

2D Sediment Options and Boundary Conditions

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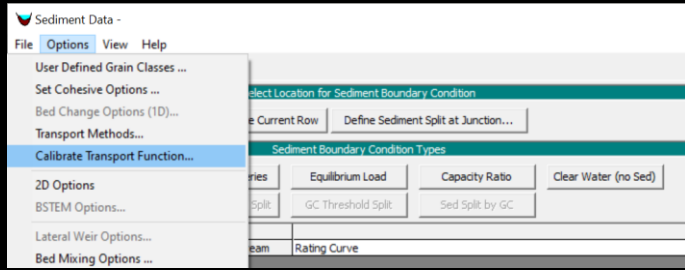
1



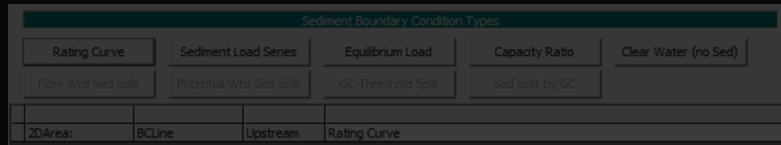
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Topics

**Sediment
Options
Menu**



**Boundary
Condition
Options**



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A screenshot of the 'Sediment Data - 2D Sediment' Options menu. The menu items are: File, Options, View, Help. The 'Options' sub-menu is open, showing: User Defined Grain Classes ..., Set Cohesive Options ..., Bed Change Options (1D)..., Transport Methods... (highlighted with a red box), Calibrate Transport Function..., 2D Options (highlighted with a red box), BSTEM Options..., Lateral Weir Options..., Bed Mixing Options ... (highlighted with a red box), Subsidence..., Set Pass Through Nodes ..., Observed Data ..., and Delete Load Record. A red arrow points from the three highlighted items to the text 'Menus I Open for ALL 2D Sediment Models'.

**Menus I Open for ALL
2D Sediment Models**

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Transport Methods...

Calibrate Transport Function...

2D Options

BSTEM Options...

Lateral Weir Options...

Bed Mixing Options ...

Subsidence...

Set Pass Through Nodes ...

Observed Data ...

Delete Load Record

Define Grain Classes and Sediment Properties

Sediment Diameters (mm)										
Class	Label	Min	Max	Mean	SG	n	BD	Coh?	De	
1	Clay	0.002	0.004	0.003	2.65	0.82	480	1	1	
2	VFM	0.004	0.008	0.006	2.65	0.61	1041	1	1	
3	FM	0.008	0.016	0.011	2.65	0.61	1041	1	1	
4	MM	0.016	0.032	0.023	2.65	0.61	1041	1	1	
5	CM	0.032	0.0625	0.045	2.65	0.61	1041	1	1	
6	VFS	0.0625	0.125	0.088	2.65	0.44	1489	0	1	
7	FS	0.125	0.25	0.177	2.65	0.44	1489	0	0.4	
8	MS	0.25	0.5	0.354	2.65	0.44	1489	0	0.09	
9	CS	0.5	1	0.707	2.65	0.44	1489	0	0.09	
10	VCS	1	2	1.41	2.65	0.44	1489	0	0.09	
11	VFG	2	4	2.83	2.65	0.44	1489	0	0.09	
12	FG	4	8	5.66	2.65	0.44	1489	0	0.09	
13	MG	8	16	11.3	2.65	0.44	1489	0	0.09	
14	CG	16	32	22.6	2.65	0.44	1489	0	0.09	
15	VCG	32	64	45.3	2.65	0.44	1489	0	0.09	
16	SC	64	128	90.5	2.65	0.44	1489	0	0.09	
17	LC	128	256	181	2.65	0.44	1489	0	0.09	
18	SB	256	512	362	2.65	0.44	1489	0	0.09	
19	MB	512	1024	724	2.65	0.44	1489	0	0.09	
20	LB	1024	2048	1448	2.65	0.44	1489	0	0.09	

Currently Default

Density Method: Bulk Density (All Classes)

Enforce Adjacent-Non-Overlapping Grain Classes and Geometric Mean

OK Cancel Defaults

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Transport Methods...

Calibrate Transport Function...

2D Options

BSTEM Options...

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Define Grain Classes and Sediment Properties

Sediment Diameters (mm)				
Class	Label	Min	Max	Mean
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2	VFM	0.004	0.008	0.006
3	FM	0.008	0.016	0.011
4	MM	0.016	0.032	0.023
5	CM	0.032	0.0625	0.045
6	VFS1	0.0625	0.085	0.073
7	VFS2	0.085	0.11	0.097
8	VFS3	0.11	0.125	0.117
9	FS	0.125	0.25	0.177
10	MS	0.25	0.5	0.354
11	CS	0.5	1	0.707
12	VCS	1	2	1.414
13	VFG	2	4	2.828
14	FG	4	8	5.657
15	MG	8	16	11.31
16	CG	16	32	22.63
17	VCG	32	64	45.25
18	SC	64	128	90.51
19	LC	128	256	181
20	SB	256	512	362

We use the Geometric Mean Of the Log₂ Grain Classes...

$$d = \sqrt{d_{max}d_{min}}$$

...but these are editable

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Sediment Data - 2D Sediment

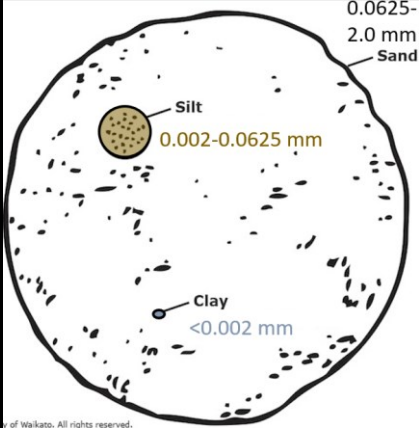
File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Modified From:
<https://www.sciencelearn.org.nz/images>



Define Grain Classes and Sediment Properties

Sediment Diameters (mm)				
Class	Label	Min	Max	Mean
1	Clay	0.002	0.004	0.003
2	VFM	0.004	0.008	0.006
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6	VFS	0.0625	0.125	0.088
7	FS	0.125	0.25	0.177
8	MS	0.25	0.5	0.354
9	CS	0.5	1	0.707
10	VCS	1	2	1.41
11	VFG	2	4	2.83
12	FG	4	8	5.66
13	MG	8	16	11.3
14	CG	16	32	22.6
15	VCG	32	64	45.3
16	SC	64	128	90.5
17	LC	128	256	181
18	SB	256	512	362
19	MB	512	1024	724
20	LB	1024	2048	1448

Applies to the first five grain classes:
 Sand and Silt
 <625 microns or
 <0.0625 mm
 In default grain classes

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Transport Methods...

