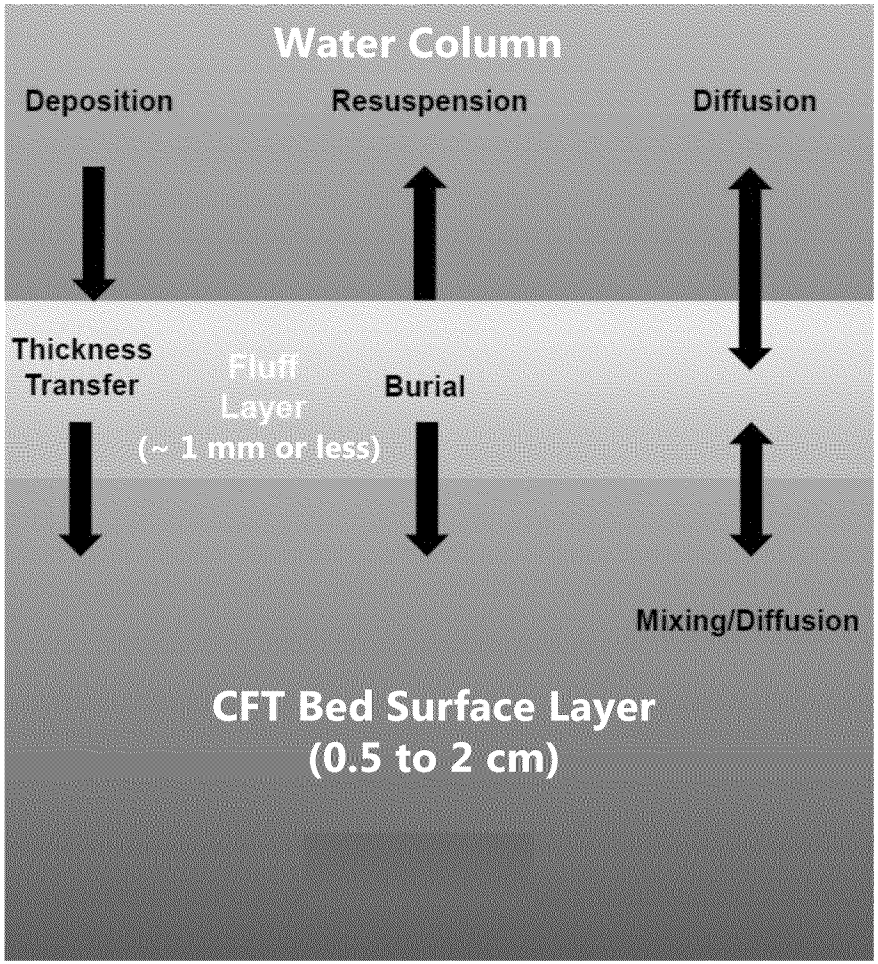
Bed Structure in CFT and ST Models

CFT Model



Stack of bed layers beneath (1 cm; not shown)

ST Model

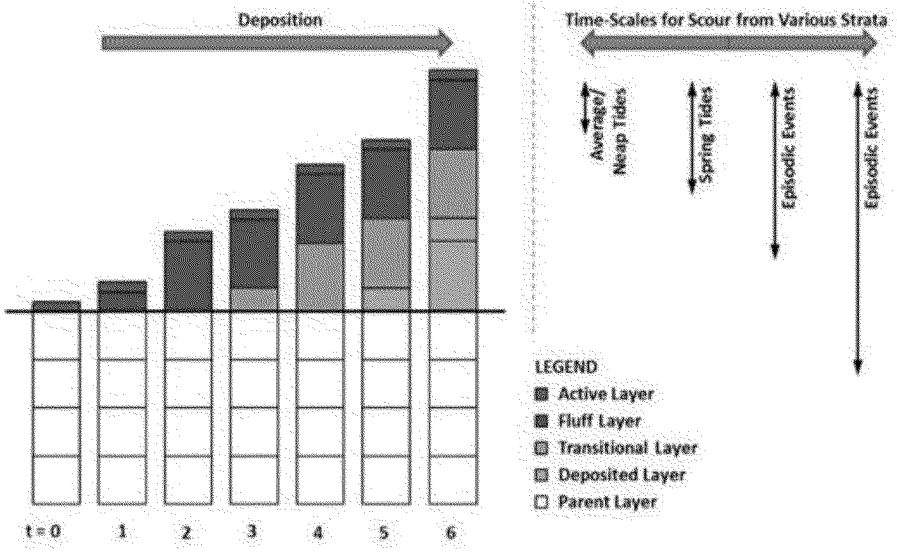


Figure 36. Schematic of revised bed layering in ECOM-SEDZLJS and conceptual representation of hydrodynamic conditions potentially responsible for erosion from various strata.

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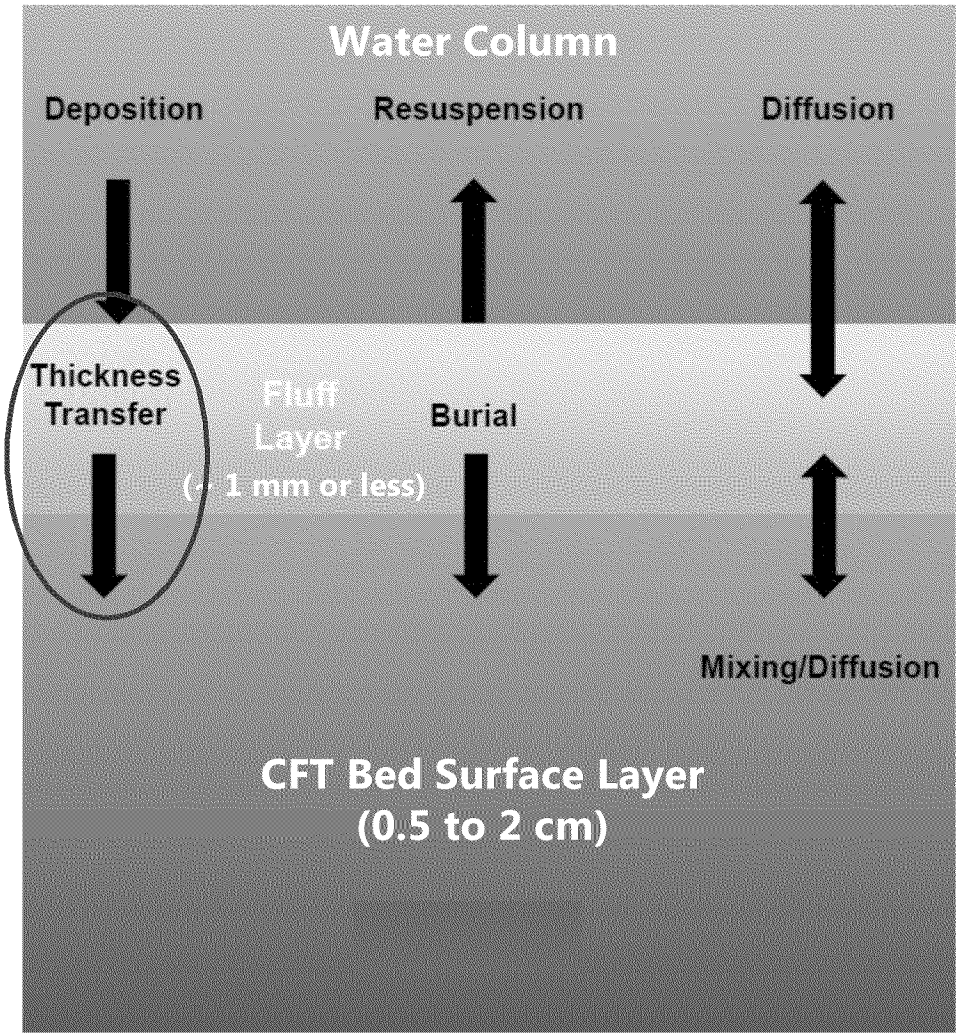
Fluff Thickness Transfer in CFT Model



