Hindcasting Winds, Waves, and Storm Surge for Hurricane Rita

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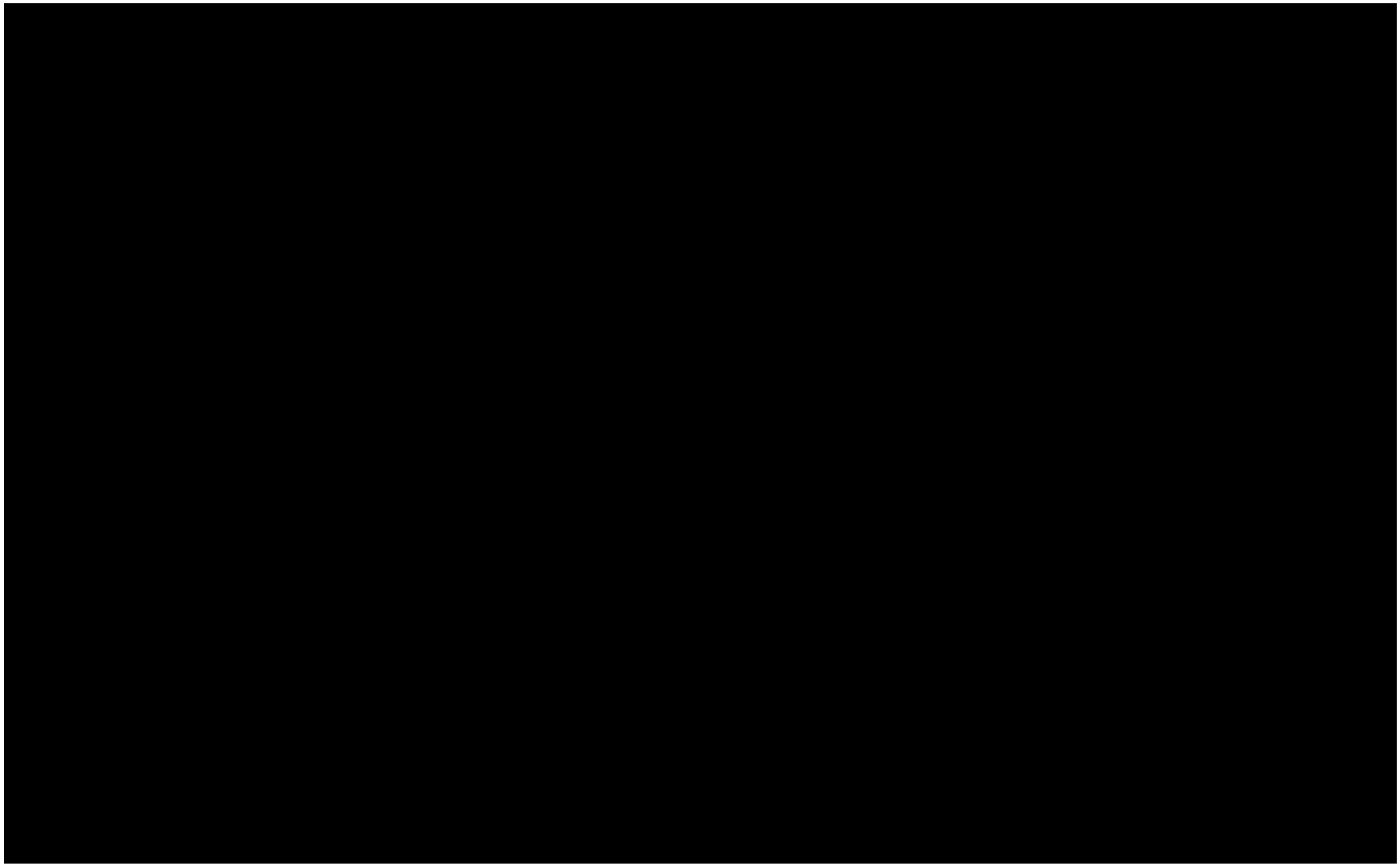
Hurricane Rita

Quick Facts (http://en.wikipedia.org/wiki/Hurricane_Rita)

- Maximum winds: 175 mph (78 m/s)
- Fourth-most intense Atlantic hurricane (897 mbar)
  - Most intense: Wilma 2005 (882 mbar)
  - Sixth-most intense: Katrina 2005 (902 mbar)
- Landfall: 0740 UTC 24 September 2005
  - Earliest 17th named storm

Hurricane Rita

NASA Satellite Movie (http://svs.gsfc.nasa.gov/vis/a000000/a003200/a003265/index.html)



Hurricane Rita

NASA Satellite Image (http://www.nasa.gov/vision/earth/lookingatearth/h2005_rita.html)