Calibrate Transport Function...

2D Options

BSTEM Options...

Lateral Weir Options...

Bed Mixing Options ...

Subsidence...

Set Pass Through Nodes ...

Observed Data ...

Delete Load Record

$E = k_d(\tau_b - \tau_c)$

Excess Shear Erodibility Model

2D-Specific Methods

Cohesive Options

Use Selected Transport Functions for All Grain Sizes

Use Krone/Partheniades for Clay and Silt Size Fractions

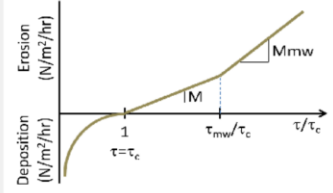
Use Krone/Partheniades (HEC 6T Capacity Method)

Erodibility Parameter Type:

Particle Erosion: Threshold (τ_c) (Pa), Slope of the Erosion Rate (ρ) ($N/m^2/hr$)

Mass Wasting Erosion: Threshold (τ_{ms}) (Pa), Slope of the Erosion Rate (ρ_{ms}) ($N/m^2/hr$)

Alternate Cohesive Approaches (2D Only): Deposition Threshold (τ_c') (lb/ft²), Power (n) (Opt)



Flocculation Method:

Hwang (1989) Flocculation Coefficients: a, b, m, n

User Specified Flocculation Curve:

Concentration	Fall Velocity
mg/L	mm/s
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Consolidation Curve:

Time	Bulk Density
day	kg/m ³
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Flocculation (2 Methods)

Consolidation

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Sediment Data - 2D Sediment

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Two Parameter Groups
1. Advection-Diffusion
2. Adaptation

Transport Model and AD Parameters:

1D Methods:

Routing Method (1D): Continuity

Sediment Junction Split Method: Flow Weighted

Pool Pass Through Method: Upstream Capacity

2D Methods:

AD Parameters Adaptation

Load Correction Factor (Relative Particle Velocity)

Total Load Correction Factor

Bed-Load Correction Factor: Van Rijn

Suspended-Load Correction: Exponential Conc Profile

Diffusion Coefficient

Total-Load Diffusion Method: None

Susp Diffusion Method: None

Bed Load Diffusion Method: None

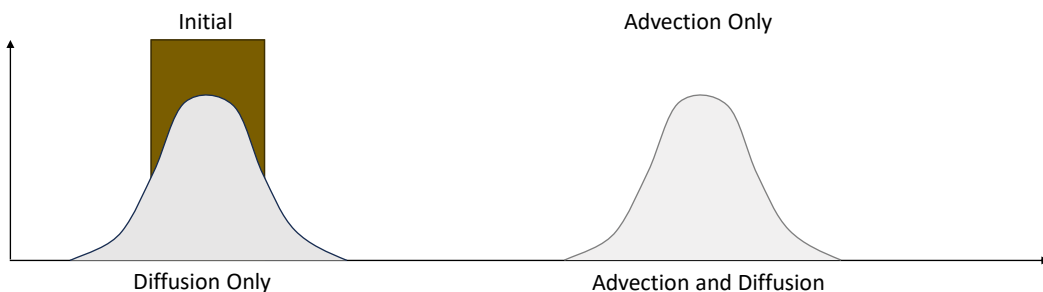
OK Cancel

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Governing Sediment Equations

- Total-load Transport Equation

$$\frac{\partial}{\partial t} \left(\frac{hC_{tk}}{\beta_{tk}} \right) + \underbrace{\nabla \cdot (h\mathbf{U}C_{tk})}_{\text{Advection}} = \underbrace{\nabla \cdot (\varepsilon_{tk} h \nabla C_{tk})}_{\text{Diffusion}} + E_{tk} - D_{tk}$$



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$$\frac{\partial}{\partial t} \left(\beta_{tk} h C_{tk} \right) + \nabla \cdot (h \mathbf{U} C_{tk}) = \nabla \cdot (\epsilon_{tk} h \nabla C_{tk}) + E_{tk} - D_{tk}$$

Advection
Diffusion

Load Correction Factor (Relative Particle Velocity)

Diffusion Coefficient Not Commonly Adjusted

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The Bed Change Equation

The Adaptation Length affects the non-equilibrium erosion and deposition rate.

Guidance is 1 to 2X the cell size. (downstream direction)

Increasing Adaptation Length approaches an equilibrium model, increases deposition and erosion, leads to stronger blue-red.

↑ Adaptation Length ↓ Bed Change
 ↑ Adaptation Length Smooths Results
 ↑ Adaptation Length ↑ Stability

$$\rho_{sk}(1 - \phi_b) \left(\frac{\partial z_b}{\partial t} \right)_k = \underbrace{D_{tk}}_{\text{Deposition}} - \underbrace{E_{tk}}_{\text{Erosion}} + \nabla \cdot (\kappa_{bk} |q_{bk}| \nabla z_b)$$

$$D - E = \alpha_c \omega_s C - \alpha_c \omega_s C_*$$

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Recommended

Not-Recommended

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Transport Methods...

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Bed Mixing Options ...

Subsidence...

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Delete Load Record

Scaling Factors

Transport and Mobility Scaling Factors

Transport Function Scaling Factor: 0.9 Increasing This Factor Increases Transport

Critical Mobility Scaling Factor: 1 Increasing This Factor Decreases Transport

Excess Shear

$$q_b^* = X * f(\tau^* - \tau_c^*)$$

Excess Stream Power

$$q_b^* = X * f(VS - V_c S)$$

The mobility factor can be more sensitive because it is often raised to a power.