- Exponential decay of fluff thickness
- Allows fluff layer to mimic what is "going up and down"
- Avoids the "reservoir effect" by transferring stagnant fluff thickness to underlying bed
- Essentially an adaptive grid scheme

Bed Layer Dynamics in ST Model

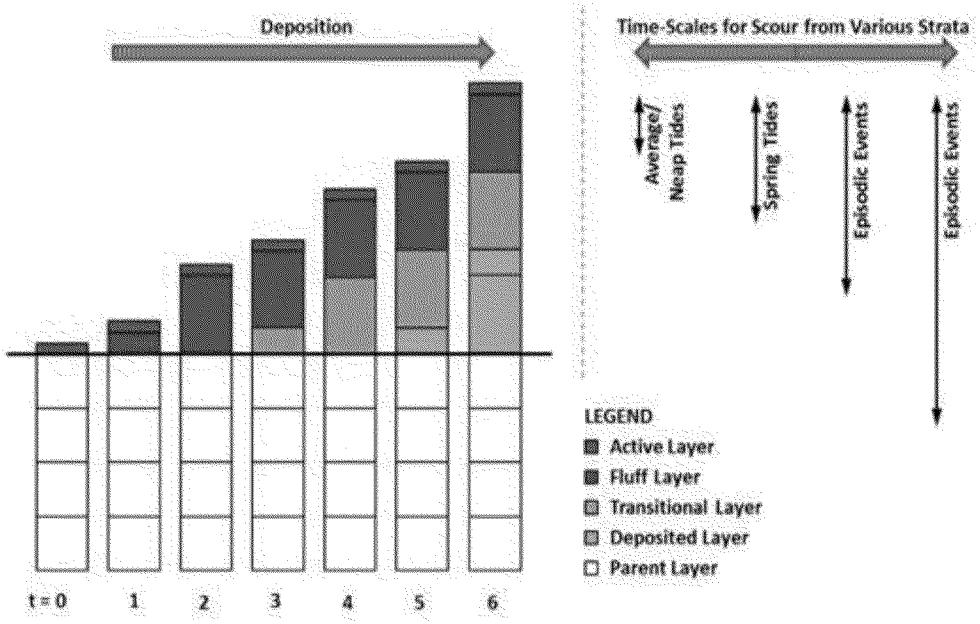
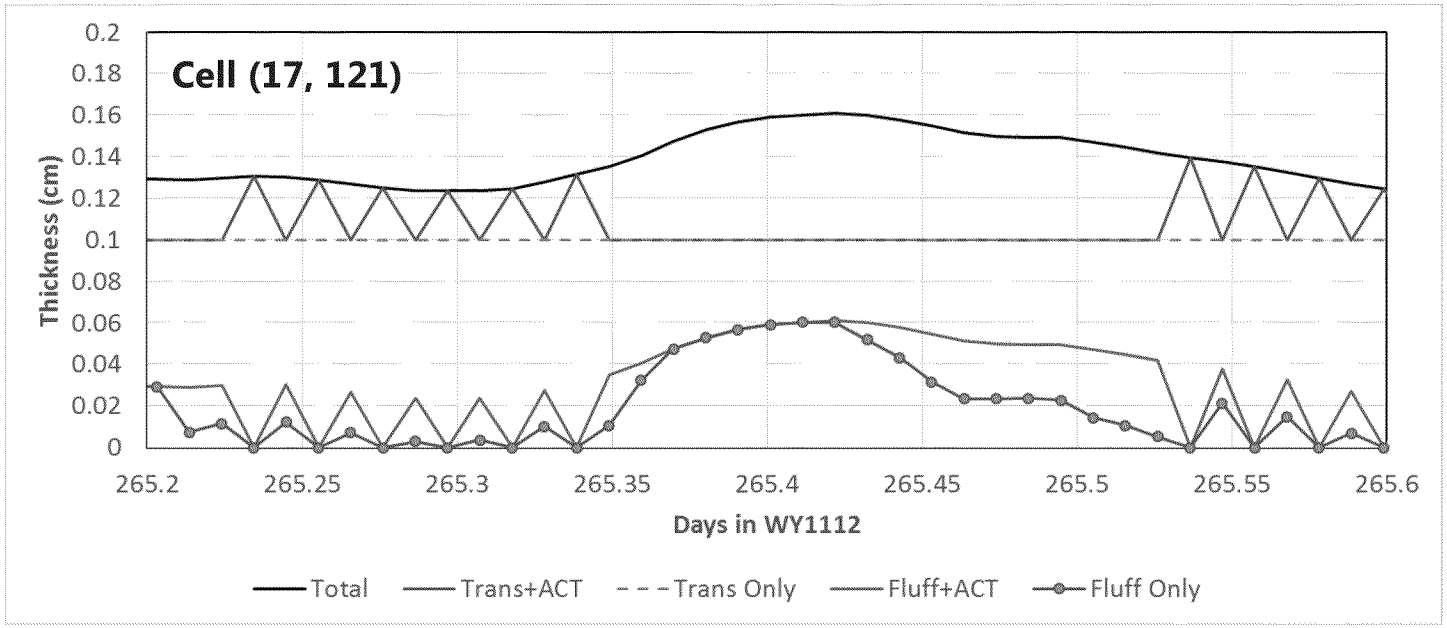


Figure 36. Schematic of revised bed layering in ECOM-SEDZLJS and conceptual representation of hydrodynamic conditions potentially responsible for erosion from various strata.



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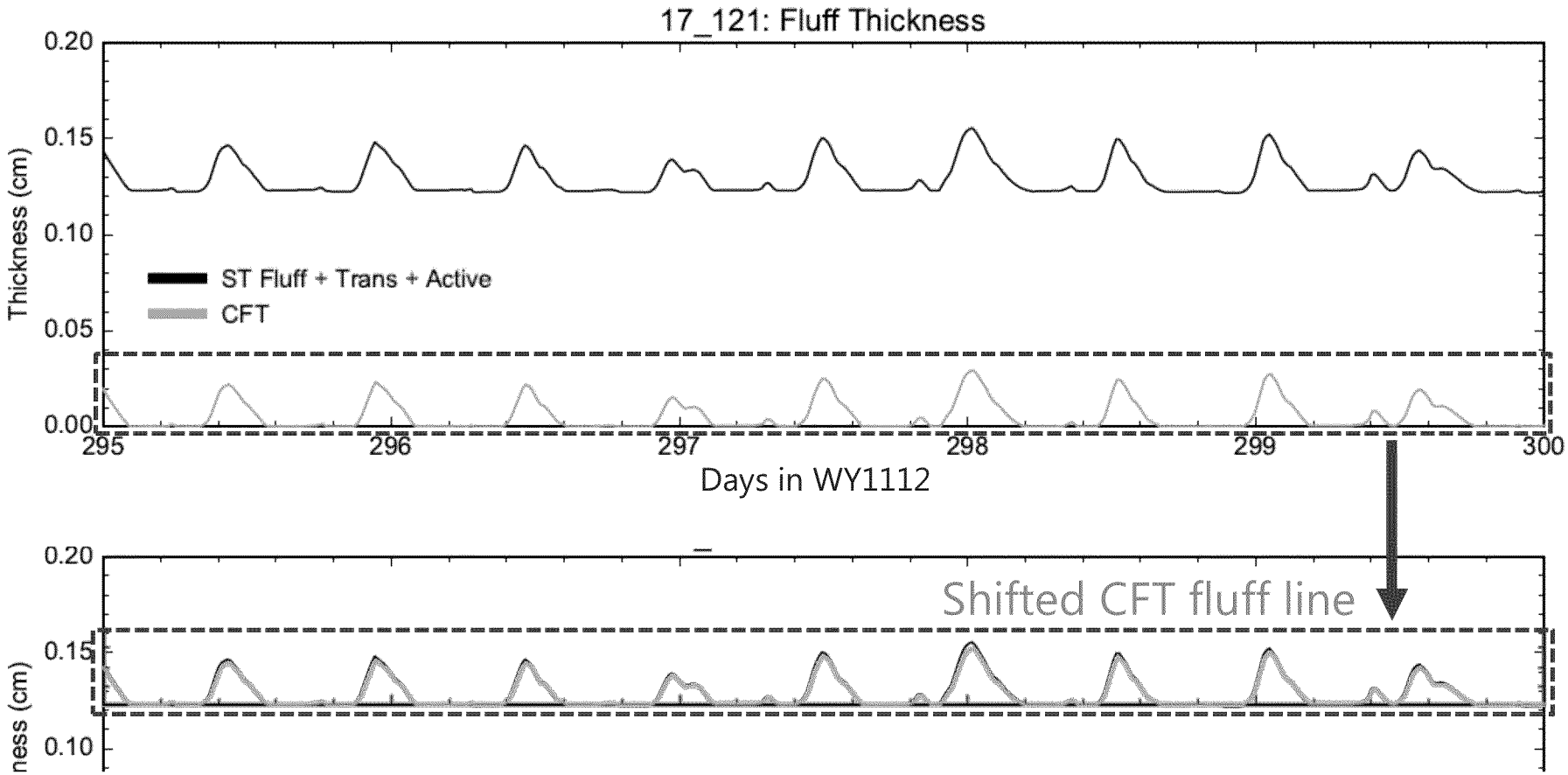
CFT Fluff Layer: No Net Deposition Period



