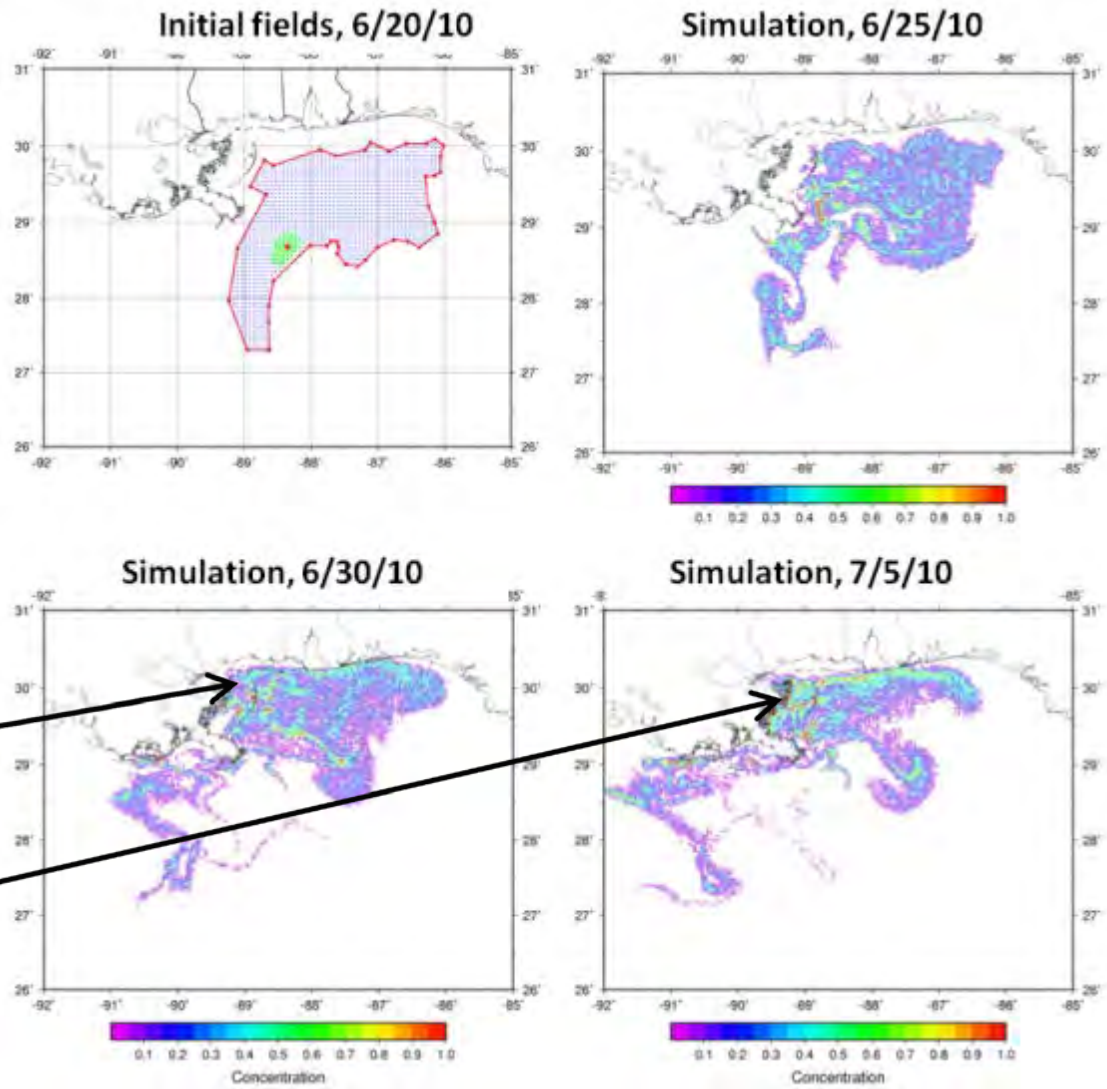


The influence of cyclones on the Deepwater Horizon Oil Spill

Pat Fitzpatrick, Yee Lau, Chris Hill, and Haldun Karan

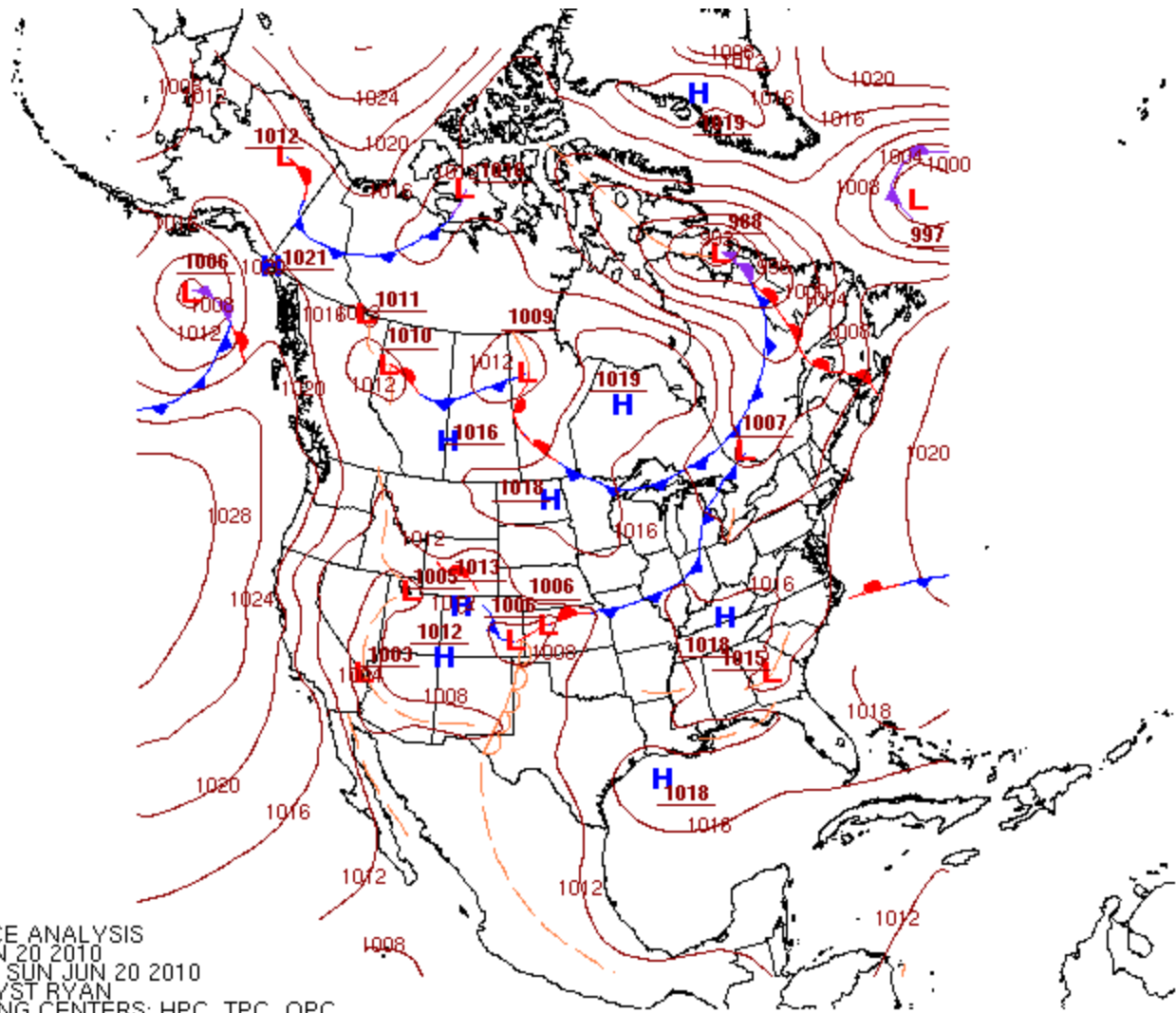
Oil spill simulation from 6/20/10-7/10/10 using AMSEAS NCOM data



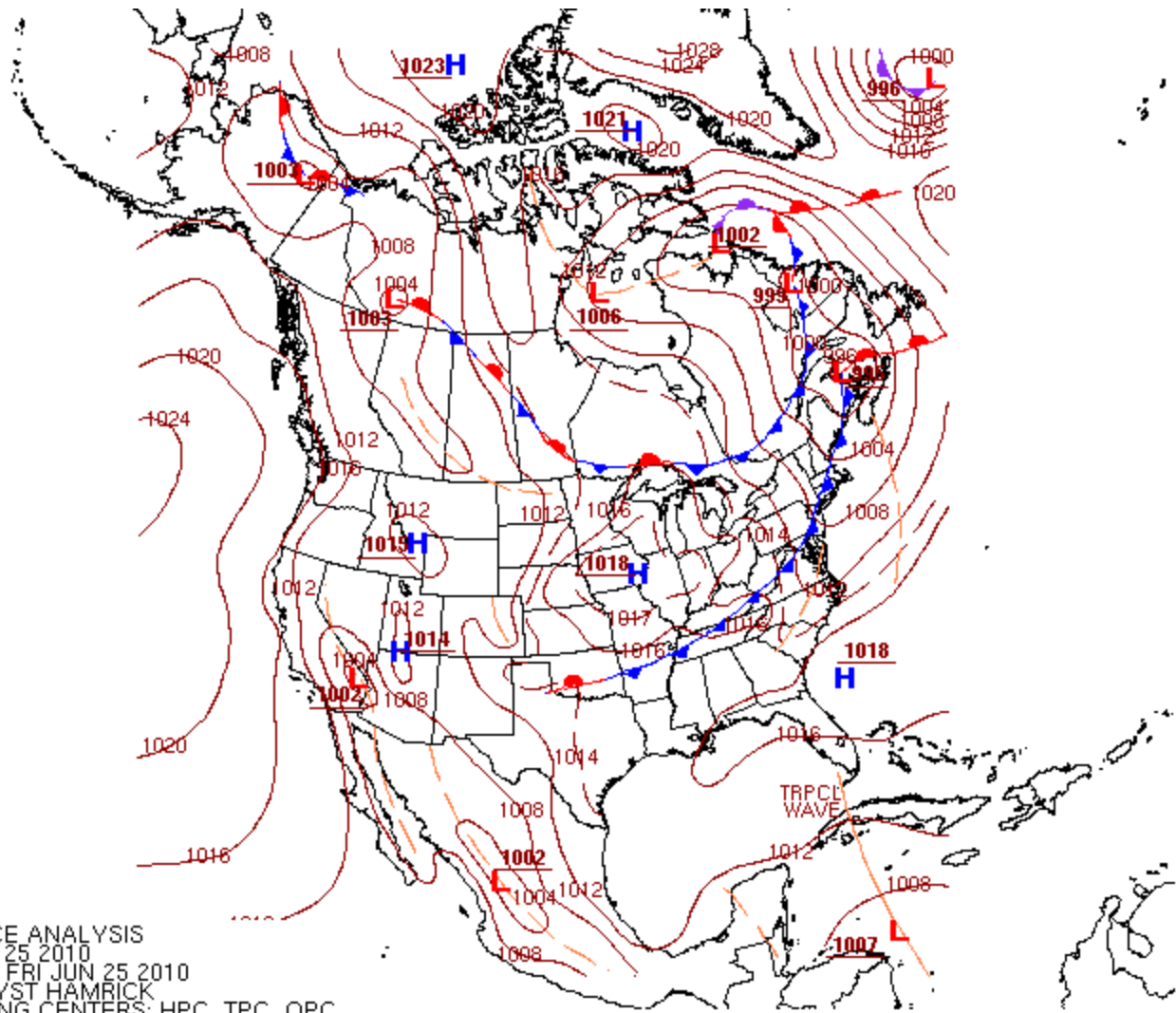
Note inshore movement of oil starting late June