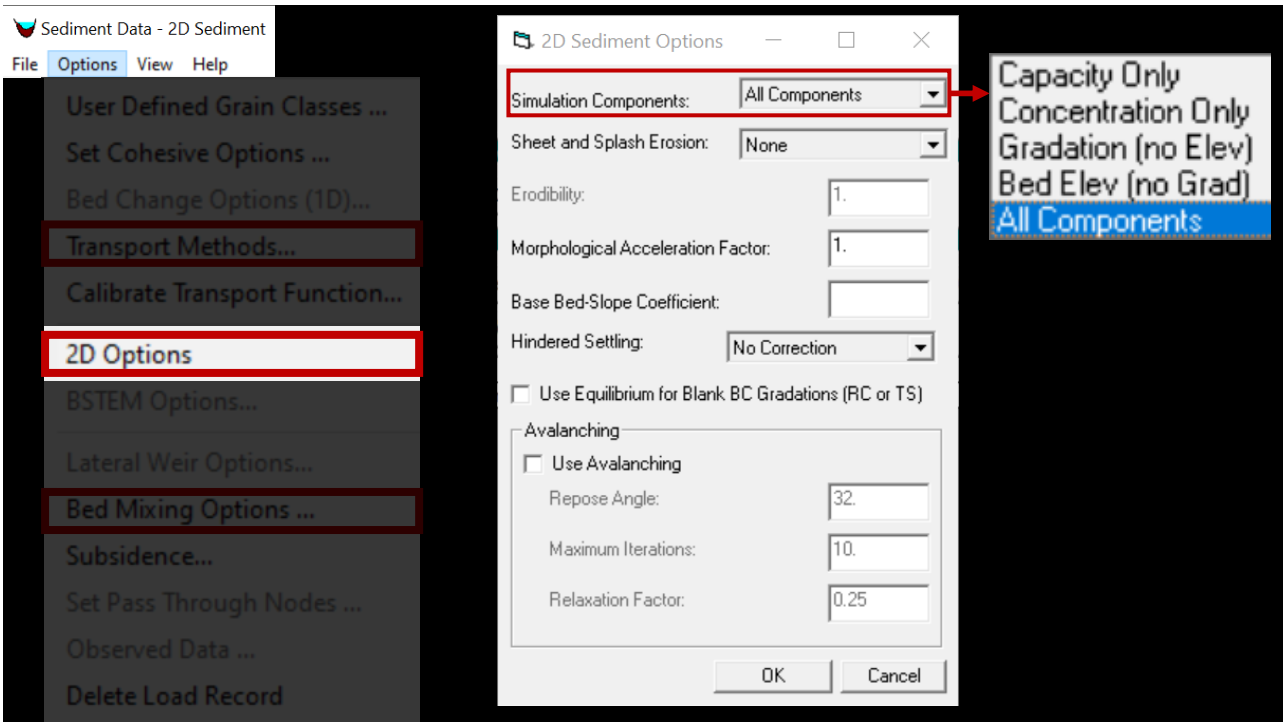
Example Scaling Factors

1.1 = 10% increase

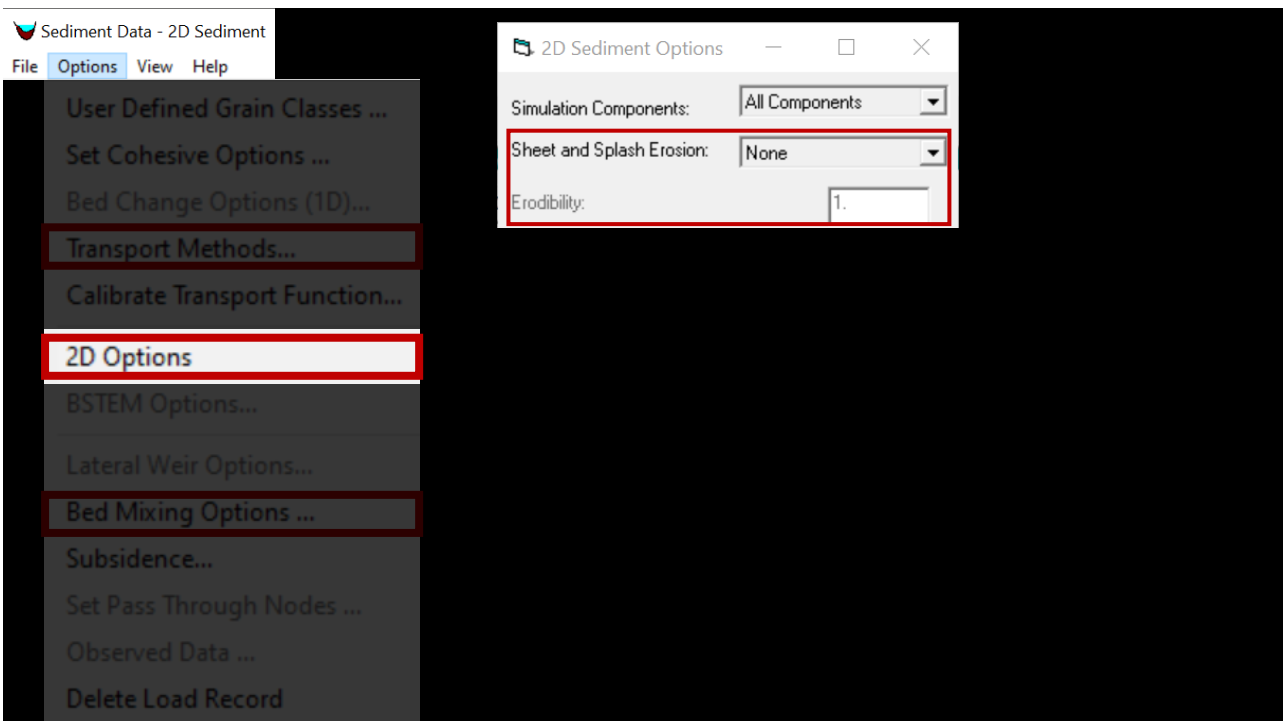
0.9 = 10% decrease

I generally keep these numbers between 0.8 and 1.2 and try to use evidence from data or field processes to support the direction.