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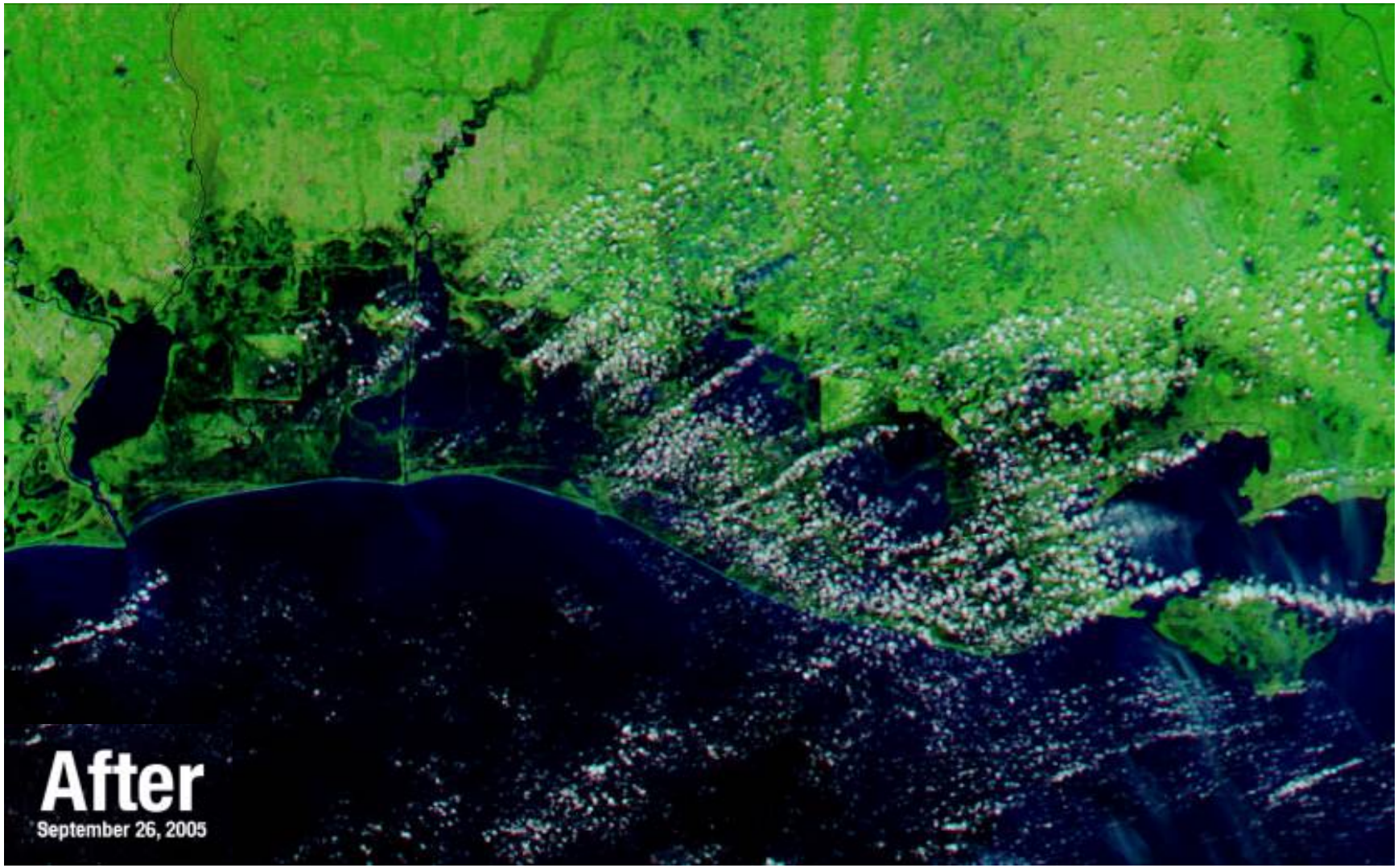
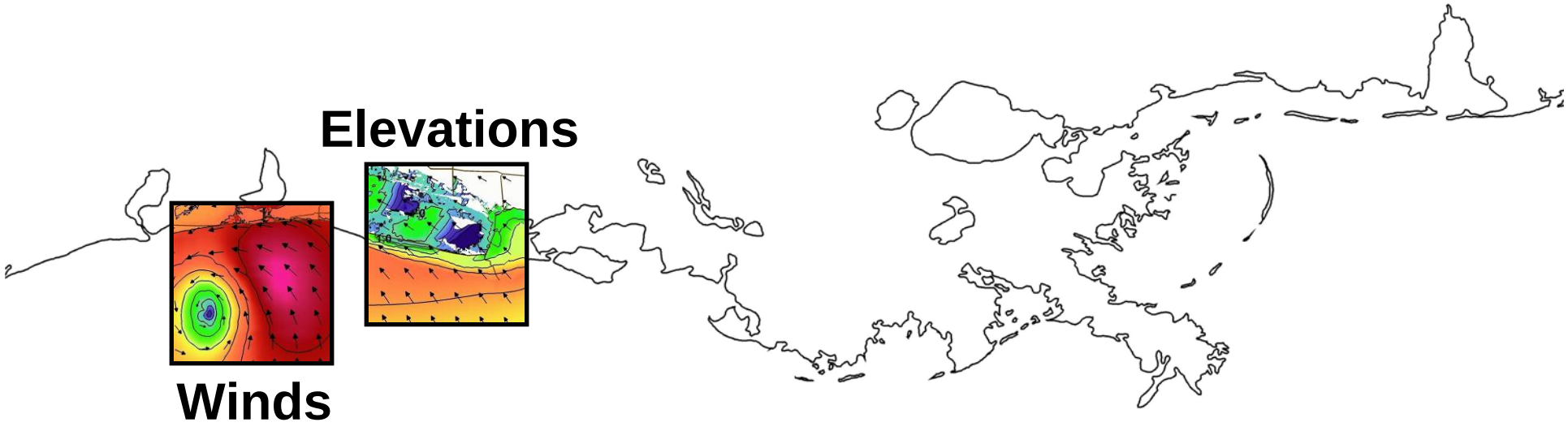
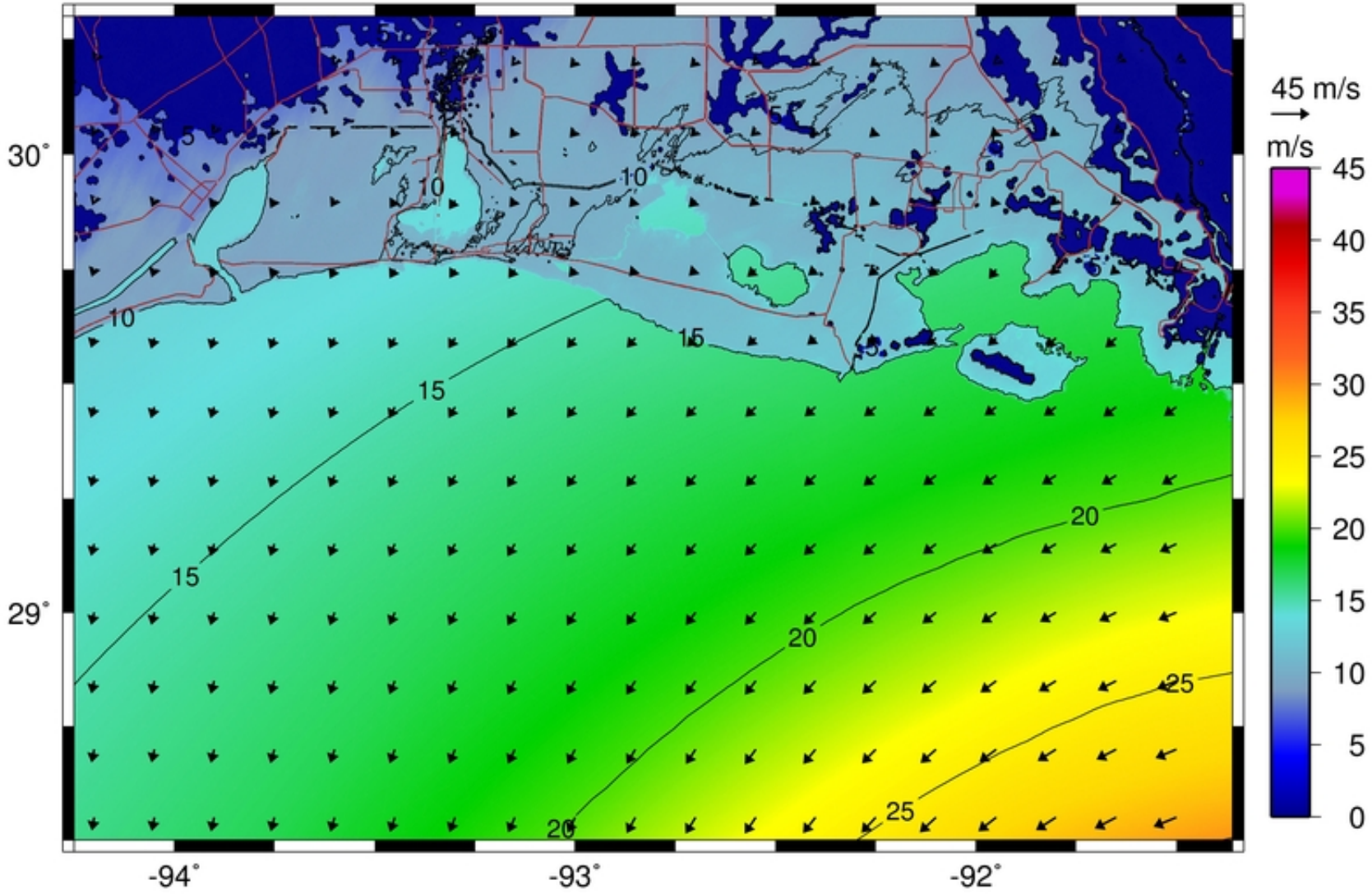