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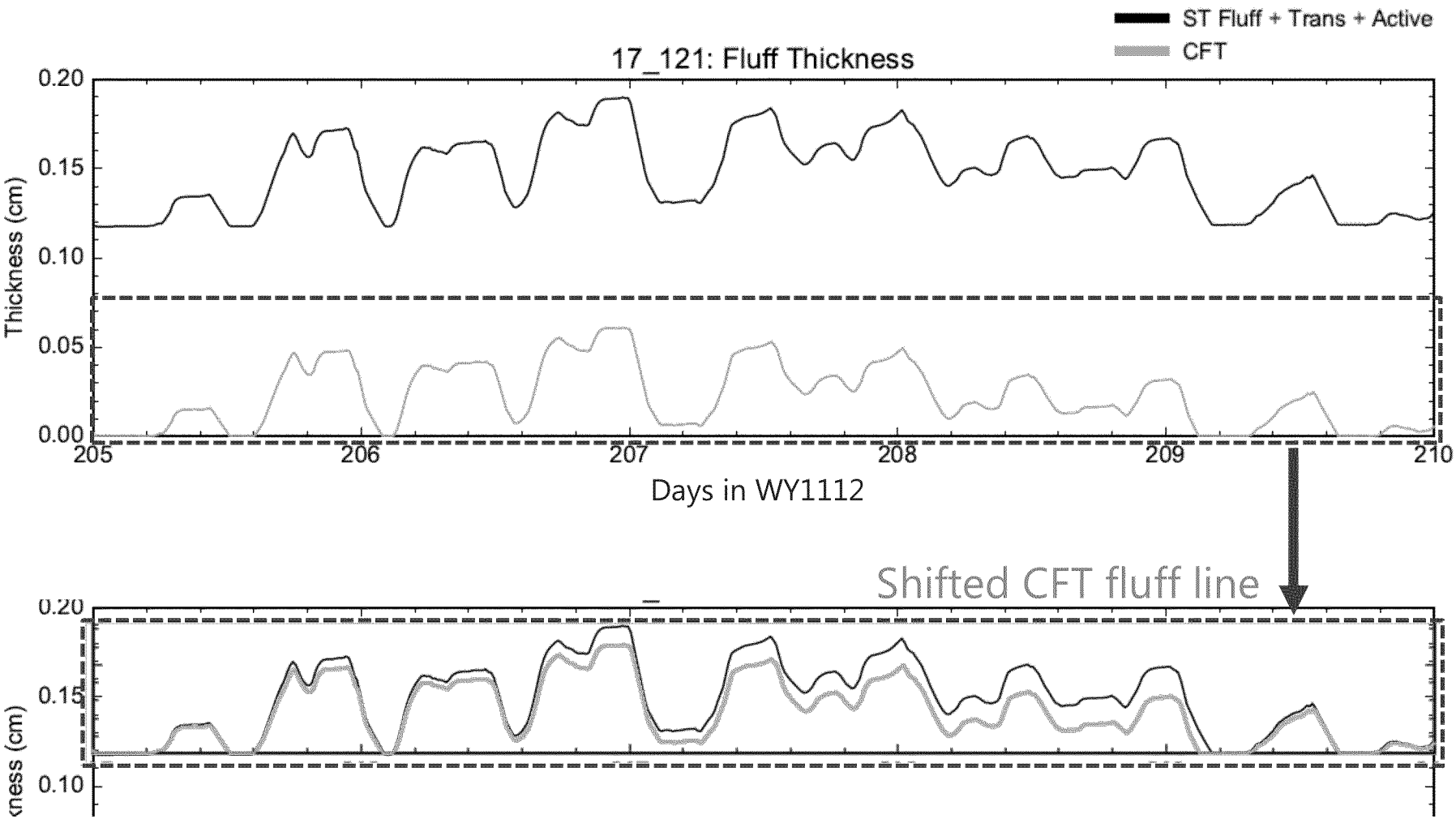
CFT Fluff Layer: Mild Net Deposition Period



