F Tran	ill continuous c sparency	olor tange				
Max: 1.0 Specify a range Min: -5.0 Max: 10.0	0.0 D.0 Fill below	I F Tran Tran	ill continuous c sparency nsparent %: 0	olor range				
Max: 1.0 V Specify a range Min: -5.0	0.0	IV F	ill continuous c	olor range				

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- GSSHA can simulate both overland and Stream erosion
- You can define erodible depth for the channels

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- Select all the streams and edit properties
- Enter Max erosion to define the erodibility of the streams

10 m -	Lype		Link/Superlink	Manning's n	Depth (m)	Bottom width (m)	Side slope (H:V)	[2] Geomery	Max erosion (m)	Groundwate
All		+				1		F	1.0	
2 Tr	apezoidal channel	+	4	0.690032	0.7	2.4	4.2	Γ	0.35	Generic
nT e	apezoidal channel	+	3	0.119091	0.5	1.0	4.2	Γ	0.35	Generic
12 Tr	apezoidal channel	+	2	0.909913	0.6	1.5	4.2	Γ	0.35	Generic
226 Tr	apezoidal channel	+	1	1.55995	0.5	0.5	4.3	E.	0.35	aeneric .
					-					
*		_		JR.						
Hale									- OK	



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