Adding 2D Sediment Data and Viewing Results

Stanford Gibson, PhD and Alex Sánchez, PhD

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Adding 2D Sediment Data and Viewing Results

Adding 2D Sediment Data

I. Select Equations
II. Sediment Boundary Conditions
III. Define Bed Gradations

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series
III. Profile Lines

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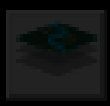

Viewing 2D Sediment Results

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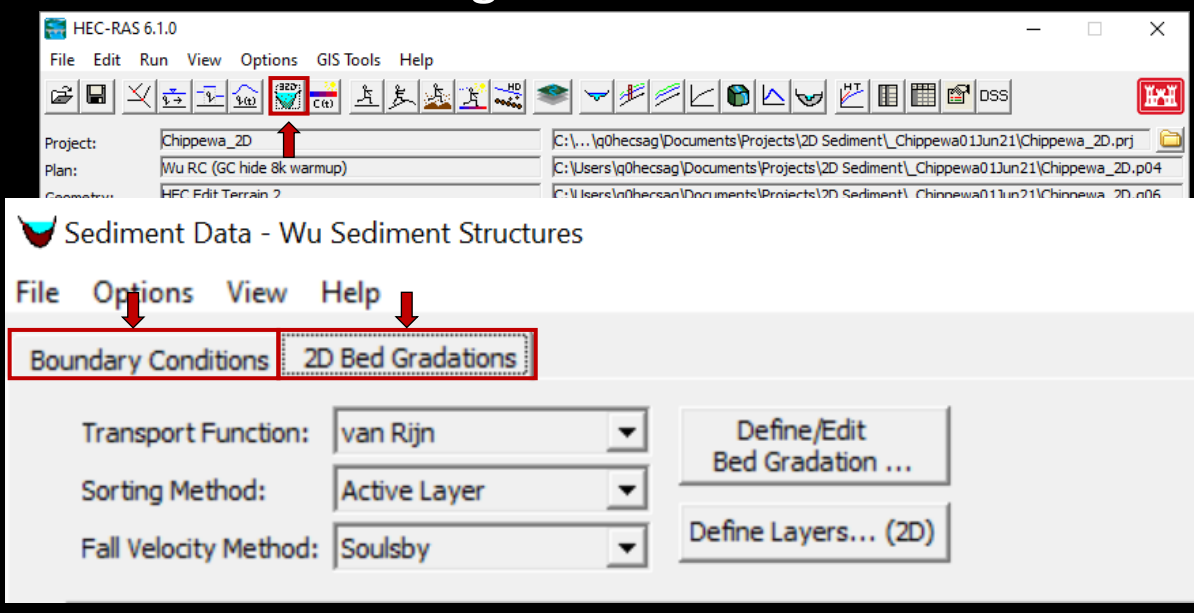
Adding Sediment Data



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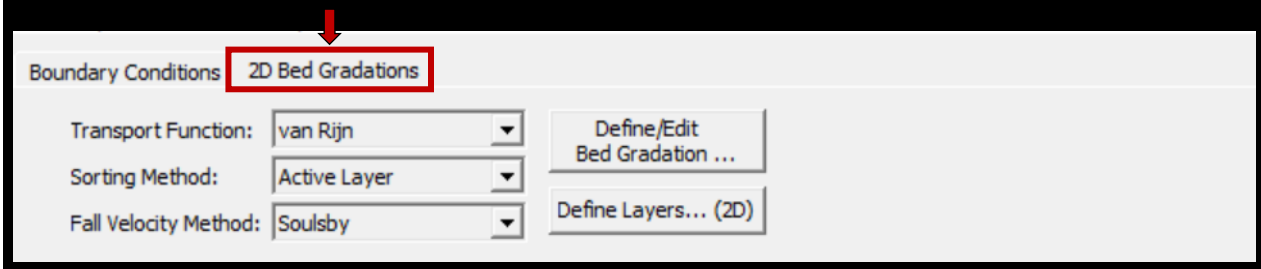
Adding 2D Sediment Data and Viewing Results

Adding 2D Sediment Data

I. Select Equations

Initial Conditions and Transport Parameters
→ 2D Bed Gradations



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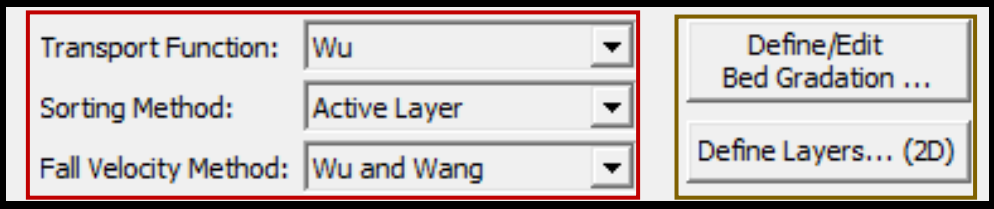
Transport Equations with Bed Gradations



Equations

Gradations Define Here Use Later

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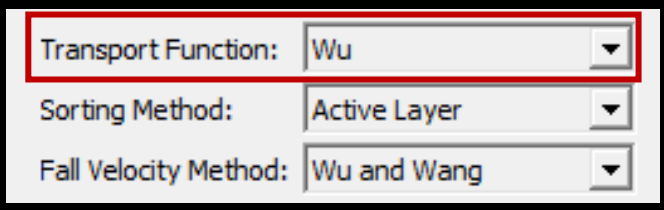
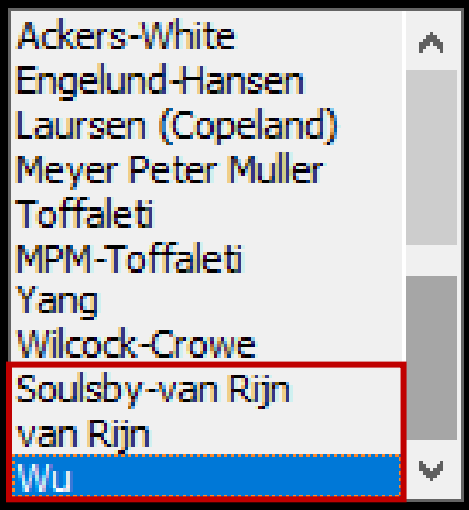
Initial Conditions and Transport Equations



Transport Function

2D sediment can work with any Transport Function
But the Bottom three are 2D-Specific
Use Caution applying 1D Functions in 2D Models
This has little precedent and may be poorly Specified



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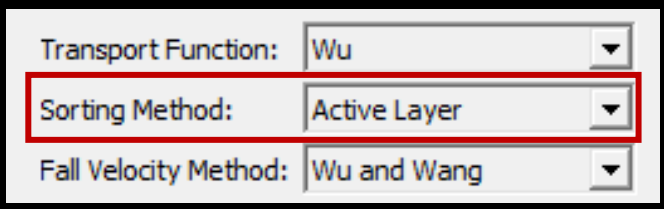
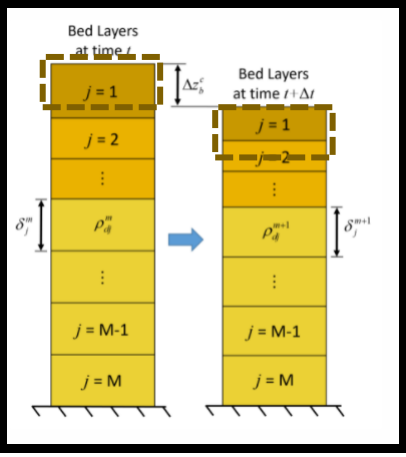
Initial Conditions and Transport Equations