Model description

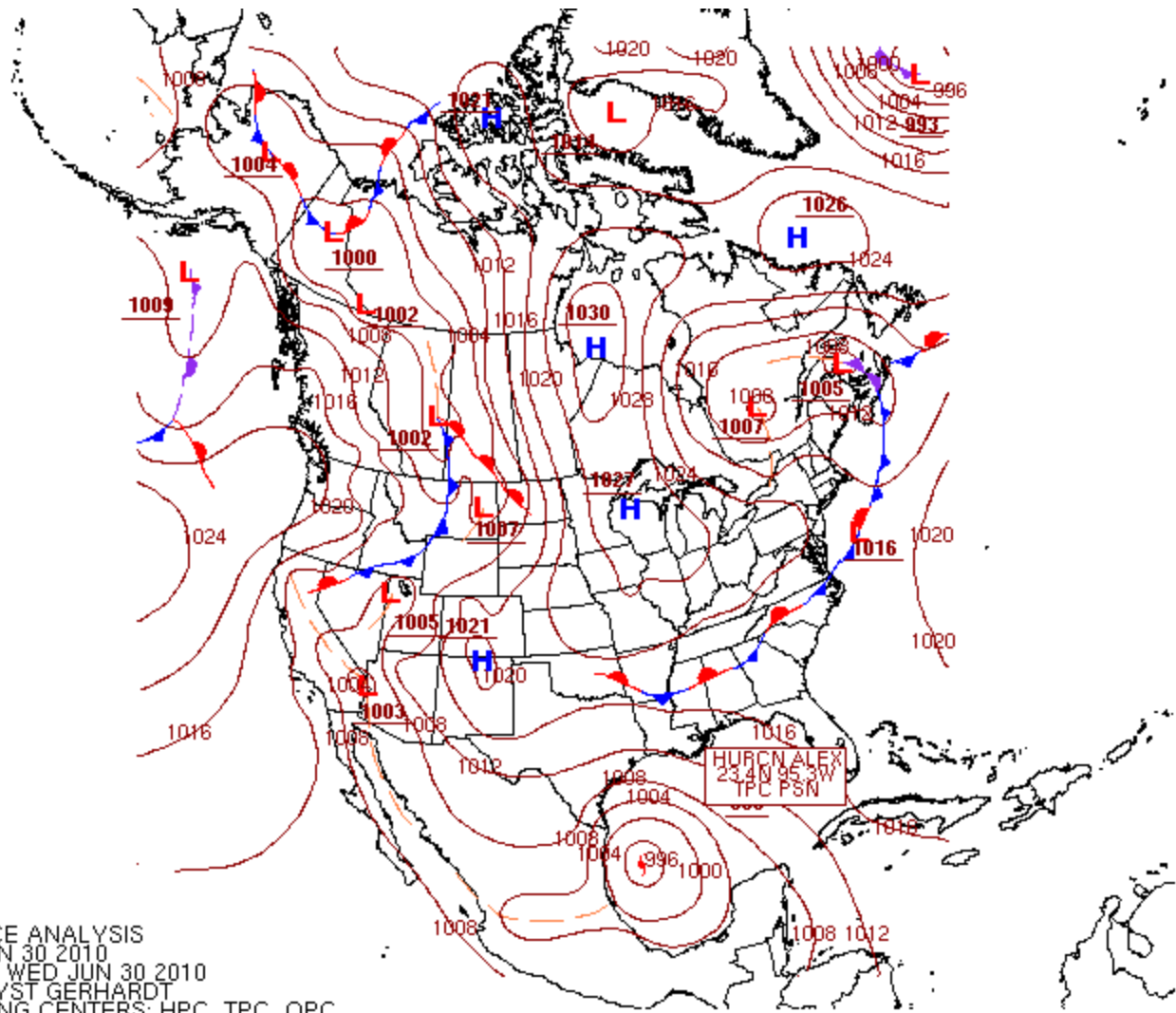
- Lagrangian particle tracker with random walk diffusion
- Input consisted
 - i. latitude and longitude parcel positions in the oil-contaminated area
 - ii. wind
 - iii. current
 - iv. array of pseudo-random numbers (from Mersenne Twister algorithm, initial seed from machine noise)
- new parcels were released damaged Macondo rig location at each timestep
- Twenty-five parcels were released at each position, and when combined with a $10 \text{ m}^2\text{s}^{-1}$ diffusion coefficient, resulted in a natural trajectory spread with time
- Initial positions based interpretation on
 - i. NASA MODIS
 - ii. SAR imagery from <http://www.cstars.miami.edu>
 - iii. NOAA/NESDIS Satellite Analysis Branch (SAB) experimental surface oil analysis products at <http://www.ssd.noaa.gov/PS/MPS/deepwater.html>
 - iv. NOAA's Office of Response and Restoration oil trajectory maps at <http://response.restoration.noaa.gov>
- Parcels advected at 80% of the ocean current speed and at 3% of the wind speed. Bilinear interpolation of wind and current applied from model grid to parcel location.



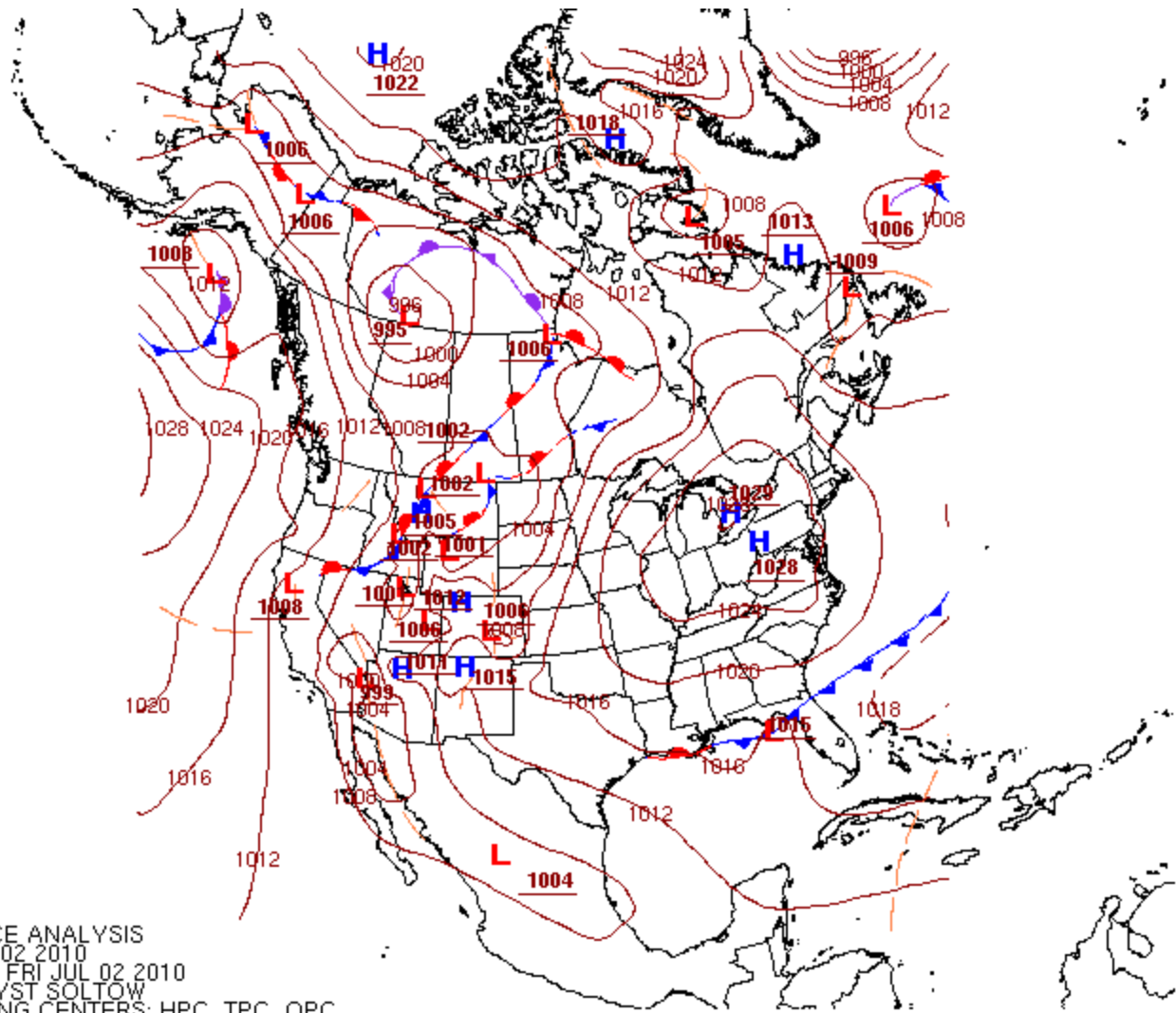
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 COLLABORATING CENTERS: HPC, TPC, OPC



