Set up multi-tributary models, examples in the Patuxent and the Corsica rivers

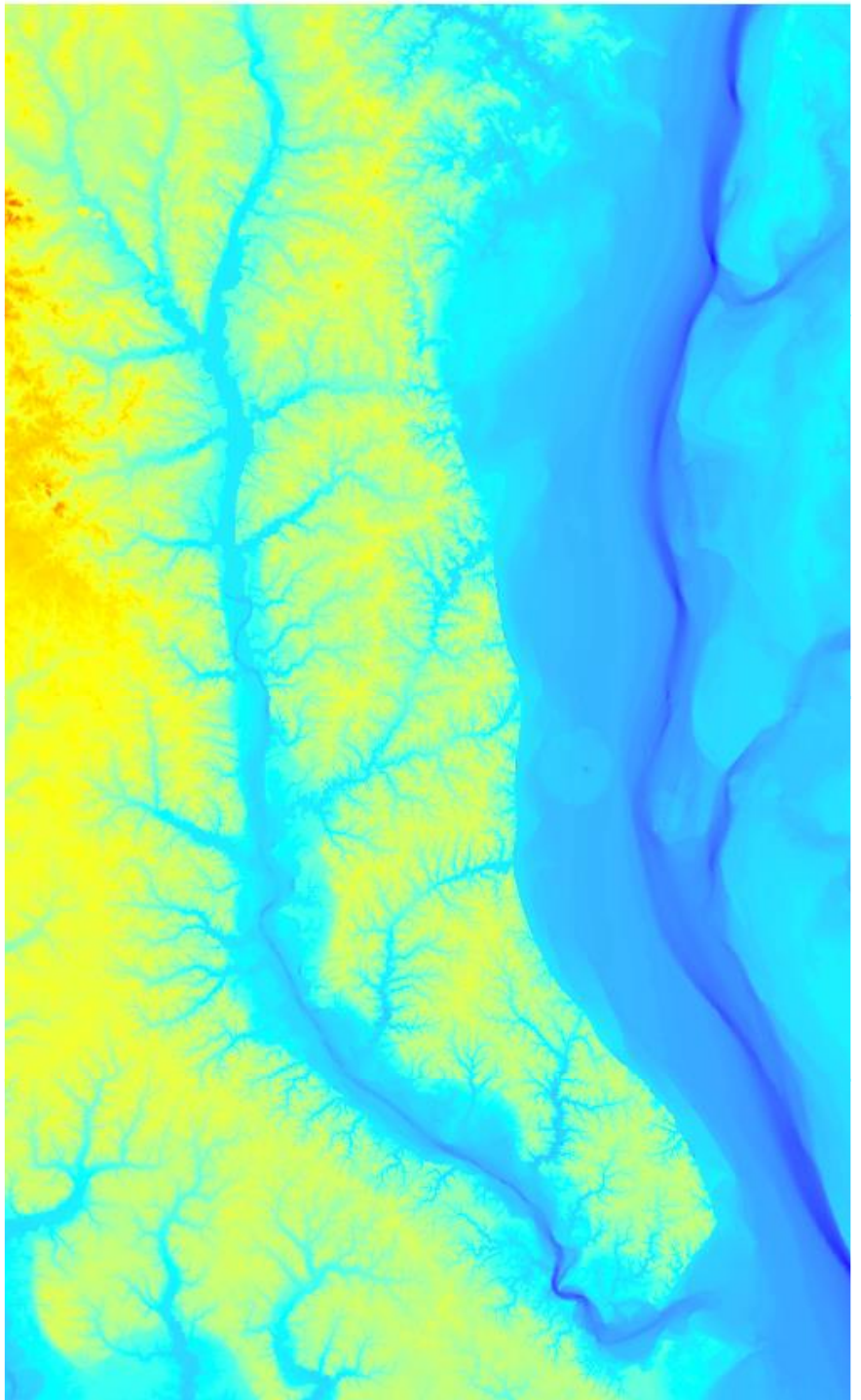
Richard Tian and CBPO modeling team

Modeling Quarterly Review
10/06/2021
Annapolis

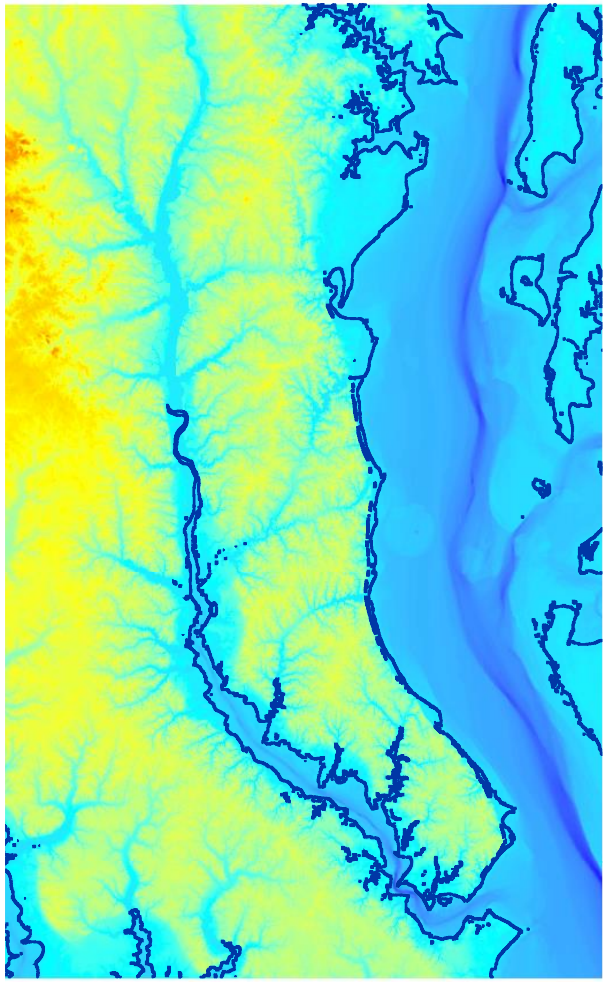
Bathymetry at Patuxent (-50.7 to 116 meters)

USGS webpage: https://topotools.cr.usgs.gov/topobathy_viewer/dwndata.htm.

