

XBeach Course

31 October 2016
Delft, The Netherlands



1 GETTING STARTED

The course materials contain the XBeach executable, model examples and some Deltares software (RGFGRID, Quickin and Quickplot) that will help us to analyze and modify model (results).

2 HANDS-ON EXERCISE: SANTA ROSA

Overwash at Santa Rosa Island , USA (2DH): This case concerns overwash at Santa Rosa island in the Gulf of Mexico during hurricane Ivan in 2004. You can work on the following assignments.

1. Go to the folder: `..\DSD2016\morphology_day\hands-on\SantaRosa\`
2. Open `params.txt` in which you specify model input files and settings. Check the number of grid-points in x-direction (n_x) and y-direction (n_y). How many directional wave bins are defined and what is their width (`thetamin`, `thetamax`, `dtheta`).
3. In this simulation the grid is specified in Delft3D format. Open Quickin in the Delft 3D menu (Grid → Quickin) and use the brief tutorial to read in the grid and bathymetry. Does the grid resolution vary in cross-shore direction? And in longshore direction? What are the minimum dx and dy ? Why can the grid be coarse offshore?
4. How many wave conditions do we apply in this simulation? What is the offshore mean wave direction? Does the surge level change in the simulation?
5. What is the simulation time (hydrodynamic and morphological)?
6. Inspect the model results and make an animation of the short wave height and the water levels (For the water levels simulation set the color limits manual between -0.5 and 3.5).
7. Make an animation of cumulative sedimentation/erosion. Describe what is happening. (For the cum. sedimentation/erosion set the color limits manual between -3 and 3)
8. Look at the mean flow field. Plot the flow field in colored vectors. Where are the flow velocities highest and what is the direction of the flow (cross-shore or longshore)? Is there (also) a longshore current present and what is its intensity?
9. If you have time left feel free to:
 - a. Narrow or broaden the imposed spectrum by changing the parameter s in 'jonswap.inp' (you could i.e set $s = 100$ and $s = 2$ respectively). Make animations of the instantaneous short wave height to see what is happening to the size of the wave groups.
 - b. Design a nourishment in Quickin (see tutorial for a bit of help) to reduce the impact of the storm on Santa Rosa Island. Change the `depfile` in `params.txt` to make a simulation with the updated bathymetry.

3 TUTORIALS

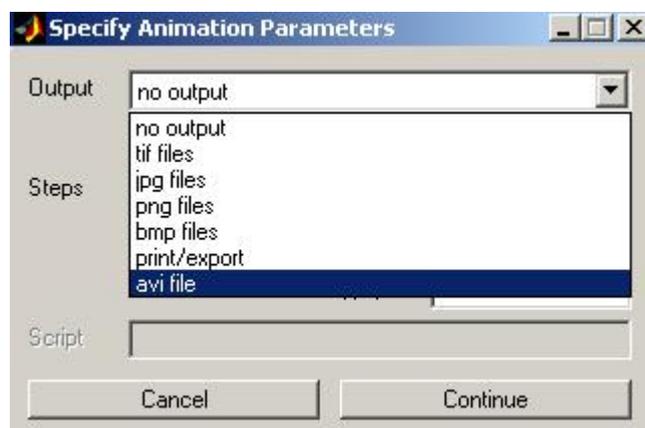
Quickplot Tutorial

Quickplot can be used to do a first inspection of XBeach output.

1. You can start quickplot via the Delft3D menu, (Utilities → Quickplot)
2. Click  to open a file.
3. Choose Files Type 'NetCDF and GRIB Files' and open 'xboutput.nc'. Select 'Hrms wave height based on instantaneous energy' as the data-field to plot. Select the proper location (M corresponds to cross-shore locations and N to longshore locations) or station you want to investigate and press . If you want to make plots together and compare, you can choose a different colour by , and then click . Use  icons to zoom in/out. Drag  or click  on the toolbar to view different time steps.
4. To make animations of multiple variables instantaneously, variables need to be linked in time (space is another option). You can do this by pressing  and then select:



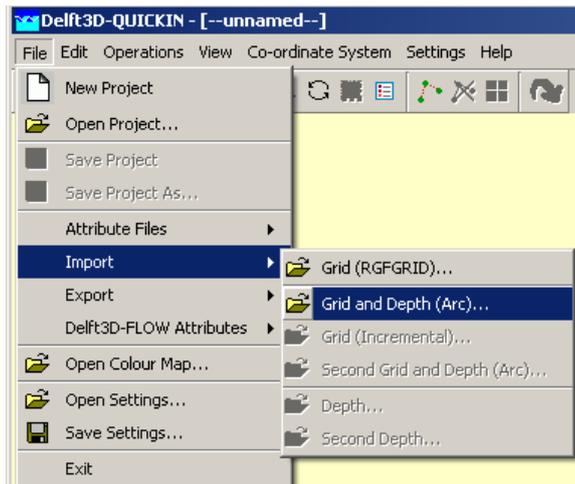
5. In the Quickplot figure click  to make animations. Select 'avi' files in the output window to generate your own avi files.



RGFGRID / Quickin Tutorial

Quickin can be used to inspect computational grids or adapt bathymetries.

1. Importing a computational grid by selecting 'File → Import → Grid'



2. View the Grid and domain properties by selecting 'Operations → Actual and Maximum Data Dimensions'.

3. Select  on the toolbar and press A key on the keyboard, an anchor will appear, which acts as zero-distance point. The grid size can be measured in that way. The distance (in meter) is displayed in the status bar at the right of the co-ordinate.

Move anchor	X,Y: 7109.280, 3671.103 Cartesian	Dist 169.052 [m]
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4. To edit model bathymetry select  and draw a polygon. You close the polygon by clicking right mouse button. Next you can edit bathymetry in the polygon created. To do so i.e select 'Operations → Delete → Depth', this will delete all depth within the Polygon. Next you can select 'Operations → Combine Depth and Uniform Value → Fill Missing Depth With Uniform Value'. The new bathymetry can be exported to a new bathymetry file via 'File → Export → Depth'.