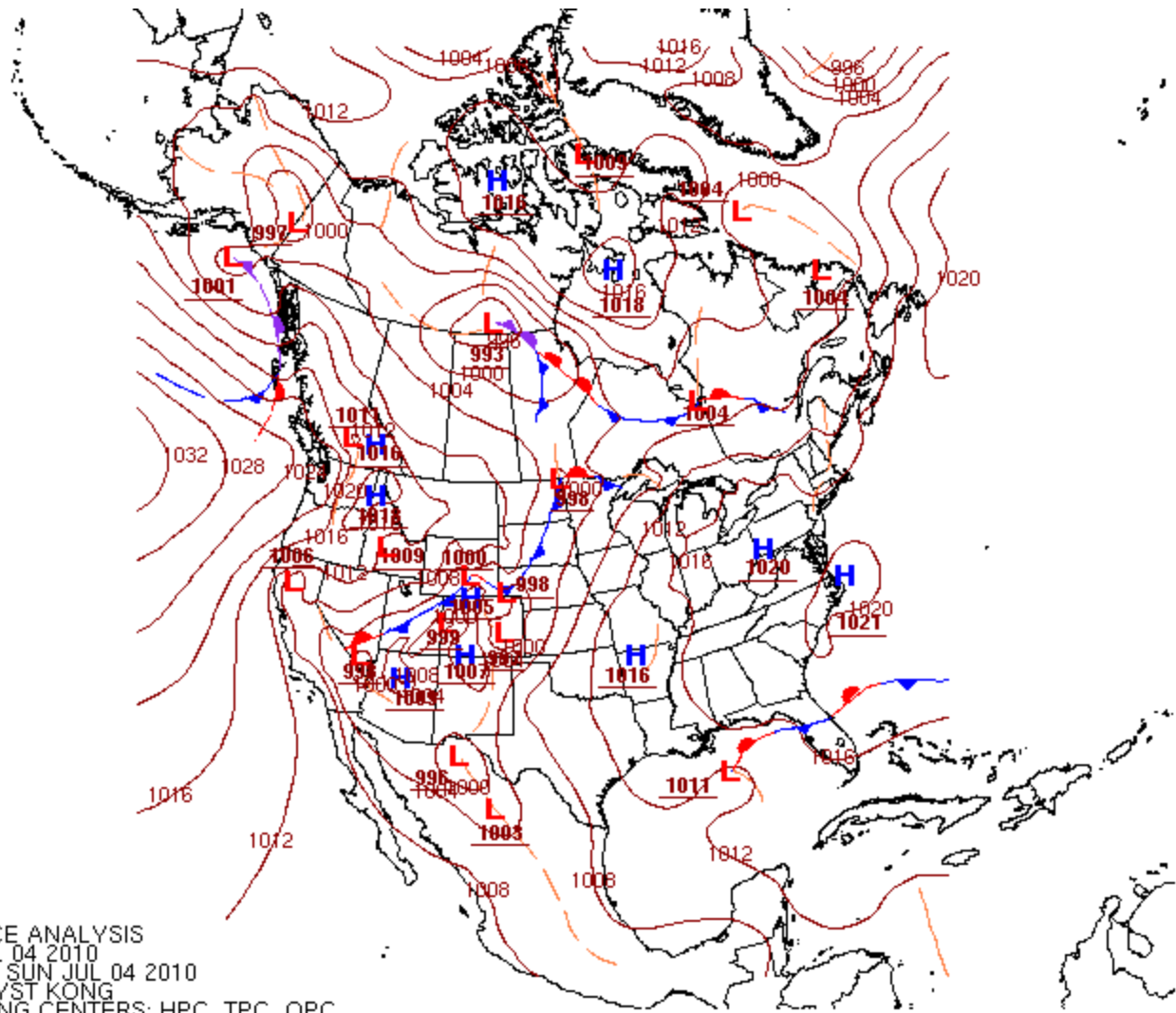
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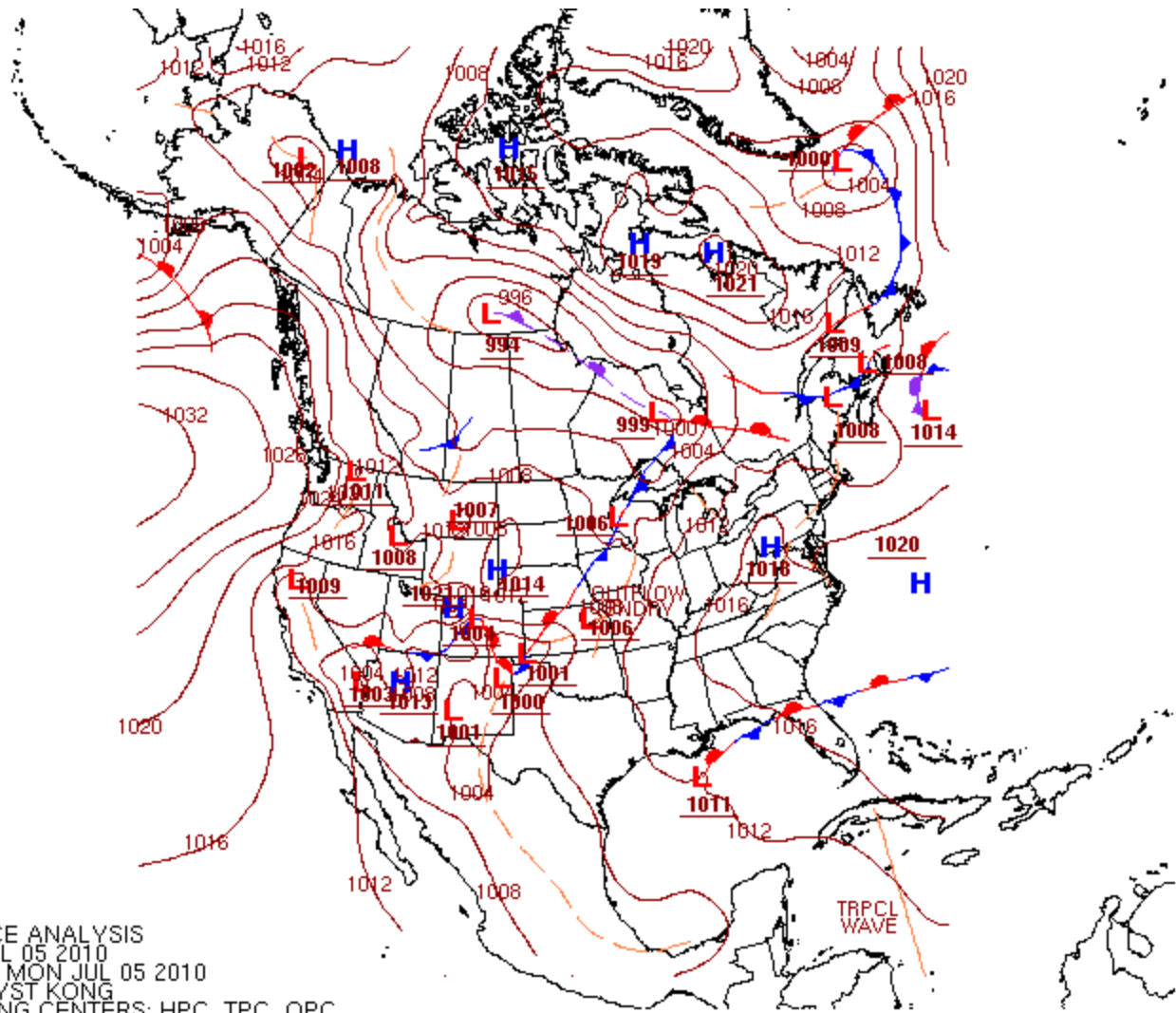
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1200Z SURFACE ANALYSIS
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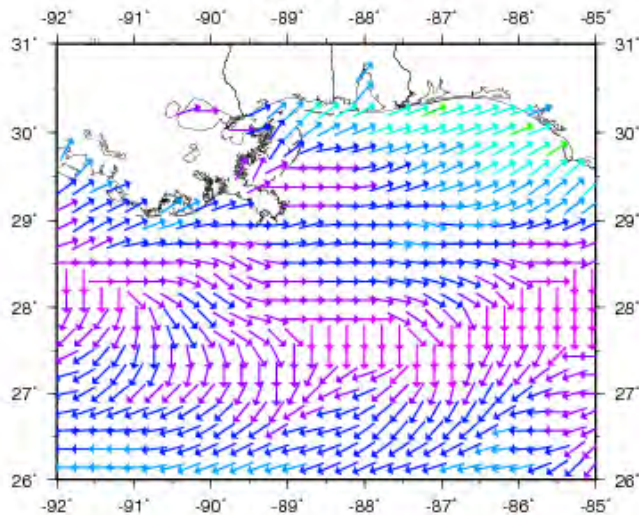


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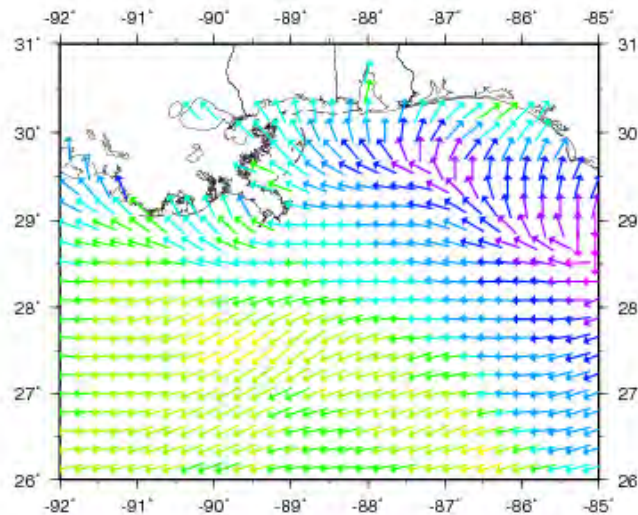


