Delta-X Application Workshop

Delft3D model

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Delta-X

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Overview

- Developed by Deltares (Netherlands)
- Numerical model used in coastal, river, lake, and estuarine areas
- Many processes:
  1. Flows induced by tides, density gradients and wave induced currents
  2. Wave propagation
  3. Sediment transport
  4. Morphological changes
  5. Advection/dispersion of effluents
  6. Water quality

Delft3D versions

- Delft3D v4 (classic version)

Hydro-Morphodynamics

Delft3D-FM (flexible mesh)

D-Flow Flexible Mesh

https://oss.deltares.nl/web/delft3d/get-started

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SEARCH

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Get Started

Get the Delft3D Graphical User Interface (free of charge)

When you are signed in (top right corner of the page), you will see the text titled "GUI" below, containing information on how to request a GUI package and a link to the GUI request form.

Download source code

Go to the Source Code section below and follow the steps as indicated to download the source code.

Get high level support

If you want the Delft3D software and GUI as package, y
overview of the Delft3D Software Service Packages can
quote or more information.

How to obtain a GUI package

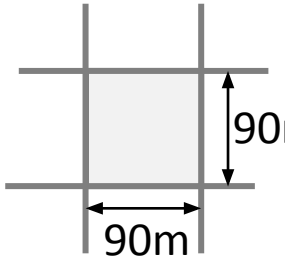
To receive this GUI package and a license file valid for one year, please fill out this GUI request form.
Your request will be handled within 5 working days.

Delta-X model

We use 3 modules:

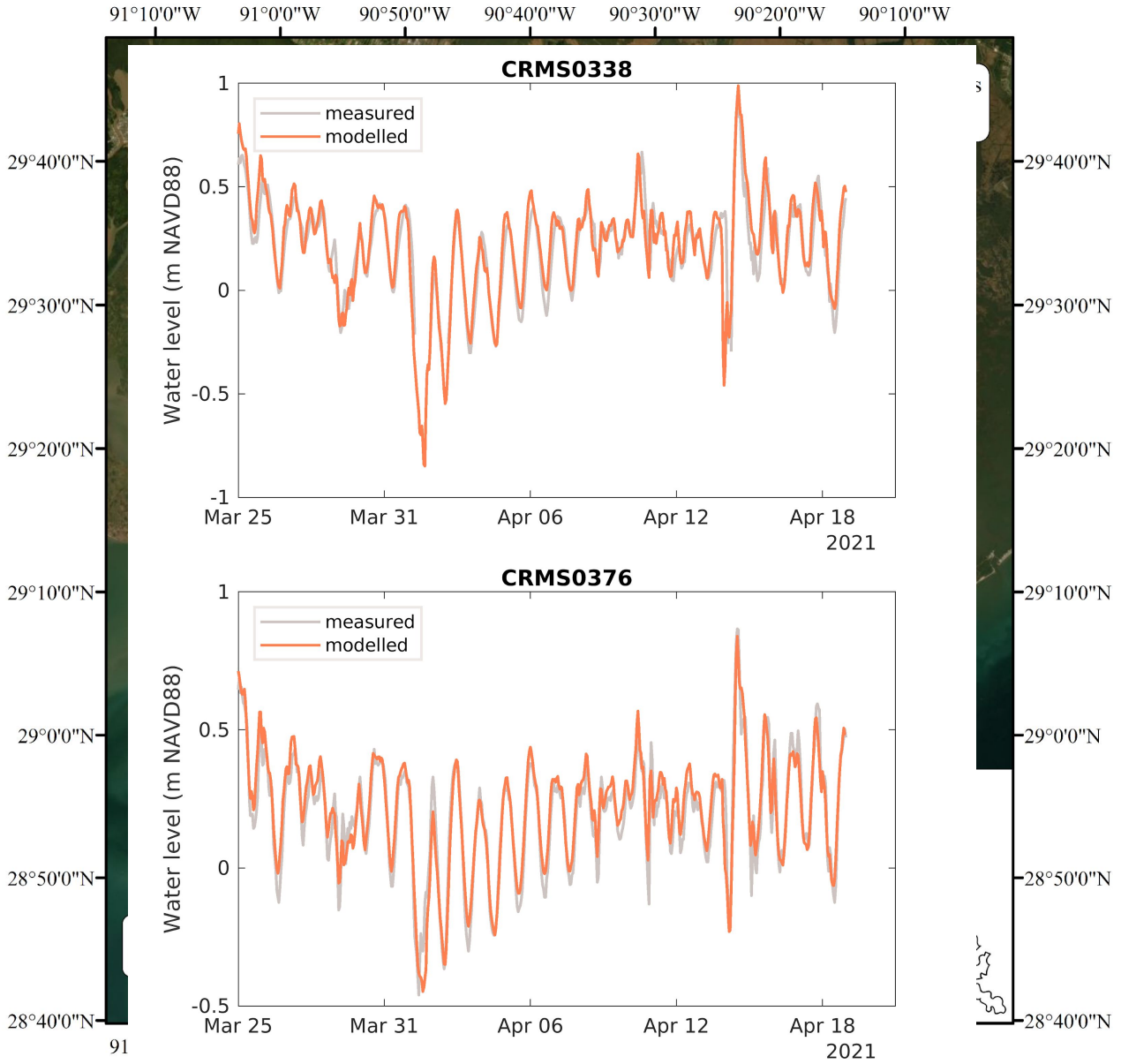
- Delft3D-**FLOW** and Delft3D-**MOR** → Hydrodynamics (water levels and velocity) 2D shallow water equations
  → Sediment transport and morphology
- Delft3D-**WAVE** → SWAN (Waves)