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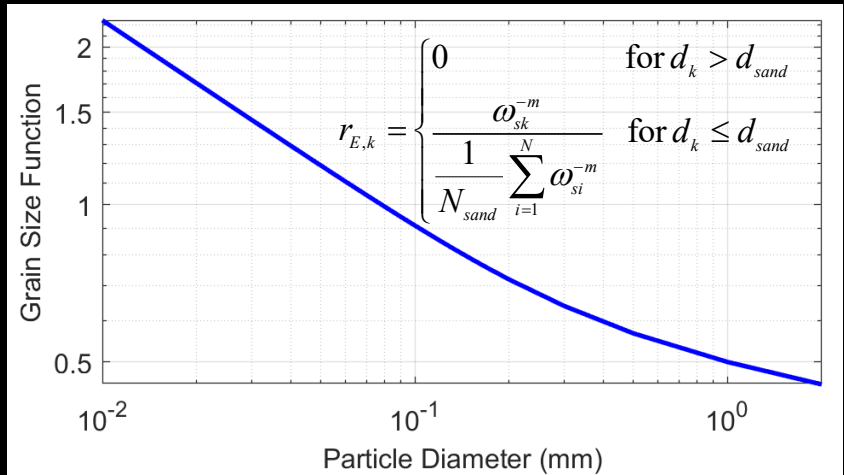
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Sheet and Splash Erosion

- Based on Wei et al. (2009)
 - Extended to multiple grain sizes and limited for intense rain
 - Applied to hydraulically dry areas of cells
- No rill dynamics
 - Sediment instantly reaches wet portion of cell



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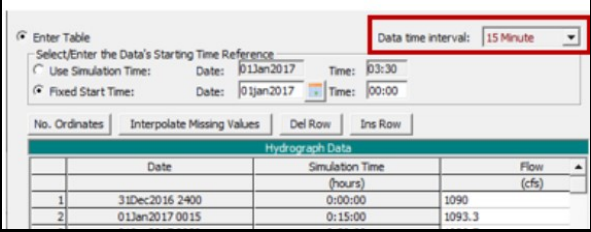
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The screenshot shows the 'Sediment Data - 2D Sediment' software interface. The 'Options' menu is open, and the '2D Options' option is highlighted. The '2D Sediment Options' dialog box is also visible, showing the following settings:

- Simulation Components: All Components
- Sheet and Splash Erosion: None
- Erodibility: 1.
- Morphological Acceleration Factor: 1.

Below the dialog box, a text box states: "Because sediment change is accelerated, you must compress time by compressing your hydrograph." This is illustrated by two graphs showing a hydrograph. The left graph shows a wide, low hydrograph, and the right graph shows a narrower, taller hydrograph, with an arrow labeled "MAF=2 Time/2" pointing from the left to the right graph.

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No. Ordinates	Interpolate Missing Values	Del Row	Ins Row
Hydrograph Data			
	Date	Simulation Time (hours)	Flow (cfs)
1	31Dec2016 2400	0:00:00	1090
2	01Jan2017 0015	0:15:00	1093.3

New Data Time Interval = $\frac{\text{Original Data Time Interval}}{\text{Morphological Acceleration Factor}}$

Accelerate bed change by 15X → Reduce Flow Increment from 15 to 1 min

Morphological Acceleration Factor: Data time interval:

Accelerate bed change by 5X → Reduce Flow Increment from 15 to 3 min

Morphological Acceleration Factor: Data time interval:

Accelerate bed change by 3X → Reduce Flow Increment from 15 to 5 min

Morphological Acceleration Factor: Data time interval:

Choose an MAF that divides well into your original data time interval.

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes

Bed Change Options (1D)

2D Options

SYSTEM Options...

Lat

Recommended Range: 0.0-0.5

Bed Mixing

Subsidence...

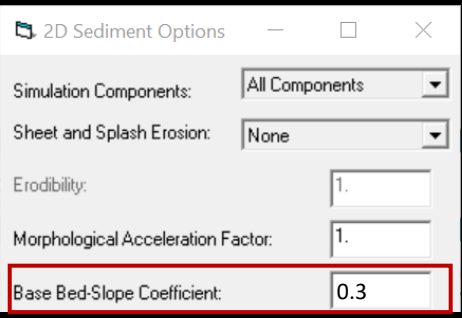
Set Pass Through Nodes ...

Observed Data ...

Delete Load Record

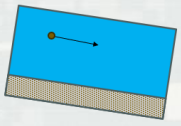
The slope correction is essentially a diffusion term for bed change.

↑ Slope Coefficient smooths erosion-deposition (e.g. red-blue patching)

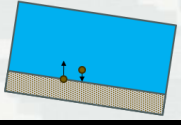


Governing Sediment Equations

- Total-load Transport Equation

$$\frac{\partial}{\partial t} \left(\frac{hC_{tk}}{\beta_{tk}} \right) + \nabla \cdot (h\mathbf{U}C_{tk}) = \nabla \cdot (\epsilon_{tk} h \nabla C_{tk}) + E_{tk} - D_{tk}$$


- Bed Change Equation

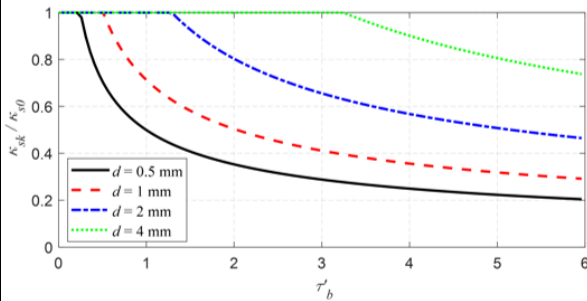
$$\rho_{sk}(1 - \phi_b) \left(\frac{\partial z_b}{\partial t} \right)_k = D_{tk} - E_{tk} + \nabla \cdot (\kappa_{bk} |q_{bk}| \nabla z_b)$$