SW Louisiana



SW Louisiana

Winds – 1200 UTC 23 September 2005



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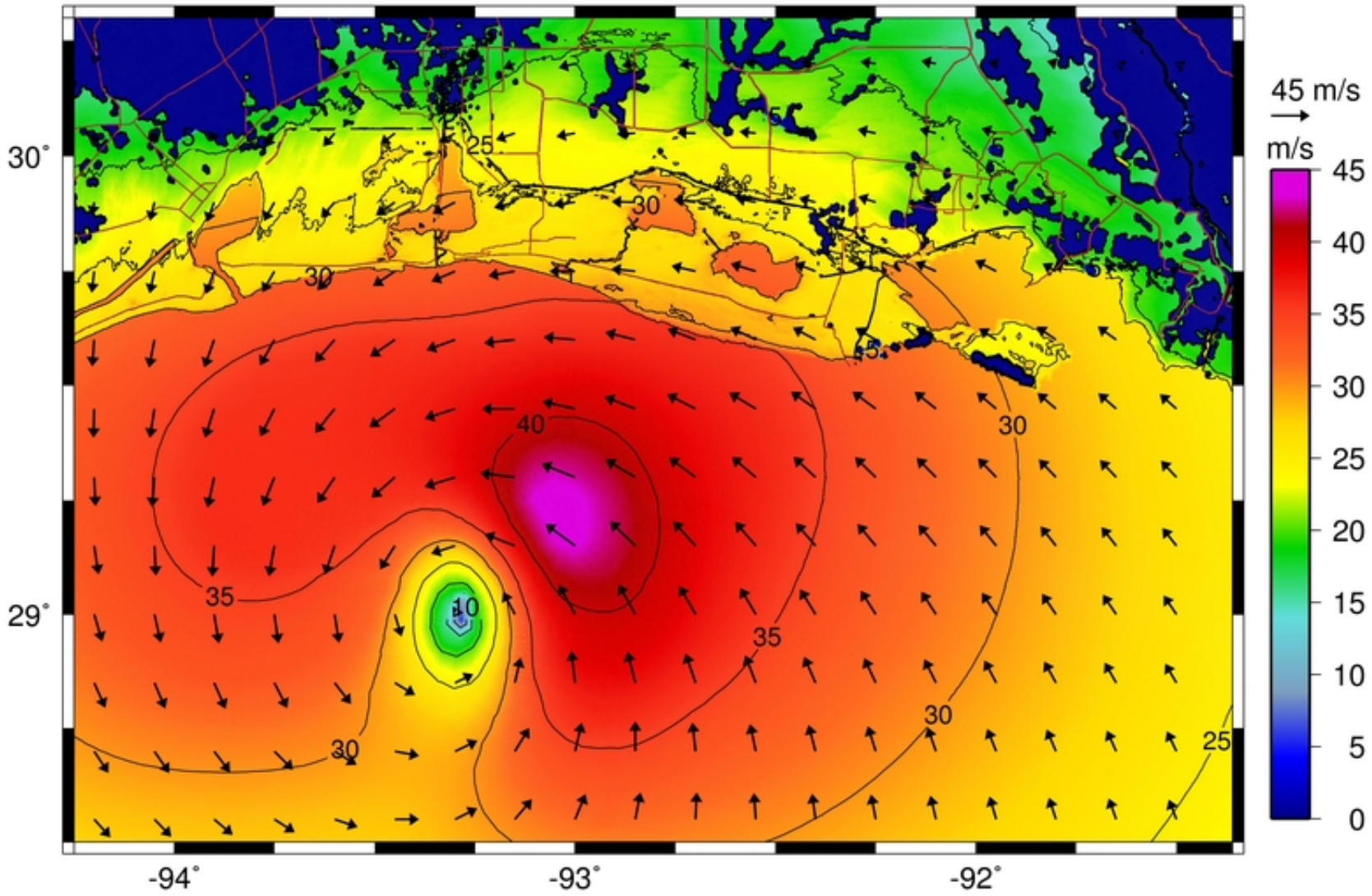

