DSM2 Bay-Delta Tutorial 1: Historical Simulation

Purpose: This tutorial will teach you to clone a simulation and launch a basic run of the historical HYDRO and QUAL.

Note that in production you seldom will clone the historical simulation. You should not create a simulation to add a few output locations or change scalars like a time step. In the present case, we will be making major changes that justify the step.

HYDRO and QUAL

1. **Create and verify the tutorial files:**
   a. In windows, navigate to *{DSM2_home}**tutorial**historical*.
   b. If there are no *.inp files, double click the batch file *createme.bat.*
   c. The necessary files should be copied from the *{DSM2_home}**study_templates**historical*

2. **Reset Model Name Parameters in the Text Input/Config Files:**
   a. 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*.
   b. Change the temporary directory. By default, the models use a scratch directory to buffer temporary files and then write the data back to HEC-DSS at the end of the run. This ensures no data is written if the model fails. If you use this feature, you need to make sure your scratch directory is ample in size. If you can afford the consequences of a half-written path in the event of a failure, your run will be more efficient if you skip the use of intermediate temporary files and use dss_direct = true in the SCALARS section.
      1) In *hydro.inp*, *qual_ec.inp*, *qual_do.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. In qual_ec, instead of changing *temp_dir,* add a scalar variable *dss_direct* and set it to *t* for *true.*

iv) Save the four files.

3. Modify the Run Times in the Config File:

```
#runtime
START_DATE        01JAN1996
START_TIME         0000
QUAL_START_DATE   01JAN1996
PTM_START_DATE    ${QUAL_START_DATE}
END_DATE           31DEC1996
END_TIME          2400
```

4. Run HYDRO:

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

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.

e. 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
END
```

f. Save *qual_ec.inp*.

5. Run QUAL for EC:

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

6. Running QUAL with Nonconservative Constituents: (SKIP, PENDING DATA)

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

b. Open *qual_do.inp*.

c. Open *config-hist.inp*.

1) In the ENVVARS section, locate the environmental variable, DSM2MODIFIER from *hist* to *nonconserve*.
2) Save *config-hist.inp*.

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

Particle Tracking Modeling (PTM)

1. Run PTM

a. In the command window, type: ptm historical_ptm.inp
1) If necessary, reduce the running time period by modifying *END_DATE* in *configuration_historical.inp*.

Making animation of Particle Tracking Modeling (PTM)

1. Modify the PTM input file to make text output and to turn on the dispersion parameters:

a. In Windows Explorer, copy the folder *ptm_animate* (with subfolders) from
\{DSM2_home}\study_templates\ptm_animate
to the study directory, creating:
\{DSM2_home}\tutorials\historical\ptm_animate

b. With the PTM, it is useful to be able to switch easily between text and dss output formats -- note that the animator requires text files. The *configuration_historical.inp* file is structured so that we can swap the environmental variable *PTMOUTPUTFILE*. We are going to point *PTMOUTPUTFILE* to *PTMOUTPUTTEXT* so we can use the animator.
i) Locate the *PTMOUTPUTFILE* at the end of the file, and modify as:
`PTMOUTPUTFILE ${PTMOUTPUTTEXT}`

c. Open the file, *historical_ptm.inp*.
1) Locate the SCALARS section. Check all of the dispersion parameters to be *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:

a. In the command window, type: *ptm historical_ptm.inp*.

b. In Windows Explorer:

1) Navigate to the directory,

*{DSM2_home}**tutorials**historical**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}**tutorials**historical**ptm-animate**dual**left_panel*

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

3. Repeat with Dispersions Parameters Turned Off:

a. In Windows Explorer, navigate to the directory,

*{DSM2_home}**tutorials**historical*\

b. Open the file, *historical_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: *ptm historical_ptm.inp*.

d. In Windows Explorer:

1) Navigate to the directory,

*{DSM2_home}**tutorials**historical**output*

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

3) Navigate to the directory,

*{DSM2_home}**tutorials**historical**ptm-animate**dual**right_panel*

4) Paste the files in the *right_panel* directory.

5) Navigate to the directory,

\{DSM2_home}\tutorials\historical\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:

a. The *left_panel* and *right_panel* directories contain files needed for operation:
   1) *fluxInfoDB.data* stores file and path information for the PTM output (the flux output in the text file is labeled with DSS-like path names). The listings in this file will be turned into the small flux bar graphs you see in the animator. The integer you see above the file name is node, which is how you identify locations in the animator (see *network.dat* below)
   2) *labelsDB.data* stores label information. You list labels and their location (using nodes, see *network.dat* below)
   3) *network.dat* stores *x*- and *y*-locations for nodes and channels. Pseudo-nodes are used for labels and other annotations as noted above. Please note that the nodes that are used in *network.dat* are internal node numbers, not external. This makes the file very hard to edit, a point that will probably be addressed in the future. If you want a mapping of external-to-internal numbers, look at your echoed hydro output file (*.out or *.hof).

b. Examine these files and the labels in them. Change the labels to something creative and reopen the animator.