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The Bed Change Equation

$$\rho_{sk}(1 - \phi_b) \left(\frac{\partial z_b}{\partial t} \right)_k = D_{tk} - E_{tk} + \nabla \cdot (\kappa_{bk} |q_{bk}| \nabla z_b)$$

Bed Change
Deposition
Erosion
Slope Correction



$$\kappa_{bk} = \kappa_{b0} \sqrt{\frac{\tau_{crk0}}{\max(\tau'_b, \tau_{crk0})}}$$

$\kappa_{b0} \approx 0.1 - 0.5$

2D Sediment Options

Simulation Components: All Components

Sheet and Splash Erosion: None

Erodibility: 1

Morphological Acceleration Factor: 1

Base Bed-Slope Coefficient: 0.3

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Sediment Data - 2D Sediment

File Options View Help

- User Defined Grain Classes ...
- Set Cohesive Options ...
- Bed Change Options (1D)...
- Transport Methods...
- Calibrate Transport Function...
- 2D Options**
- BSTEM Options...

2D Sediment Options

Simulation Components: All Components

Sheet and Splash Erosion: None

Erodibility: 1

Morphological Acceleration Factor: 1

Base Bed-Slope Coefficient: 0.3

The Bed Change Equation

$$\rho_{sk}(1 - \phi_b) \left(\frac{\partial z_b}{\partial t} \right)_k = D_{tk} - E_{tk} + \nabla \cdot (\kappa_{bk} |q_{bk}| \nabla z_b)$$

Bed Change
Deposition
Erosion
Slope Correction

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Sediment Data - 2D Sediment

File Options View Help

2D Options

BSTEM Options...

Lateral Weir Options...

Bed Mixing Options ...

Hindered Settling:
At high concentrations the solids bang against each other and slow settling down, "hindering settling," reducing the fall velocity.

2D Sediment Options

Simulation Components: All Components

Sheet and Splash Erosion: None

Erodibility: 1.

Morphological Acceleration Factor: 1.

Base Bed-Slope Coefficient: 0.3

Hindered Settling: No Correction

$$\omega_{sd(h)} = \omega_{sd(cl)} (1 - C_{TV})^4$$

Hindered Settling Velocity

Clear Water Settling Velocity

Total Concentration

- Only for 2D Sediment
- Only for noncohesives
- Cohesives treated separately
- Richardson and Zaki (1952)

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Sediment Data - 2D Sediment

File Options View Help

User Defined Grain Classes ...

Set Cohesive Options ...

Bed Change Options (1D)...

Transport Methods...

Calibrate Transport Function...

2D Options

BSTEM Options...

Lateral Weir Options...

Bed Mixing Options ...

Subsidence...

Set Pass Through Nodes ...

Observed Data ...

Delete Load Record

2D Sediment Options

Simulation Components: All Components

Sheet and Splash Erosion: None

Erodibility: 1.

Morphological Acceleration Factor: 1.

Base Bed-Slope Coefficient: 0.3

Hindered Settling: No Correction

Use Equilibrium for Blank BC Gradations (RC or TS)

Avalanching

Use Avalanching

Repose Angle: 32.

Maximum Iterations: 10.

Relaxation Factor: 0.25

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Sediment Data - 2D Sediment
File Options View Help

Flow ←

d_j d_k

Bed Mixing Options ...

Bed Mixing Options

Capacity Partitioning (1D Only)
Capacity Partitioning Method: Bed Gradation Only % Inflow Gradation: 10

Hiding and Exposure Functions
Hiding Function: Wu et al Hiding Exponent: 0.8 Shape Factor: 0.6

Active Layer Options
Active Layer Thickness: X d90 Multiplier: 3 Min Thickness: 0.1 ft

Exchange Increment (1D Only): % Bedload: 70 % Active Layer: 30

Cover/Active Layer Gradations (1D Only)
 Specify Separate Cover/Active Layer Gradations

Copeland Method Option (test) (1D Only) OK Cancel Defaults ...

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Topics

**Sediment
Options
Menu**

Sediment Data -
File Options View Help

- User Defined Grain Classes ...
- Set Cohesive Options ...
- Bed Change Options (1D)...
- Transport Methods...
- Calibrate Transport Function...
- 2D Options
- BSTEM Options...
- Lateral Weir Options...
- Bed Mixing Options ...

Sediment Boundary Condition Types

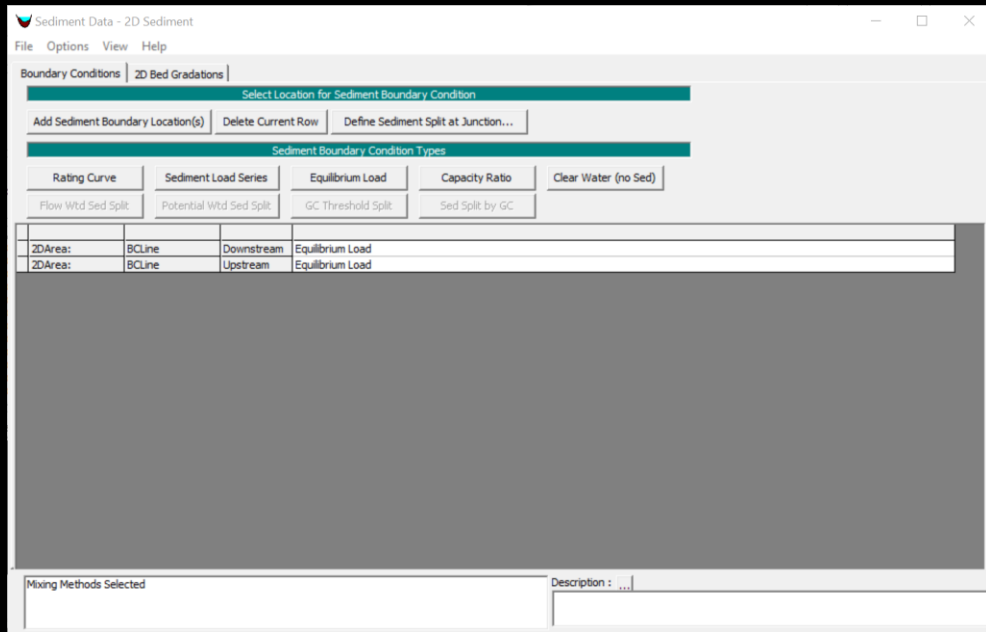
Equilibrium Load	Capacity Ratio	Clear Water (no Sed)
GC Threshold Split	Sed Split by GC	