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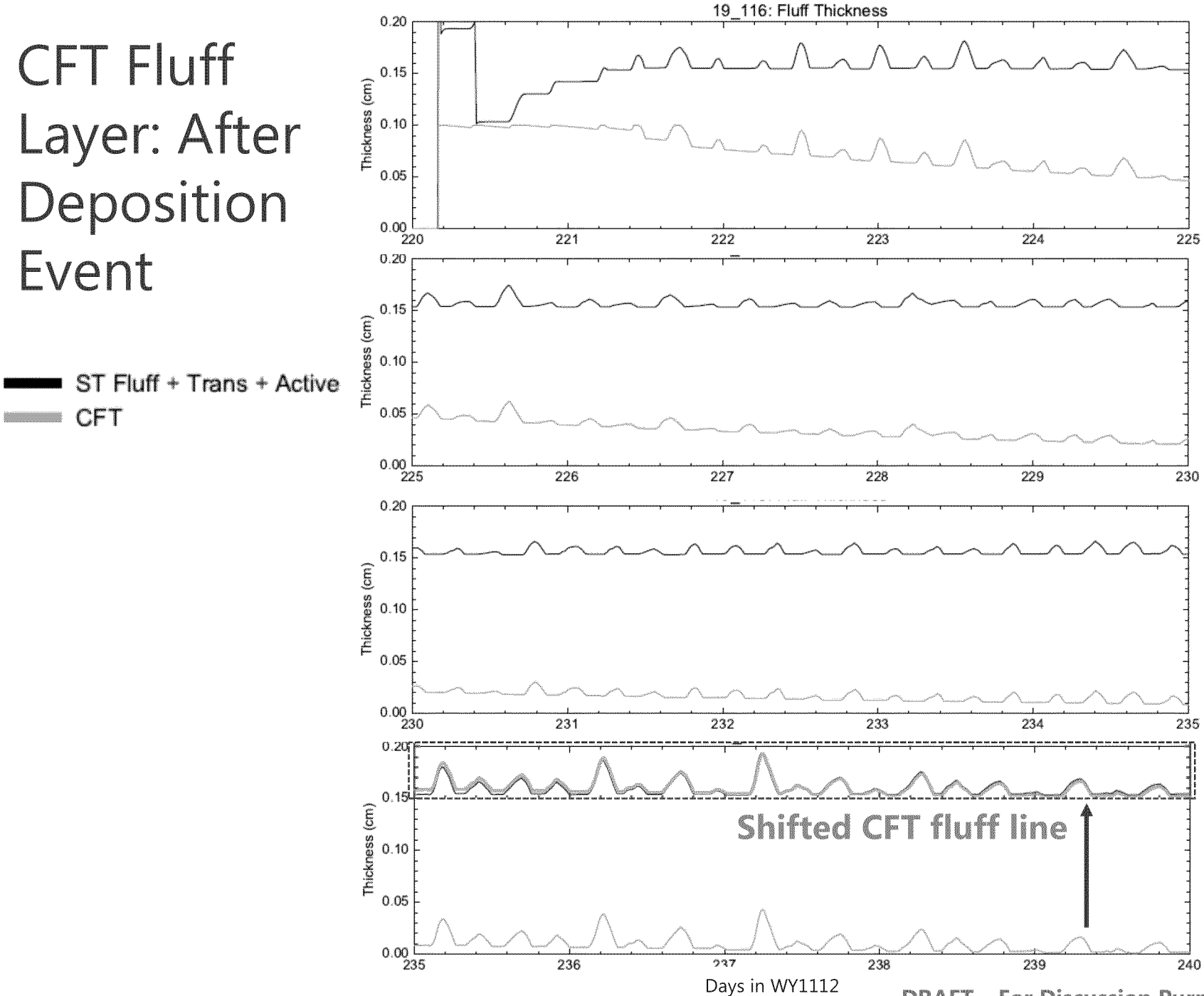
CFT Fluff Layer: After Deposition Event



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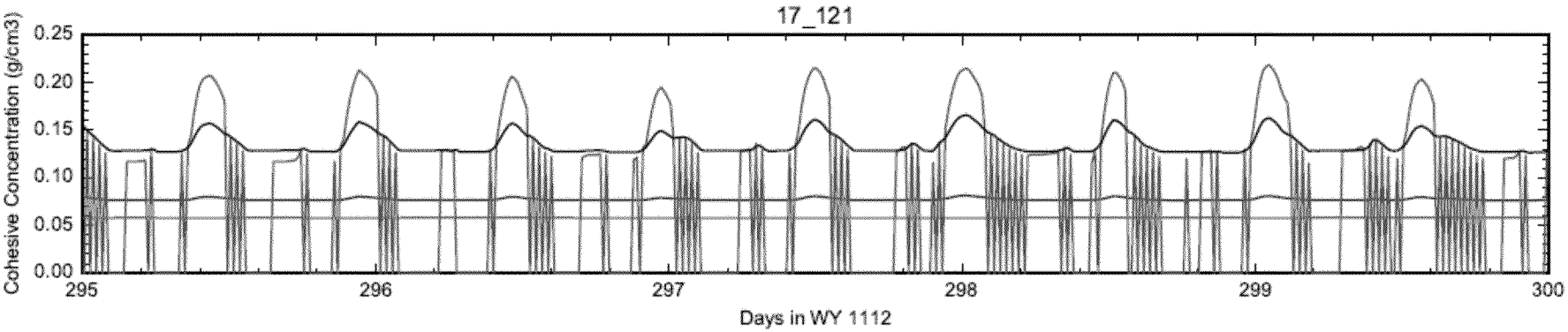
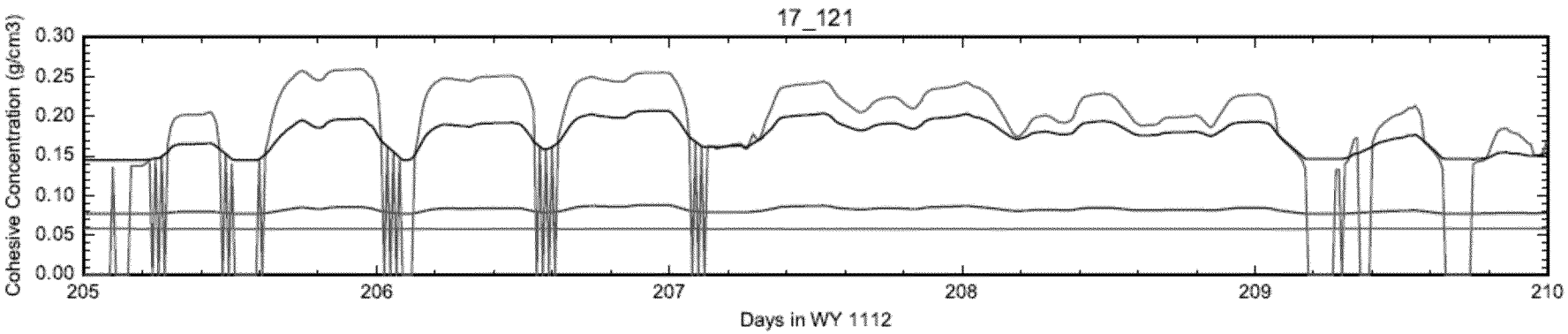
Surface Sediment Composition Dynamics from the ST Model





Fluff Layer
Fluff + Transitional Layers
0-2 cm
0-15 cm ← CFT model currently uses this composition

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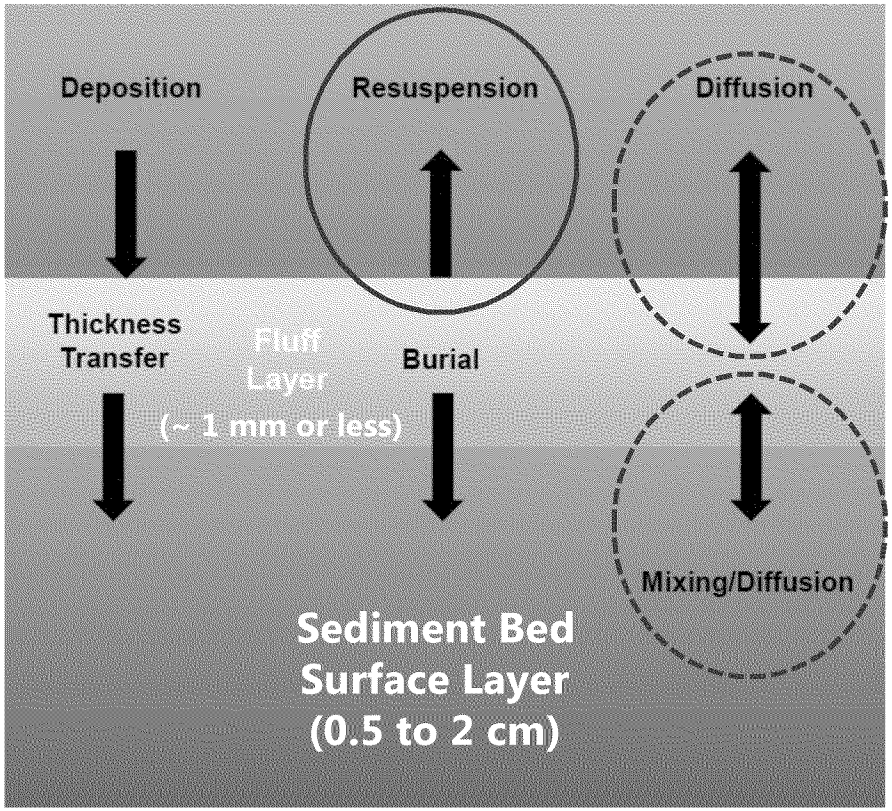
Influence of Resolving the Fluff Composition on CFT Model Predictions