Domain



Regular grid

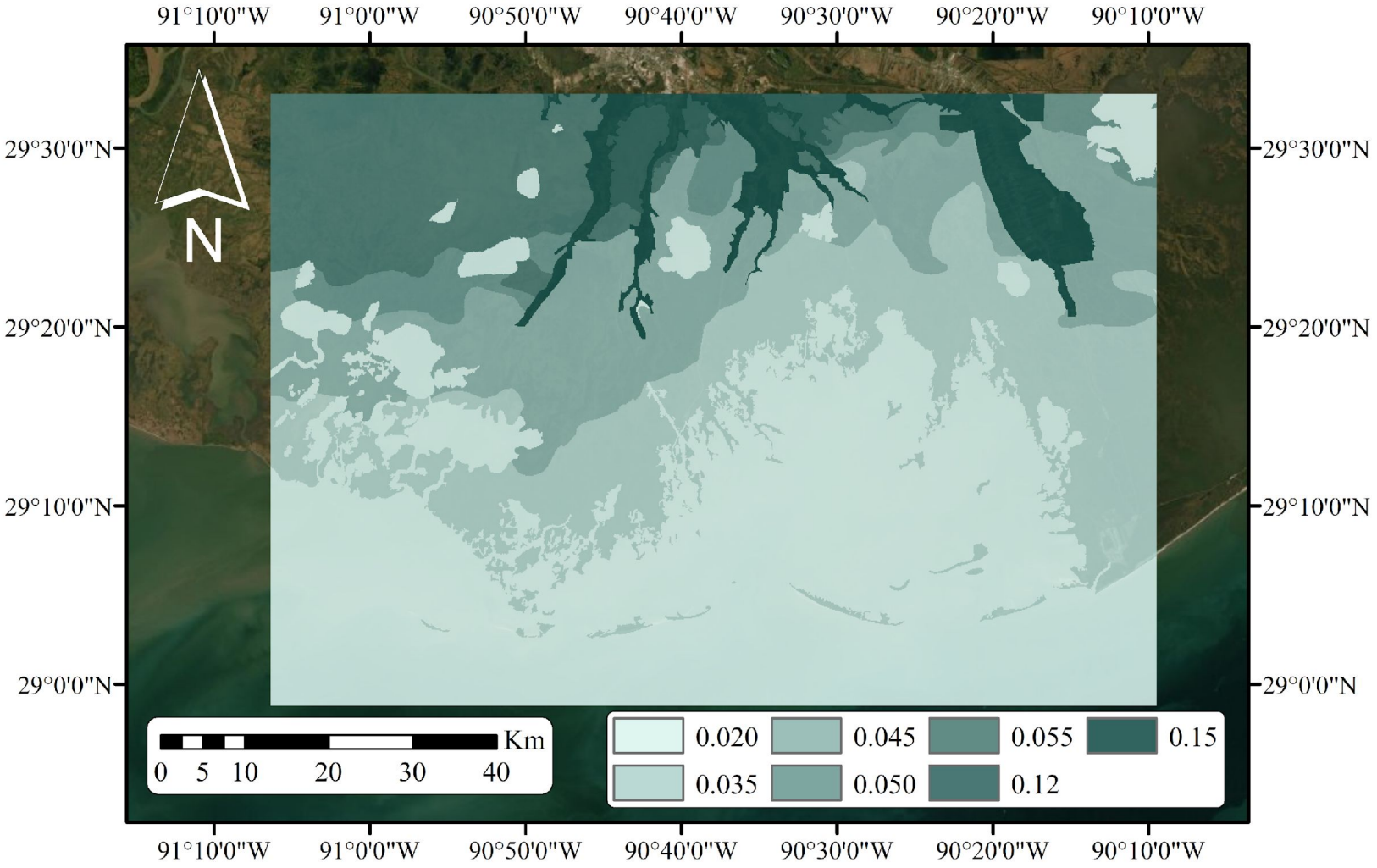
Coastwide Reference Monitoring System (CRMS) stations for validation