**Boundary
Condition
Options**

Sediment Boundary Condition Types

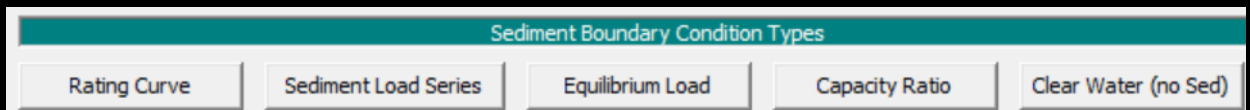
Rating Curve	Sediment Load Series	Equilibrium Load	Capacity Ratio	Clear Water (no Sed)
Flow Wtd Sed Split	Potential Wtd Sed Split	GC Threshold Split	Sed Split by GC	
2D Area:	BCLine	Upstream	Rating Curve	

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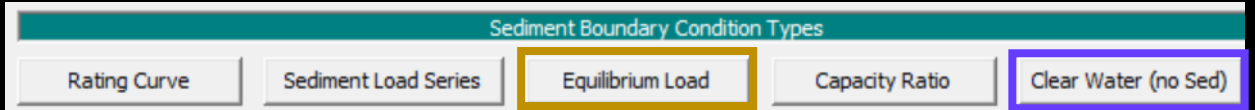
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Upstream Boundary Conditions



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Upstream Boundary Conditions



Computes sediment capacity across boundary condition and introduces the load into the boundary cells equal to the capacity.

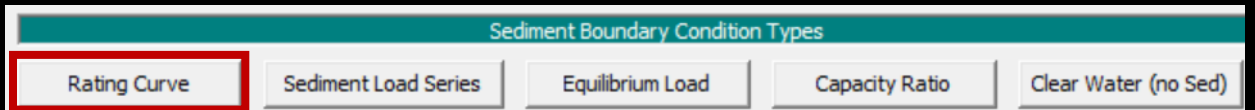
Brings in no sediment. Can erode upstream cells if they are not coarse enough.

- Should keep the cells at the boundary condition stable.
- Cannot compute wash load.
- Problematic at actively changing transects.
- VERY sensitive to bed gradation at the cell centers which can be extremely uncertain.

Let's start with the easiest two

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Upstream Boundary Conditions

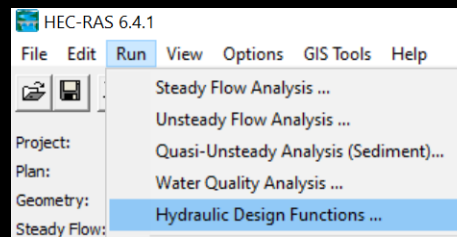


Rating Curve for US BC

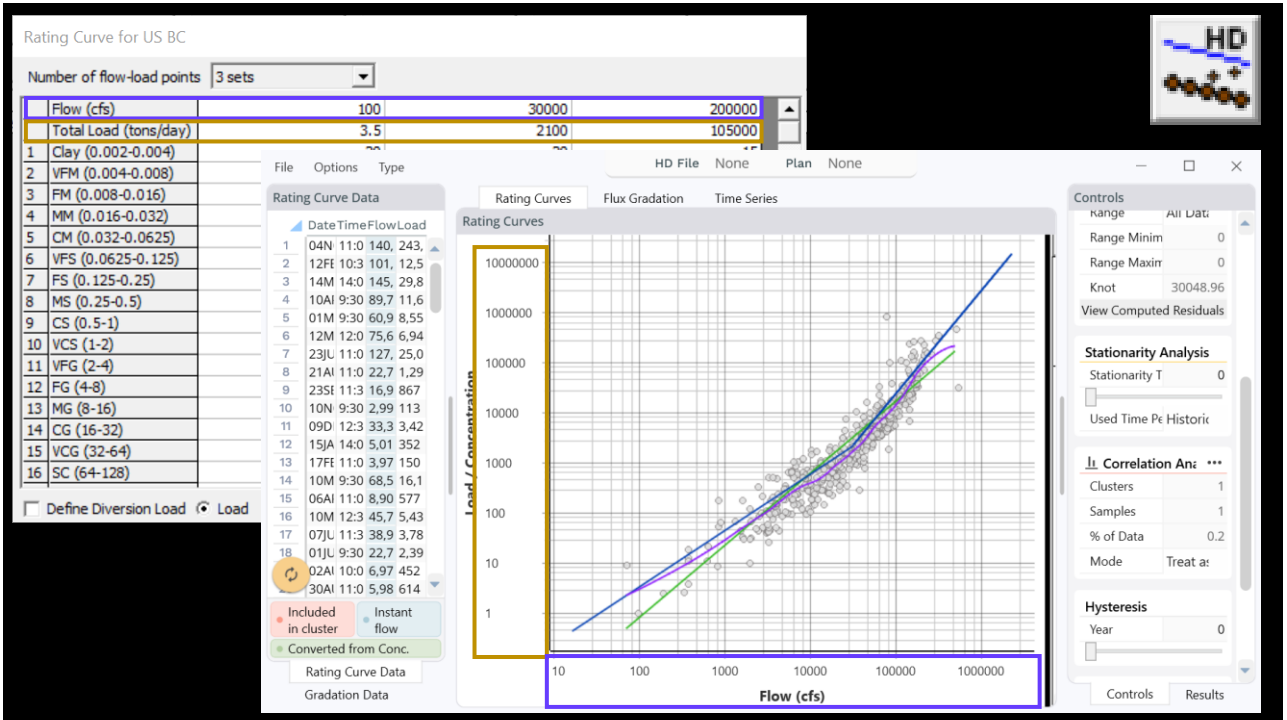
Number of flow-load points: 3 sets ≤ 3

	100	30000	200000
Total Load (tons/day)	3.5	2100	105000
1 Clay (0.002-0.004)	20	20	15
2 VFM (0.004-0.008)	12	12	10
3 FM (0.008-0.016)	12	12	10
4 MM (0.016-0.032)	12	12	10
5 CM (0.032-0.0625)	12	12	10
6 VFS (0.0625-0.125)	12	12	10
7 FS (0.125-0.25)	20	20	30
8 MS (0.25-0.5)			
9 CS (0.5-1)			
10 VCG (1-2)			
11 VFG (2-4)			
12 FG (4-8)			
13 MG (8-16)			
14 CG (16-32)			
15 VCG (32-64)			
16 SC (64-128)			