Sorting/Mixing Method

- Thomas and Copeland are 1D Specific
- It Doesn't Matter What You Choose
- HEC-RAS will Use "Active Layer"
- But the 2D Active Layer ≠ 1D Active Layer
- 2D Active Layer Model is Superimposed on a More Sophisticated Multi-layer Stratigraphy



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Adding 2D Sediment Data and Viewing Results

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II. Sediment Boundary Conditions

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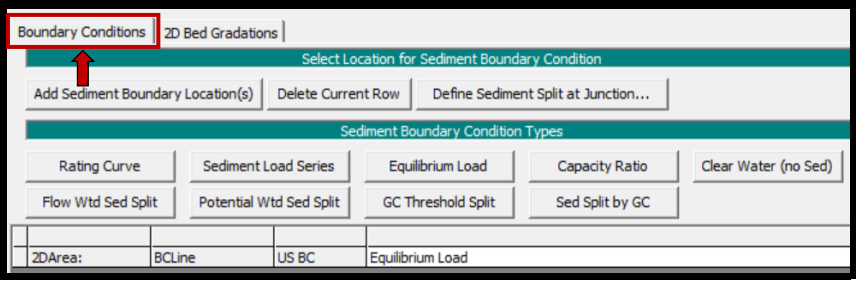

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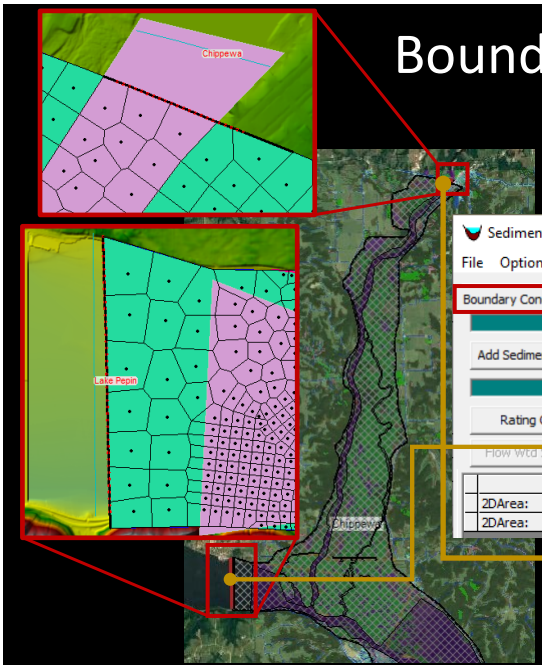
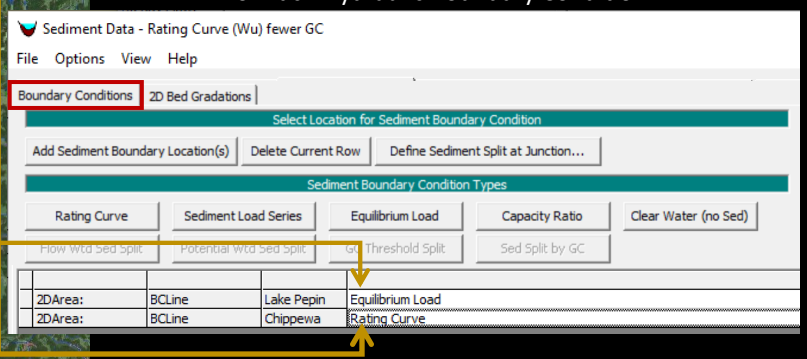
Boundary Conditions



Define a Sediment Boundary Condition
for Each Hydraulic Boundary Condition



There are Four Sediment Boundary Conditions

1. Rating Curve
2. Time Series
3. Equilibrium
4. Capacity Ratio
5. Clear Water

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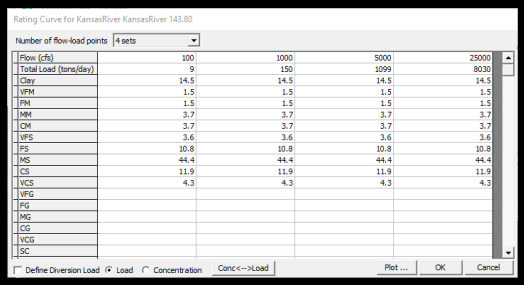
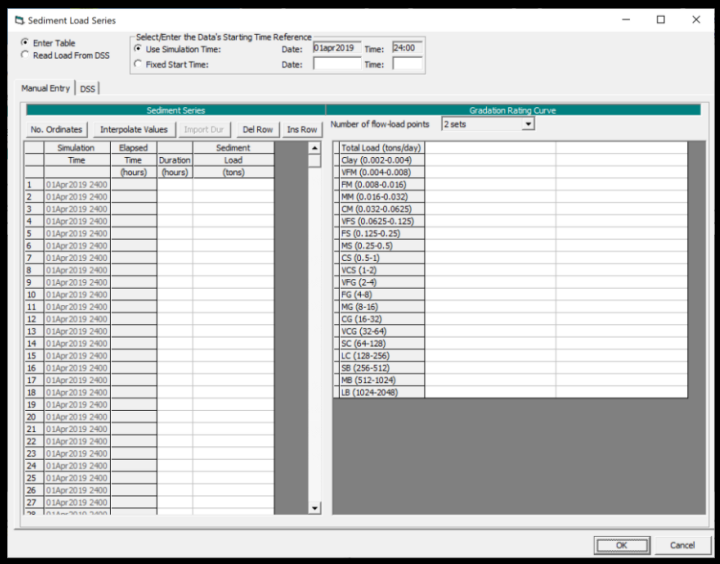
Rating Curve



Sediment Time Series



Both these boundary conditions require grain class fraction estimates

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Adding 2D Sediment Data

I. Select Equations
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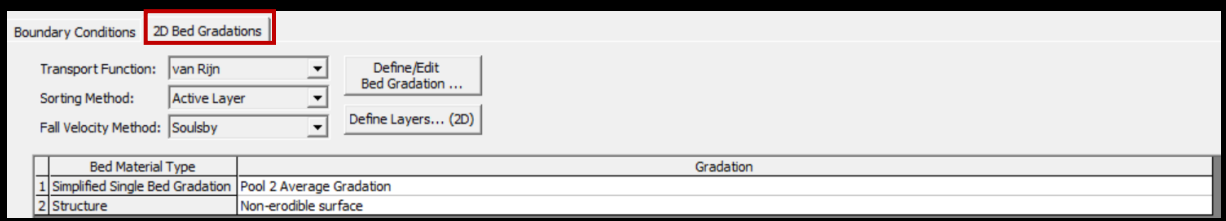
III. Define Bed Gradations