Bottom friction

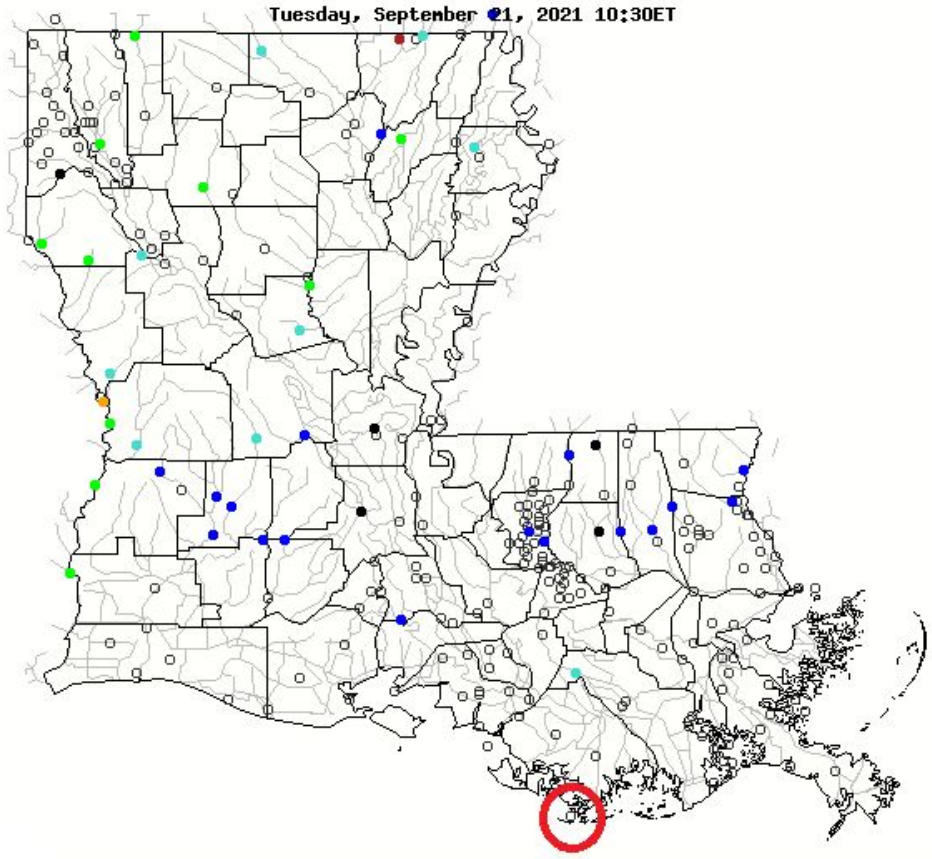
Manning coefficient based on the type of wetland (info from CRMS)