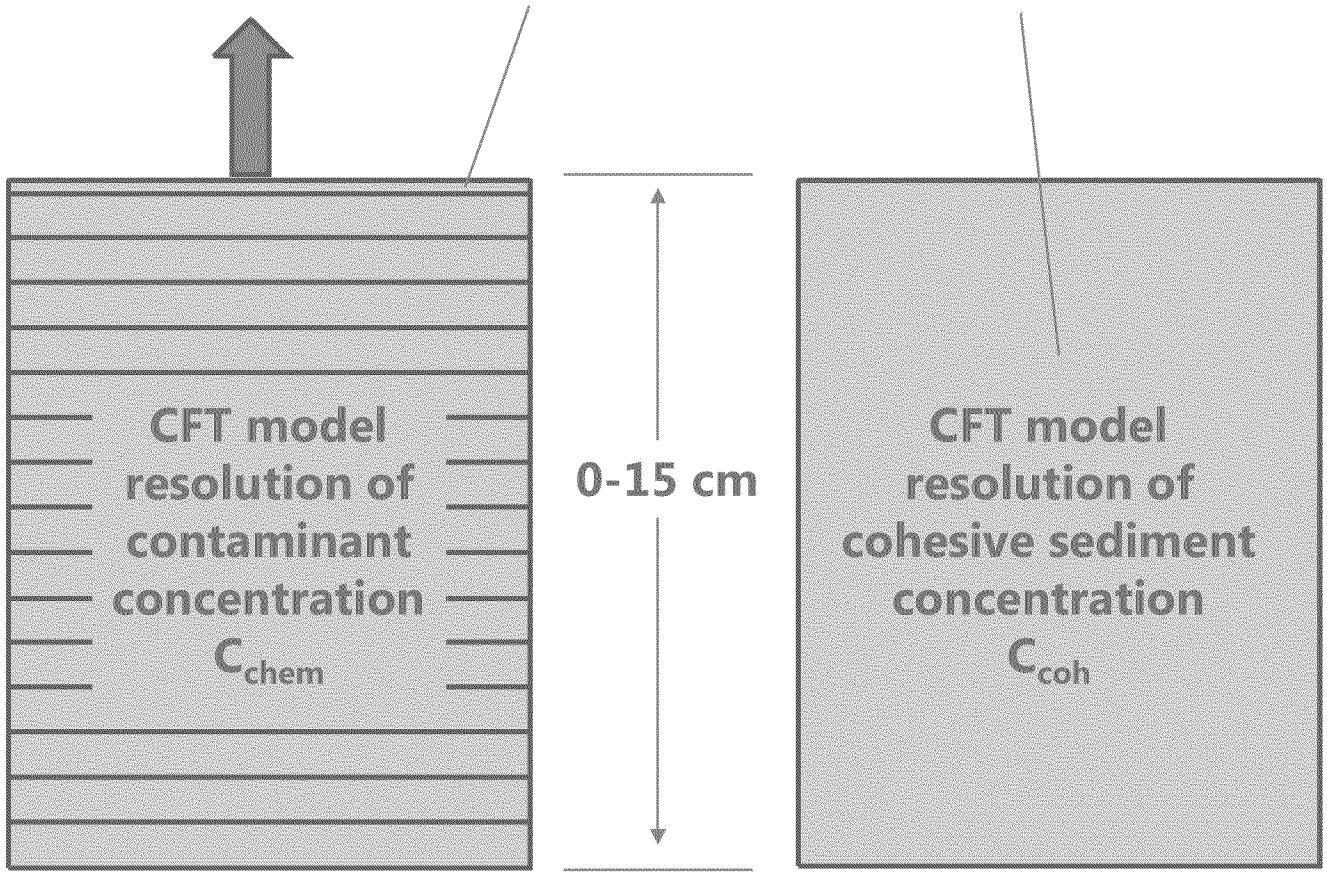
- Chemical erosion flux
  - Flux = chemical conc * cohesive erosion velocity
  - Cohesive erosion velocity = cohesive solids mass flux / cohesive solids conc
- Diffusion and mixing fluxes
  - Mainly if carbon model is also updated to resolve fluff layer
- Post-processed variables
  - Solids-normalized concentrations in fluff layer



Chemical Erosion Flux

Cohesive Erosion Velocity

$$Ero_{chem} = C_{chem} * [\, Ero_{coh} / C_{coh} \,]$$



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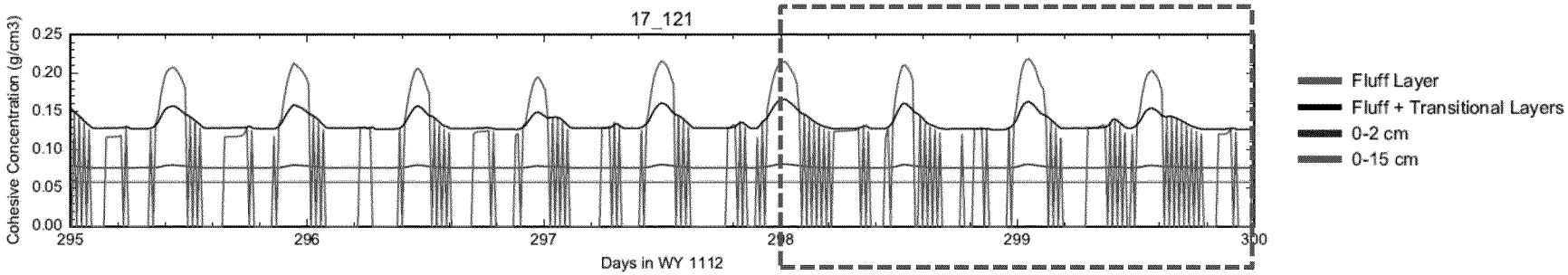
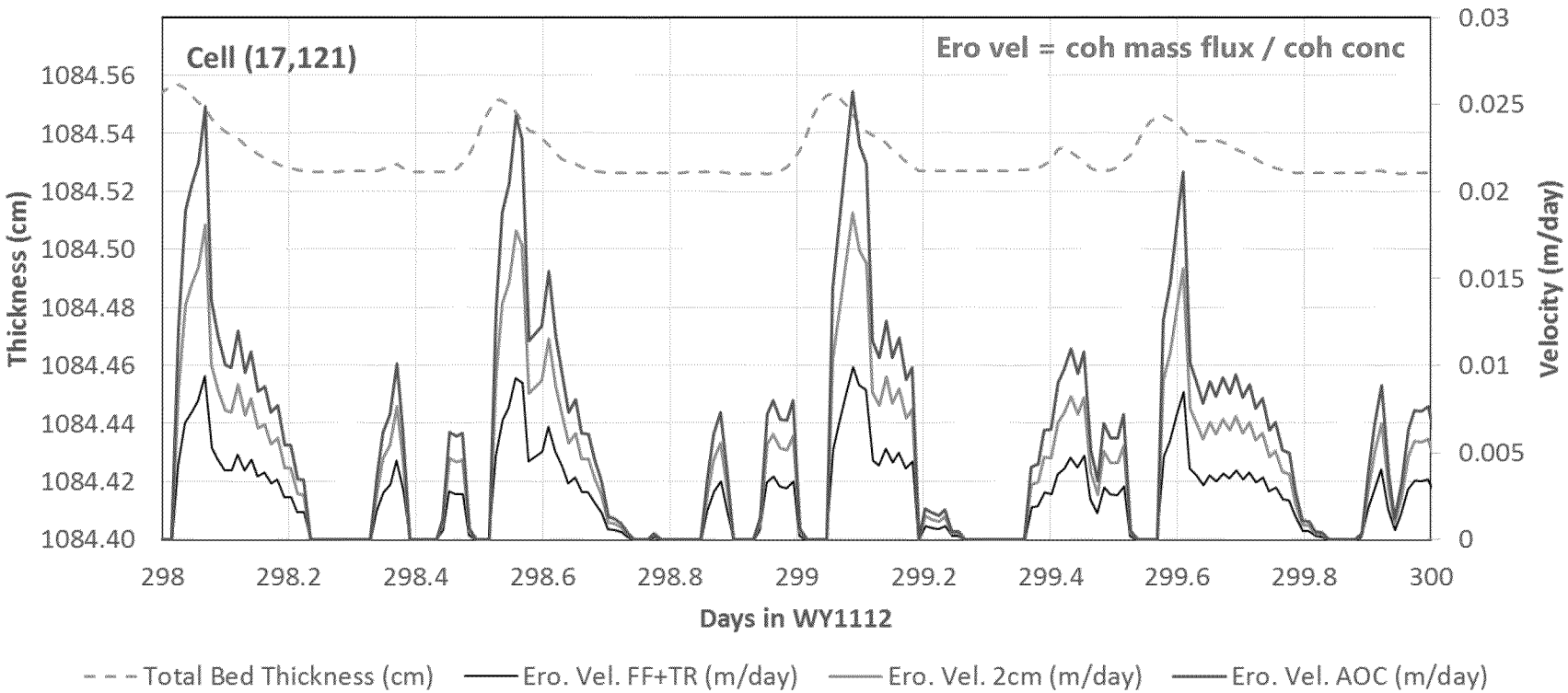
Erosion Velocity vs Cohesive Conc Averaging Depth