III. 2D Bed Gradations



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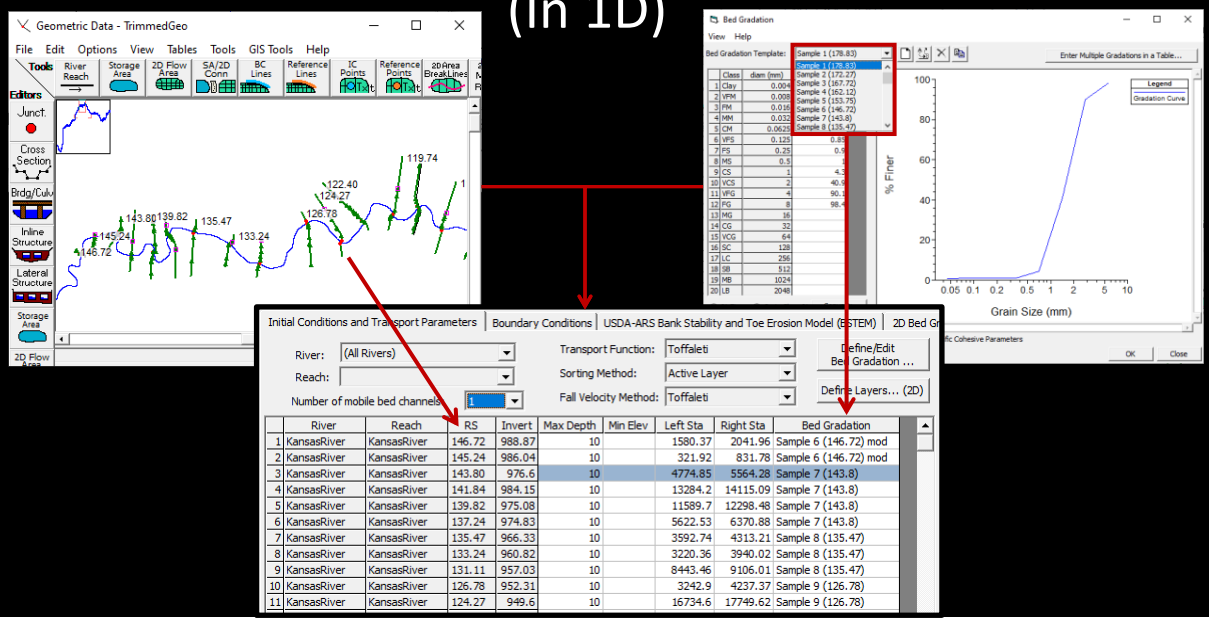
Defining Bed Gradations (In 1D)



	River	Reach	RS	Invert	Max Depth	Min Elev	Left Sta	Right Sta	Bed Gradation
1	KansasRiver	KansasRiver	146.72	988.87	10		1580.37	2041.96	Sample 6 (146.72) mod
2	KansasRiver	KansasRiver	145.24	986.04	10		321.92	831.78	Sample 6 (146.72) mod
3	KansasRiver	KansasRiver	143.80	976.6	10		4774.85	5564.28	Sample 7 (143.8)
4	KansasRiver	KansasRiver	141.84	984.15	10		13284.2	14115.09	Sample 7 (143.8)
5	KansasRiver	KansasRiver	139.82	975.08	10		11589.7	12298.48	Sample 7 (143.8)
6	KansasRiver	KansasRiver	137.24	974.83	10		5622.53	6370.88	Sample 7 (143.8)
7	KansasRiver	KansasRiver	135.47	966.33	10		3592.74	4313.21	Sample 8 (135.47)
8	KansasRiver	KansasRiver	133.24	960.82	10		3220.36	3940.02	Sample 8 (135.47)
9	KansasRiver	KansasRiver	131.11	957.03	10		8443.46	9106.01	Sample 8 (135.47)
10	KansasRiver	KansasRiver	126.78	952.31	10		3242.9	4237.37	Sample 9 (126.78)
11	KansasRiver	KansasRiver	124.27	949.6	10		16734.6	17749.62	Sample 9 (126.78)

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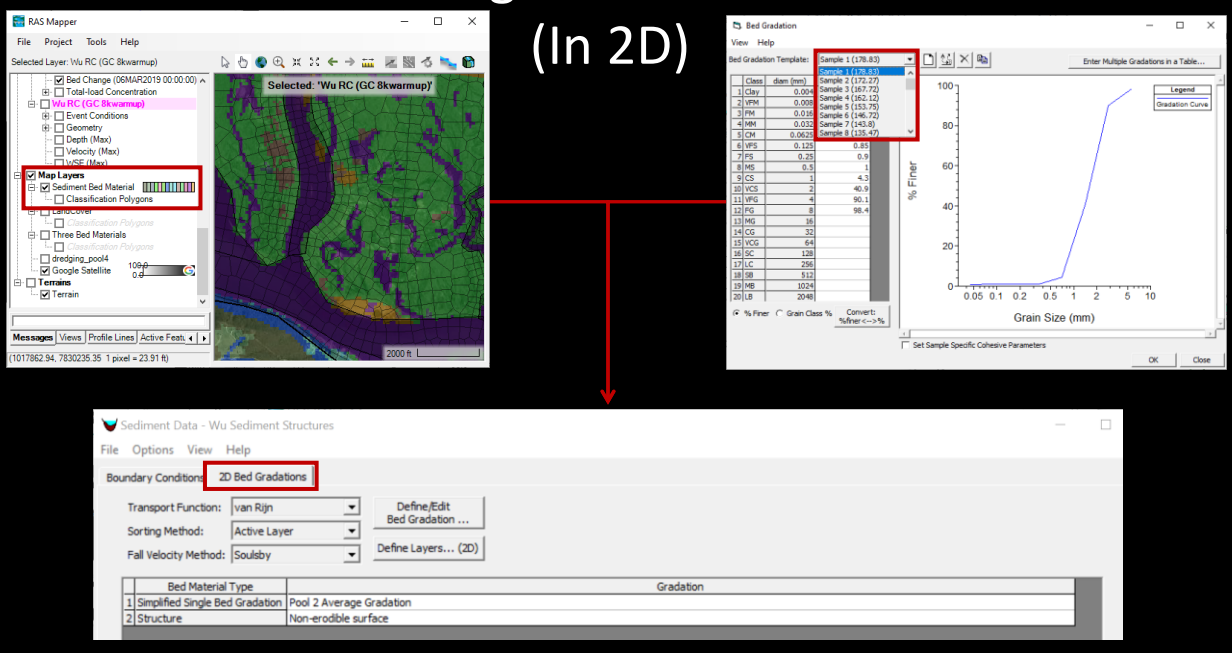
Defining Bed Gradations (In 2D)



	Bed Material Type	Gradation
1	Simplified Single Bed Gradation	Pool 2 Average Gradation
2	Structure	Non-erodible surface

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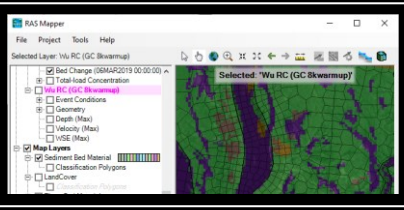
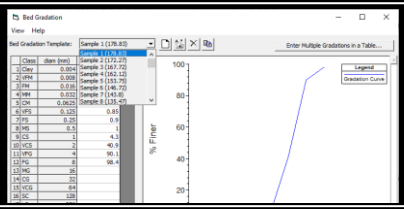
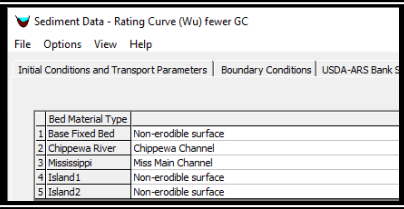
Defining Bed Gradations