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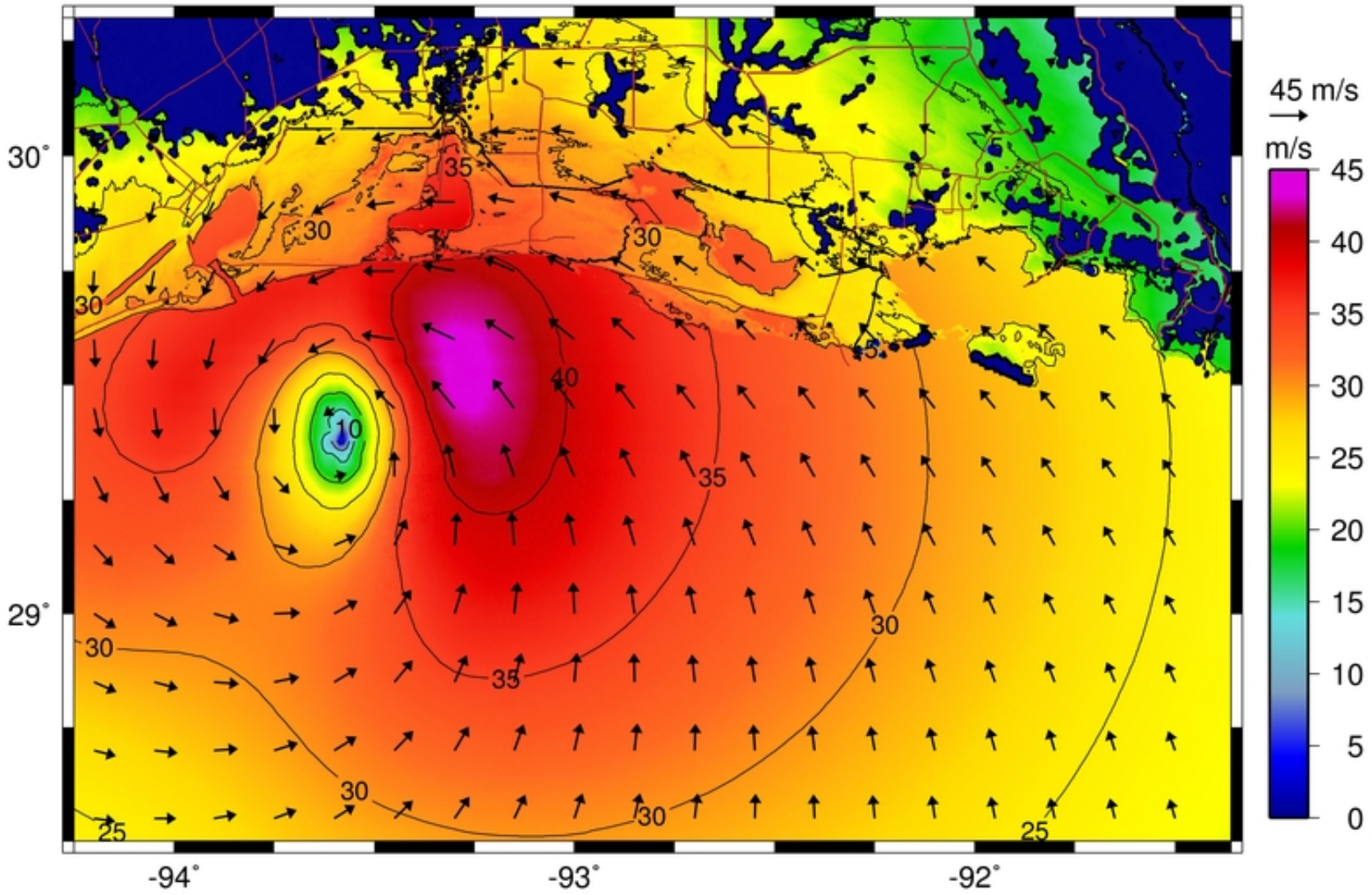

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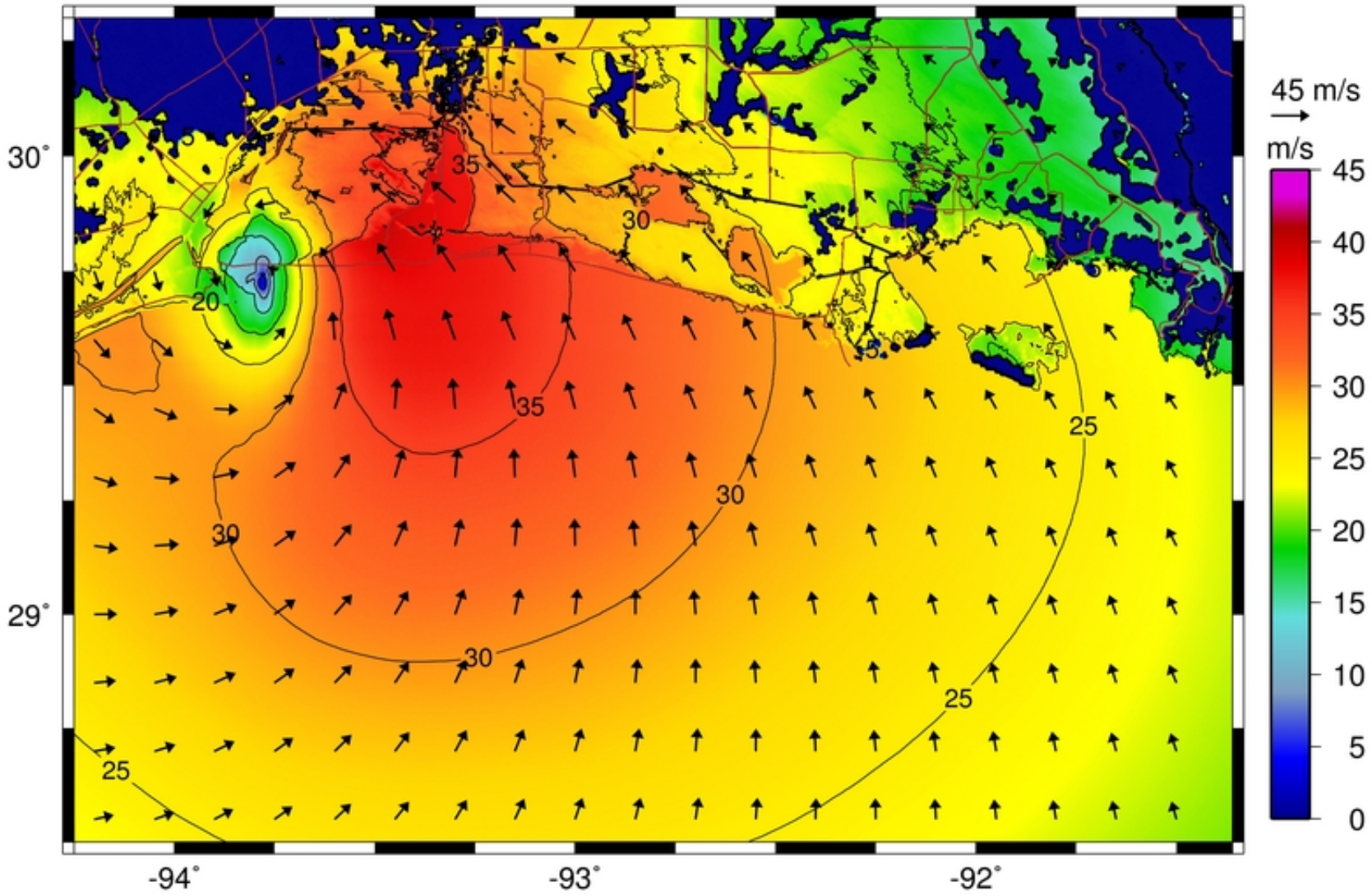