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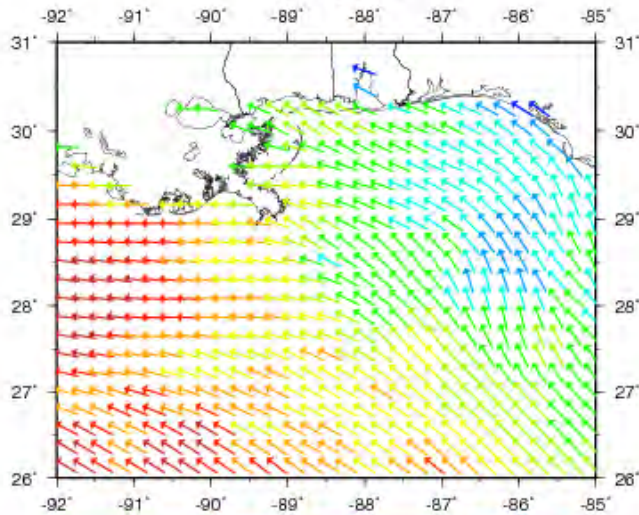
6/20/10



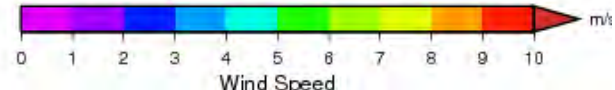
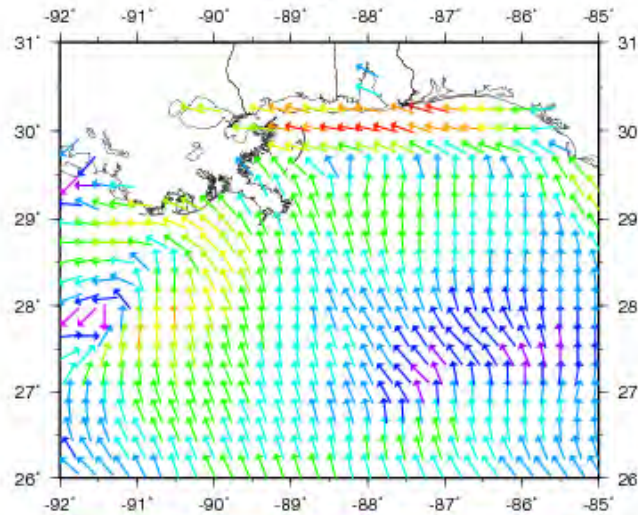
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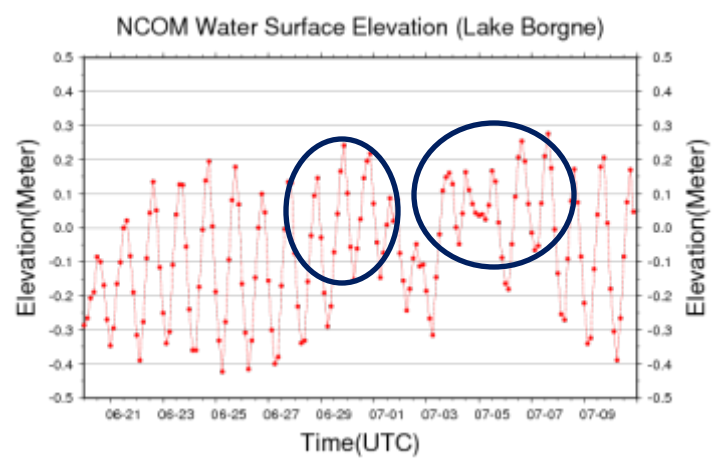
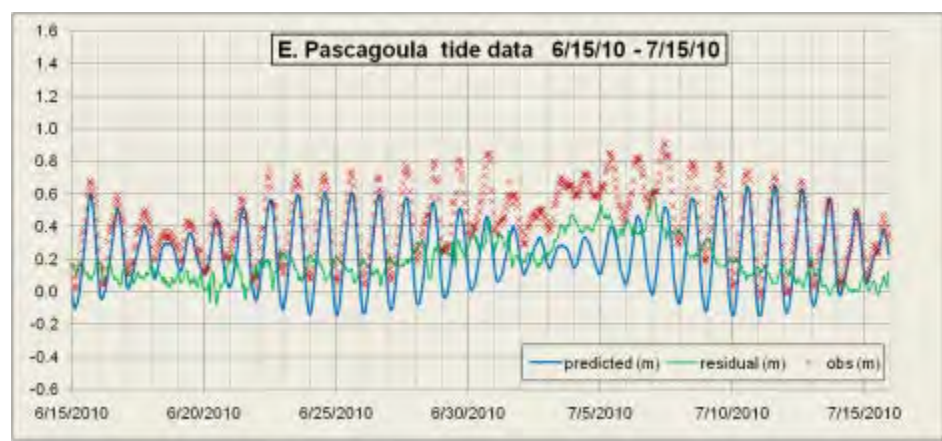
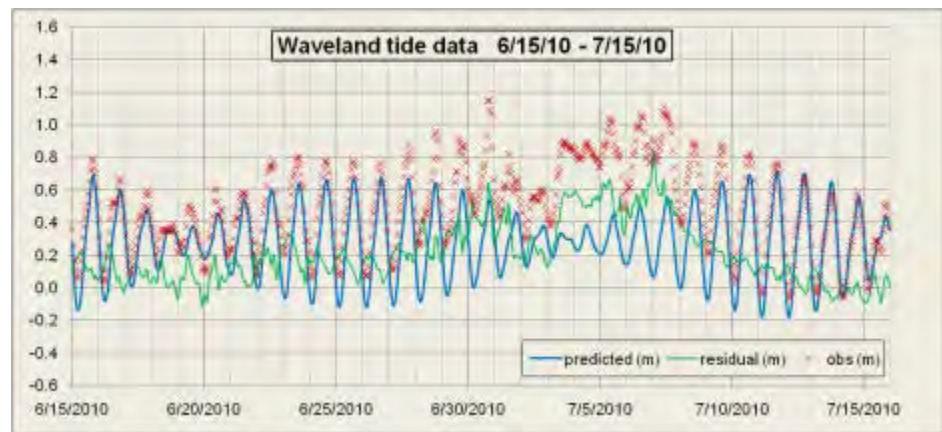
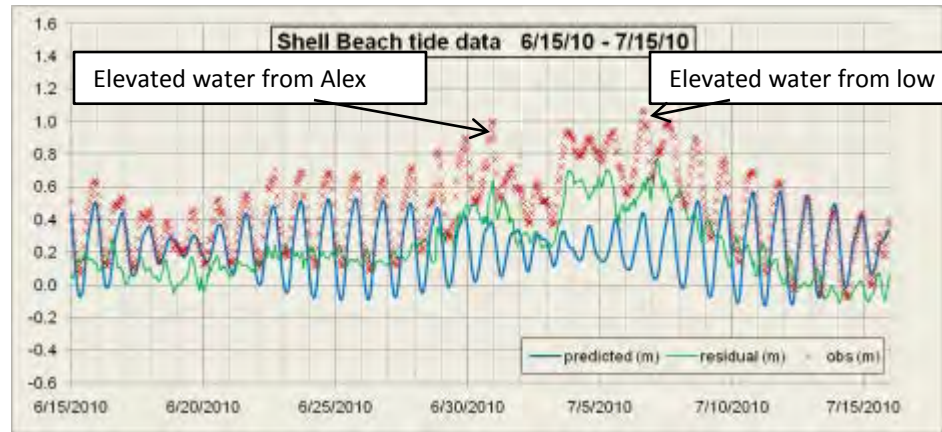
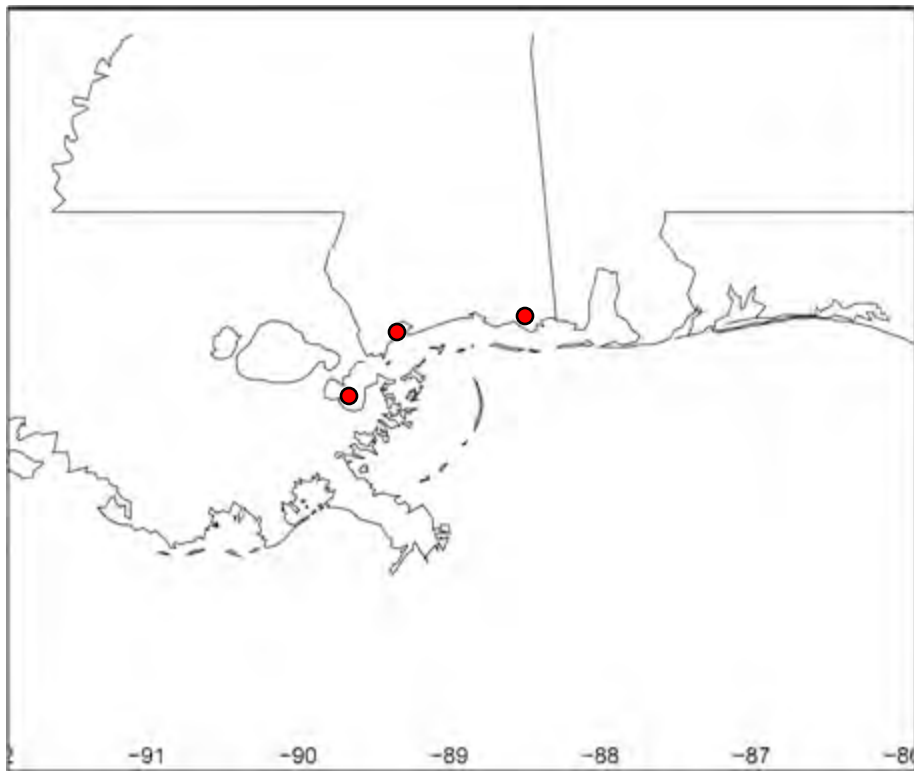


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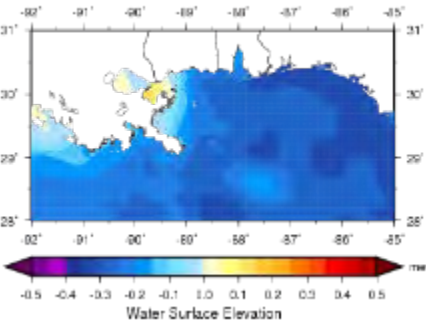