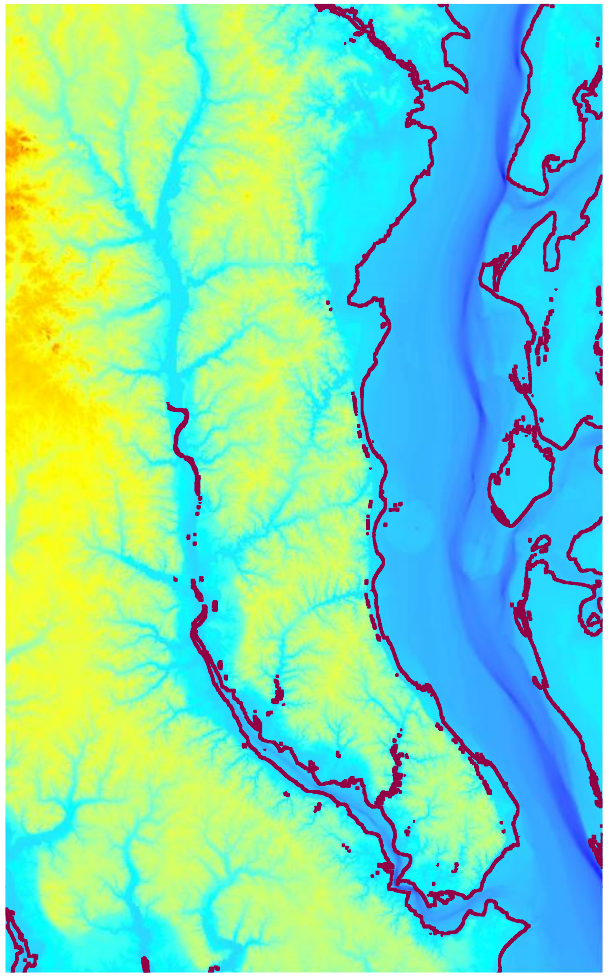
<10,000 square kilometers



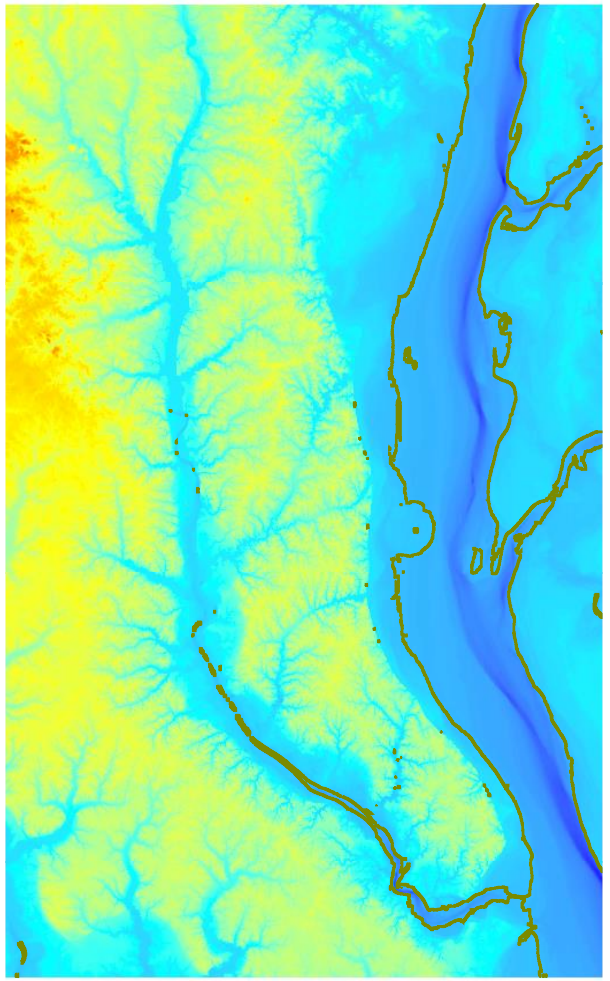
-2 meter



-5 meter

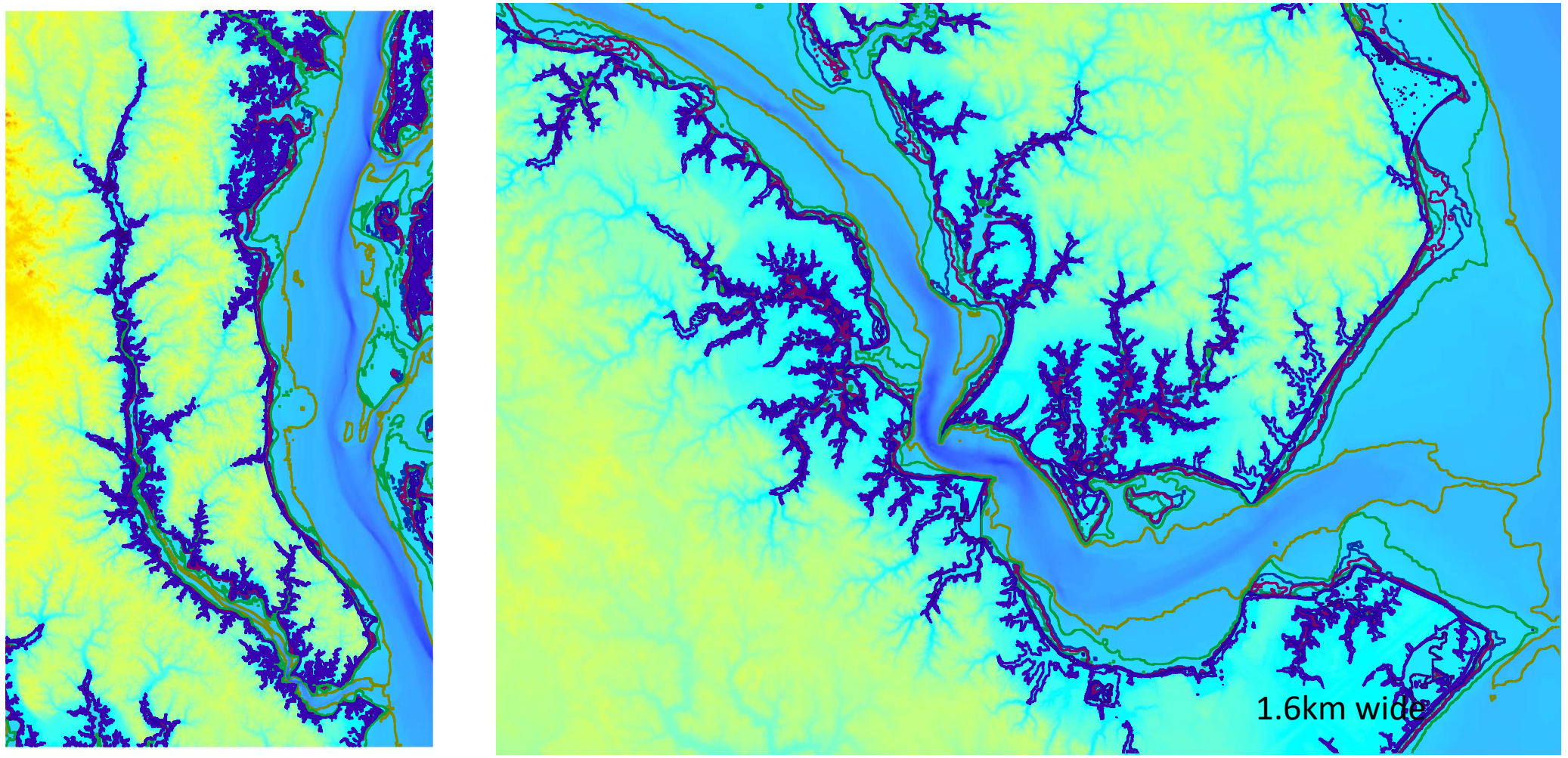


-10 meter

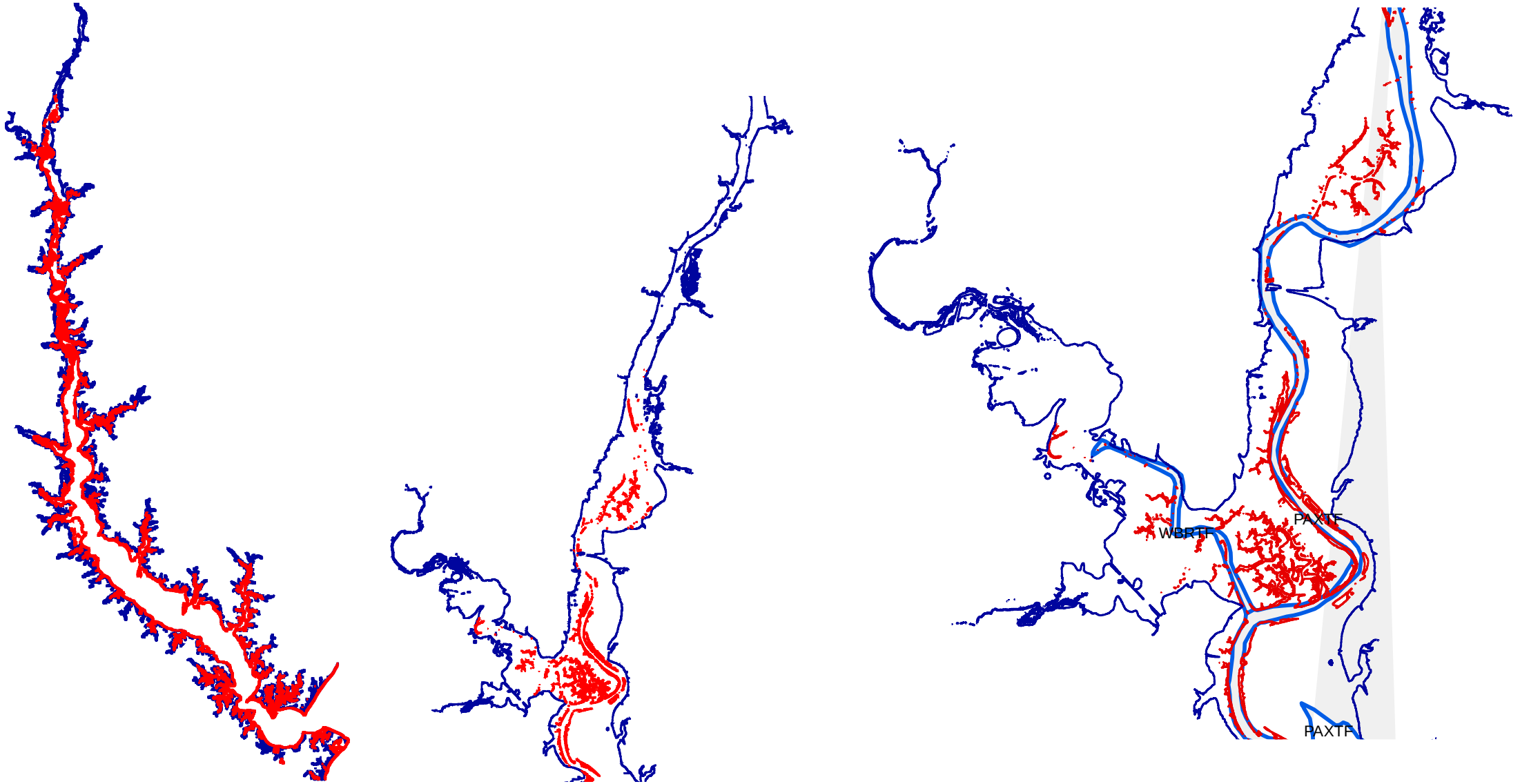


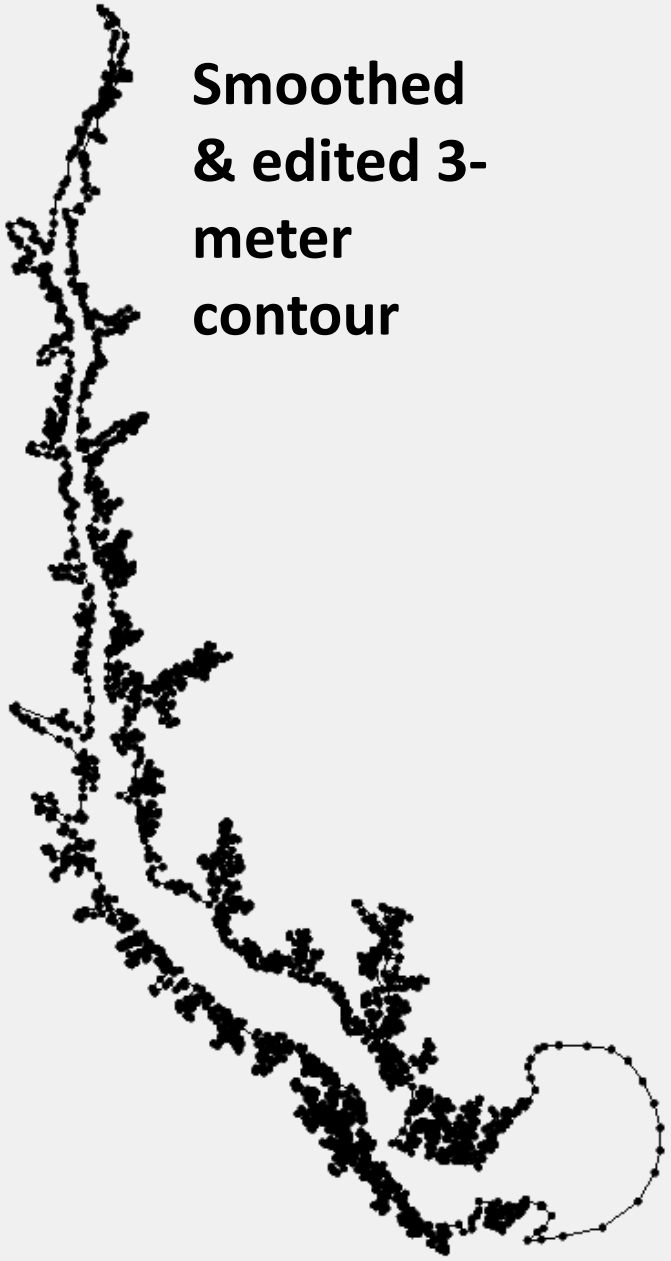
3-meter contour and coastline

All contours