Values from LA-GAP classification



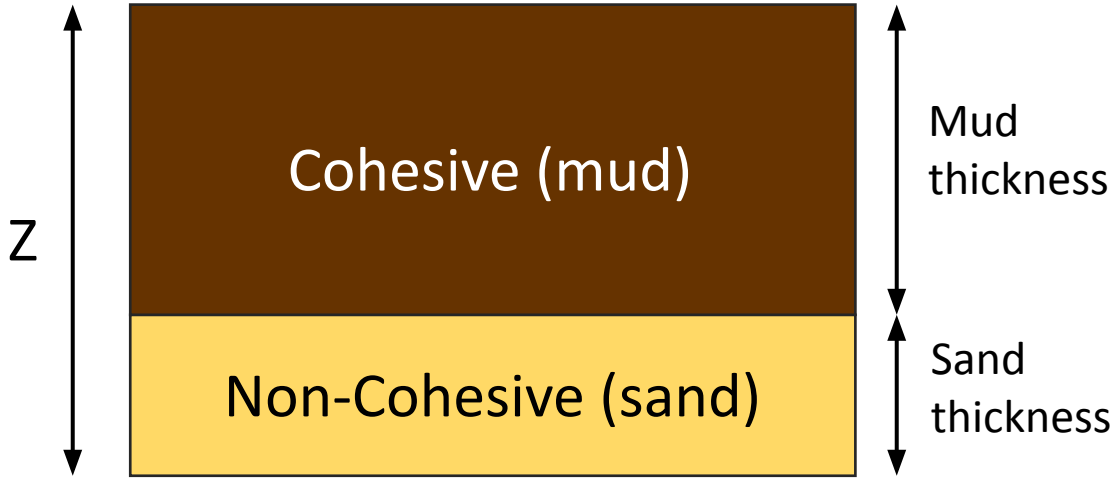
Boundary conditions

Water level and wind data are taken from the USGS station 073813498



Sediment transport

Sediments are resuspended from the bottom and transported by the water flow