7/5/10

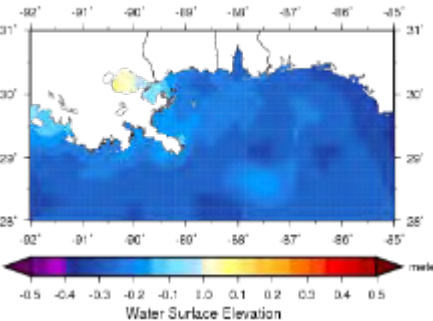




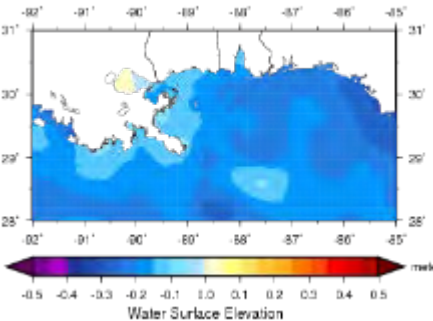
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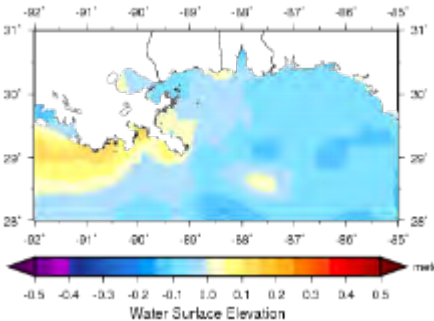
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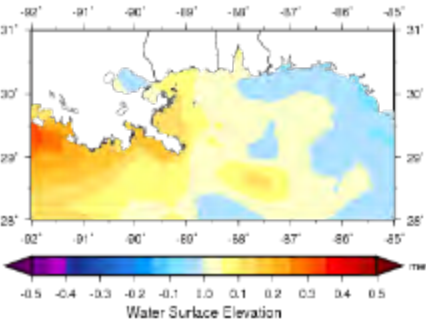
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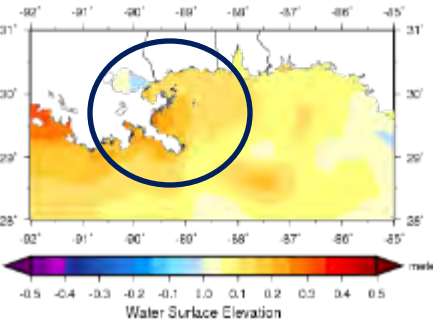
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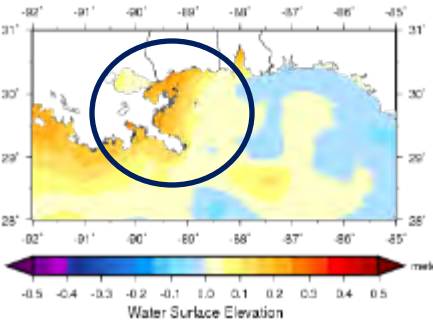
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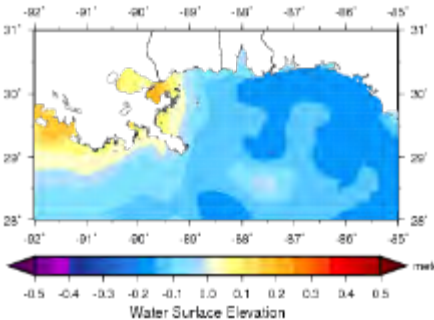
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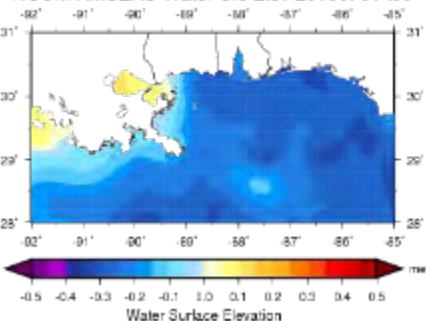
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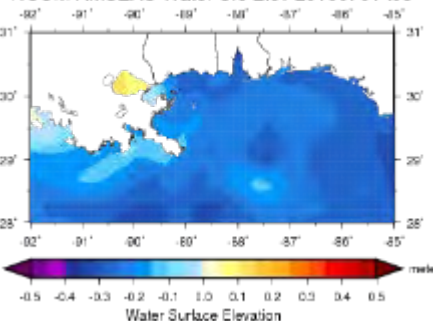
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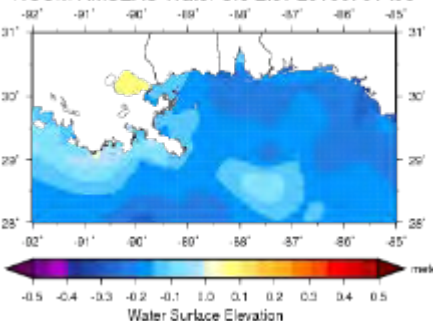
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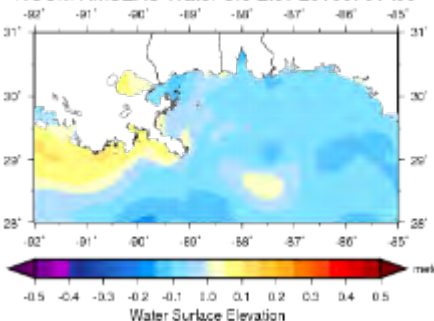
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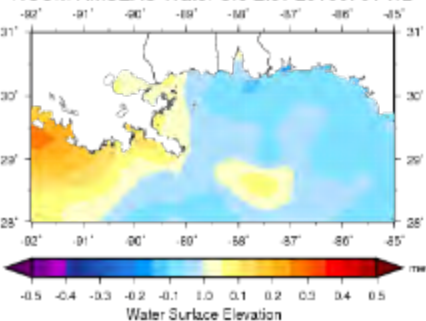
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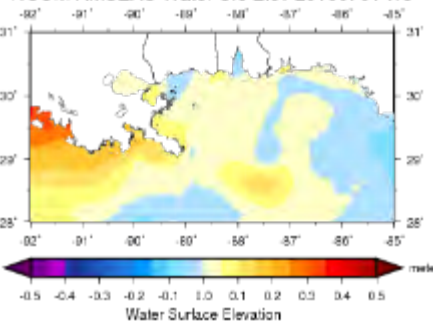
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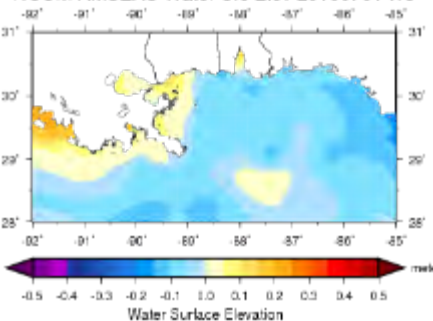
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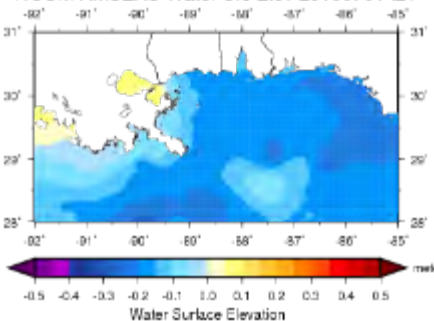
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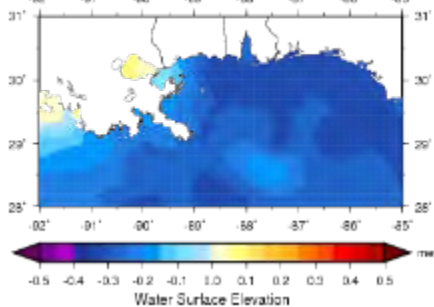
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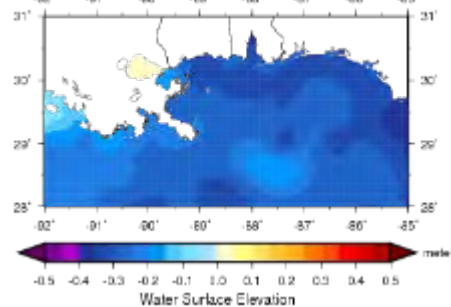
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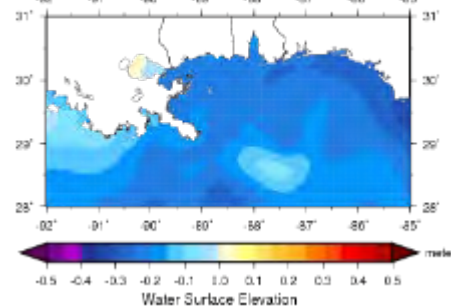
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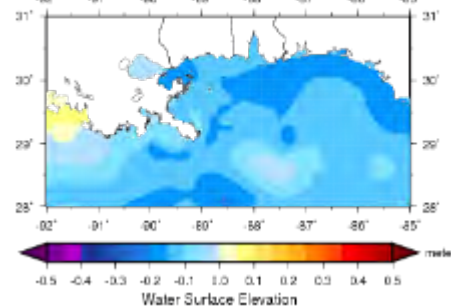
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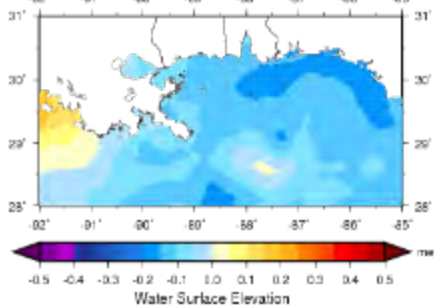
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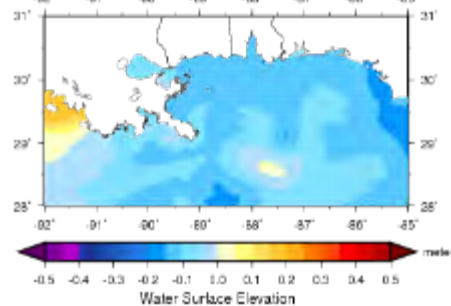
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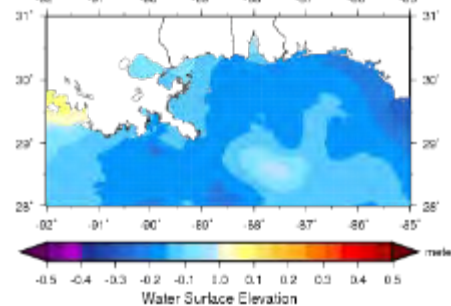
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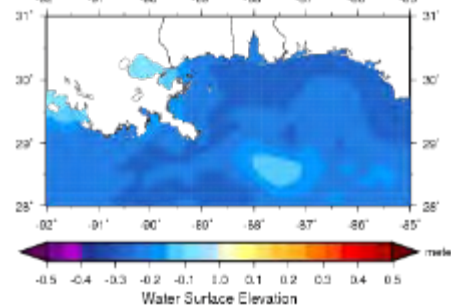
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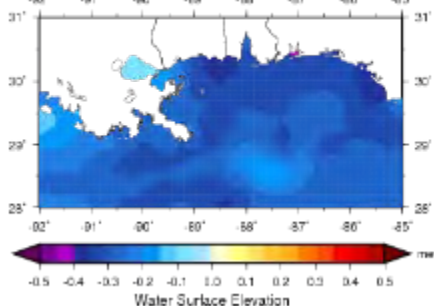
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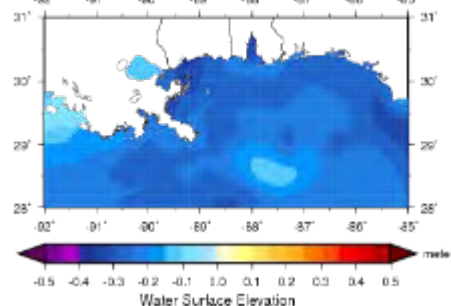
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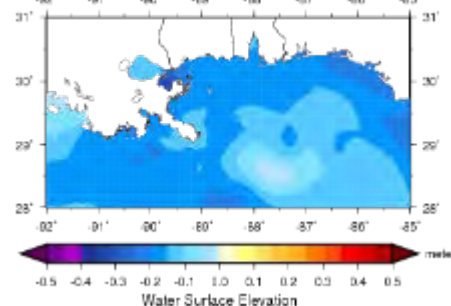
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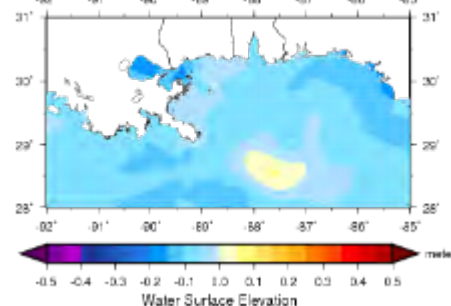
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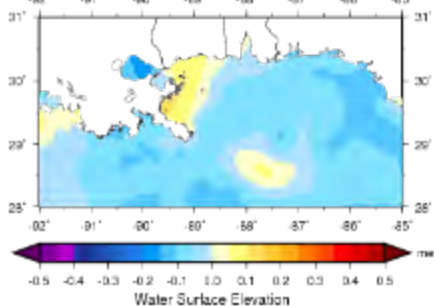
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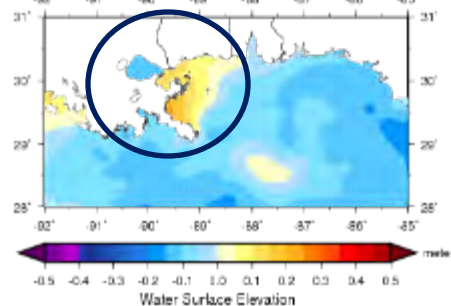
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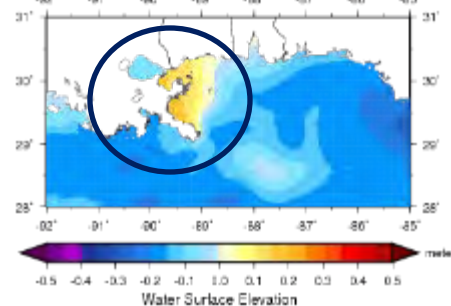
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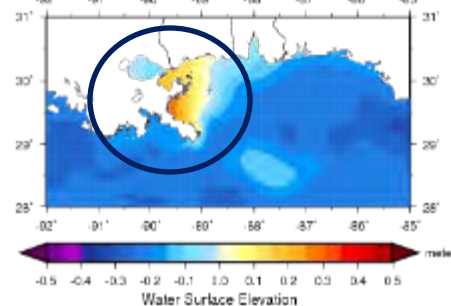
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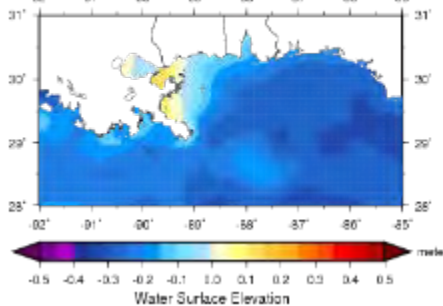
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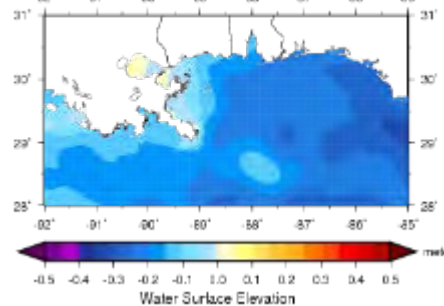
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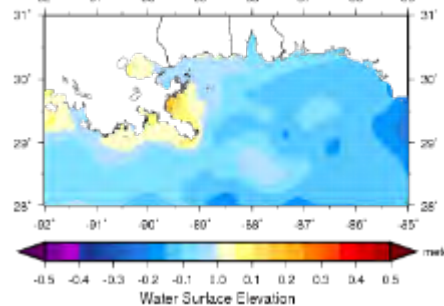