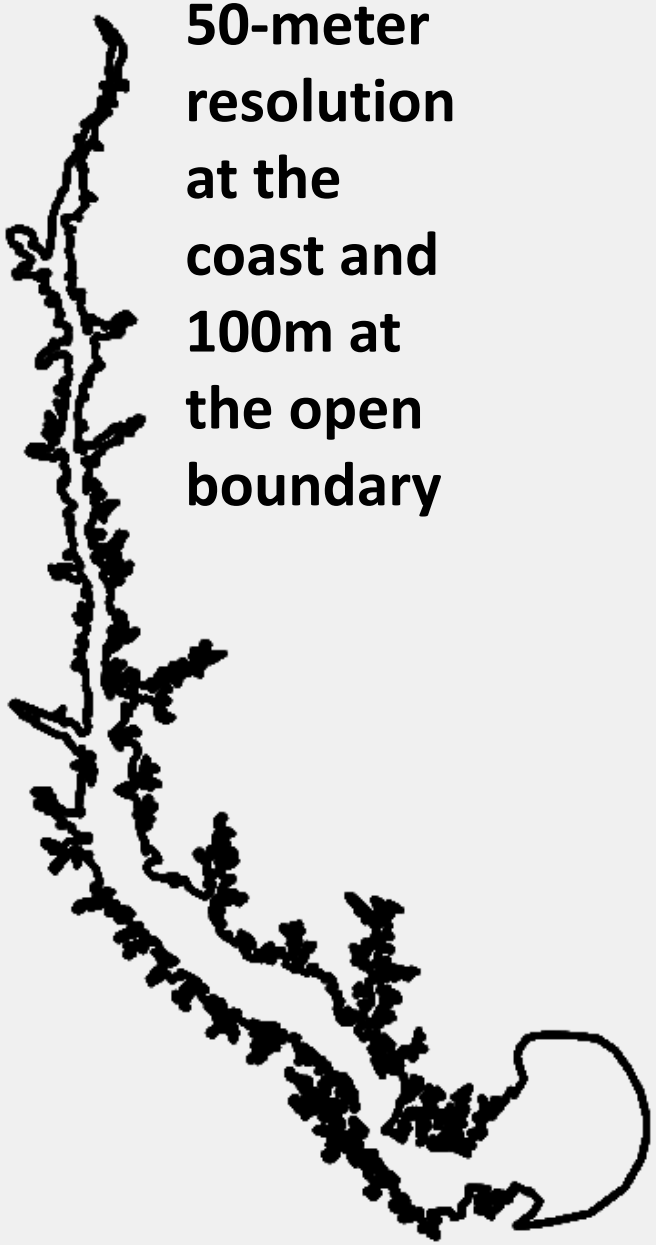


Contour 3 and 0 (red) tolerance=10



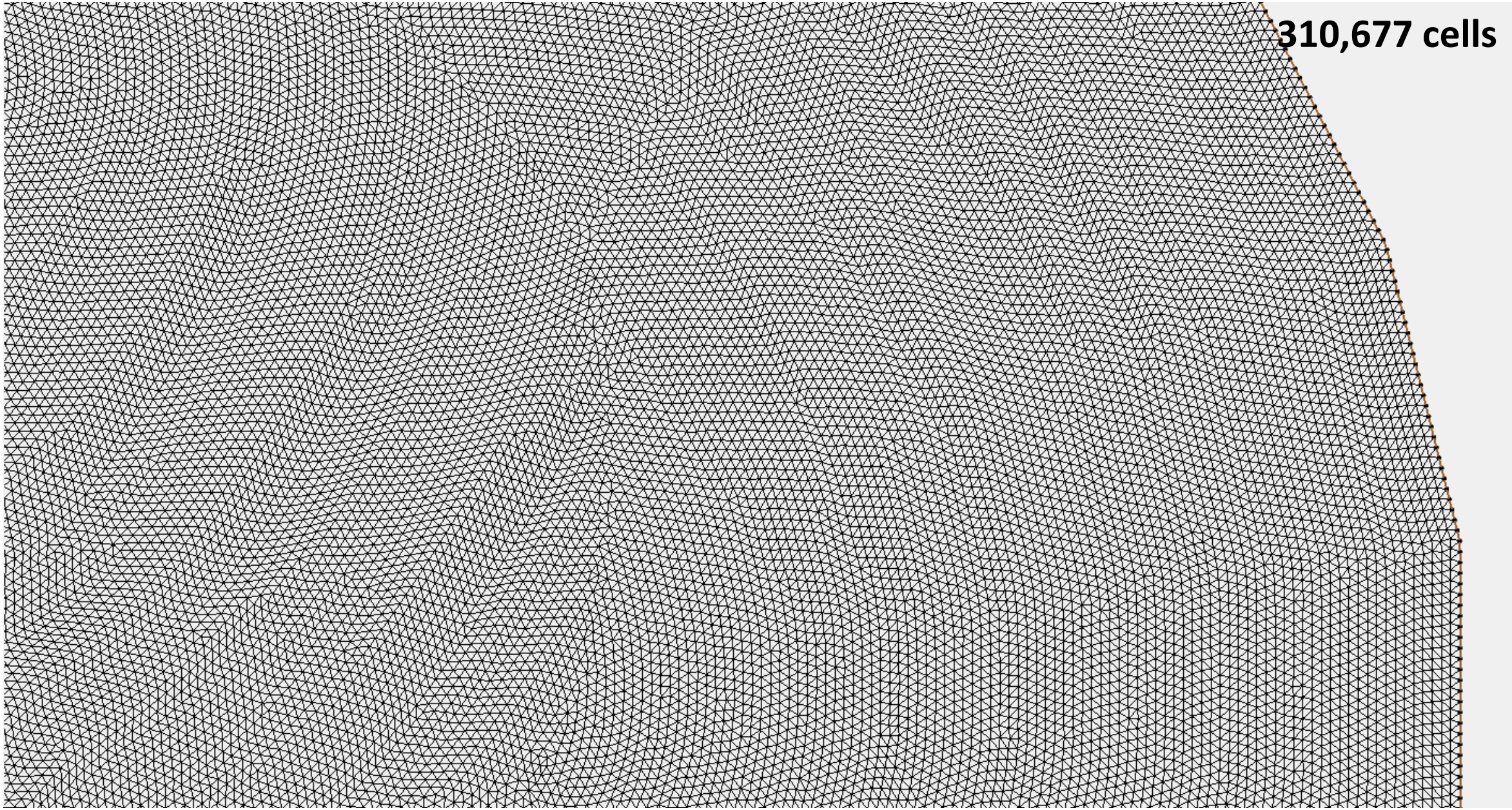


Smoothed & edited 3-meter contour

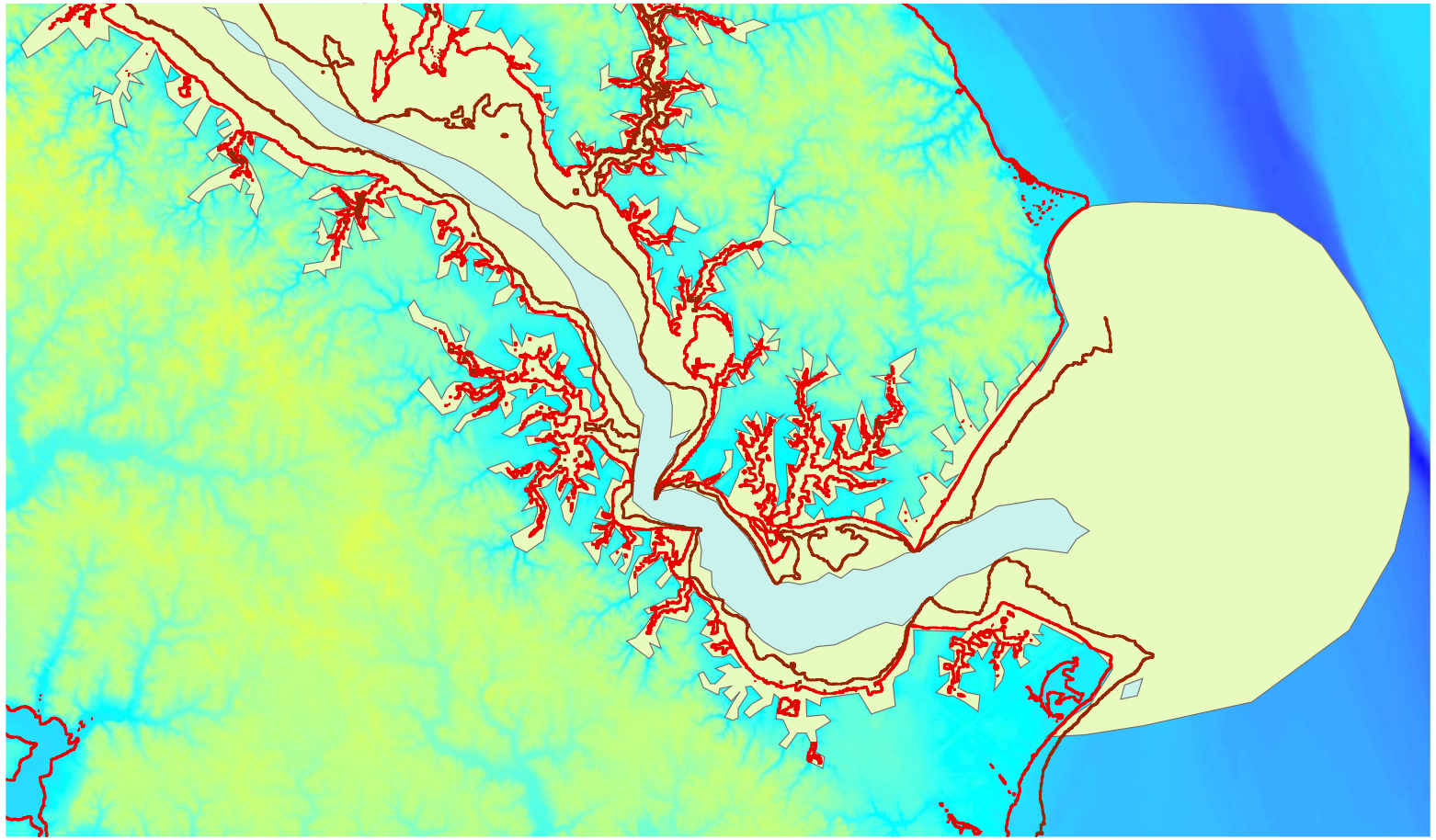


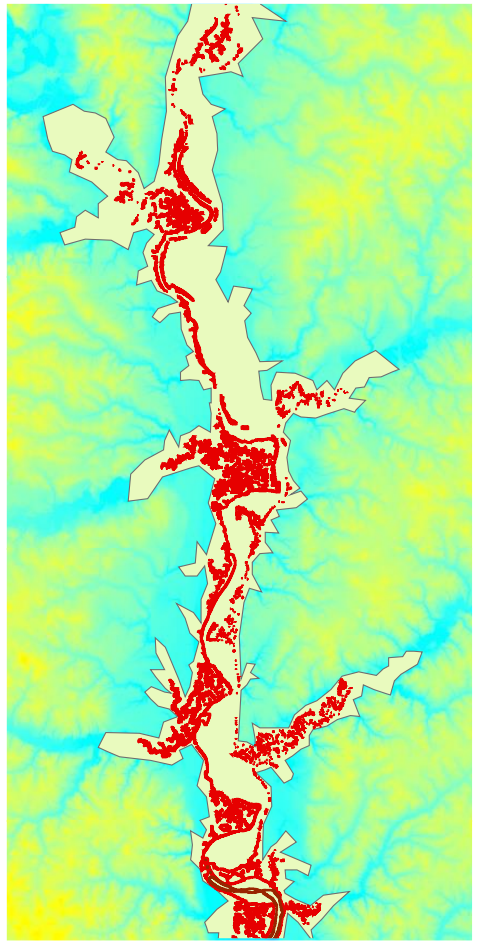
50-meter resolution at the coast and 100m at the open boundary