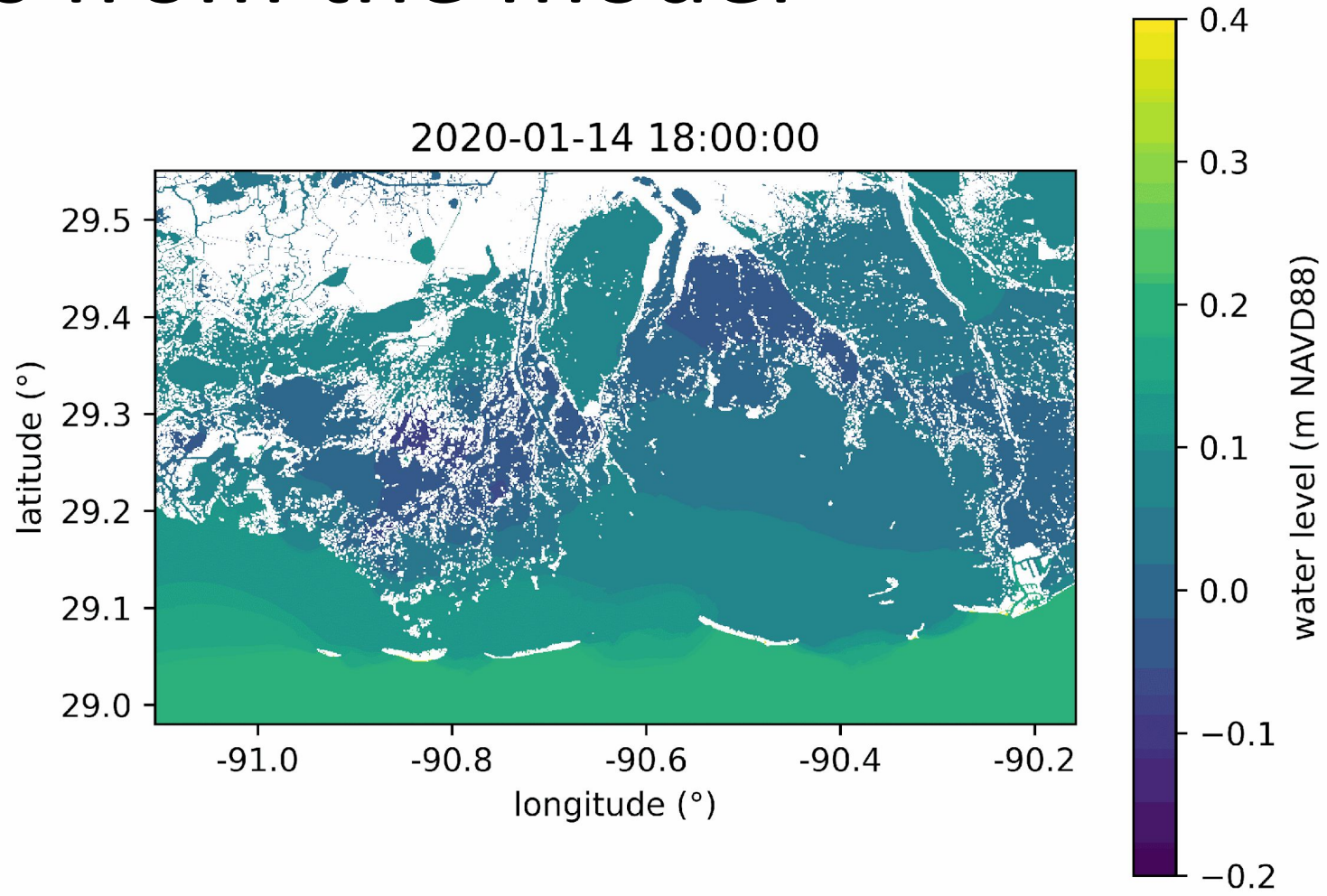


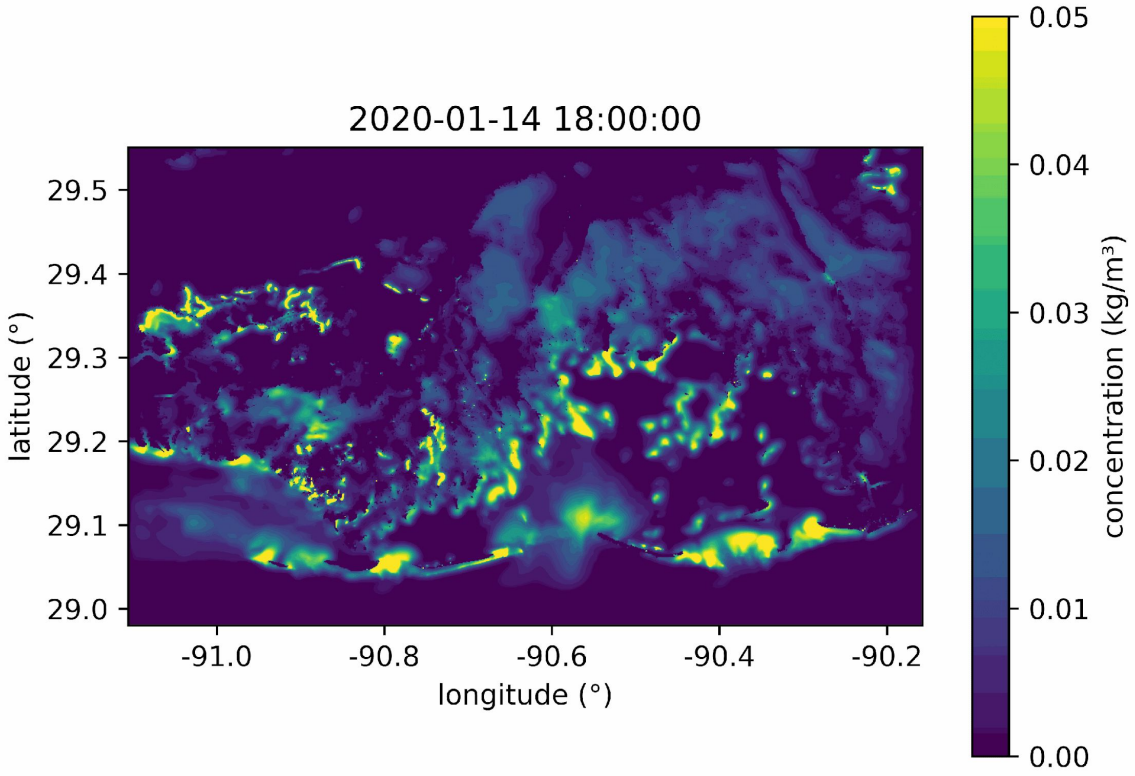
Main parameters:

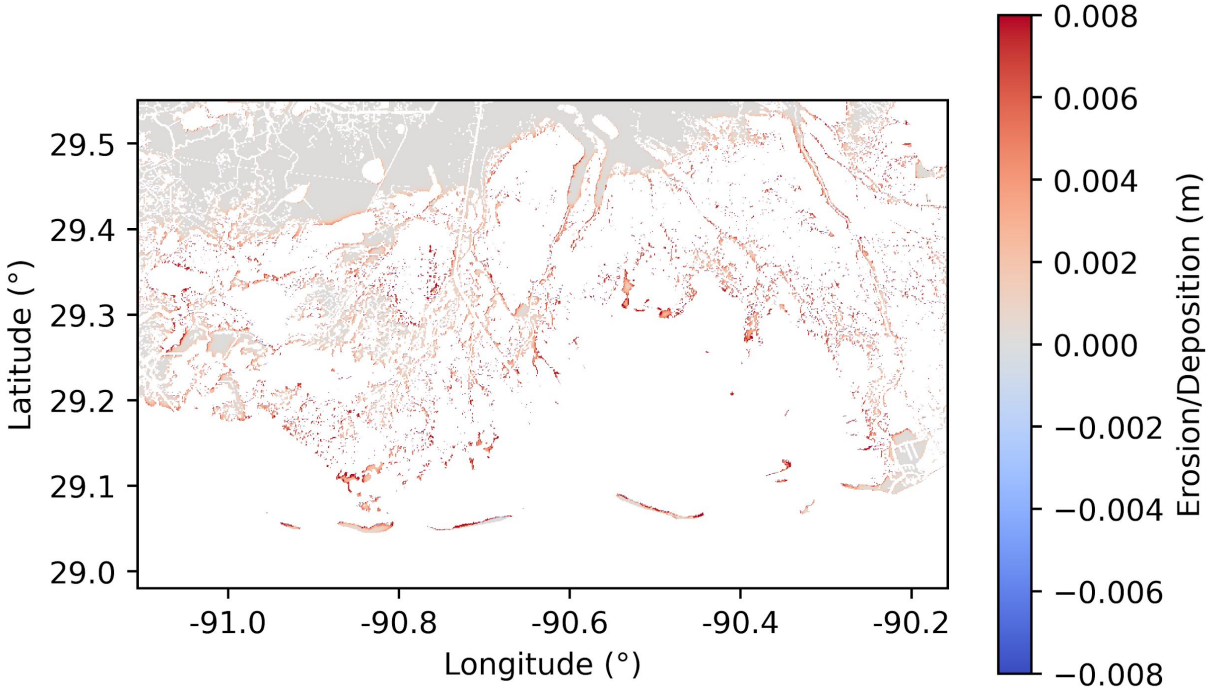
- $\rho_s = 1600\ kg/m^3$
- $w_s = 0.25\ mm/s$
- $\tau_{cr,e} = 0.1\ Pa$ for water
- $\tau_{cr,e} = 1\ Pa$ for marsh