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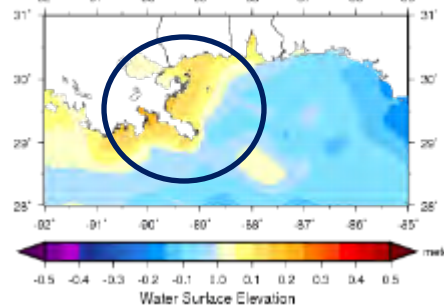
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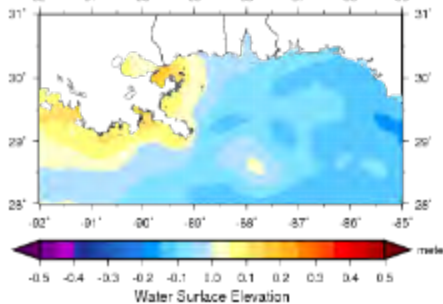
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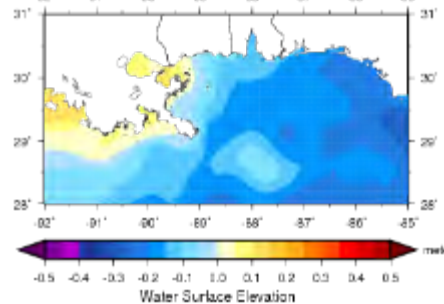
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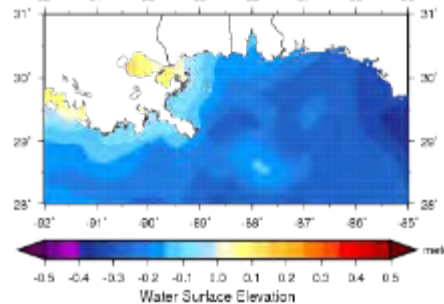
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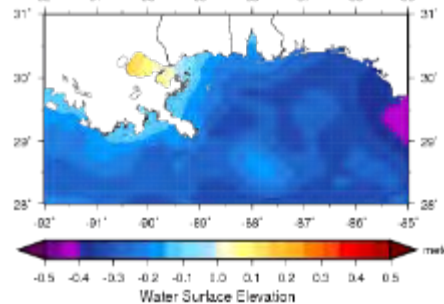
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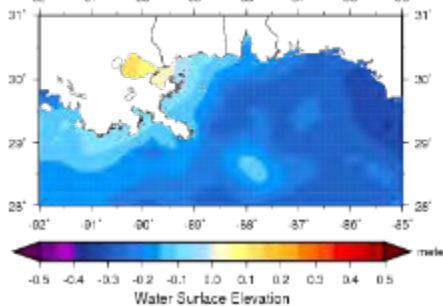
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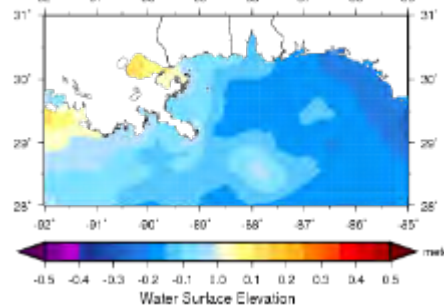
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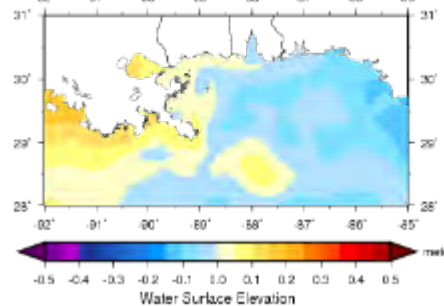
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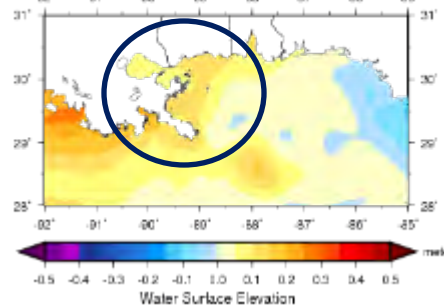
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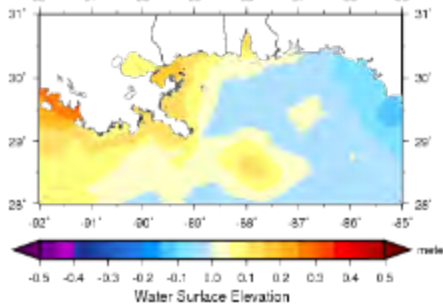
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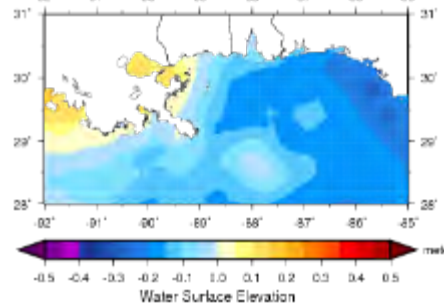
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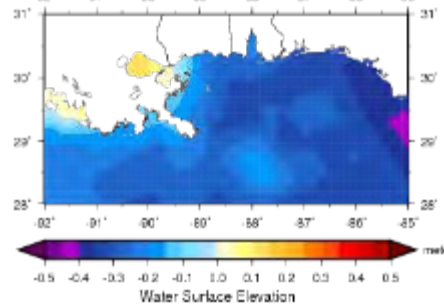
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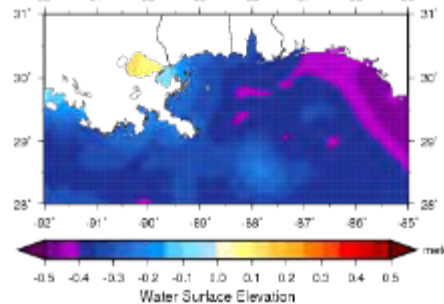
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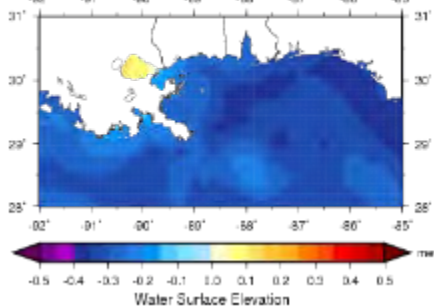
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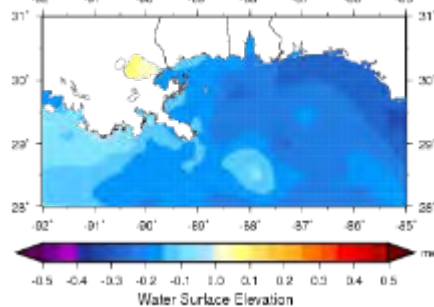
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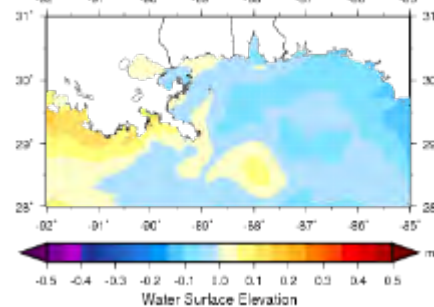
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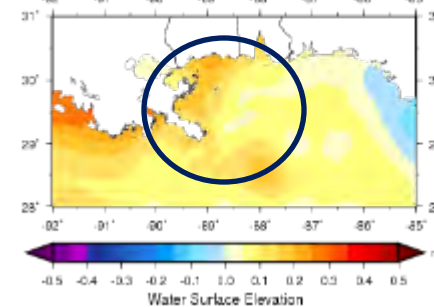
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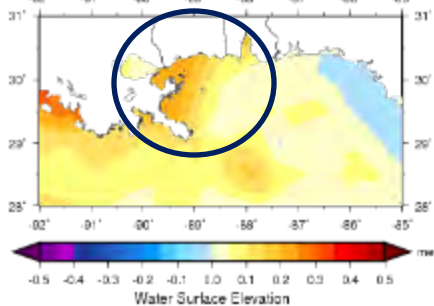
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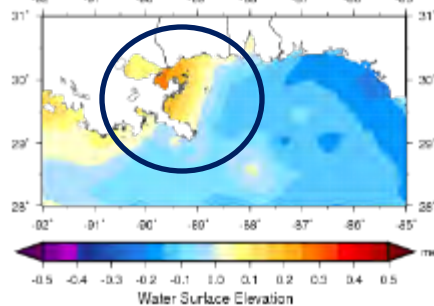
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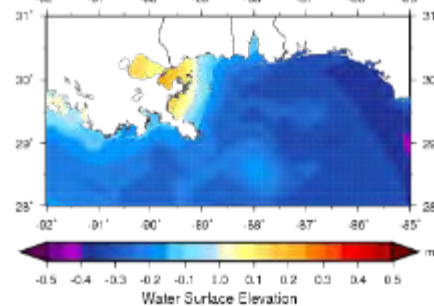
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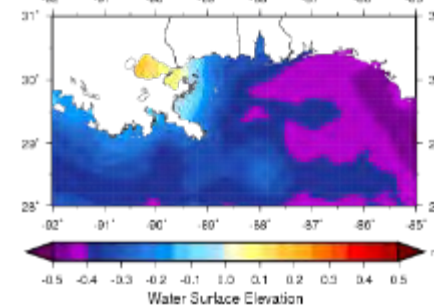
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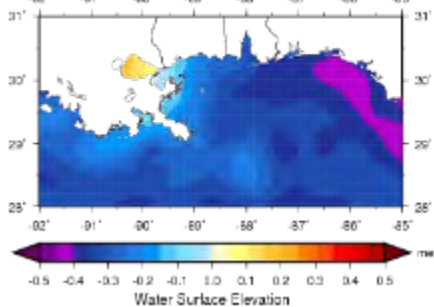
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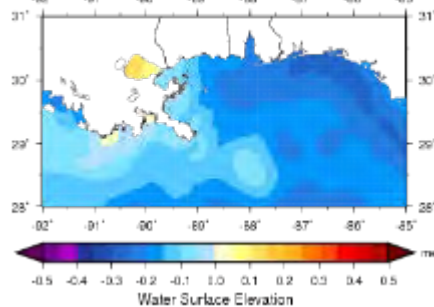
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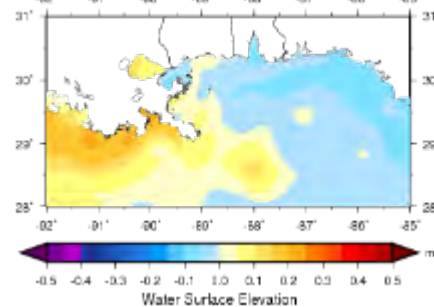
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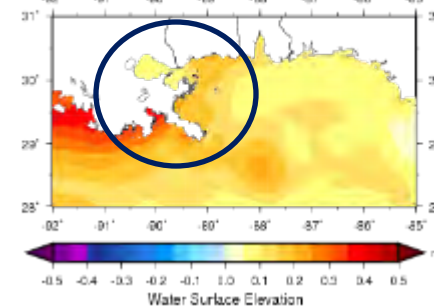
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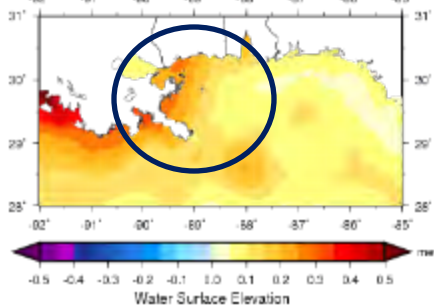
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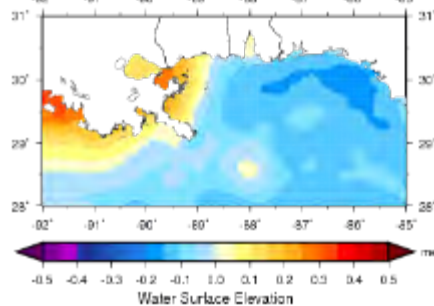
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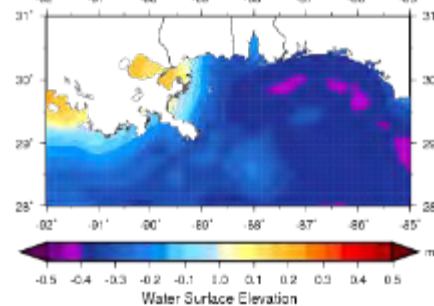
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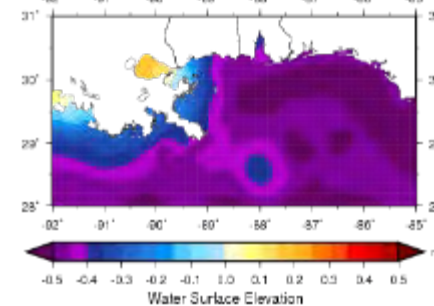
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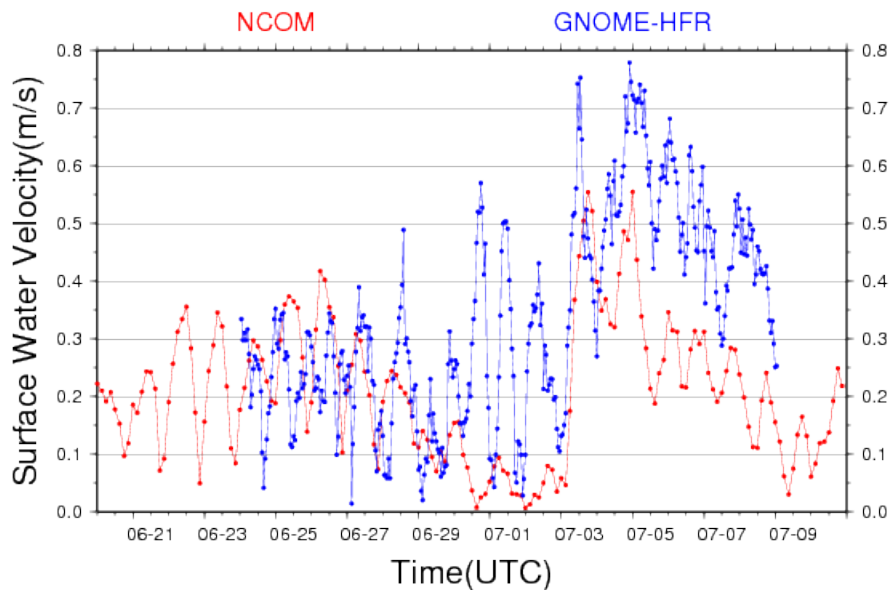
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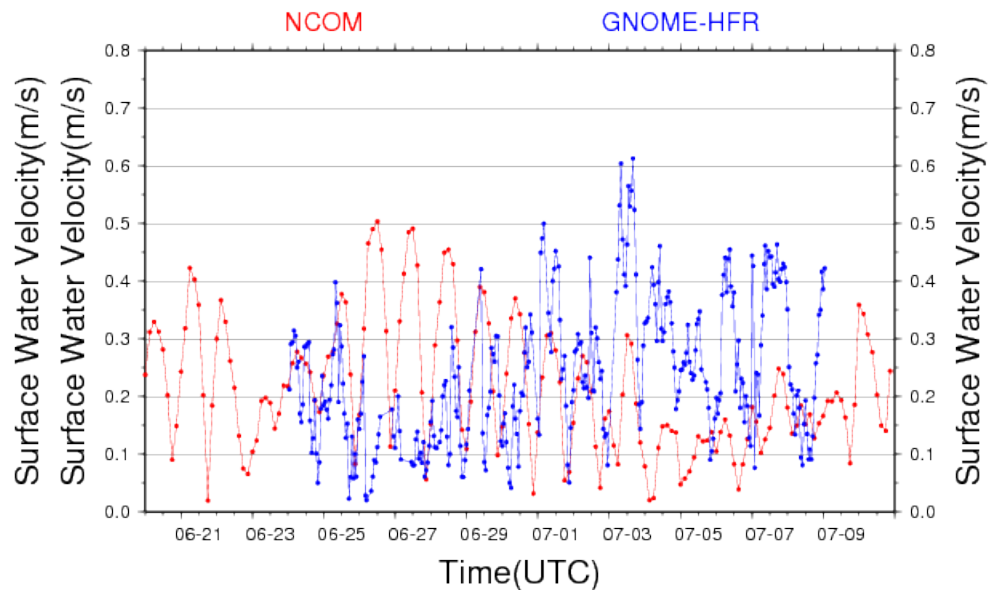
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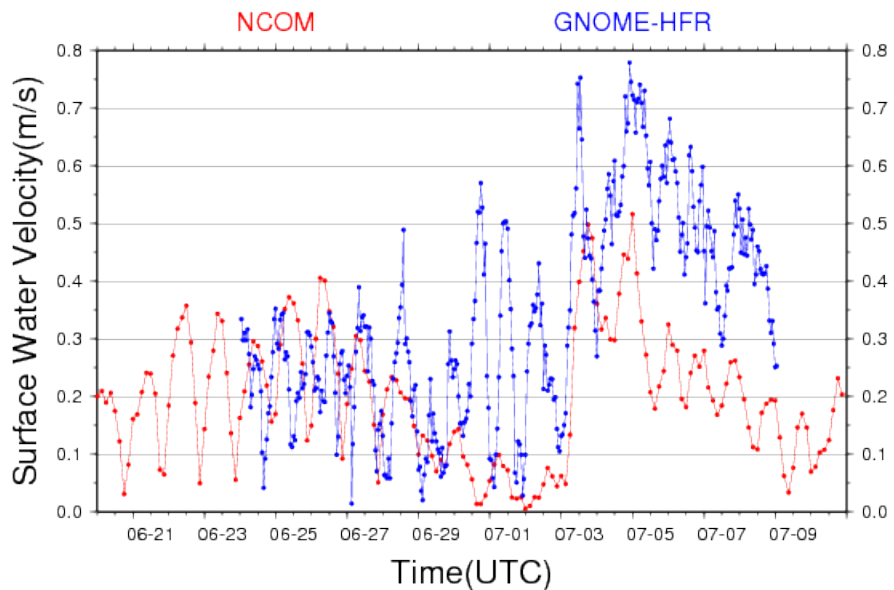
NCOM(0m) vs GNOME-HFR at -88.006561_30.002024



