VIII. Tutorial 7: Delta SIMULATIONS with HYDRO and QUAL

1. Clone the Historical Simulation:

a. In the file menu of the GUI, select *Clone Simulation*.

b. In the *Clone Simulation* window, select *historical*.

c. Name the cloned simulation, *historical_tutorial*.

d. Rename the QUAL models:

1) In the *Sessions Navigator*:

i) Locate the directory, *model: historical_tutorial_qual1*.

ii) Right-click on the directory and select *Edit Model Properties.*

iii) Change the name to *historical_tutorial_qual_ec*.

iv) Repeat this process for *historical_tutorial_qual2*, except rename this model, *historical_tutorial_qual_do*.

2. Reset Model Name Parameters in the Text Input Files:

a. In Windows Explorer, navigate to the directory, *\{DSM2_home}\tutorial\simulations\historic*

b. Change the model name environmental variable for HYDRO and QUAL:

1) Open the file, *hydro.inp*.

i) Under the SCALAR section, locate the environmental variable, *model_name*.

ii) Note that *model_name* itself contains the environmental variable: *SIMNAME*.

iii) *SIMNAME* is not listed anywhere in the *hydro.inp* file. If fact, it is listed in the *config-hist.inp* file.

2) Open the file, *config-hist.inp*.

i) In the ENVVARS section, locate *SIMNAME*.

ii) Change its value from *historical* to *historical_tutorial*.

iii) Save *config-hist.inp*.

3) Because *qual_ec.inp* and *qual_do.inp* both utilize the environmental variable, *SIMNAME*, these files do not have to be modified.

c. Change the model name environmental variable for PTM:
   1) Open the file, *ptm.inp*.
      i) Under the SCALAR section, locate *model_name*.
      ii) Note that it is set to the different environmental variable, *MODEL_NAME*.
      iii) This environmental variable is listed in the ENVVARS section of this file.
      iv) Change the value of *MODEL_NAME* from *needs_hydro* to *historical_tutorial_hydro*, and save the file. Note that PTM requires the grid from HYDRO.
      v) Save *ptm.inp*.

d. Change the Time Interval Environmental Variable:
   1) In the GUI, the value given for all channel output is given as *${FINE_OUT}*. If you would like to verify this, you can check the *Channel Output* view of the *Output Time Series* directory for the HYDRO setup.
   2) Navigate back to the *config-hist.inp* file:
      i) Locate *FINE_OUT* under the ENVARRS section.
      ii) Change its value from *15MIN* to *1HOUR*.
      iii) Save *config-hist.inp*.

e. Select the Proper Database:
   1) In *hydro.inp*:
      i) Find the SCALAR section.
      ii) Change the *database* entry to the following:

          database dsm2input_access

      iii) Repeat this procedure for *qual_ec.inp*, *qual_do.inp*, and *ptm.inp*.

f. Change the Temporary Directory:
   1) In *hydro.inp*, *qual_ec.inp*, *qual_do.inp*, and *ptm.inp*
      i) In the SCALAR section, find the environmental variable, *temp_dir*.
      ii) Change the value to *c:\temp* or a temp directory with ample free space.
      iii) Remember to repeat this procedure for all four files.
      iv) Save the four files.

3. Run HYDRO:

a. In Windows Explorer, navigate to the directory, *\{DSM2_home}\tutorial\simulations*

b. Right-click on the *historic* directory, and select, *Open Command Window Here.*

c. In the command window, type: *dsm2 hydro config-hist.inp*.

d. Wait for HYDRO to complete its runs.

4. Replicate HYDRO's tidefiles and modify QUAL's input file to make them suitable for a Multi-tidefile Run:

a. In Windows Explorer, navigate to the directory, *\{DSM2_home}\tutorial\simulations\historic\output*

b. Locate the *hist.h5* tidefile and copy-and-paste this file three times in the same directory. These copies will emulate hydro tidefiles generated on three separate machines.

c. Rename the copies: *tf1.h5*, *tf2.h5*, and *tf3.h5*.

d. Open *qual_ec.inp*:

1) If necessary, make corrections so that the TIDEFILE section looks as follows:

```
TIDEFILE
START_DATE    END_DATE     FILENAME
#runtime       length       output/hist.h5
runtime        20JUL1996    output/tf1.h5
20JUL1996      24JUL1996    output/tf2.h5
last           length       output/tf3.h5
01SEP1996      length       ficticious.h5
END
```

2) With the exception of the commented-out (#) statement, these statements direct QUAL to the *hydro/output* location storing the tidefiles needed for the multi-tide run. The start and end date show the possibilities: using a real date, runtime (start of the simulation), length (go to end of tidefile) and last (start where the last tidefile left off).

3) Change the temporary directory from *z:\temp* to a temp location with ample free storage.

4) Save *qual_ec.inp*.

5. Run QUAL:

a. In the command window, type: *dsm2 qual_ec config-hist.inp*.

6. Running QUAL with Nonconservative Constituents and a Single Tidefile:

a. In Windows Explorer, navigate to the directory, *d:\{DSM2_home}\tutorial\simulations\historic*

b. Open *qual_do.inp*.

1) In the TIDEFILE section, ensure that only one row for tidefiles is present and uncommented. This should be the row associated with the file, *hist.h5*.