Define Diversion Load
 Load
 Concentration
 Conc<-->Load
 Plot ...
 OK
 Cancel



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Upstream Boundary Conditions

Sediment Boundary Condition Types

Rating Curve | Sediment Load Series | Equilibrium Load | Capacity Ratio | Clear Water (no Sed)

Rating Curve for US BC

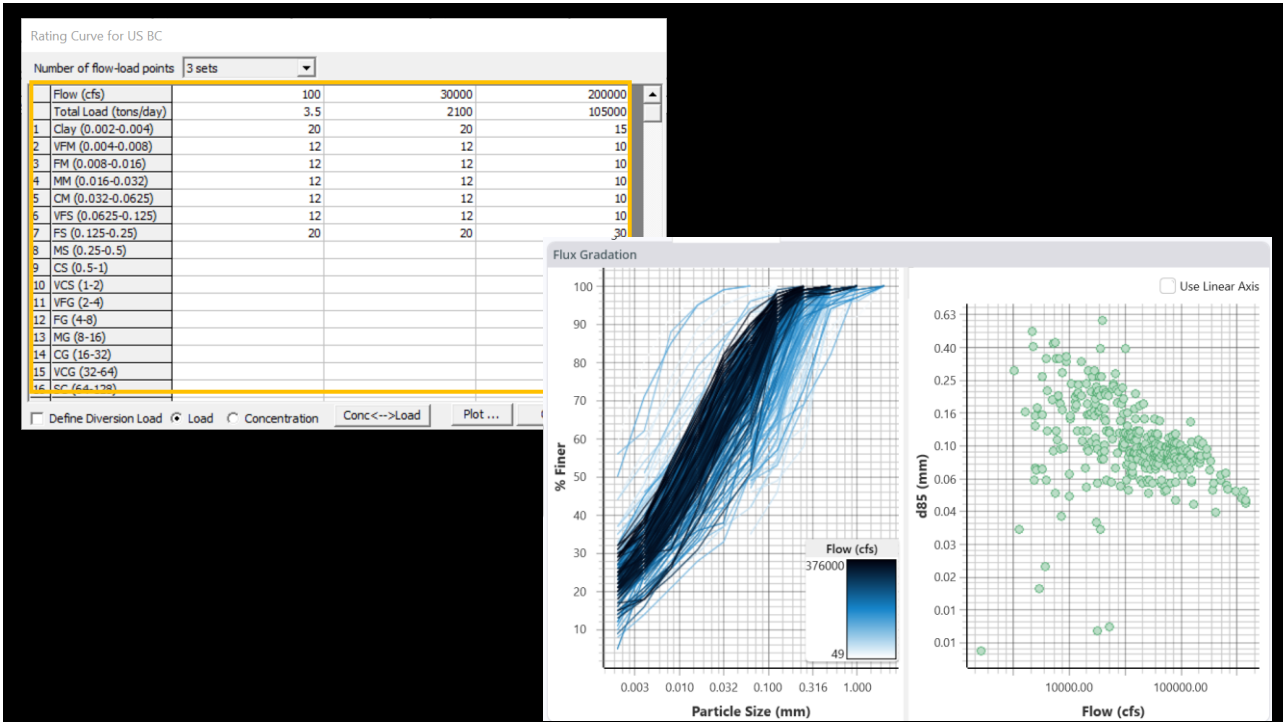
Number of flow-load points: 3 sets

	Flow (cfs)	30000	200000
Total Load (tons/day)	3.5	2100	105000
1 Clay (0.002-0.004)	20	20	15
2 VFM (0.004-0.008)	12	12	10
3 FM (0.008-0.016)	12	12	10
4 MM (0.016-0.032)	12	12	10
5 CM (0.032-0.0625)	12	12	10
6 VFS (0.0625-0.125)	12	12	10
7 FS (0.125-0.25)	20	20	30
8 MS (0.25-0.5)			
9 CS (0.5-1)			
10 VCS (1-2)			
11 VFG (2-4)			
12 FG (4-8)			
13 MG (8-16)			
14 CG (16-32)			
15 VCG (32-64)			
16 SC (64-128)			

Buttons: Define Diversion Load, Load, Concentration, Conc<-->Load, Plot..., OK, Cancel

Grain Size Distribution

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Upstream Boundary Conditions

Sediment Boundary Condition Types

Rating Curve | Sediment Load Series | Equilibrium Load | Capacity Ratio | Clear Water (no Sed)

Rating Curve for east-butte vent

Number of flow-load points 2 sets

Values=Total Load & Blanks=0

Values=Total Load & Blanks=0

Values=Total Load & Blanks=Equilibrium (2D Only)

Values=Susp, Blanks=Eq Susp, Bed Load=Eq (2D Only)

Flow (cfs)	
Total Load (tons/day)	
1 Clay (0.002-0.004)	