310,677 cells

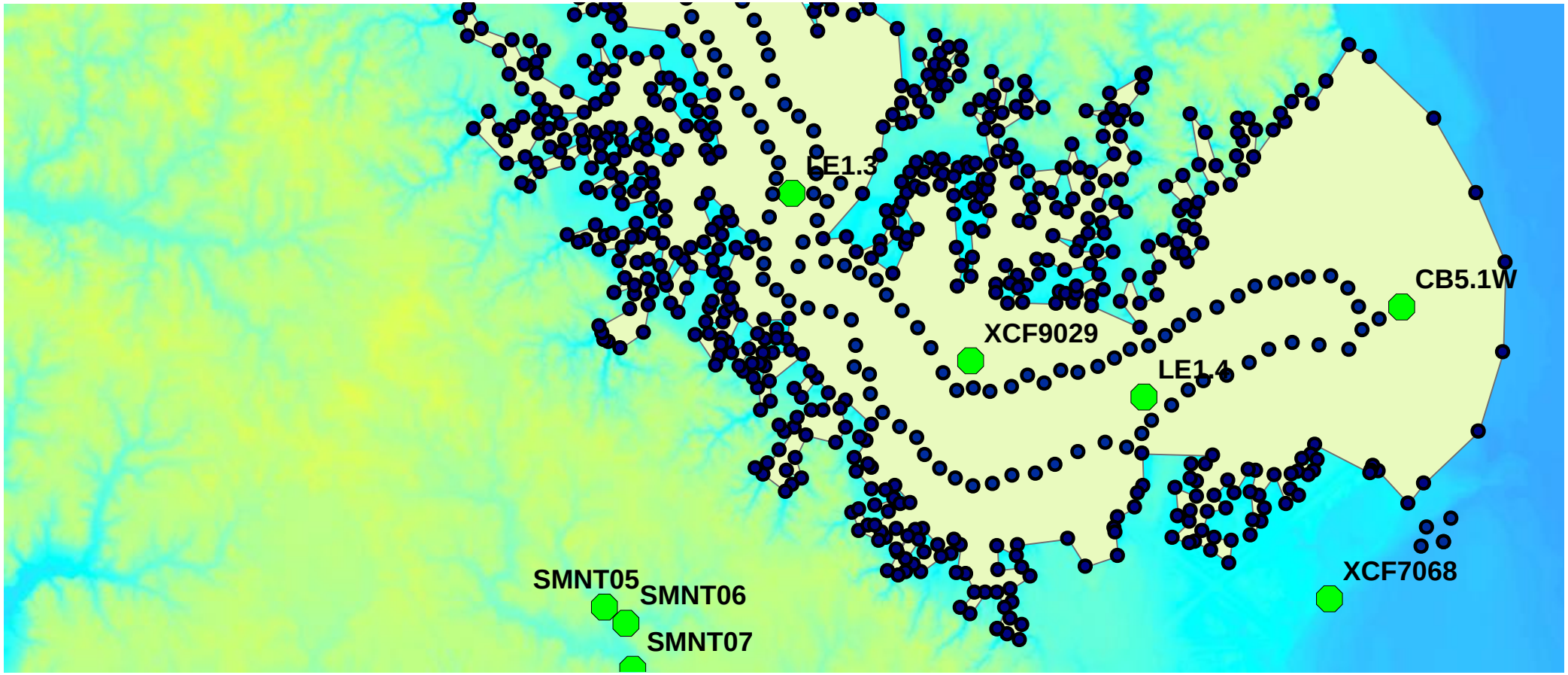

310,677 cells

Re-define and open boundary and adding 10-m contour with coarser resolution

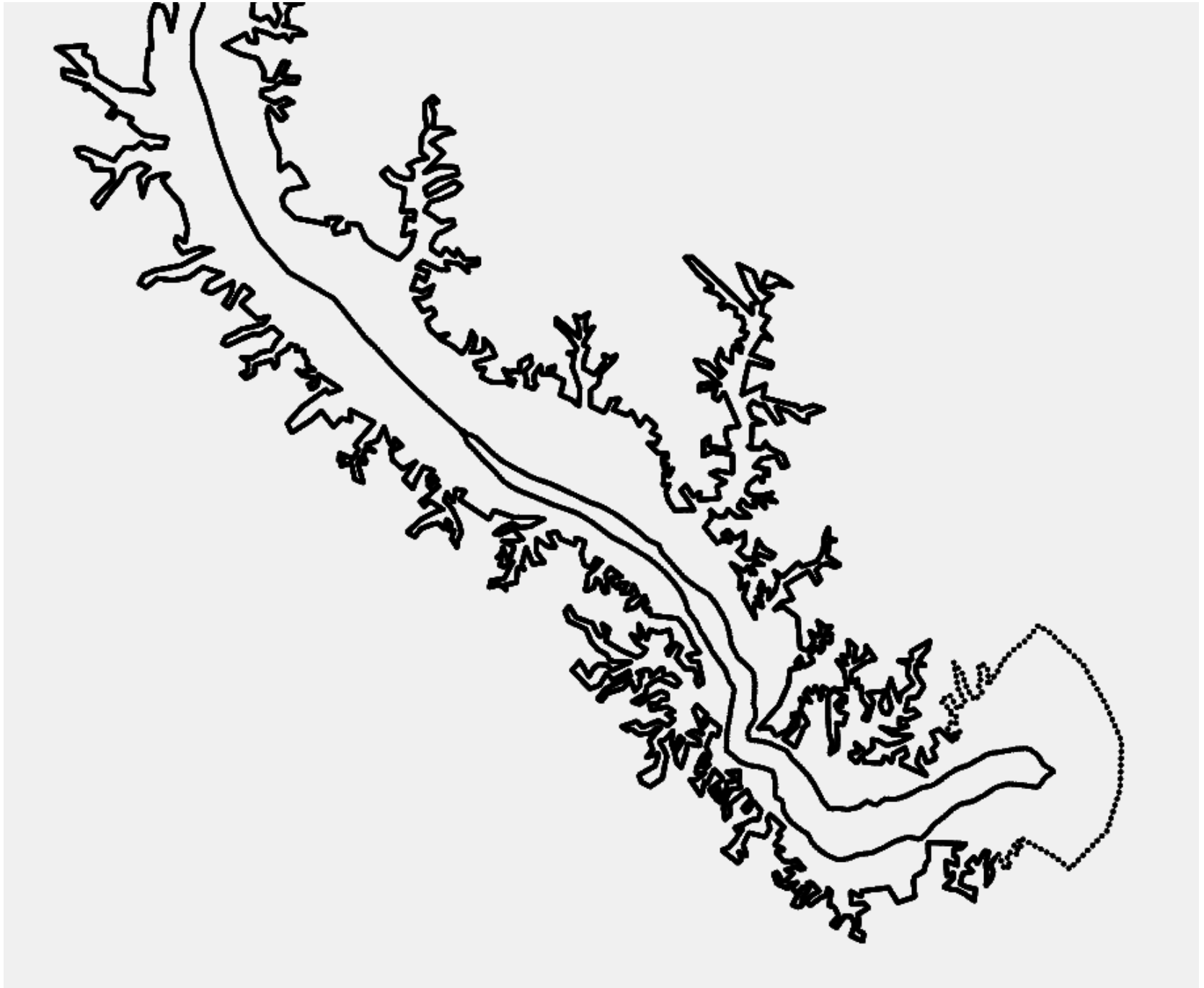




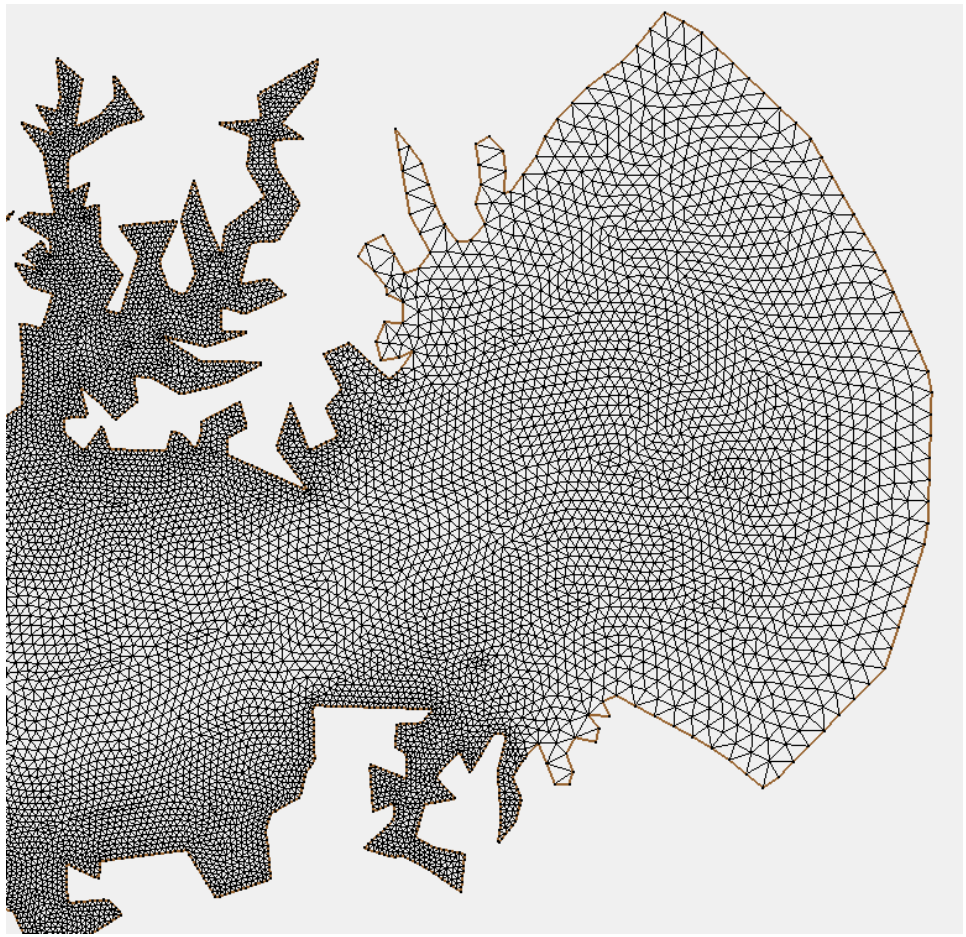
Re-define and open boundary and adding 10-m contour with coarser resolution

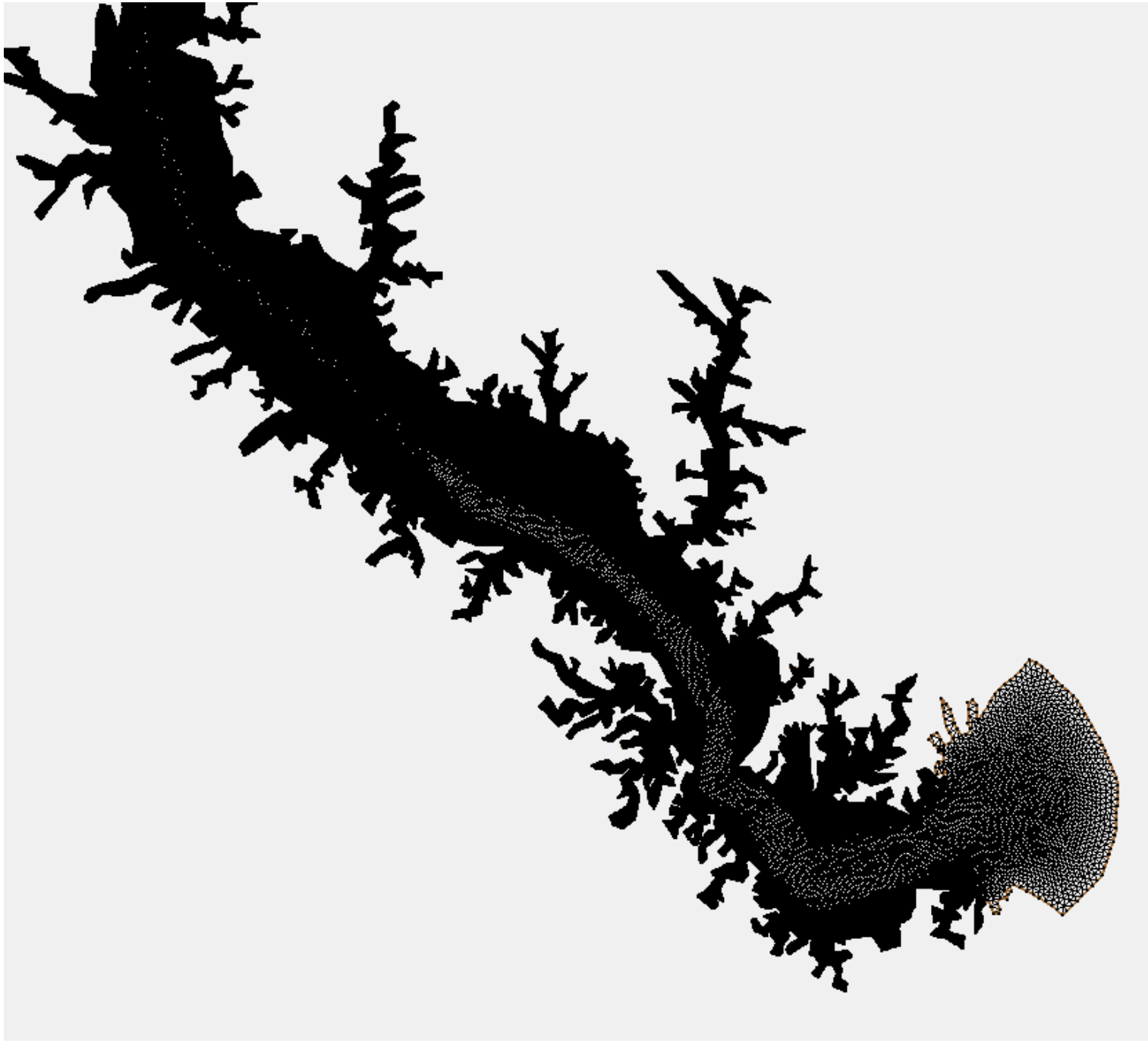


50 m resolution at the coast
100m resolution in the main channel and 200 m at the open boundary.