1. Define Sediment Material Classification Layers in Mapper	
2. Input Bed Gradation Data and Stratigraphy	
3. Associate Bed Gradation Data with Mapper Layers	

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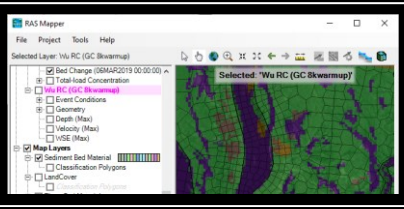
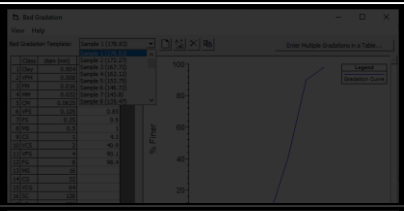
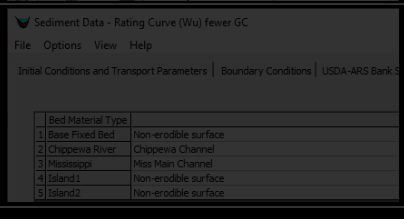
1. Define Sediment Material Classification Layers in Mapper	
2. Input Bed Gradation Data and Stratigraphy	
3. Associate Bed Gradation Data with Mapper Layers	

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Defining Bed Gradations

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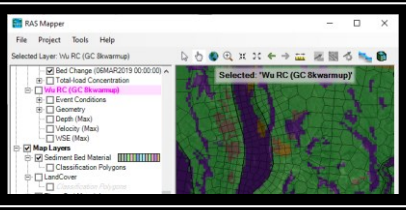

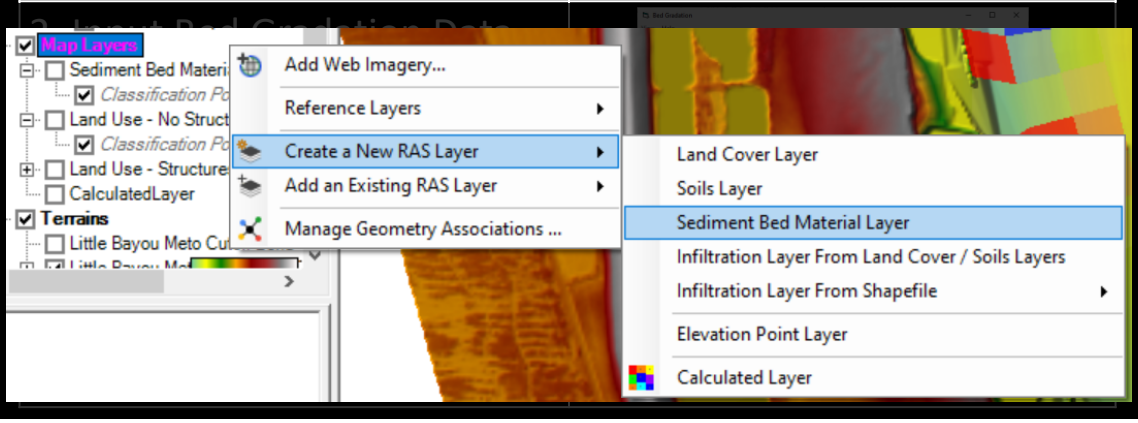

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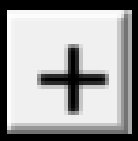
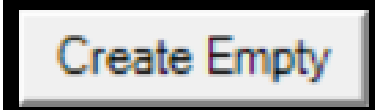
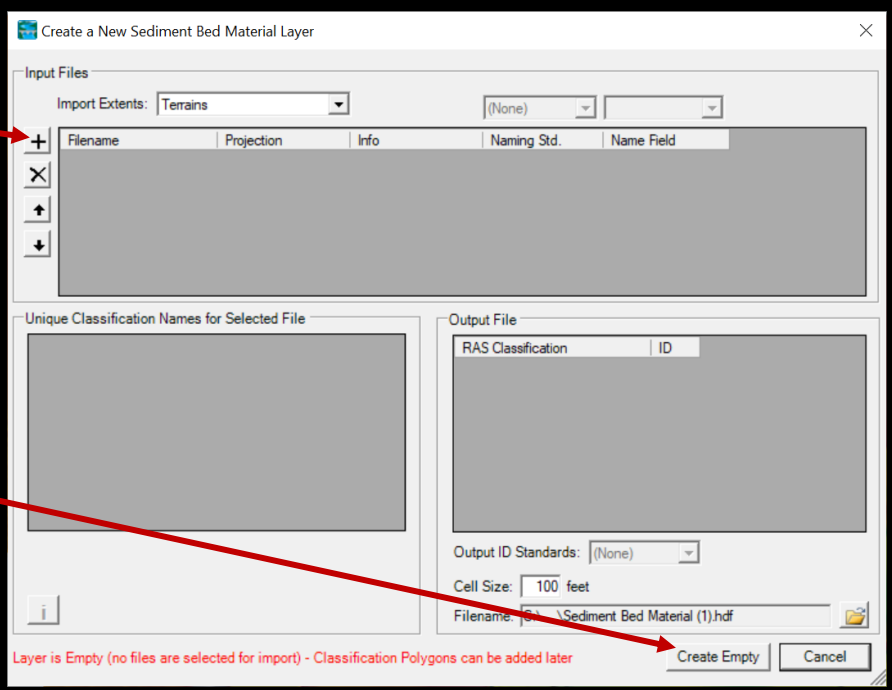
If you want to import a classification file.



If you just want to draw polygons





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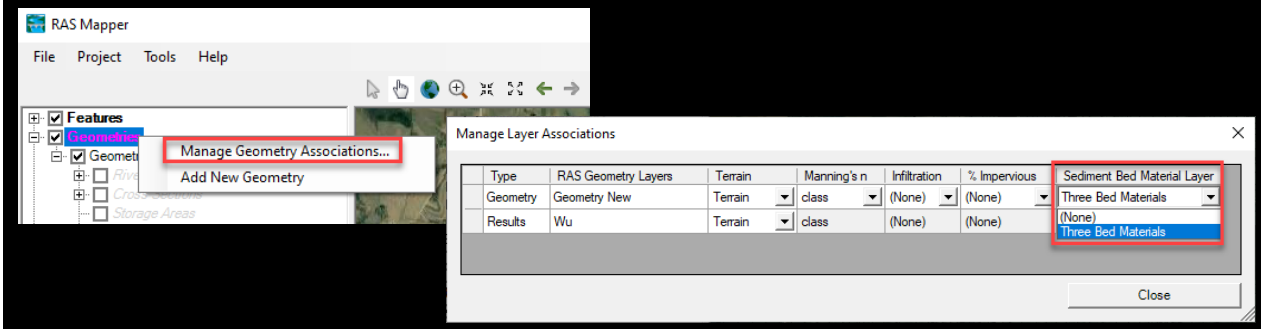
Defining Bed Gradations

Associate Bed Material Layer with…a Geometry!?!