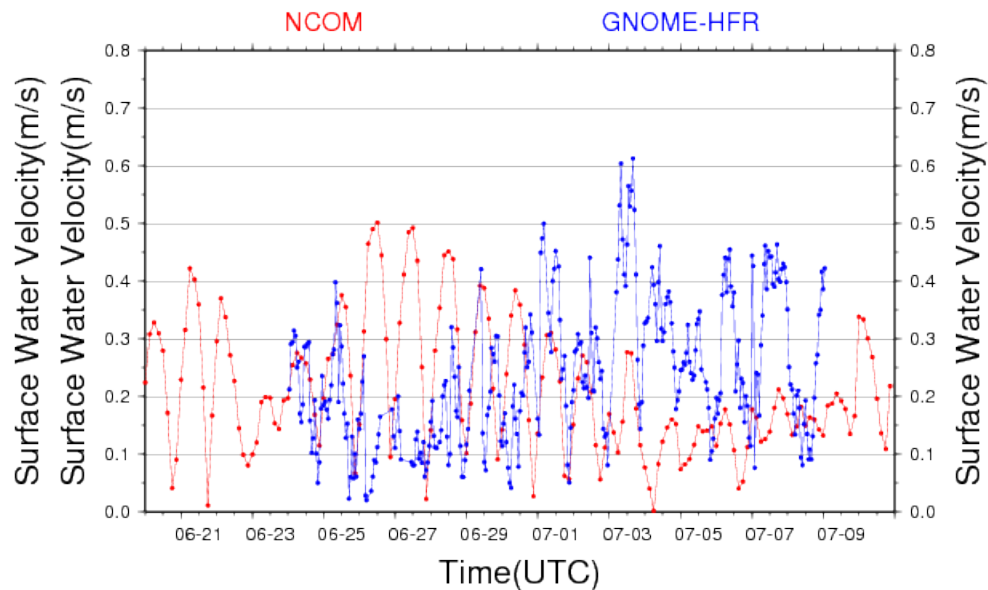
NCOM(0m) vs GNOME-HFR at -86.497589_30.002024