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Rating Curve

Values=Total Load & Blanks=Equilibrium (2D Only) ▼

Rating Curve for US BC

Number of flow-load points: 3 sets

	Flow (cfs)	100	30000	200000
Total Load (tons/day)	3.5	2100	10500	
1 Clay (0.002-0.004)	0	0	0	
2 VFM (0.004-0.008)	0	0	0	
3 FM (0.008-0.016)	15	15	10	
4 MM (0.016-0.032)	15	15	10	
5 CM (0.032-0.0625)	15	15	10	
6 VFS (0.0625-0.125)	40	40	50	
7 FS (0.125-0.25)	10	10	12	
8 MS (0.25-0.5)	5	5	7	
9 CS (0.5-1)			2	
10 VCS (1-2)				
11 VFG (2-4)				
12 FG (4-8)				
13 MG (8-16)				
14 CG (16-32)				
15 VCG (32-64)				
16 SC (64-128)				

Define Diversion Load
 Load
 Concentration
 Conc<-->Load
 Plot ...
 OK
 Cancel

**New in 6.5
Compound BCs**

0 = No Load

#'s As Specified

Blanks = Equilibrium Load

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Rating Curve

Values=Susp, Blanks=Eq Susp, Bed Load=Eq (2D Onl) ▼

Rating Curve for US BC

Number of flow-load points: 3 sets

	Flow (cfs)	100	30000	200000
Total Load (tons/day)	3.5	2100	10500	
1 Clay (0.002-0.004)	0	0	0	
2 VFM (0.004-0.008)	0	0	0	
3 FM (0.008-0.016)	15	15	10	
4 MM (0.016-0.032)	15	15	10	
5 CM (0.032-0.0625)	15	15	10	
6 VFS (0.0625-0.125)	40	40	50	
7 FS (0.125-0.25)	10	10	12	
8 MS (0.25-0.5)	5	5	7	
9 CS (0.5-1)			2	
10 VCS (1-2)				
11 VFG (2-4)				

Define Diversion Load
 Load
 Concentration
 Conc<-->Load
 Plot ...
 OK
 Cancel

**New in 6.5
Compound BCs**

0 = No Load

#'s As Specified

q_{sk}^* = Equilibrium Load

$q_{b(all)}^*$ = Equilibrium Load

For All GCS

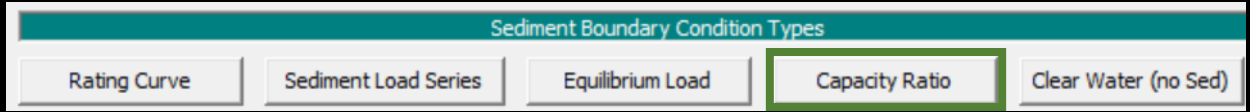
$$q_{bk}^* = 0.005Uh \left(\frac{U - U_{chk}}{\sqrt{R_k g d_k}} \right)^{2.4} \left(\frac{d_k}{h} \right)^{1.2}$$

$$q_{sk}^* = 0.012Uh \left(\frac{U - U_{chk}}{\sqrt{R_k g d_k}} \right)^{2.4} \left(\frac{d_k}{h} \right)^{d_{*k}^{-0.6}}$$

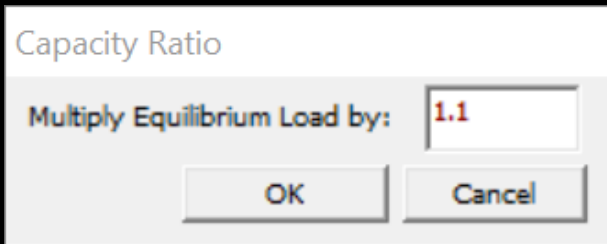
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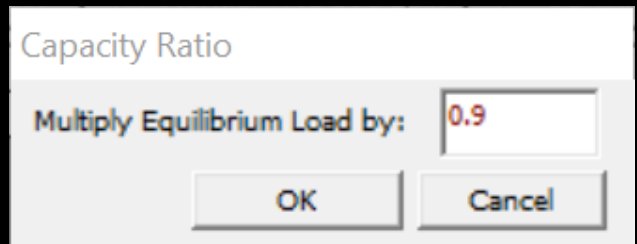
Upstream Boundary Conditions



10% Overloaded



10% Underloaded



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Sediment Load Series

Sediment Load Series

Enter Table
 Read Load From DSS

Select/Enter the Data's Starting Time Reference

Use Simulation Time: Date: 08Dec2016 Time: 0000
 Fixed Start Time: Date: Time:

Manual Entry | DSS

Sediment Series					Gradation Rating Curve		
No.	Ordinates	Interpolate Values	Import Dur	Del Row	Ins Row	Number of flow-load points	
Simulation Time	Elapsed Time (hours)	Duration (hours)				2 sets	
1	07Dec2016 2400	1	1				
2	08Dec2016 0100	2	1				
3	08Dec2016 0200	3	1				
4	08Dec2016 0300	4	1				
5	08Dec2016 0400	5	1				
6	08Dec2016 0500	6	1				
7	08Dec2016 0600	7	1				
8	08Dec2016 0700	8	1				
9	08Dec2016 0800	9	1				
10	08Dec2016 0900	10	1				
11	08Dec2016 1000	11	1				
12	08Dec2016 1100	12	1				
13	08Dec2016 1200	13	1				
14	08Dec2016 1300	14	1				
15	08Dec2016 1400	15	1				
16	08Dec2016 1500	16	1				
17	08Dec2016 1600	17	1				
18	08Dec2016 1700	18	1				
19	08Dec2016 1800	19	1				
20	08Dec2016 1900	20	1				
21	08Dec2016 2000	21	1				
22	08Dec2016 2100	22	1				
23	08Dec2016 2200	23	1				
24	08Dec2016 2300	24	1				

Total Load (tonnes/day)	240	1000
Clay (0.002-0.004)		
VFM (0.004-0.008)		
FM (0.008-0.016)		
MM (0.016-0.032)		
CM (0.032-0.0625)		
VFS (0.0625-0.125)		
FS (0.125-0.25)		
MS (0.25-0.5)		
CS (0.5-1)		
VCS (1-2)		
VFG (2-4)		
FG (4-8)		
MG (8-16)		
CG (16-32)		
VCG (32-64)	50	45
SC (64-128)	50	45
LC (128-256)		10
SB (256-512)		
MB (512-1024)		
LB (1024-2048)		

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