Fluff Layer Resuspension





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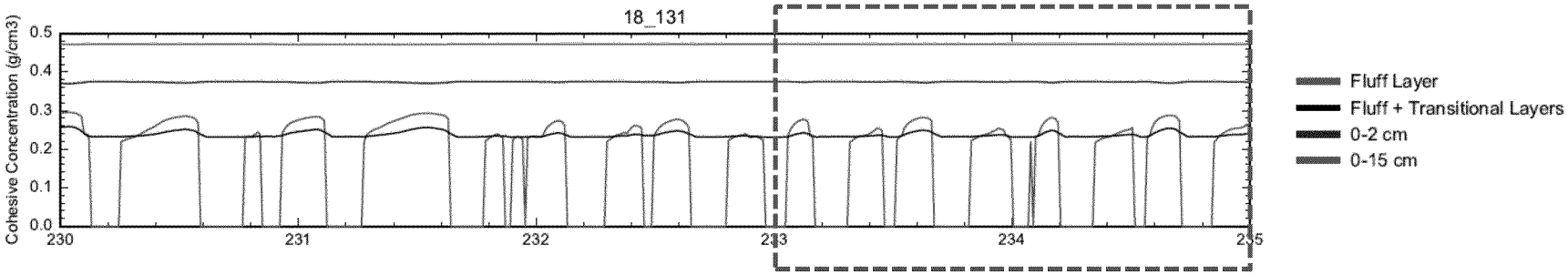
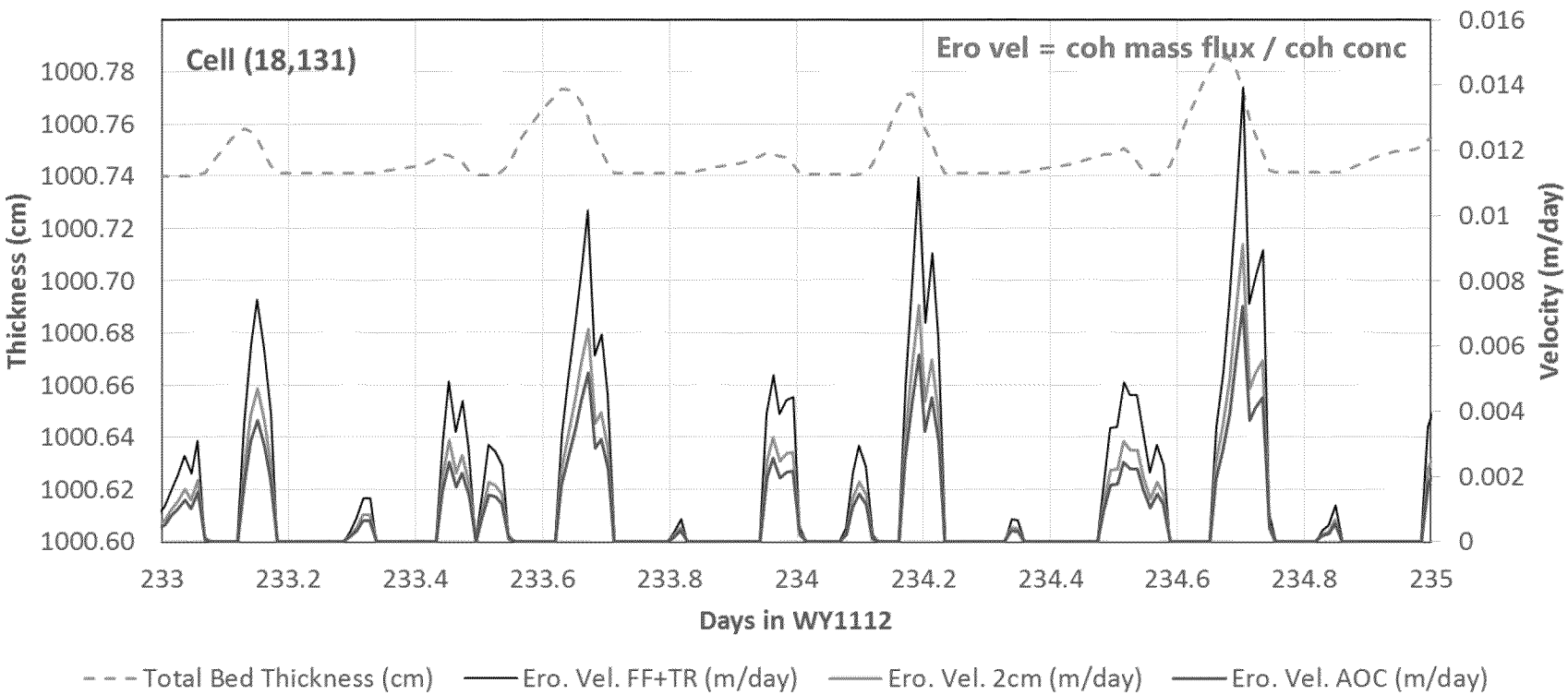
Erosion Velocity vs Cohesive Conc Averaging Depth