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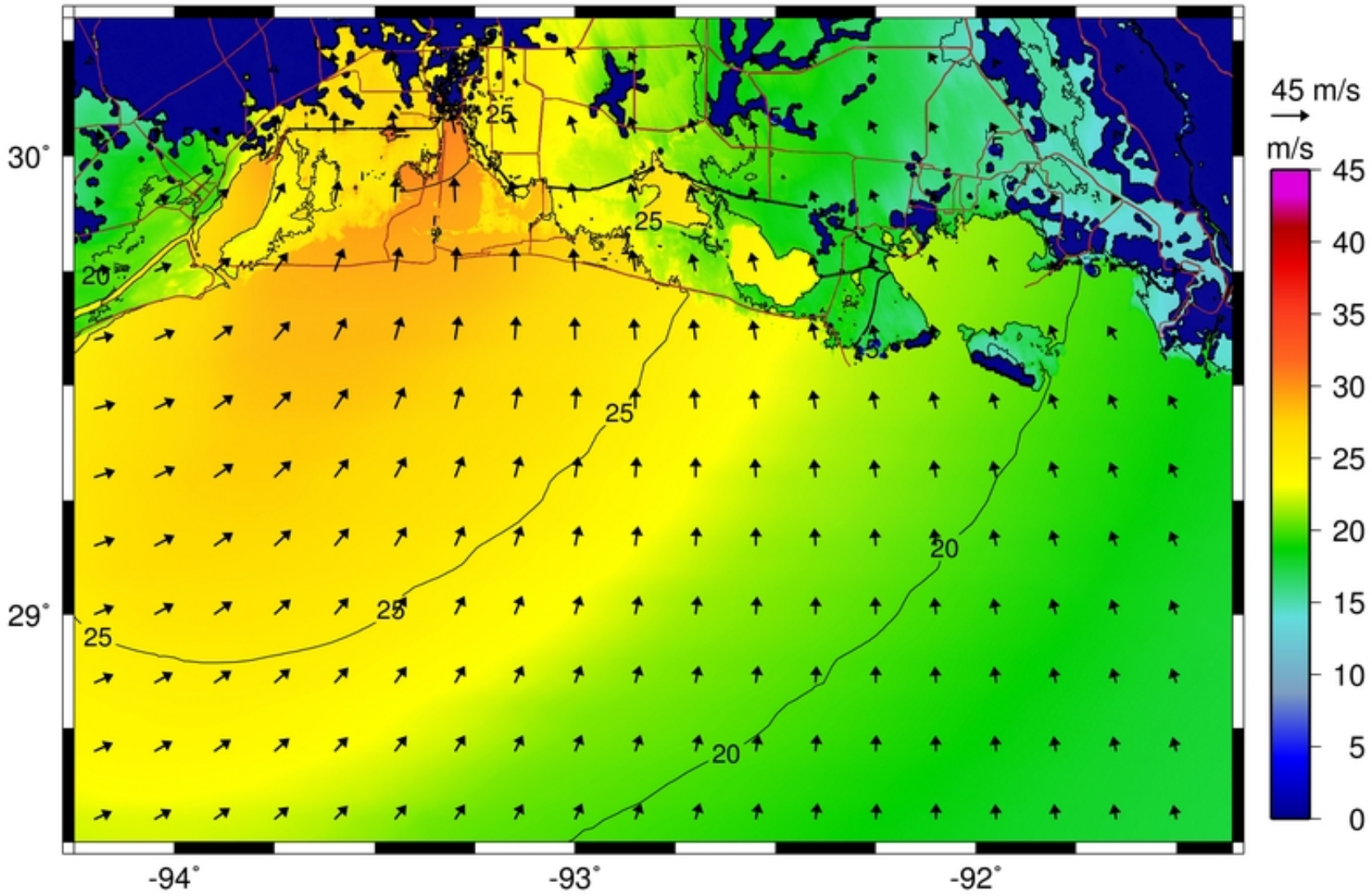

SW Louisiana

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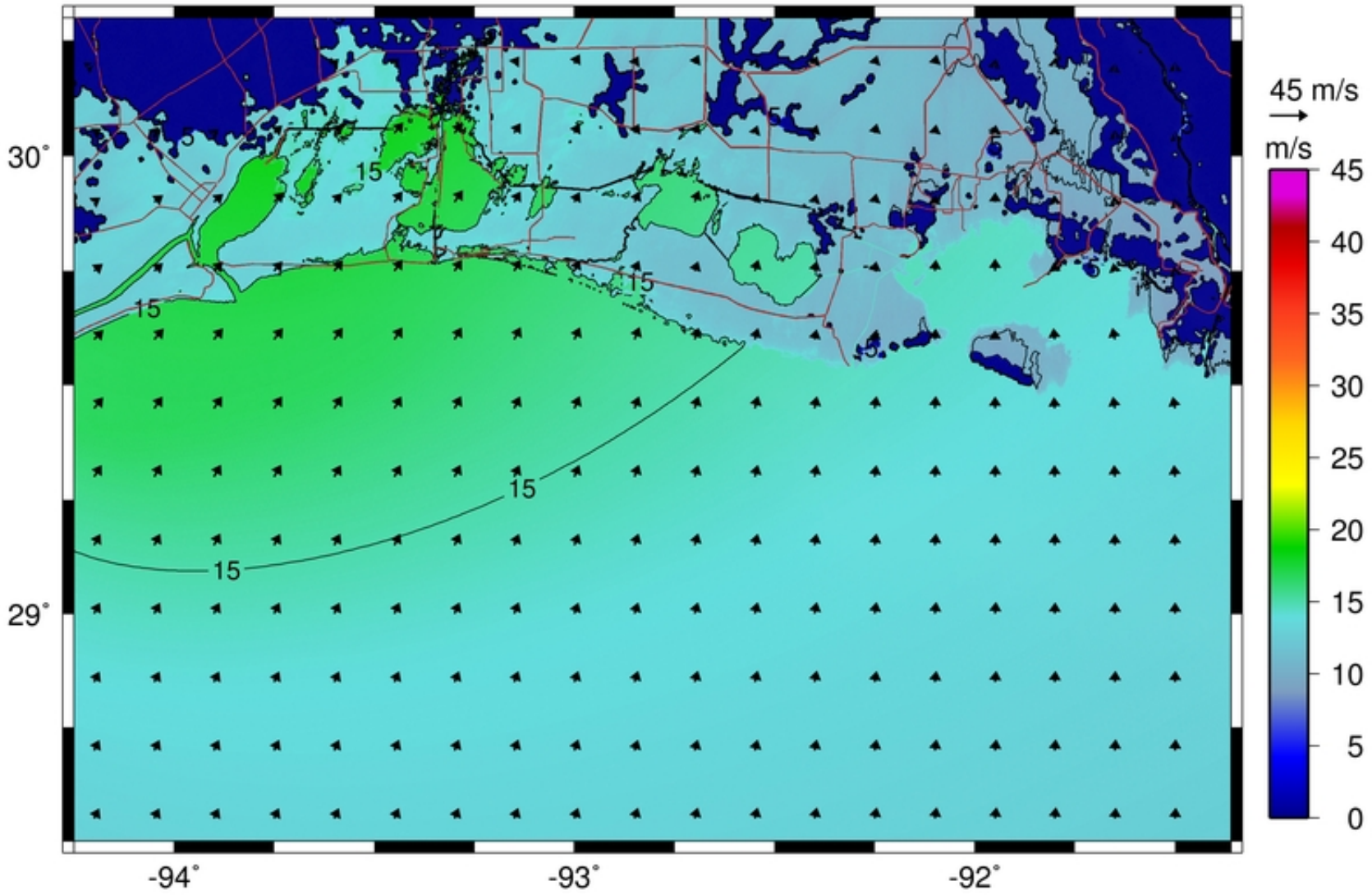

