Important Changes in AdH4.7

AdHv47 is different than AdHv46 in several important ways. There are new features available in AdHv47. Some of these are entirely new, and require new inputs. Some of these are additional features added to existing inputs, so they require modification of existing input syntax.

So, before converting any AdHv46 inputs to AdHv47, please read over this document and make sure you have checked each of these features.

Details of the syntax for each of these changes are found the hydrodynamic and sediment transport users manuals.

New Features

HYDRODYNAMICS

- **Nodal output** – The user can select any number of nodes (using PRN cards) and an output file (FNAME_nodal_output) will be written that records the velocity, depth, bed elevation, water surface elevation, and all computed concentrations, at each selected node for every computational time step.

- **Seasonal roughness factor** – The user can link an XY string to a friction string with the FR SRF card. The value on the XY series is a multiplier that can change the drag according to seasonal shifts in leaf density etc.

- **Dune Model** – The user can apply estimated dynamic dune friction with an FR DUN card. You can use this feature whether or not you are running sediment.

- **Subsidence** – The user can apply a temporally constant but spatially varying subsidence rate surface to the model. This is done by adding a subsidence rate data set to the hotstart file.

SEDIMENT

- **Dredge and place capability** – the user can schedule dredging and placement events in the model. You can have discrete events, or continuous dredging and/or placement. You can dredge material from one spot and place that same material in another spot. It dredges by material type. The cards are MP DRD for dredging, and MP DRP for placement.

- **Vegetation model** – for dynamic wetland or upland vegetation growth and loss. It is coupled to vegetation drag and swelling of the bed due to organic material (i.e. marsh elevation). It is part
of the sediment model because the vegetation root mass and refractory organic mass are treated as sediment types in the model.

**Modifications to Existing Features**

**GENERAL**

- **EEV2 and EEV4** are both modified from how they functioned in AdHv46.
  - EEV2
    - the user specifies a minimum eddy viscosity, not an adjustment factor. Typical values of the minimum eddy viscosity are given in the hydrodynamic manual. There are some changes to the equations that are invoked. These are discussed in the hydrodynamic manual.
  - EEV4
    - There are no changes to the input on this card, but there are some changes to the equations that are invoked. These are discussed in the hydrodynamic manual.

- Changed vorticity default coefficients to be consistent with theory (4.1667 and 0.8). The user does not have to do anything different on the CN VOR card, but the defaults are different than they were.

- All ice friction specifications are consolidated onto the FR ICE card.

**VESSELS**

- Added an option for vessels to be specified by position instead of velocity. This means some of the inputs are altered. Consult the hydrodynamic manual to see how the vessel inputs are done.

- Added the ability to start boats anywhere in the domain without inducing a shock, by gradually increasing the draft (slowly sinking them into place). (Note: if FDEF and SDEF are the same, the boat drops in instantly, just like it did in AdHv46)

**SEDIMENT**

- **Bed Layer porosity** – Instead of using porosity for sand and bulk density for fines, AdHv47 defines everything in terms of porosity. This one will require users to make a change to their input. Guidance is given for how to do this in the sediment transport manual. Also, if you have a sediment hotstart file from an AdHv46 simulation, and it has bulk density information on it,
AdHv47 will automatically convert that information to bed porosity for you. This means that you can use these AdHv46 sediment hotstart files in AdHv47.

- **Added local scour by excess shear.** The original local scour method is still there if a user wants to use it, but now there is another method: you can use a multiplier to make the shear bigger for that material type. This means that any MP LSM cards must now have an additional integer value at the end (either 0 or 1) to specify the method that is being invoked.

- **Added a new no bed displacement option.** With this new option, bed sediment mass is not conserved, but neither the bed surface nor the solid bottom (beneath all the bed layers) can move vertically. This makes this option ideal for sediment bed initialization. This means that any MP NDM cards must now have an additional integer value at the end (either 0 or 1) to specify the method that is being invoked.

- **Altered the active layer thickness** to allow it to be larger than it was in AdHv46, under certain circumstances. It is now entirely consistent with Borah, without any significant maximum size constraints. This affects rates of mixing in the bed. This does not require a change in the input, but it will affect the results.

- **Modified how transition between cohesive and cohesionless is done.** This does not require a change to the input, but it will affect the results:
  - Cohesive beds are still beds with 10% cohesive material, but now silts are also included in the calculation, in a weighted fashion (that is, a fine silt is more cohesive than a coarse silt).
  - At 5% cohesive fraction, the behavior of the bed begins to linearly transition to cohesive, until at 10% it is fully cohesive.