- $\rho_s = 2650\ kg/m^3$
- $D_{50} = 140\ \mu m$

Outputs from the model

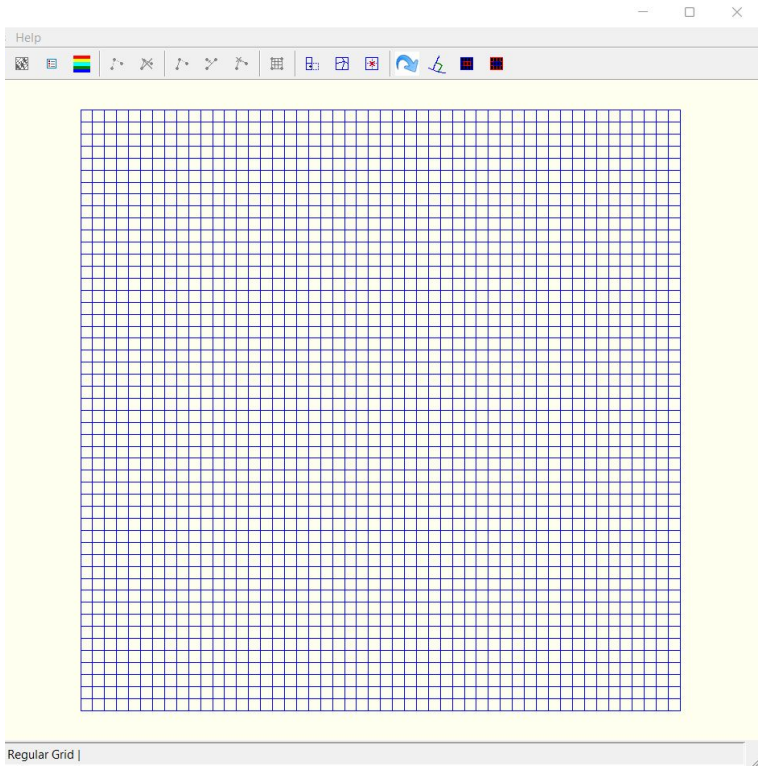


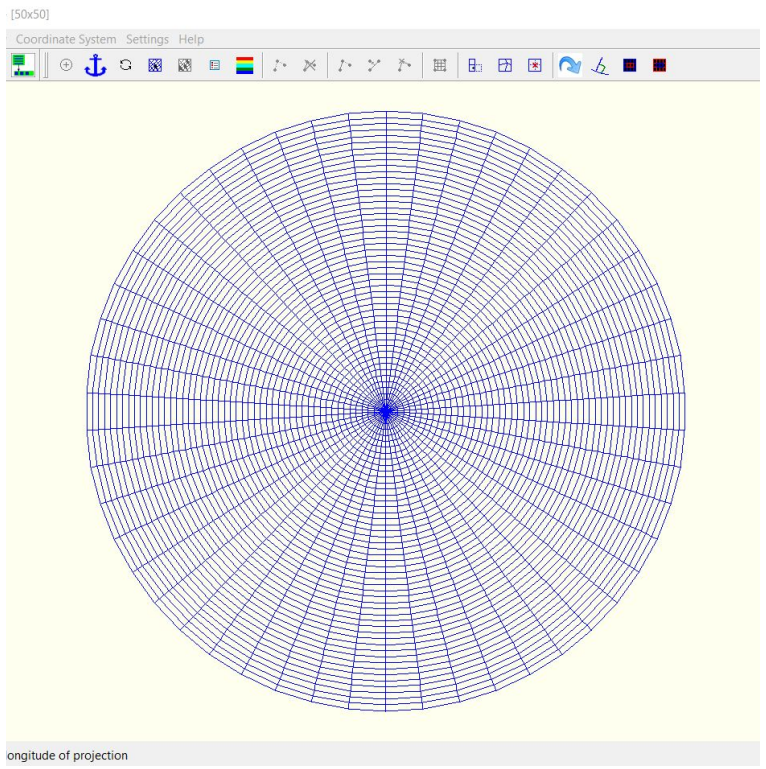

2020-01-14 18:00:00
latitude (°)
29.5
29.4
29.3
29.2
29.1
29.0
-91.0
-90.8
-90.6
-90.4
-90.2
longitude (°)
0.05
0.04
0.03
0.02
0.01
0.00
concentration (kg/m³)