- This is the Most Overlooked Step
- Implications of Associating Bed Materials with Geometry

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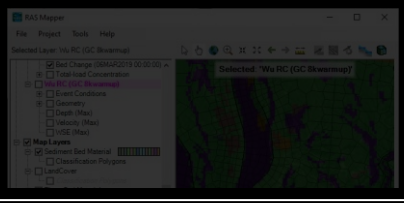
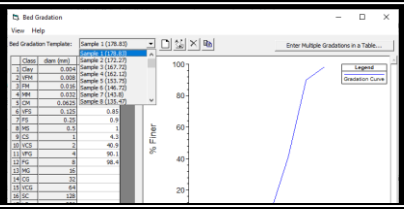
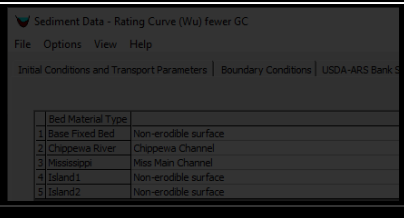
Defining Bed Gradations

1. Define Sediment Material Classification Layers in Mapper	
2. Input Bed Gradation Data and Stratigraphy	
3. Associate Bed Gradation Data with Mapper Layers	

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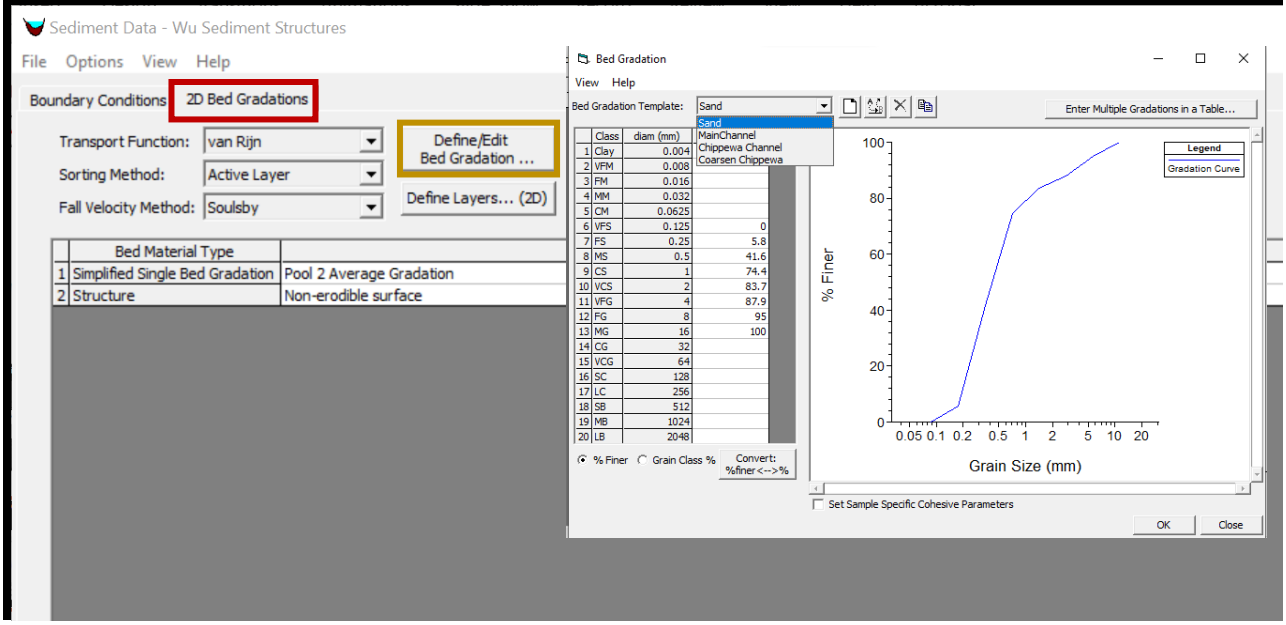
Input Bed Gradation Data



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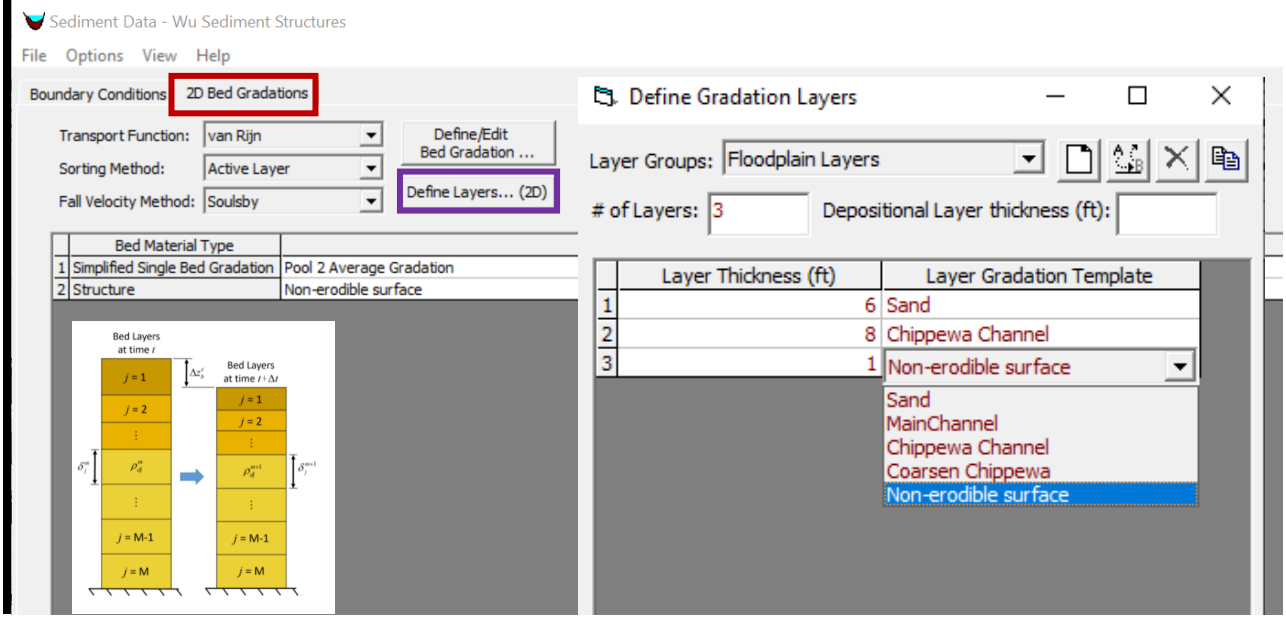
Define Stratigraphy



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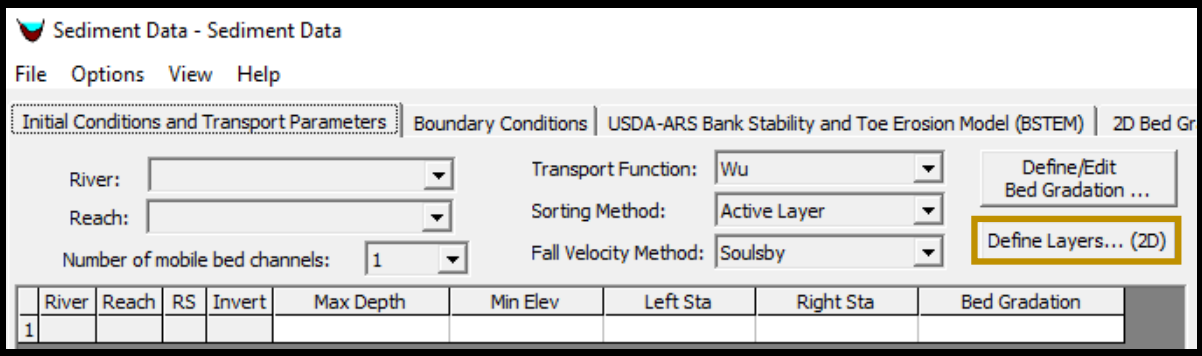
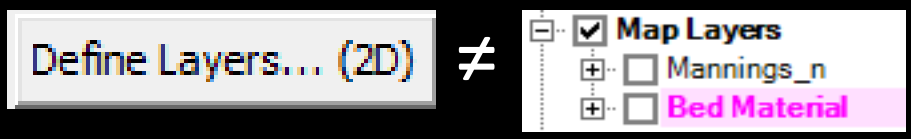
Defining Stratigraphy