SW Louisiana

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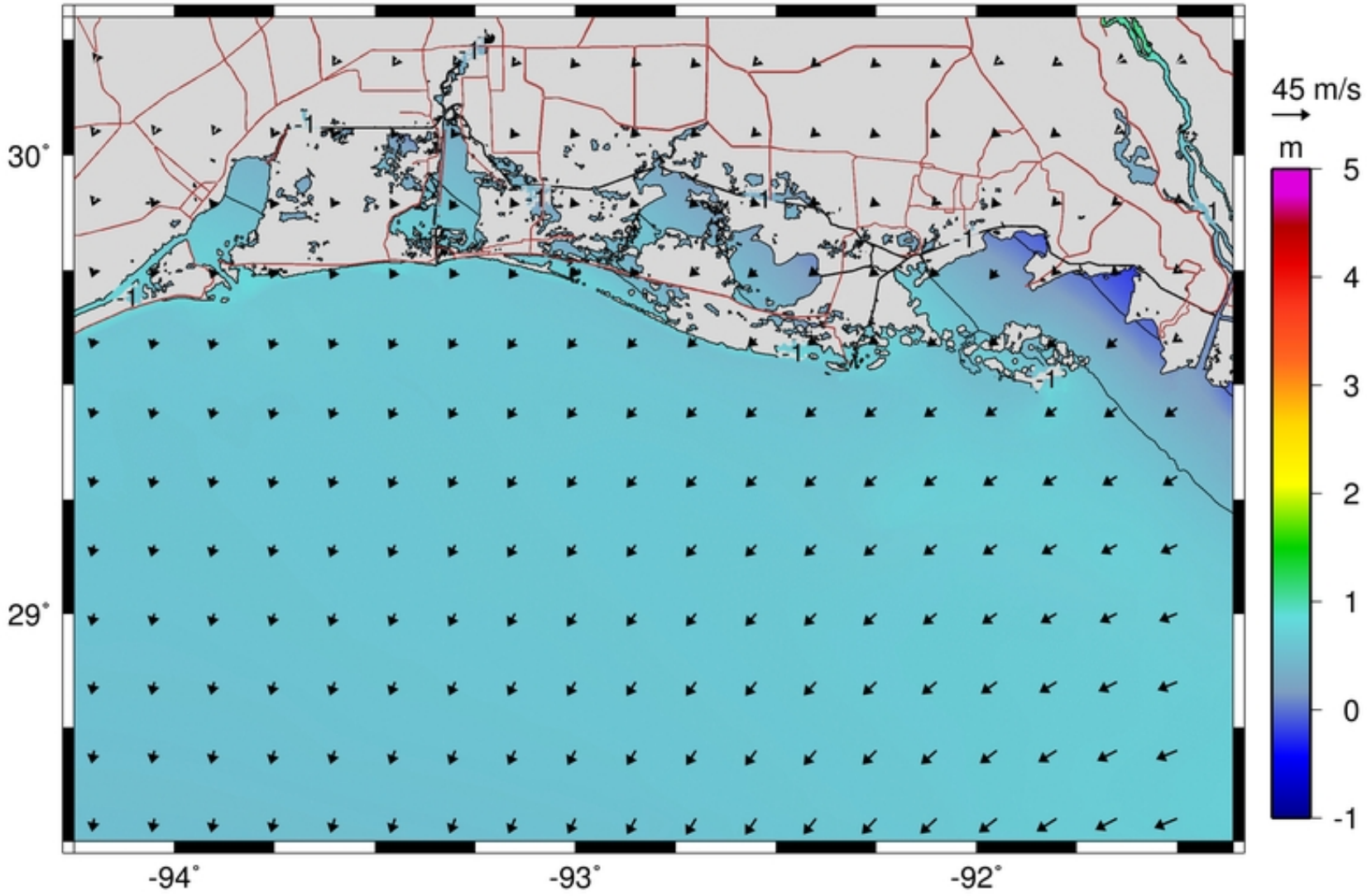

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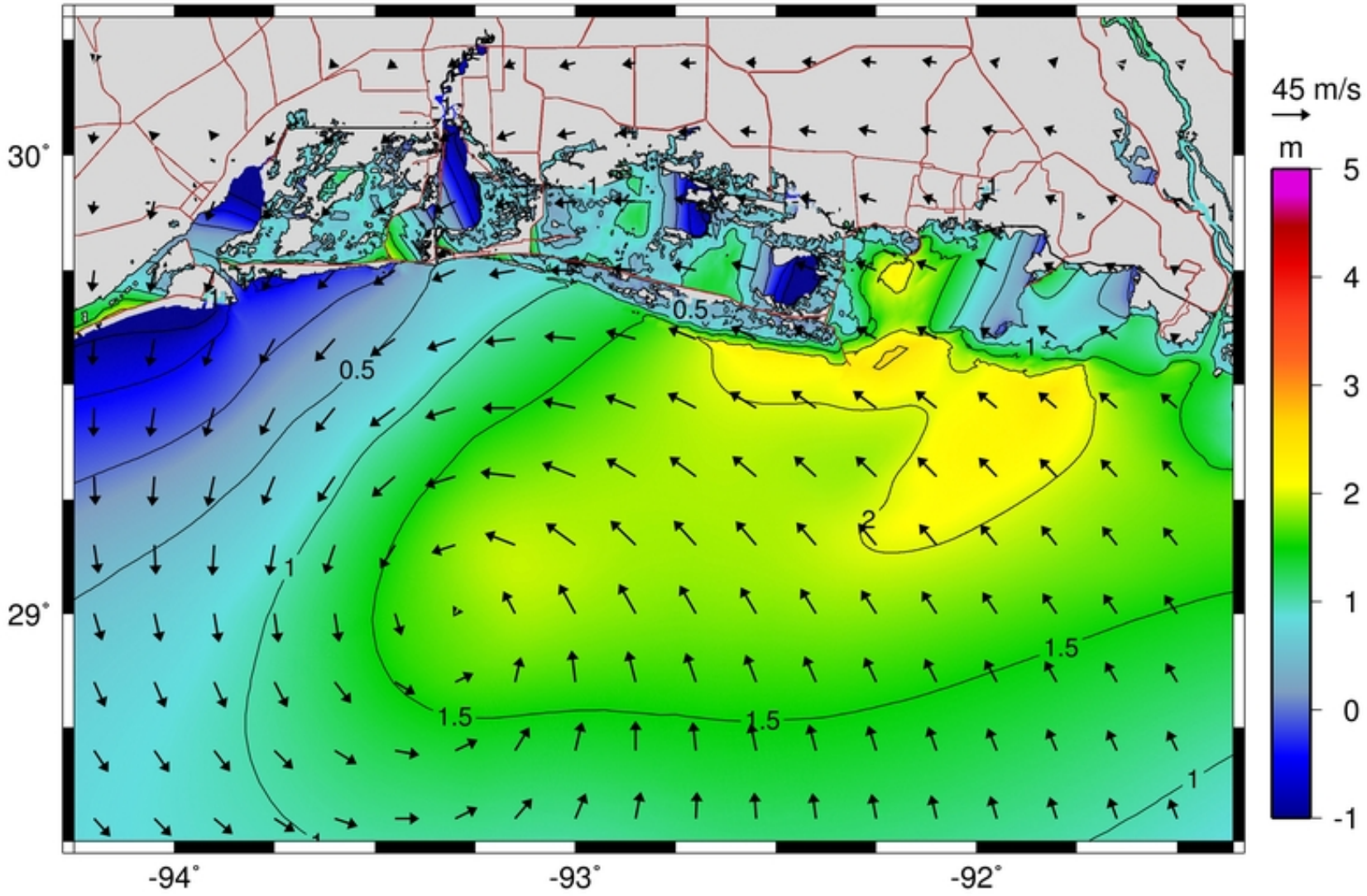