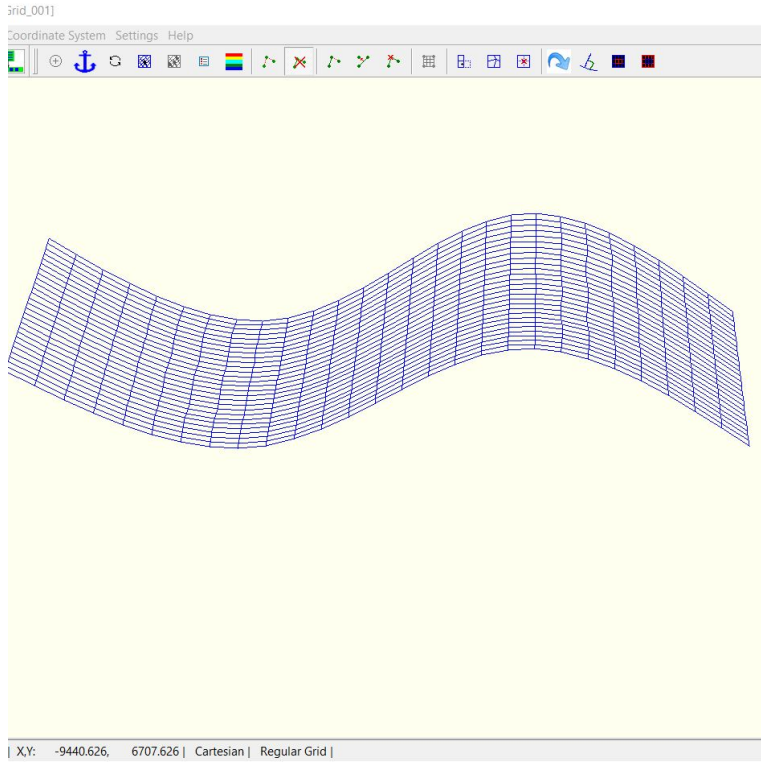

Latitude (°)
29.5
29.4
29.3
29.2
29.1
29.0
-91.0
-90.8
-90.6
-90.4
-90.2
Longitude (°)
0.008
0.006
0.004
0.002
0.000
−0.002
−0.004
−0.006
−0.008
Erosion/Deposition (m)