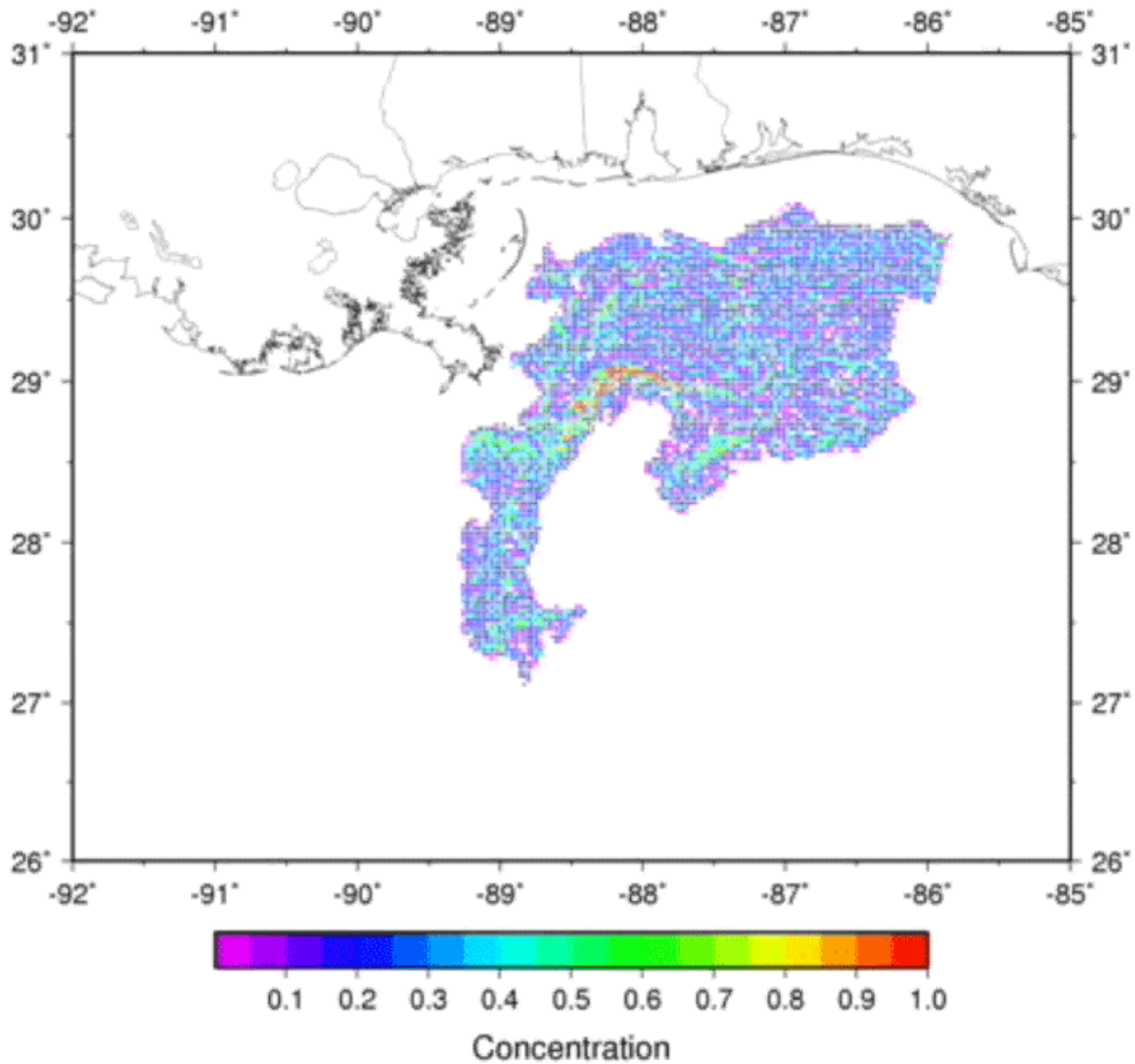
NCOM(2m) vs GNOME-HFR at -88.006561_30.002024



NCOM(2m) vs GNOME-HFR at -86.497589_30.002024



Oil Concentration (2010062118) NCOM d=10 c=0.8



Summary

- Oil transport mostly governed by ocean currents
- However, surge events associated with tropical cyclones and non-tropical lows can push oil far into the marsh system
- Difficult to know if a hurricane landfall would have been catastrophic (because they also flush the system), but the potential of inland pollution existed. Fortunately, no hurricane landfall occurred.

Future work

- New oil spill run for whole period, current and wind weights optimized from 3DVAR technique
- Analysis of weather terms
- Influence of diversions
- Overall goal: fate and transport analysis