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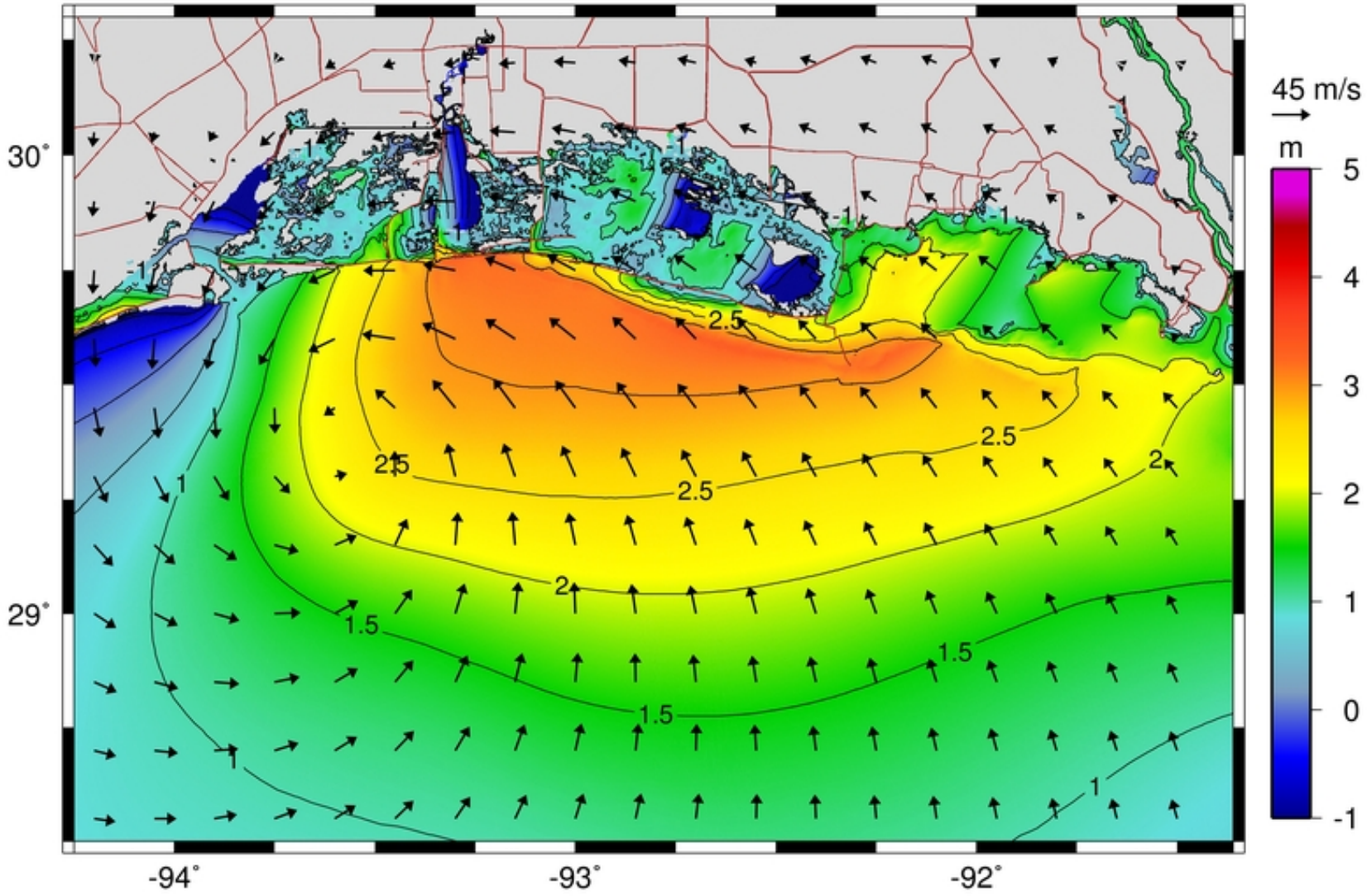