QUICKIN

Tool for grid creation



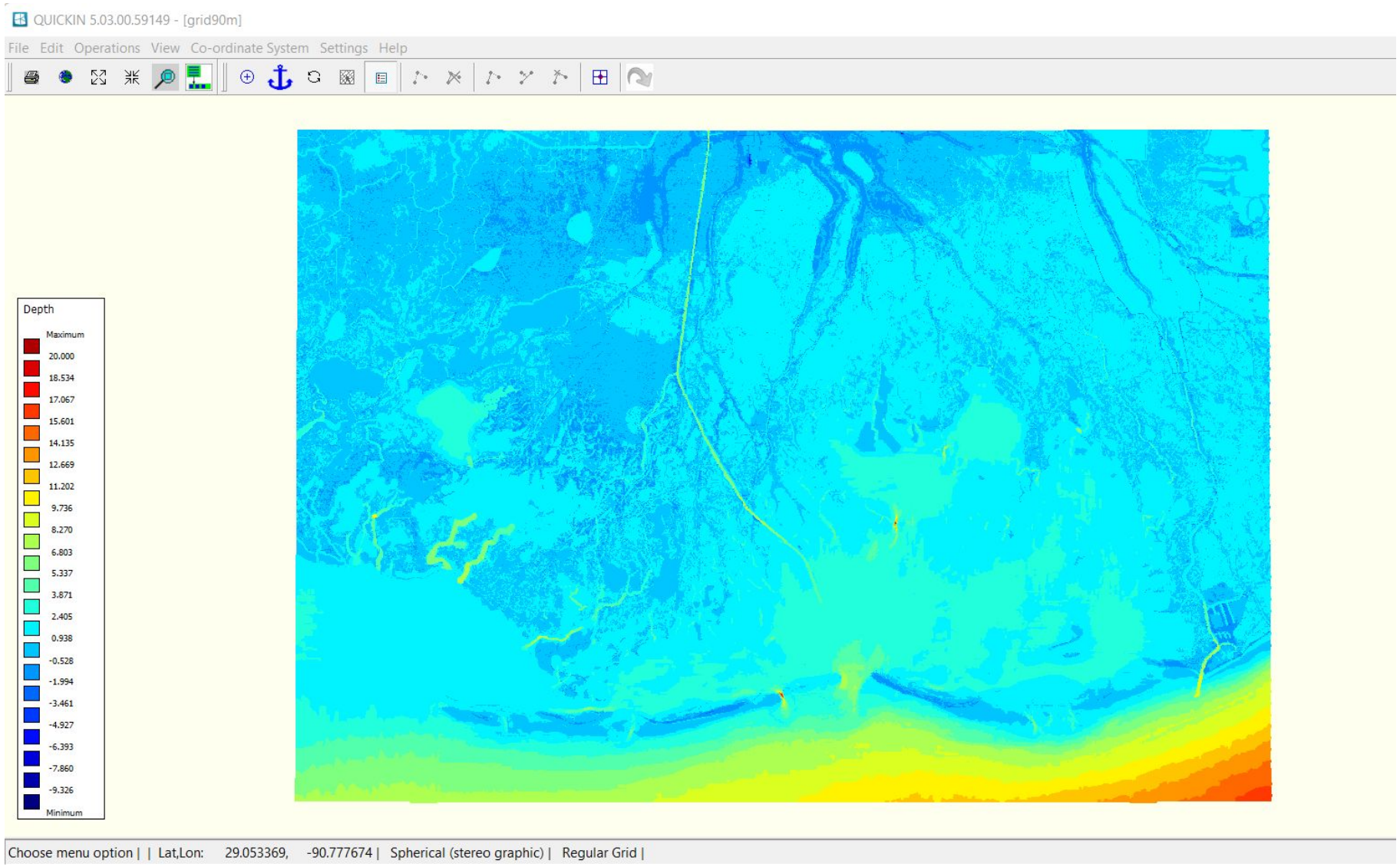




QUICKIN

Tool to generate:

- bathymetric file
- bathymetry modifications
- bottom sediment maps
- vegetation maps
- …

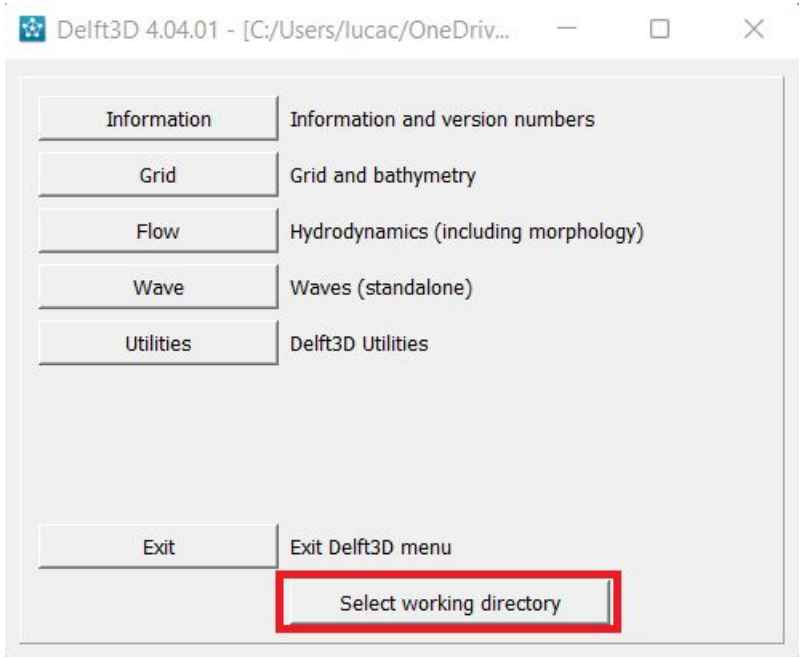


LET’S SET UP THE MODEL!

Useful tips

- Create **one** folder for **each** simulation and store **all** files in it

- First step: select the working directory!!!



Useful tips

- Use the description box at the beginning
- Make sure you **save all files with the GUI**
- Start with a short simulation to check everything works
- Add processes one at the time
- Manuals are very informative

Useful tips

- Make sure you set enough thickness to avoid sediment starvation

```
Sediment erosion shortage at NM 751 Fraction: 2 Mass available   :         -0.2567E-11 Mass to be eroded:         -0.2567E-11
Sediment erosion shortage at NM 752 Fraction: 2 Mass available   :         -0.1376E-11 Mass to be eroded:         -0.1376E-11
```

- Use QUICKPLOT mainly to export results

- You can use the QUICKPLOT function (d3d_qp) directly on Matlab