2) Change the temporary directory from *z:\temp* to a temp location with ample free storage

3) Save the *qual_do.inp* file.

c. Open *config-hist.inp*.

1) In the ENVVARS section, locate the environmental variable, DSM2MODIFIER.

2) Change the value from *hist* to *nonconserve*.

3) Save *config-hist.inp*.

d. In the command window, type: *dsm2 qual_do config-hist.inp*.

IX. Tutorial 8: Delta SIMULATIONS with PTM

1. Modify the PTM Input file to Turn On the Dispersion Parameters:

a. In Windows Explorer, navigate to the directory, *\{DSM2_home}\tutorial\simulations\historic*

b. Open the file, *ptm.inp*.

1) In the TIDEFILE section, ensure that only one row for tidefiles is present. This should be the row associated with the file, *hist.h5*.

2) Locate the GROUPS section.

3) Add two groups to the list:

sac_below_chipps	*channels*	*range:438-441*
sac_below_chipps	*channels*	*(443|452)*

4) Locate the GROUP_OUTPUT section.

5) Add this group_outputs to the list:

   sac_below_chipps 1hour ${PTMOUTPUTFILE} SAC_BELOW_CHIPPS

6) Locate the SCALARS section.

7) Change all of the dispersion parameters from *f* to *t*.

```
ptm_ivert       t       # Use Vertical velocity profile
ptm_itrans      t       # Use Transverse velocity profile
ptm_iey         t       # Use transverse mixing
ptm_iez         t       # Use vertical mixing
```

2. Run PTM and Examine the Results:

a. In the command window, type: *dsm2 ptm config-hist.inp*.

b. In Windows Explorer:

1) Navigate to the directory,

   \{DSM2_home}\tutorial\simulations\historic\output

2) Examine the output in the *ptmout.txt* file.

3) Copy the files, *anim_db.bin* and *ptmout.txt*.

4) Navigate to the directory,

   \{DSM2_home}\tutorial\simulations\historic\ptm-animate\dual\left_panel

5) Paste the files in the *left_panel* directory.

3. Now to See the Effects of having the Dispersions Parameters Turned Off:

a. In Windows Explorer, navigate to the directory,

   \{DSM2_home}\tutorial\simulations\historic

b. Open the file, *ptm.inp*.

1) Locate the SCALARS section.

2) Change all of the dispersion parameters from *t* to *f*.

```
ptm_ivert       f       # Use Vertical velocity profile
ptm_itrans      f       # Use Transverse velocity profile
ptm_iey         f       # Use transverse mixing
ptm_iez         f       # Use vertical mixing
```

c. In the command window, type: *dsm2 ptm config-hist.inp*.

d. In Windows Explorer:
    1) Navigate to the directory,
    \{*DSM2_home*}*tutorial**simulations**historic**output*
    2) Copy the files, *anim_db.bin* and *ptmout.txt*.
    3) Navigate to the directory,
    \{*DSM2_home*}*tutorial**simulations**historic**ptm-animate**dual**right_panel*
    4) Paste the files in the *right_panel* directory.
    5) Navigate to the directory,
    \{*DSM2_home*}*tutorial**simulations**historic**ptm-animate*
    6) Double-click on *dual.bat* to open the animator.
    7) Press start to start the animator and use the controls to adjust the speed.

4. Modifying the Animator Display [optional]:

a. The *left_panel* and *right_panel* directories contain files needed for operation:
    1) *fluxInfoDB.data* stores path information for the PTM output.
    2) *labelsDB.data* stores labels information.
    3) *network.dat* stores *x*- and *y*-locations for nodes and channels.
b. Examine these files.

5. Changing an Operator Rule:

a. Bring up the GUI.
b. In the *Sessions Navigator*:
    1) Expand the folder, *model: historical_hydro*.
    2) Expand the *Operations* folder.
    3) Double-click on *Operating Rules*.
c. In the *Layers* panel, click on *Layer 1* so that it is the only layer viewed.
d. Examine the rules for this gate at the Montezuma Slough.
e. Add a New Operating Rule Layer:
    1) In the *Layers* panel, right-click and select *New layer*.
    2) Select *Yes* to confirm the refresh.

3) Name the layer, *modified_montezuma_ops*.
4) The layer will be number *4*.

f. In the *Layers* panel, right-click and select *Set Edit Layer*.
g. In the *Select Layer* window, double-click *Layer 4*.
h. In the *Expressions table*:
   1) Right-click and select *Insert row*.
   2) Enter the information in the appropriate fields for the new row:
      i) Name: *mscs_calc*
      ii) Definition: *SEASON > 01AUG OR SEASON < 01FEB*
i. Save the current settings.
j. Unset the editing layer.
k. In the *Sessions Navigator*:
   1) Expand the *model: historical_tutorial_hydro* folder.
   2) Expand the *Output Time Series* directory.
   3) Double-click on *Gate Output*.
l. In the *Layers* panel, right-click and select *Add layer*.
m. In the *Select Layer* window, double-click *grid_output*.
n. In the *Layers* panel, right-click and select *Remove layer*.
o. Select *std_output_hydro_named* (note, if you omit this step there will be too many output specifications and the model will crash).
p. Rerun HYDRO:
   1) In the command window, type: *dsm2 hydro config-hist.inp*