Note: Layers ≠ Layers



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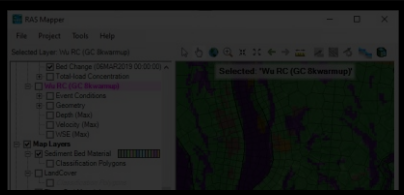
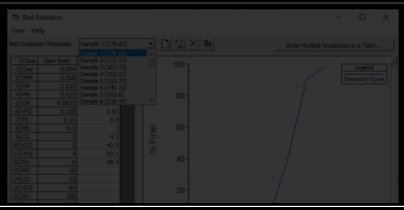
Defining Bed Gradations

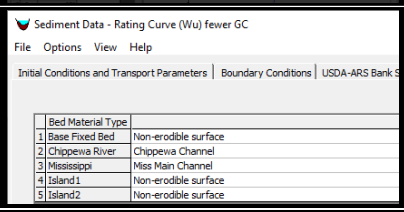
1. Define Sediment Material Classification Layers in Mapper



2. Input Bed Gradation Data and Stratigraphy



3. Associate Bed Gradation Data with Mapper Layers



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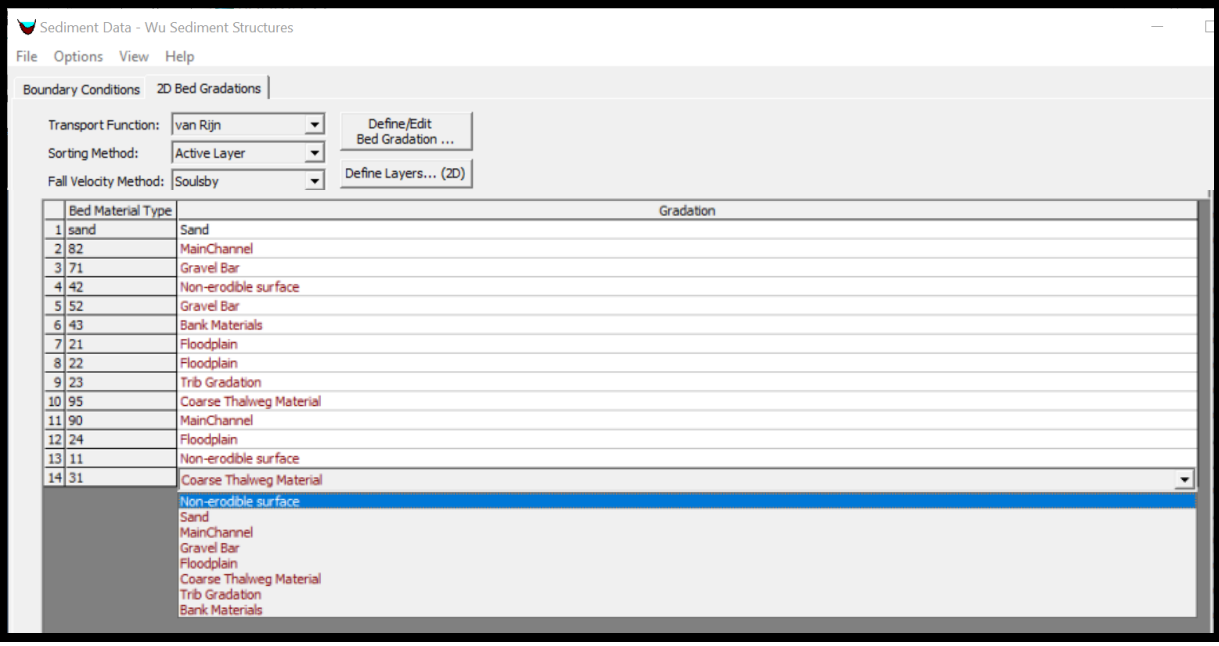
Associate Bed Gradation Data with Mapper Layers



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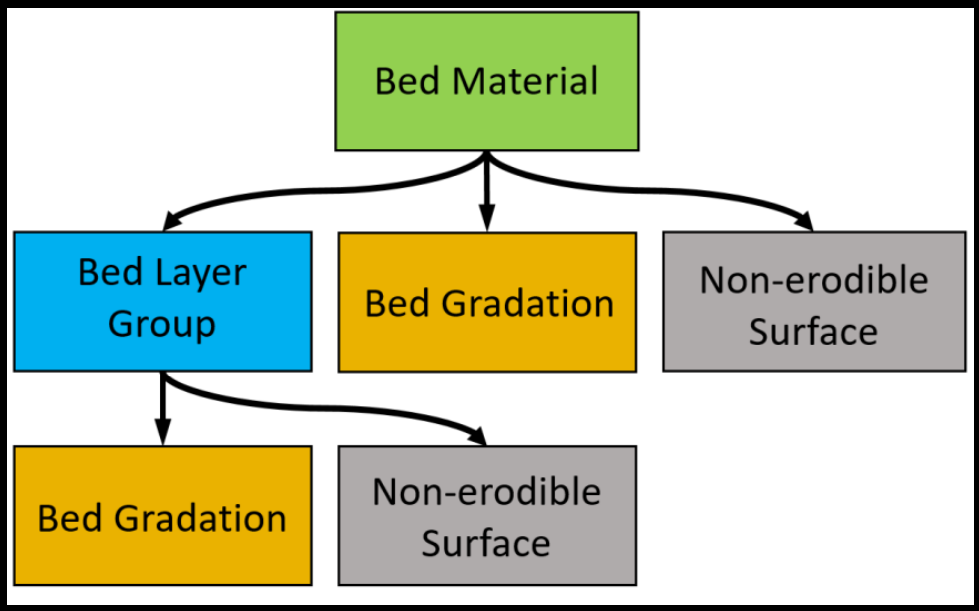
Possible Bed Material Options



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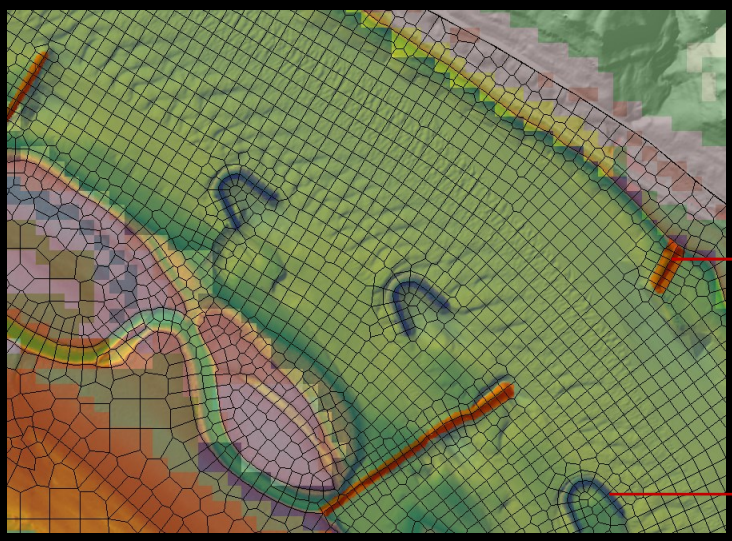
Non-Erodible Surfaces