50 m resolution at the coast
100m resolution in the main channel and 200 m at the open boundary: 150,897cell





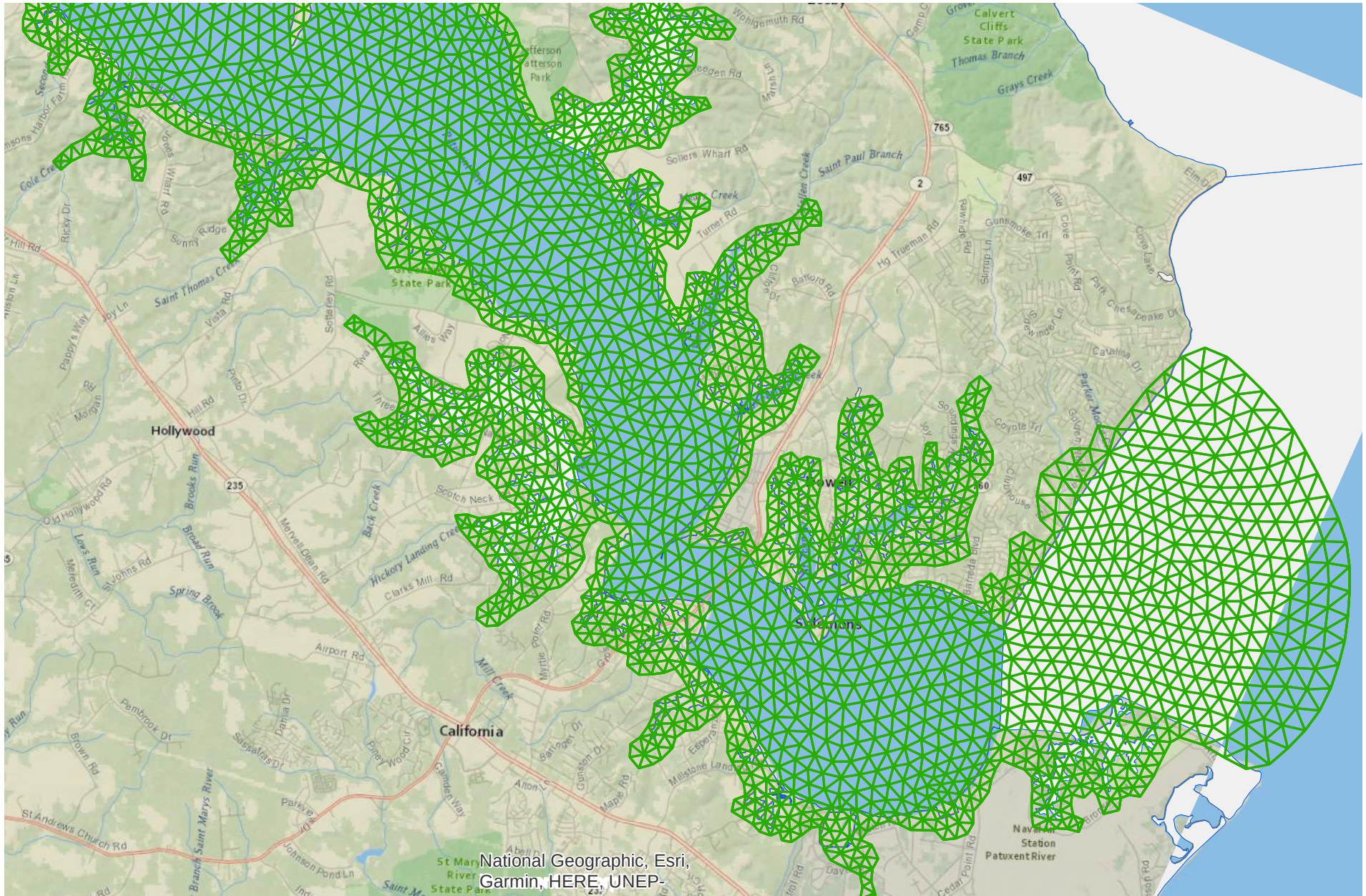
80 m resolution at the coast
150m resolution in the main channel and 300 m at the open boundary.
63512 cell

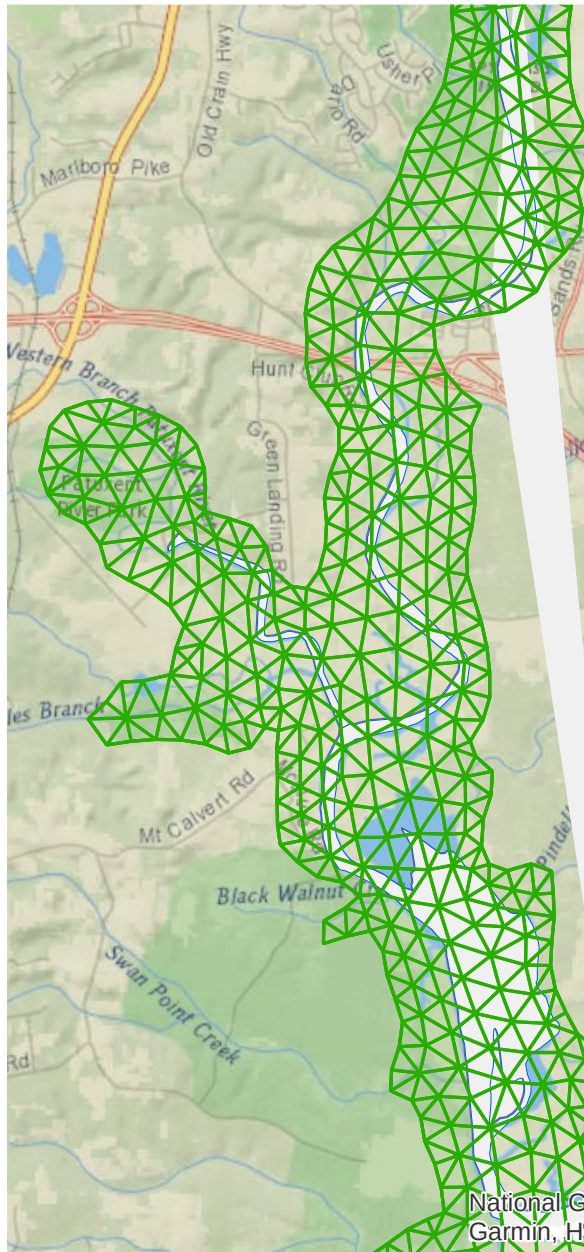
150 m resolution at the coast
200m resolution in the main channel and 300 m at the open boundary.
23705 cells

200 m resolution at the coast
300m resolution in the main channel and 400 m at the open boundary.
12863 cells
CH3D has 205 cells

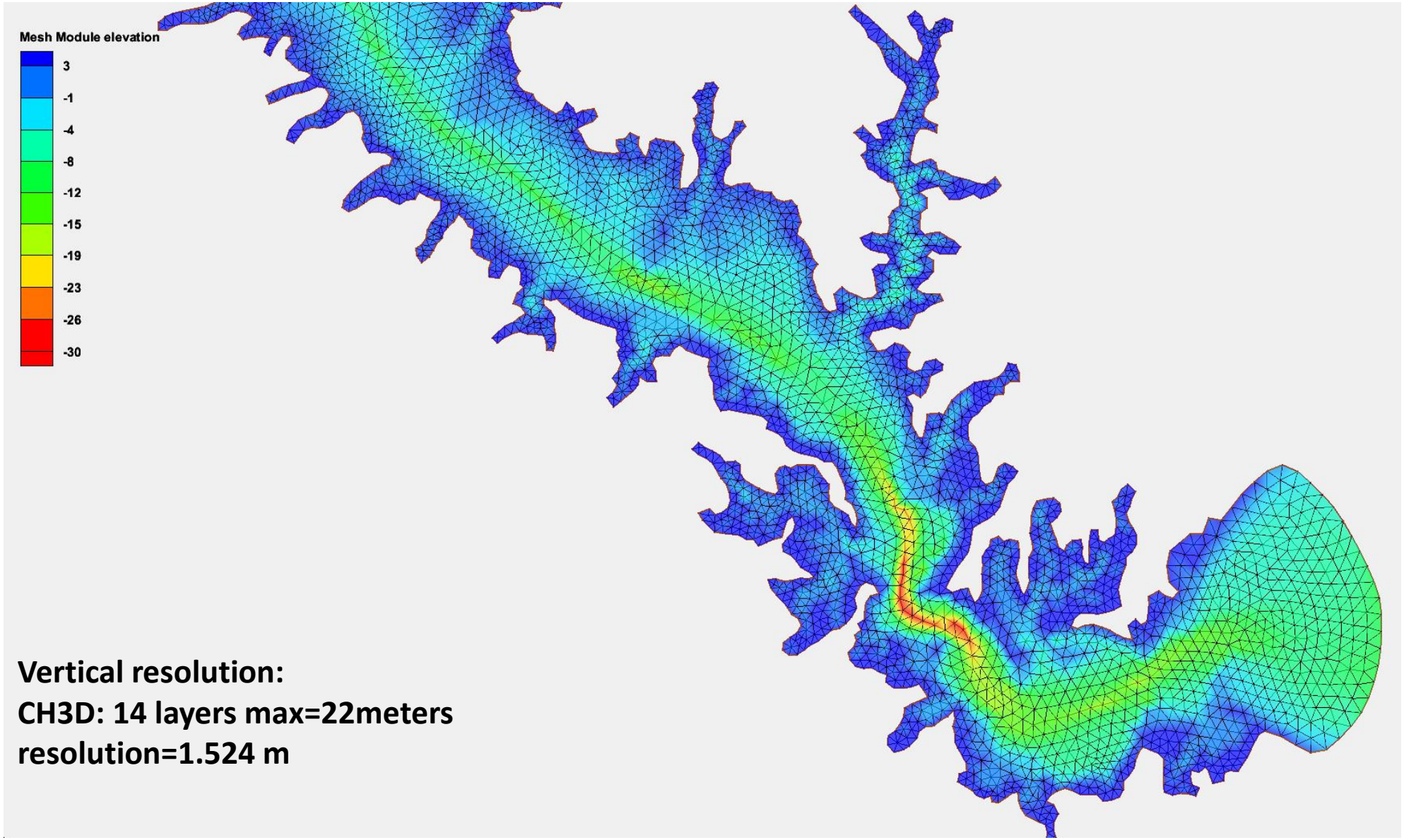
Strategy: Do not pursue high resolution, but can accommodate local waters if thus desired.