Fluff Layer Resuspension





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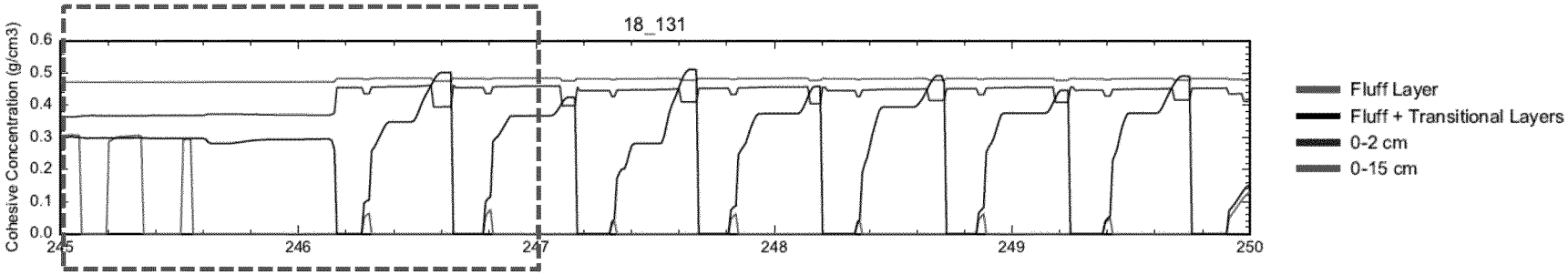
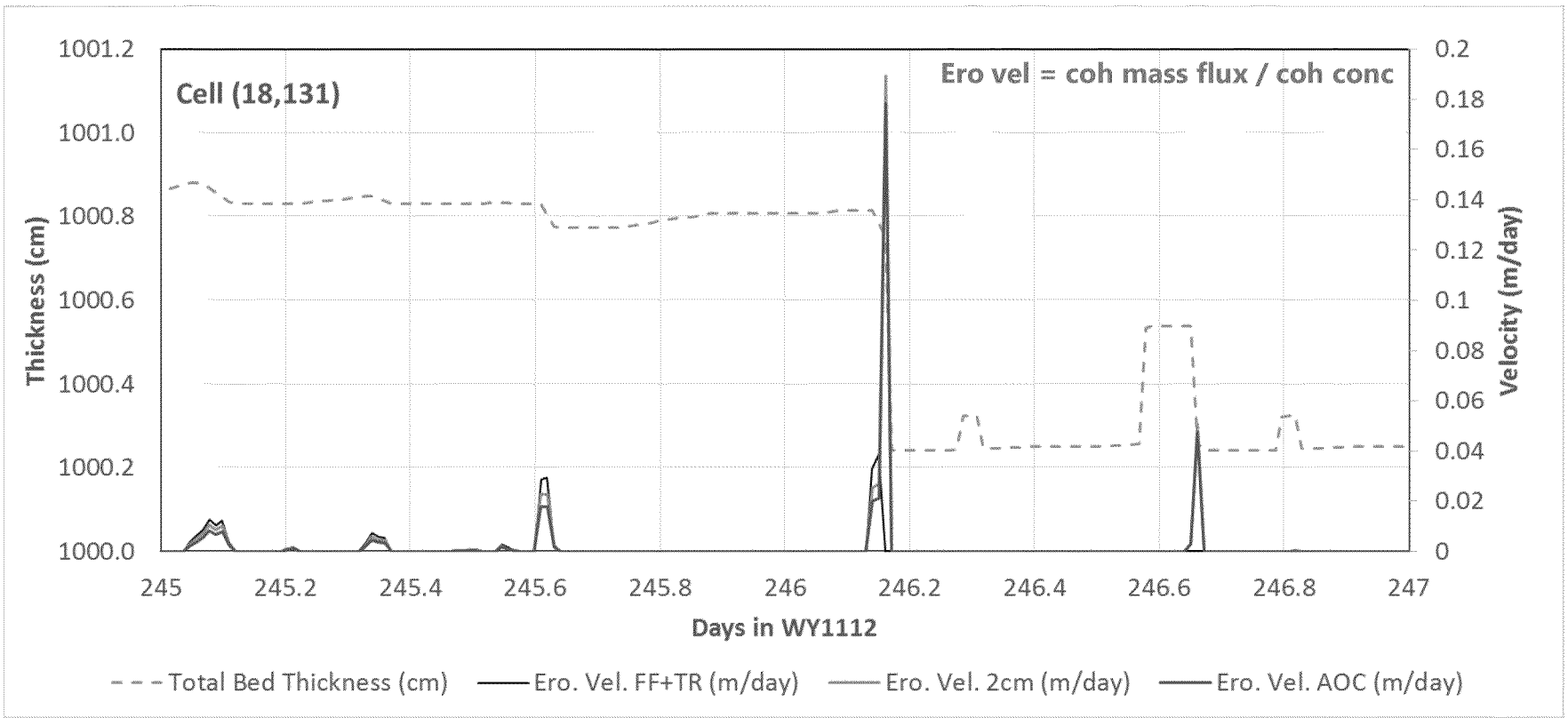
Erosion Velocity vs Cohesive Conc Averaging Depth