	Bed Material Type	
1	Bed Materials	Nonuniform
		Non-erodible surface
		Nonuniform

12	24	Floodplain
13	11	Non-erodible surface
14	31	Coarse Thalweg Material

Non-erodible surface
Sand
MainChannel
Gravel Bar
Floodplain
Coarse Thalweg Material
Trib Gradation
Bank Materials

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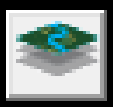

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series
III. Profile Lines

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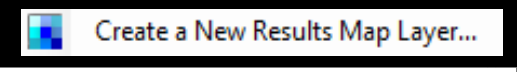
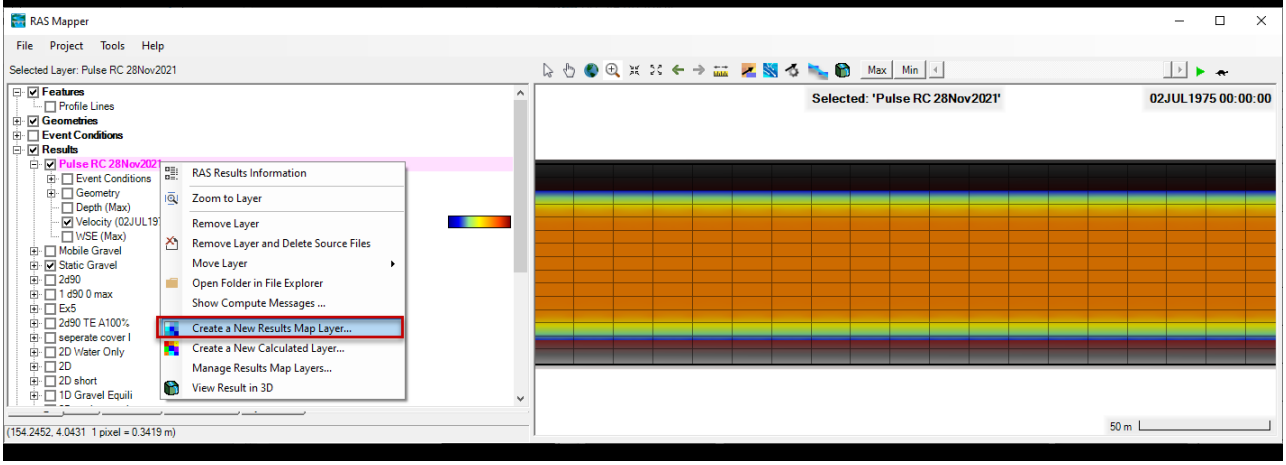
Viewing 2D Sediment Results

I. Add 2D Result Maps





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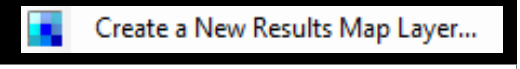

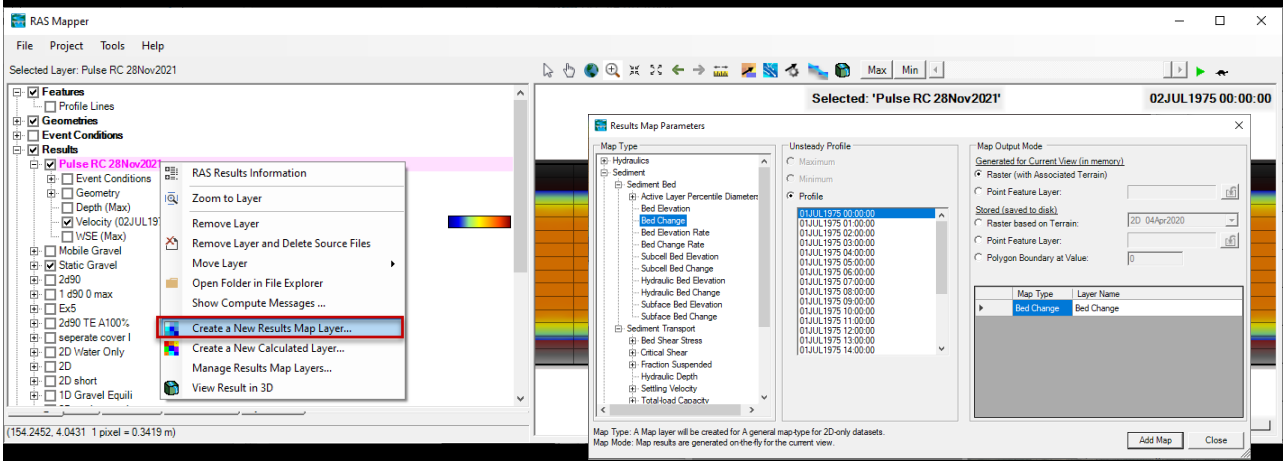

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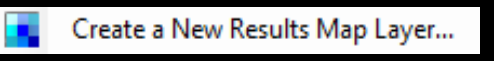

Bed Change

Concentration

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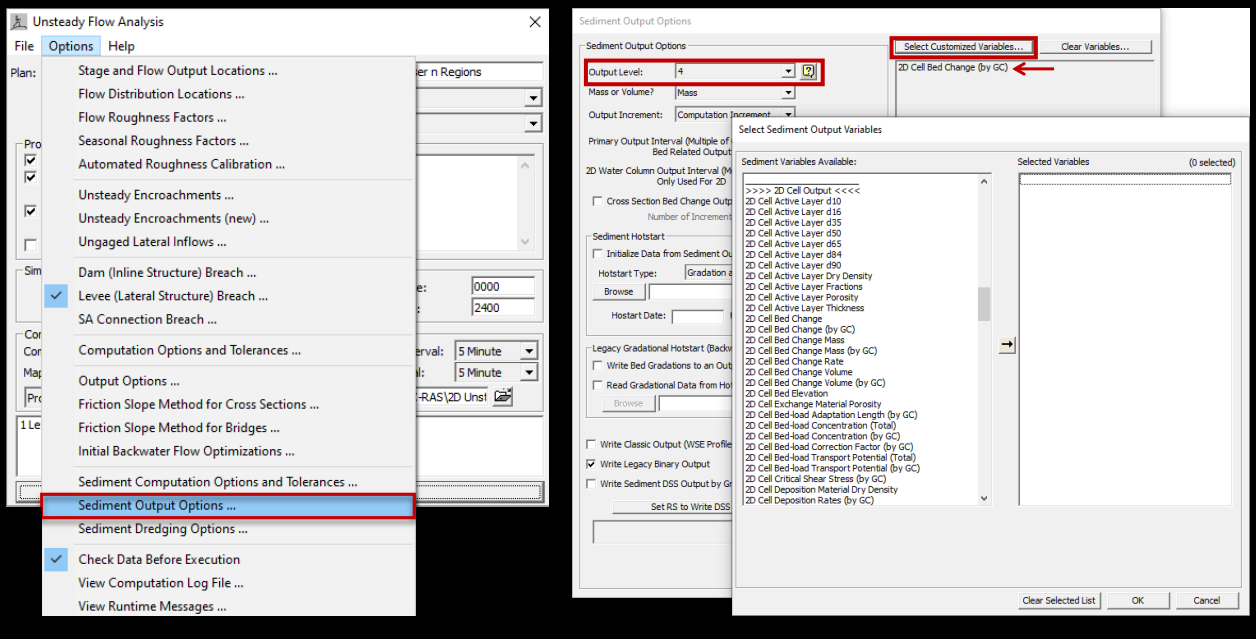
What if you want more/different results?