Compare with the coastline





Bathymetry interpolation using the nearest neighbor method

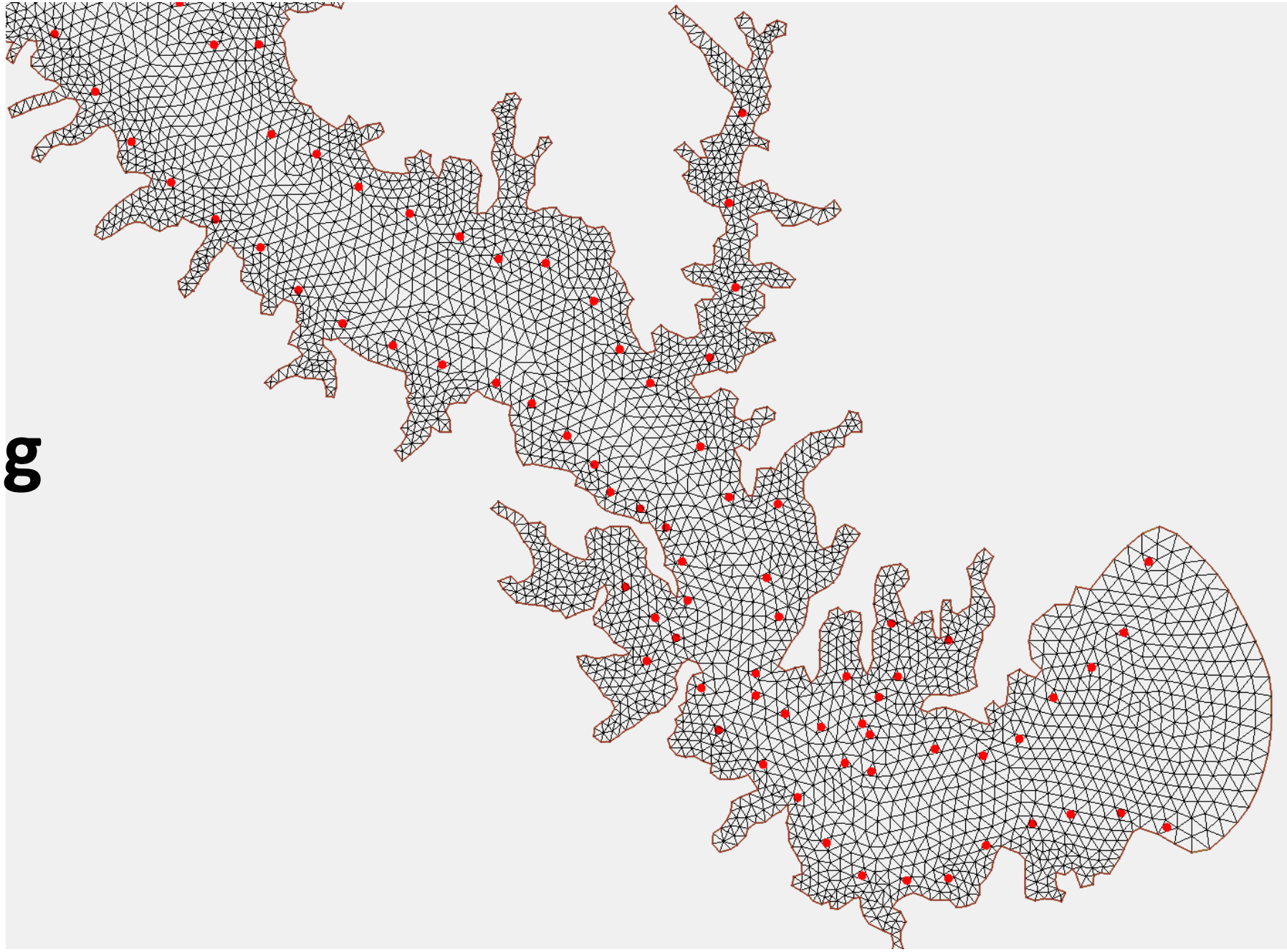


Vertical resolution:
CH3D: 14 layers max=22meters
resolution=1.524 m

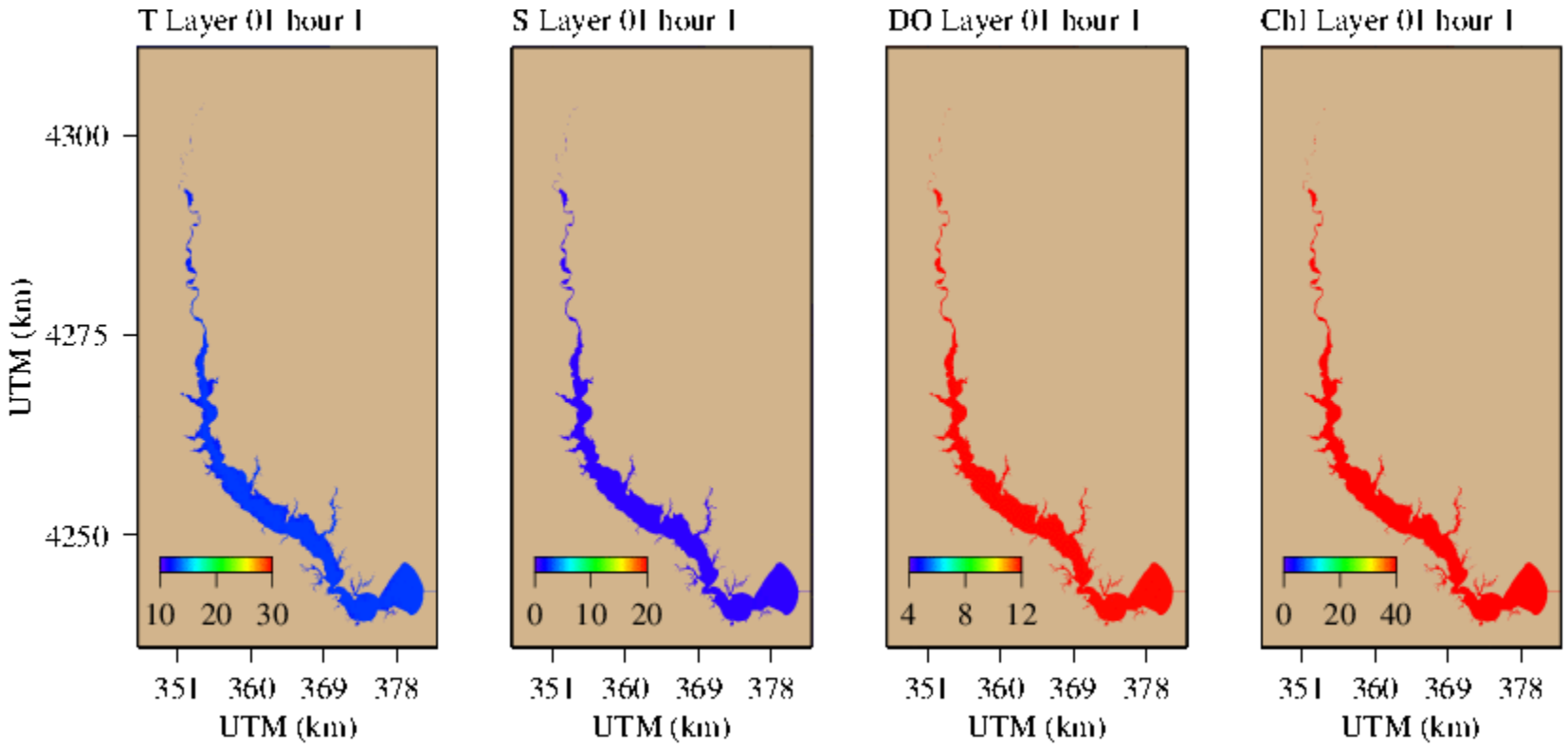
Watershed loading (112 inlets)

Surface forcing

Open boundary

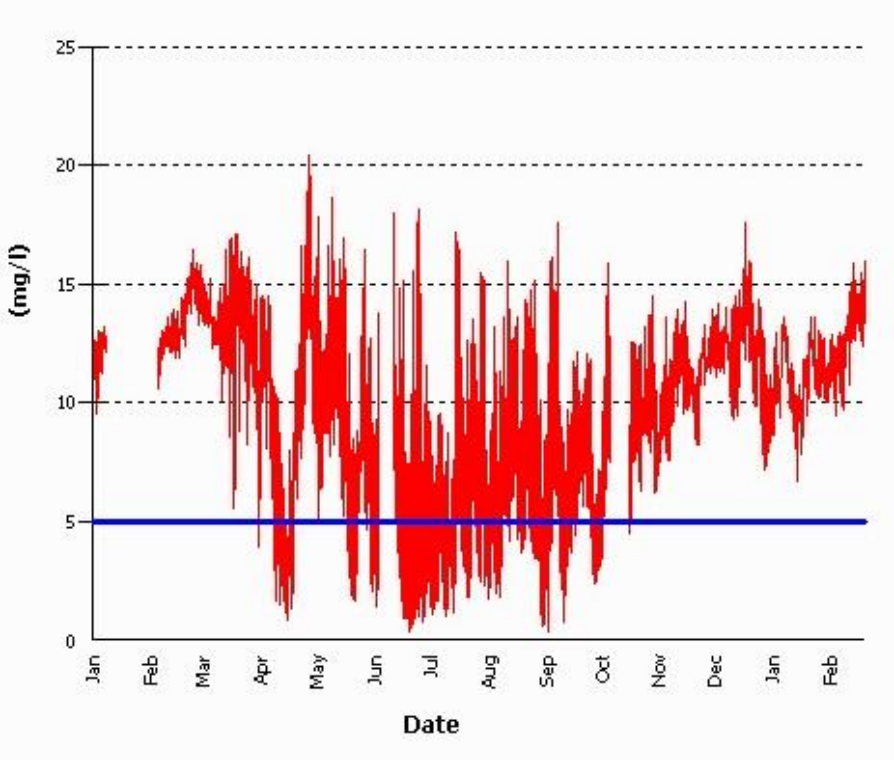


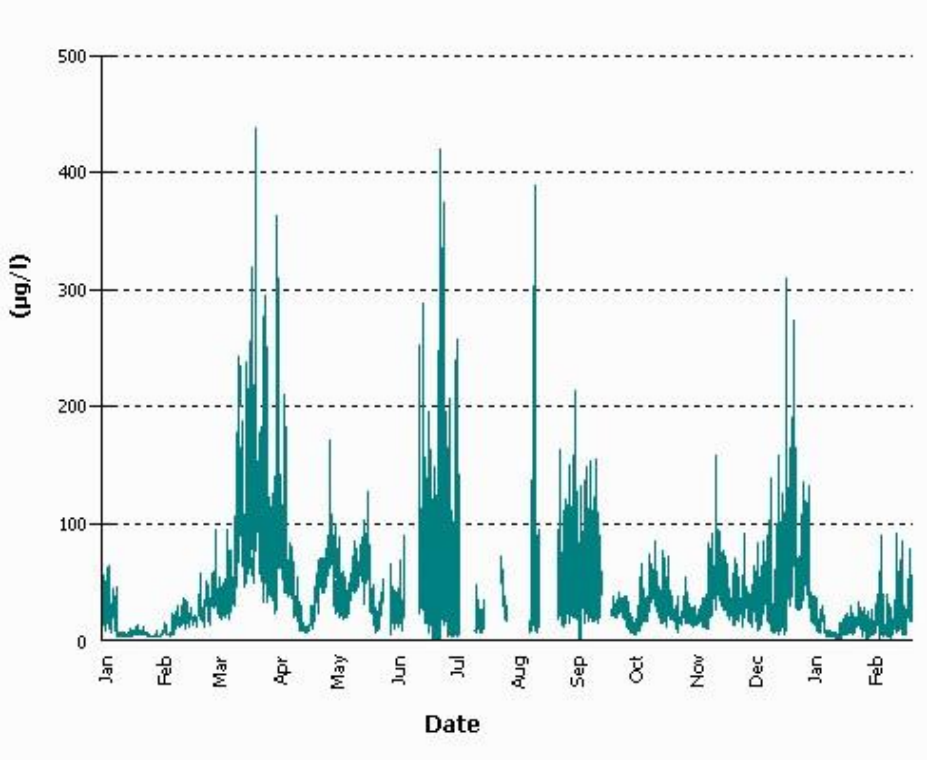
Movies of Surface T, S, DO and Chl in the Patuxent



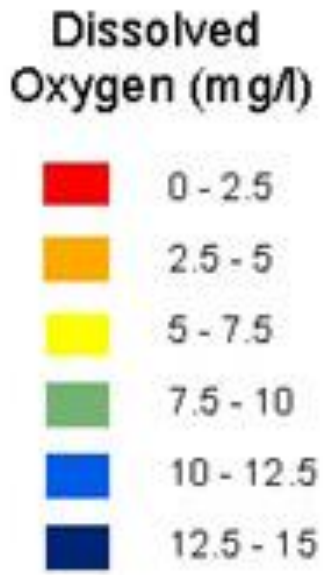
Corsica

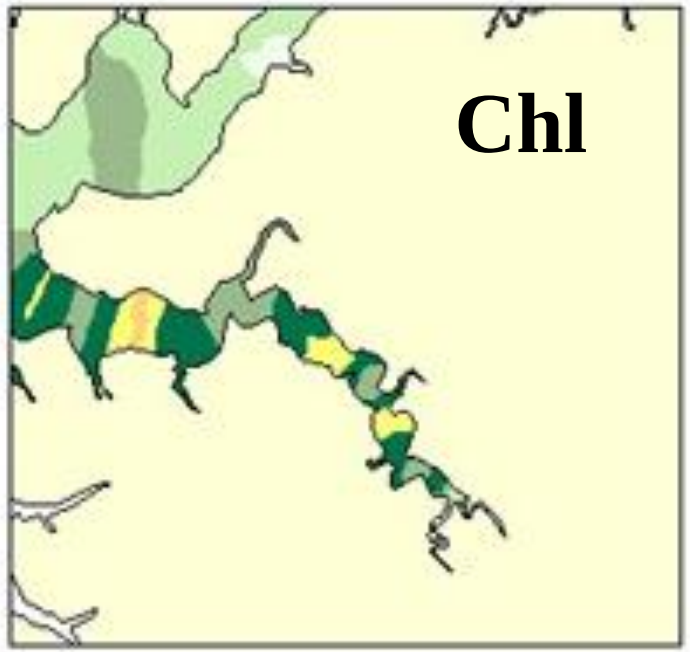
DO and Chlorophyll Data (2013; Station 3851)