Erosion Beyond the Fluff Layer





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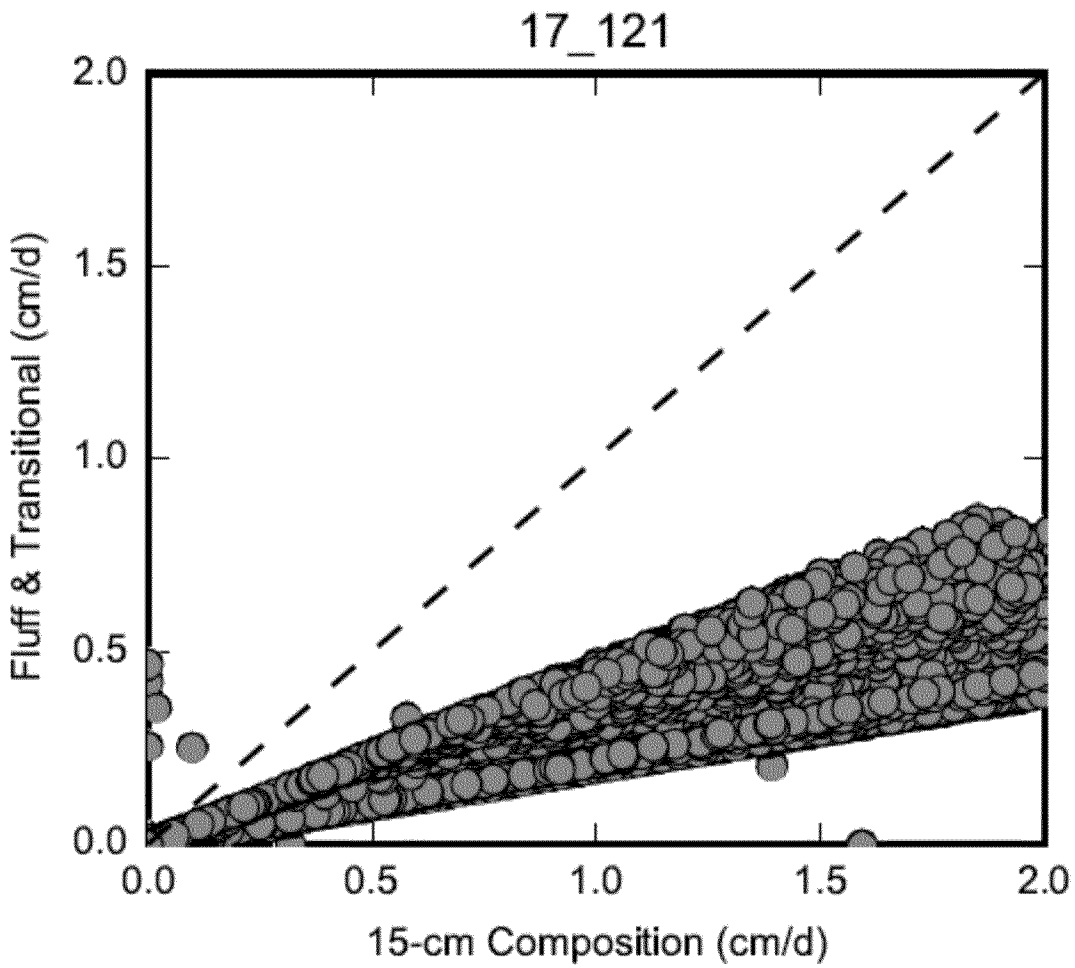
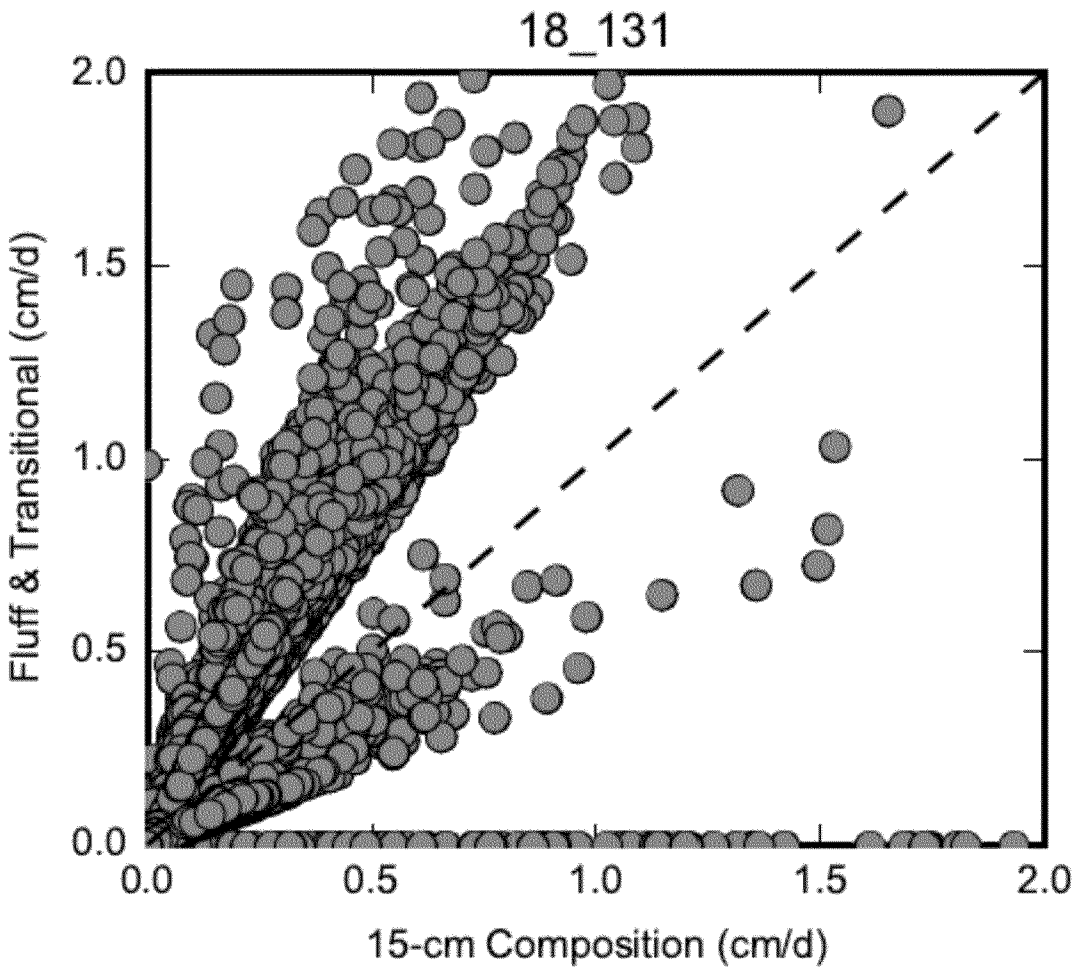
Erosion Velocity for Cohesive Solids at (17,121)



Notes: WY1112; values exceeding 2 cm/day are not shown

Erosion Velocity for Cohesive Solids at (18,131)



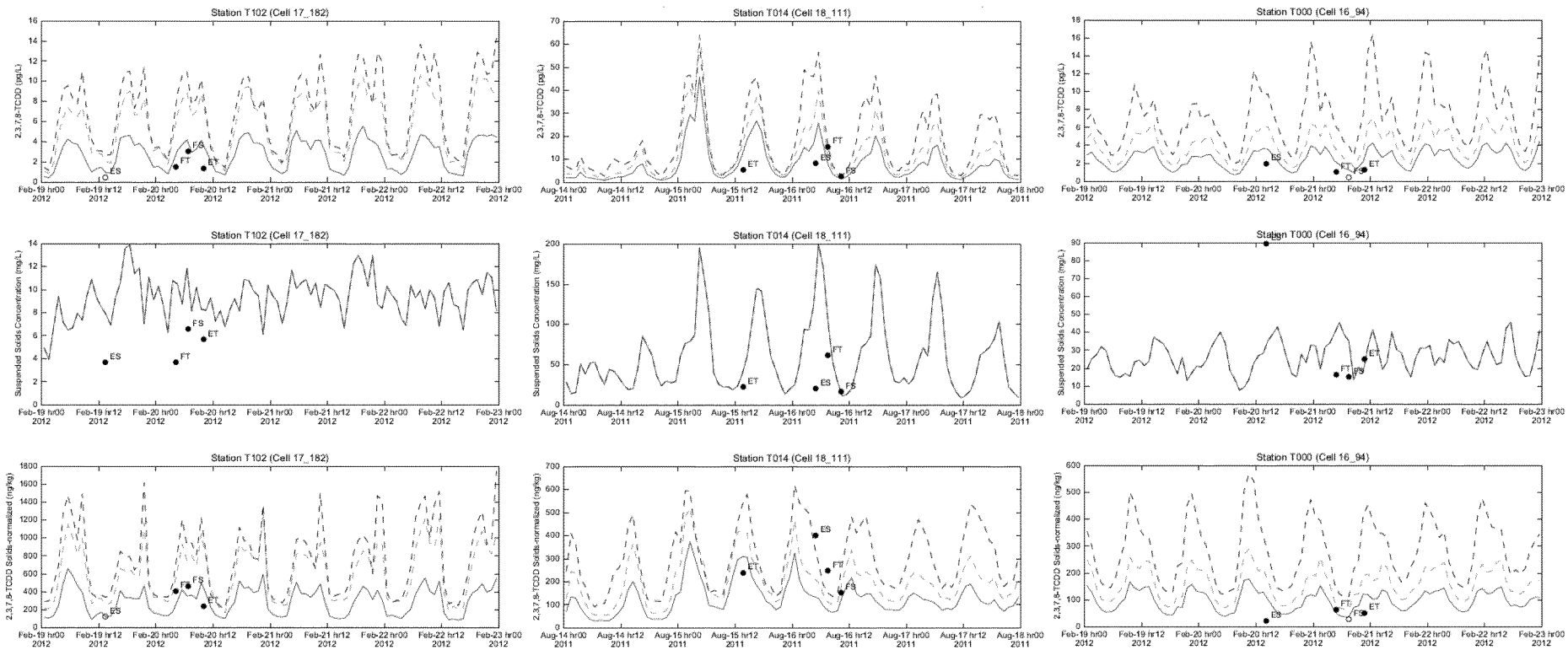
Notes: WY1112; values exceeding 2 cm/day are not shown

Proposed Revisions to Modeling the Fluff Layer

- Maintain current CFT model fluff tracking
- Include better representation of composition gradients
  - Primary focus on erosion velocity term
  - Details TBD
- Revise diffusion calculation
  - Adopt revised fluff-bed mass transfer formulation
  - Add diffusion from fluff to the water column

CFT Model Predictions
sv-CWCM Event 2 (February 2012)

Station T102 (RM 10.2) | Station T014 (RM 1.4) | Station T000 (RM 0.0)



- ● sv-CWCM data (bottom samples only)
- Draft RI model
- Revised fluff-bed mass transfer, with fluff (uncalibrated)
- Revised fluff-bed mass transfer, without fluff (uncalibrated)

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