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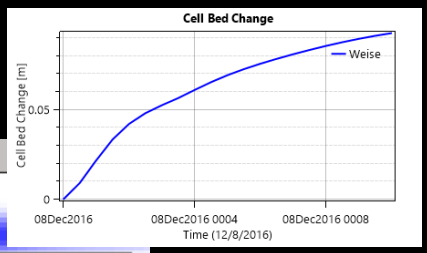
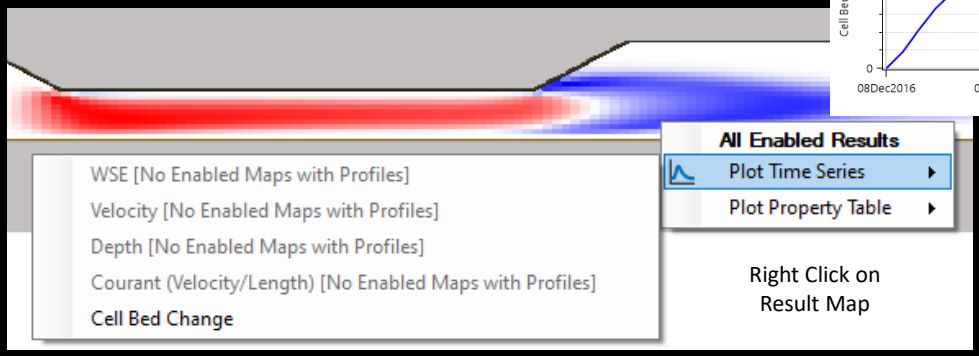
Adding 2D Sediment Data and Viewing Results

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series





Right Click on Result Map

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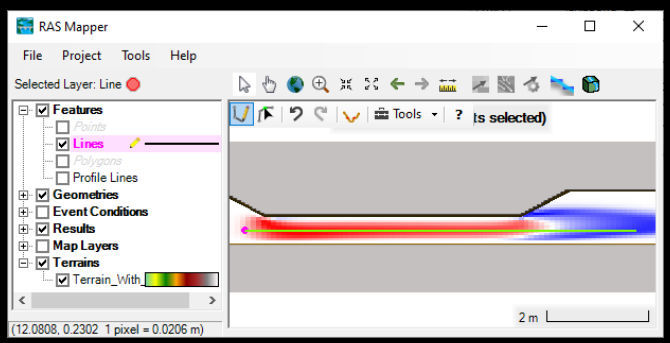
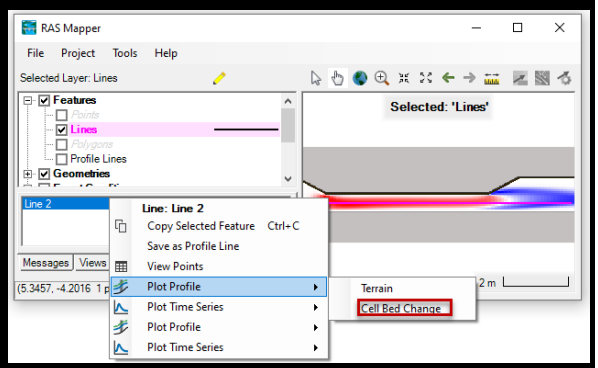
Adding 2D Sediment Data and Viewing Results

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series
III. Profile Lines





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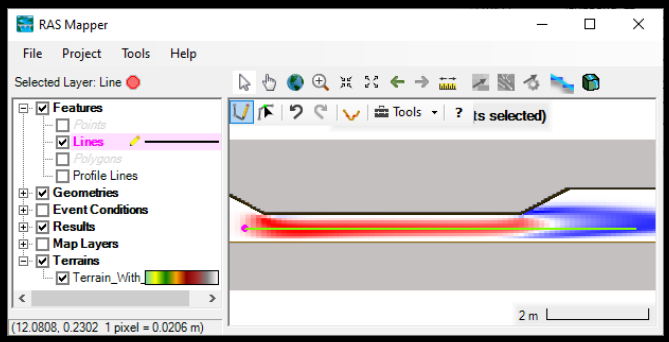
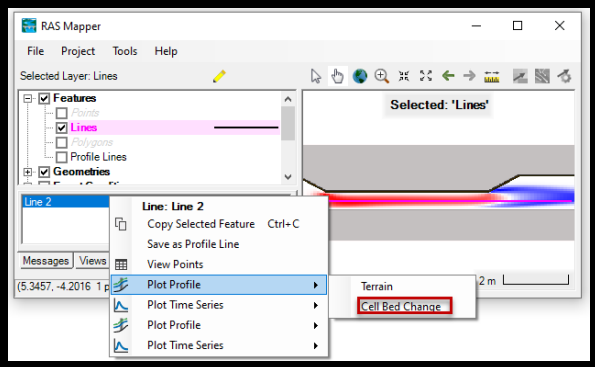
Adding 2D Sediment Data and Viewing Results

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series
III. Profile Lines





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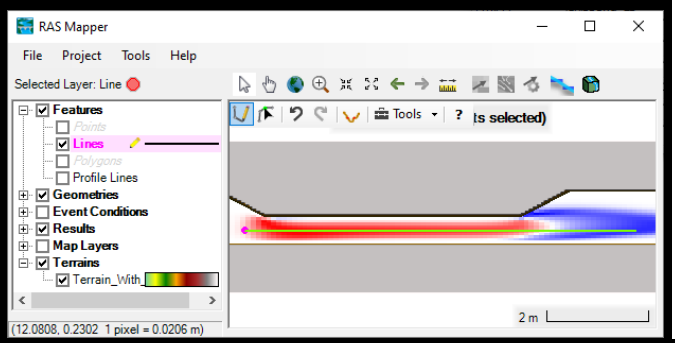
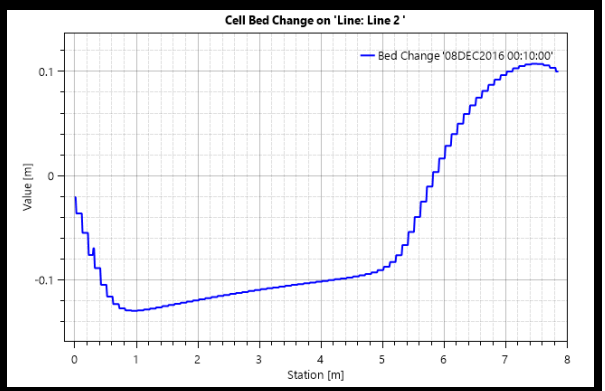
Adding 2D Sediment Data and Viewing Results

Viewing 2D Sediment Results

I. Add 2D Result Maps
II. View Time Series
III. Profile Lines





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