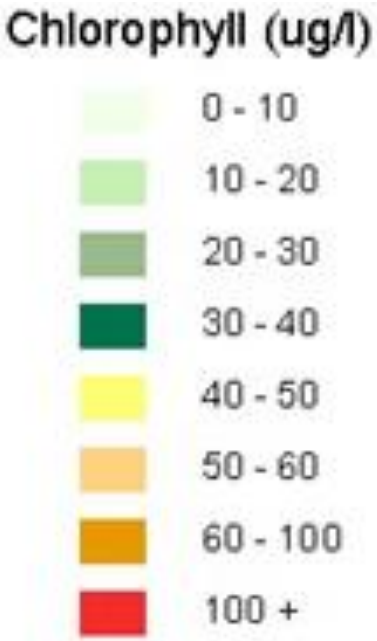




Spatial distribution in May, 2013)



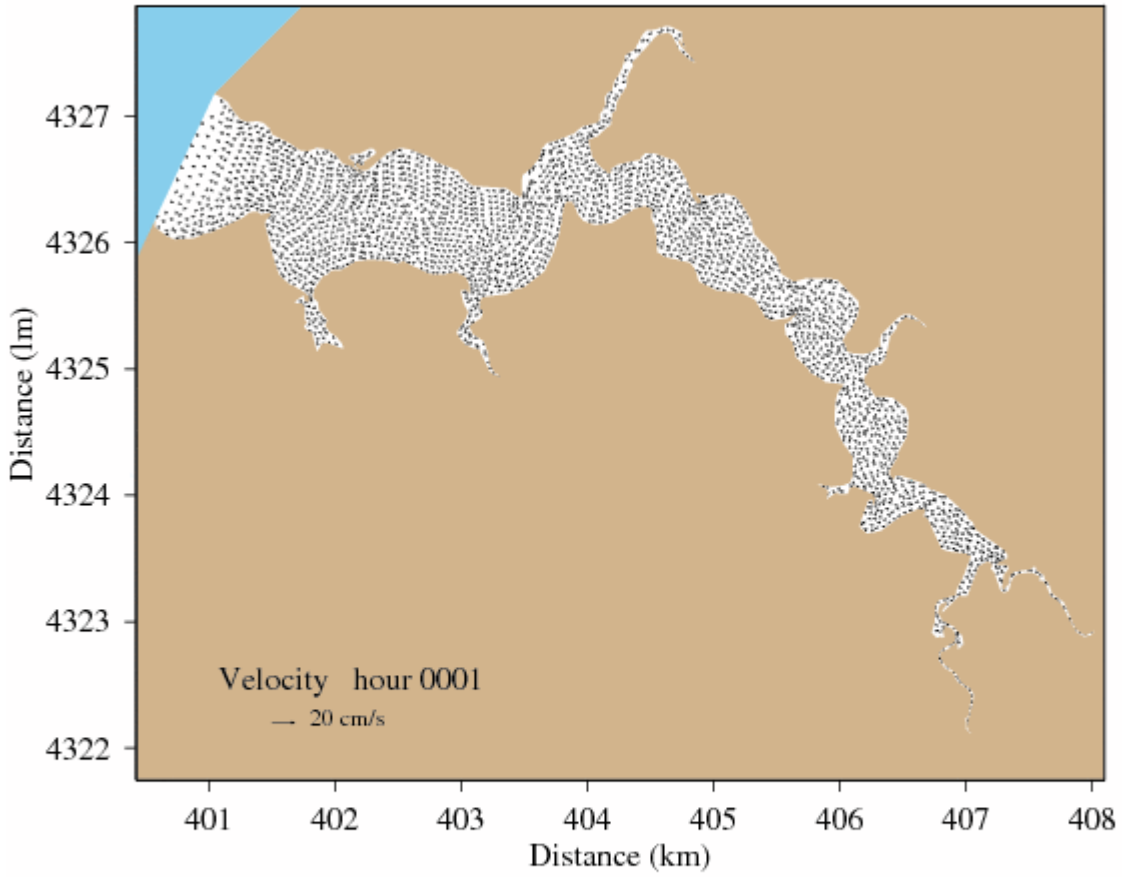




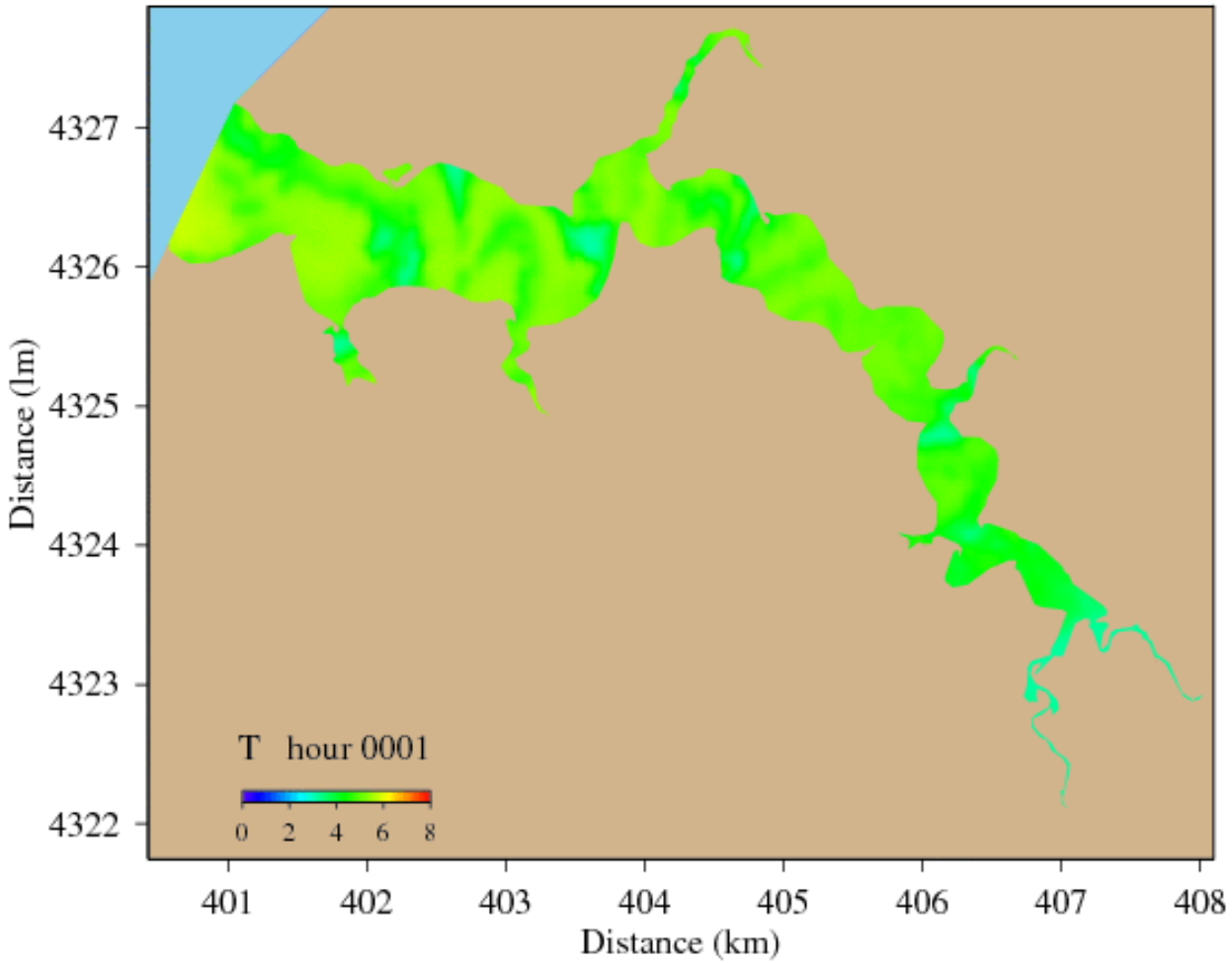
FVCOM Corsica Grid

20m resolution on coast, 100m open boundary: 5029 nodes, 2888 cells, 5 lrs

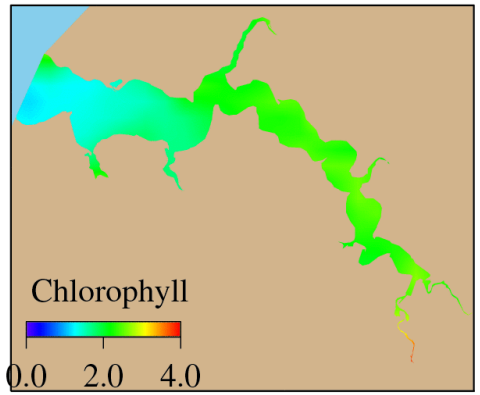
Movie of Surface Velocity

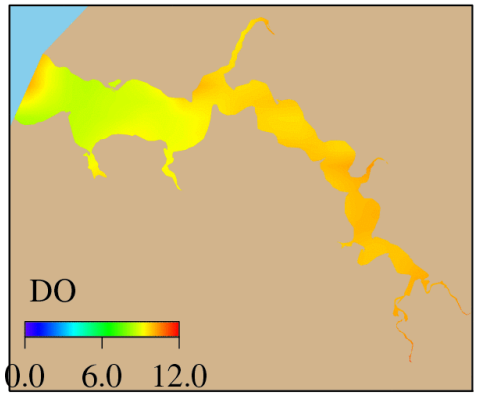


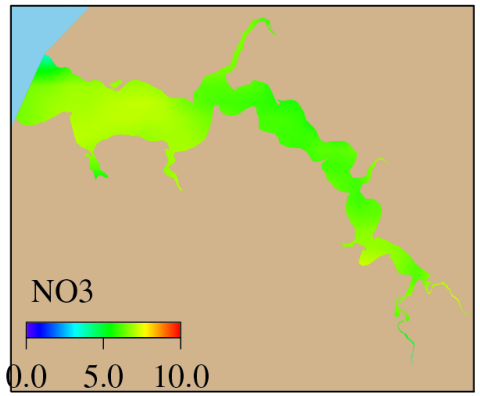
Movie of Surface Temperature

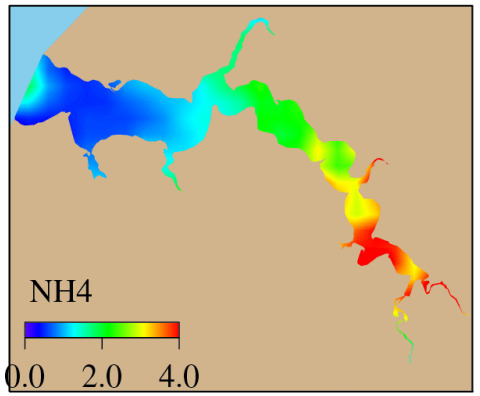


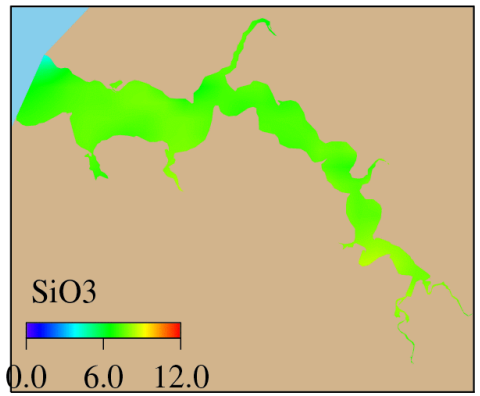
Bottom water quality variables on Feb. 15





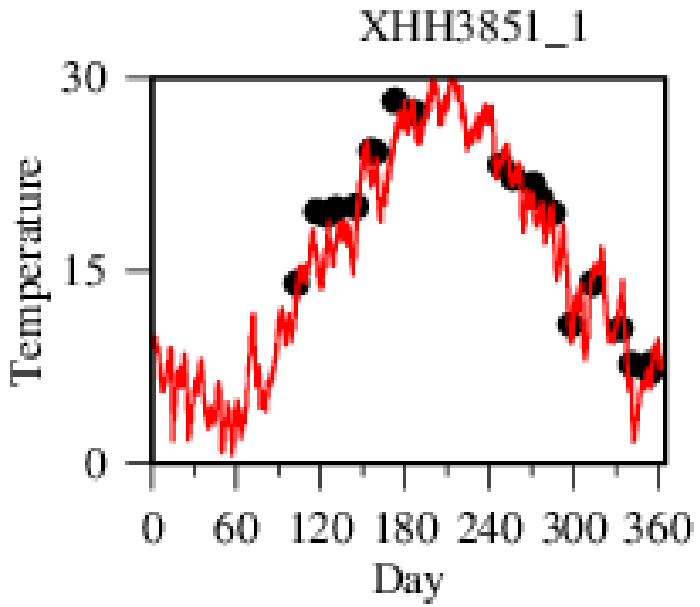


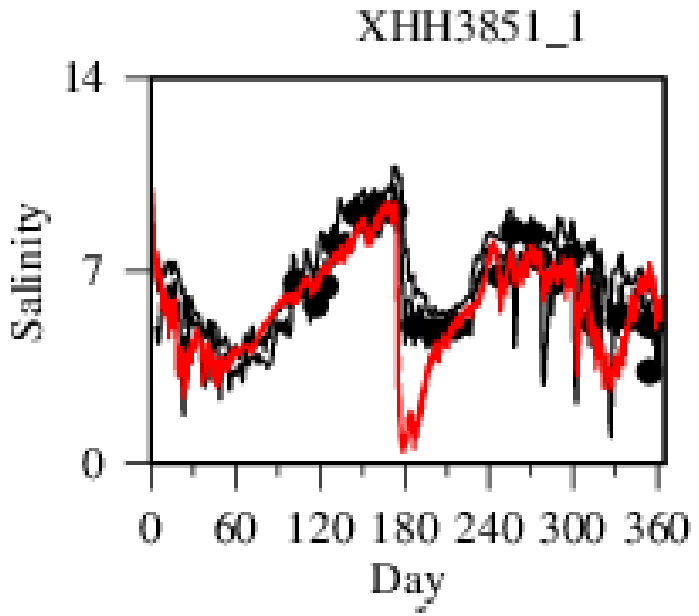


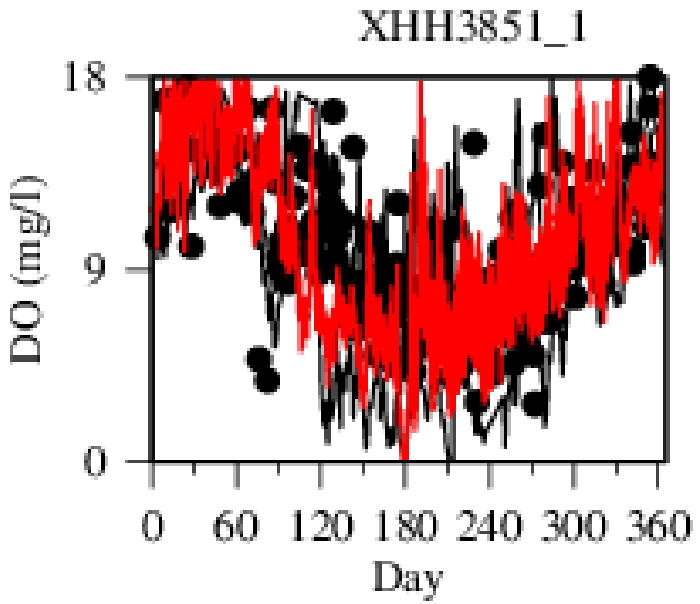


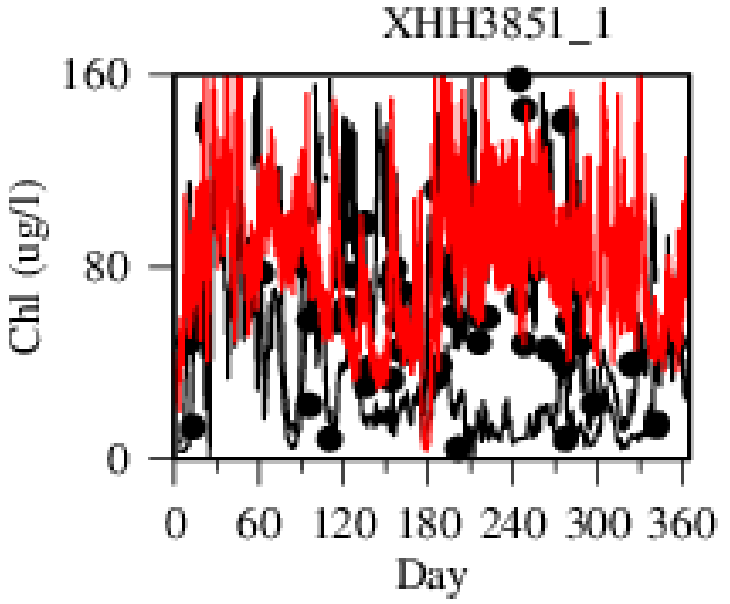
New simulation with SCHISM

Time series in 1991



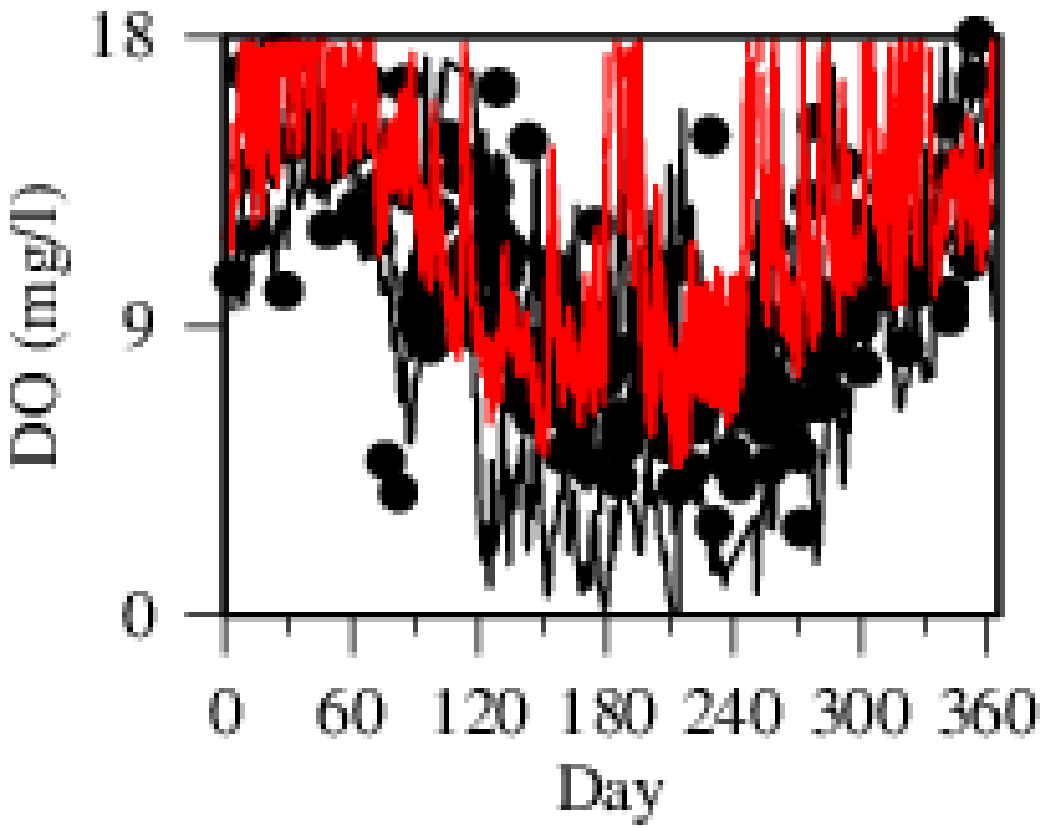




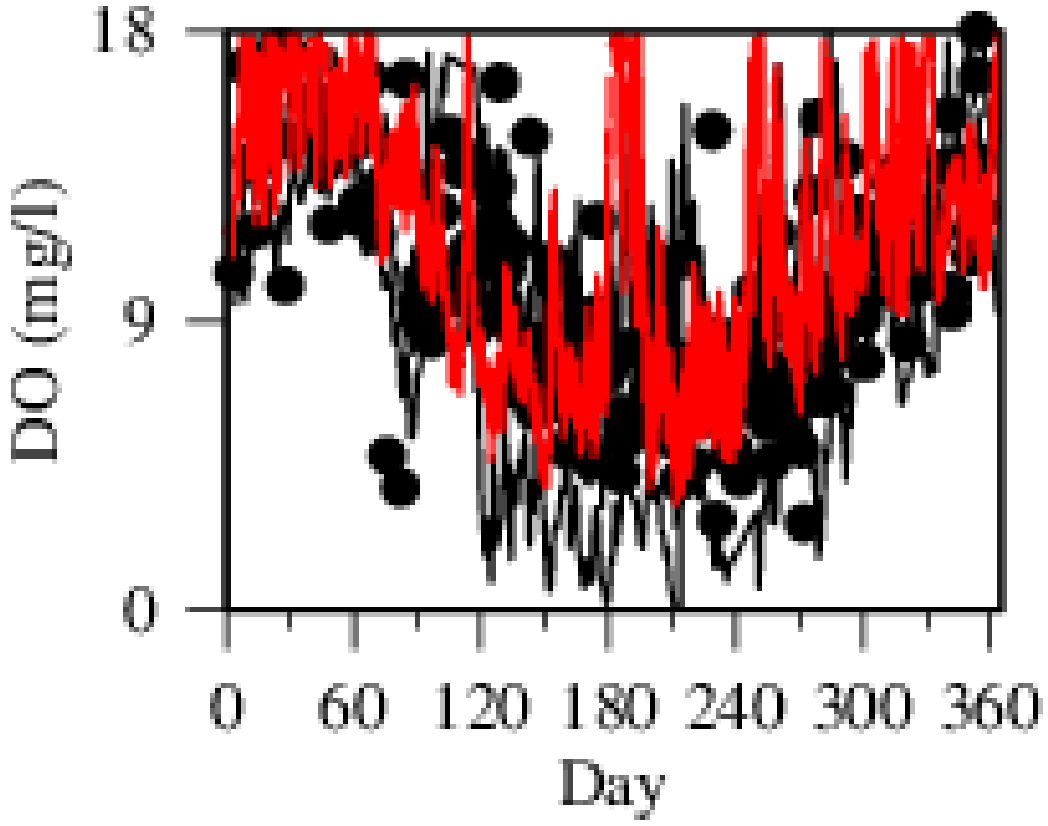


Comparison with and without wetland respiration

Without wetland



With wetland



Question

Are there local waters that need higher resolution for the tributary model simulation?