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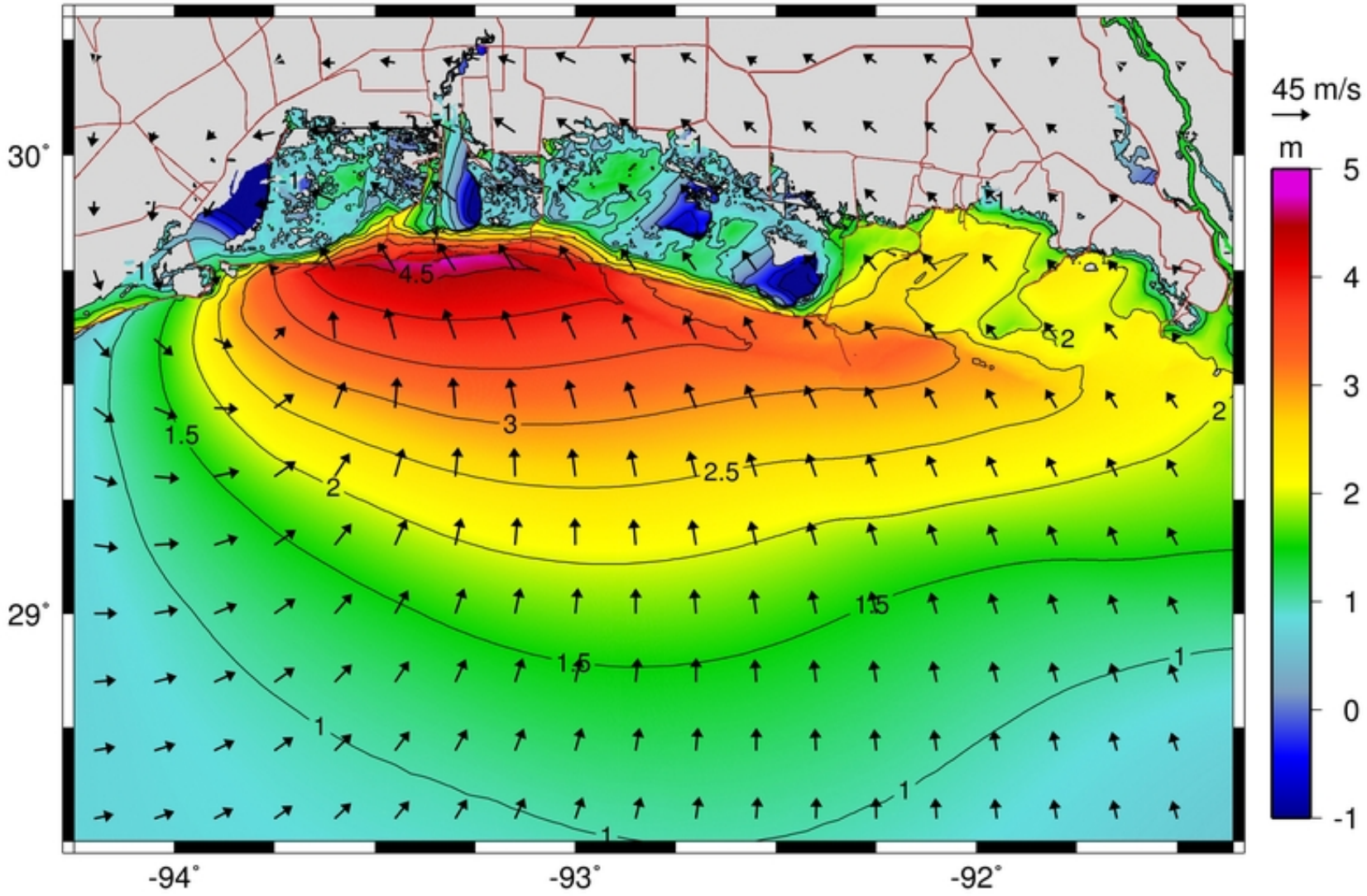

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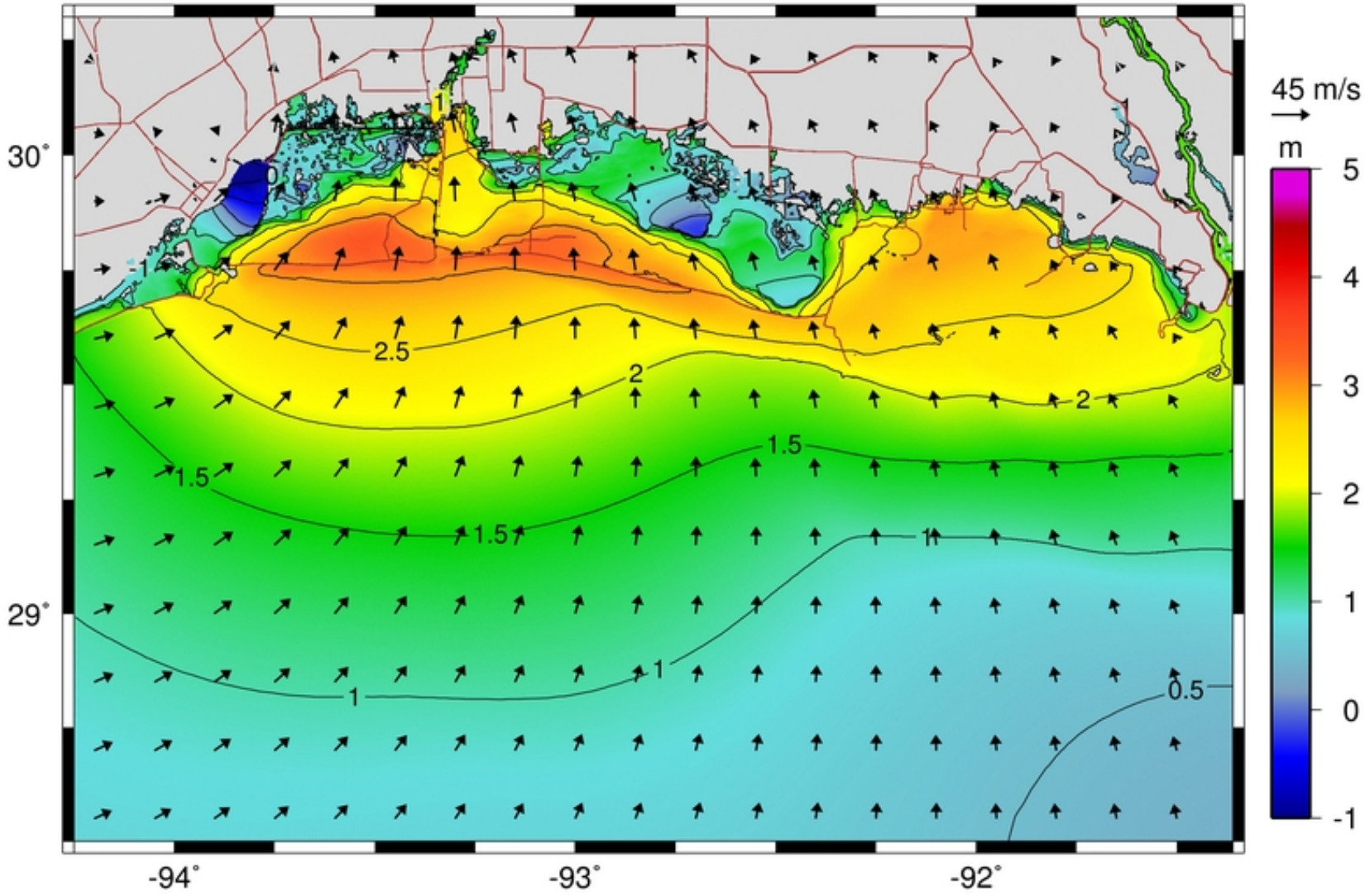

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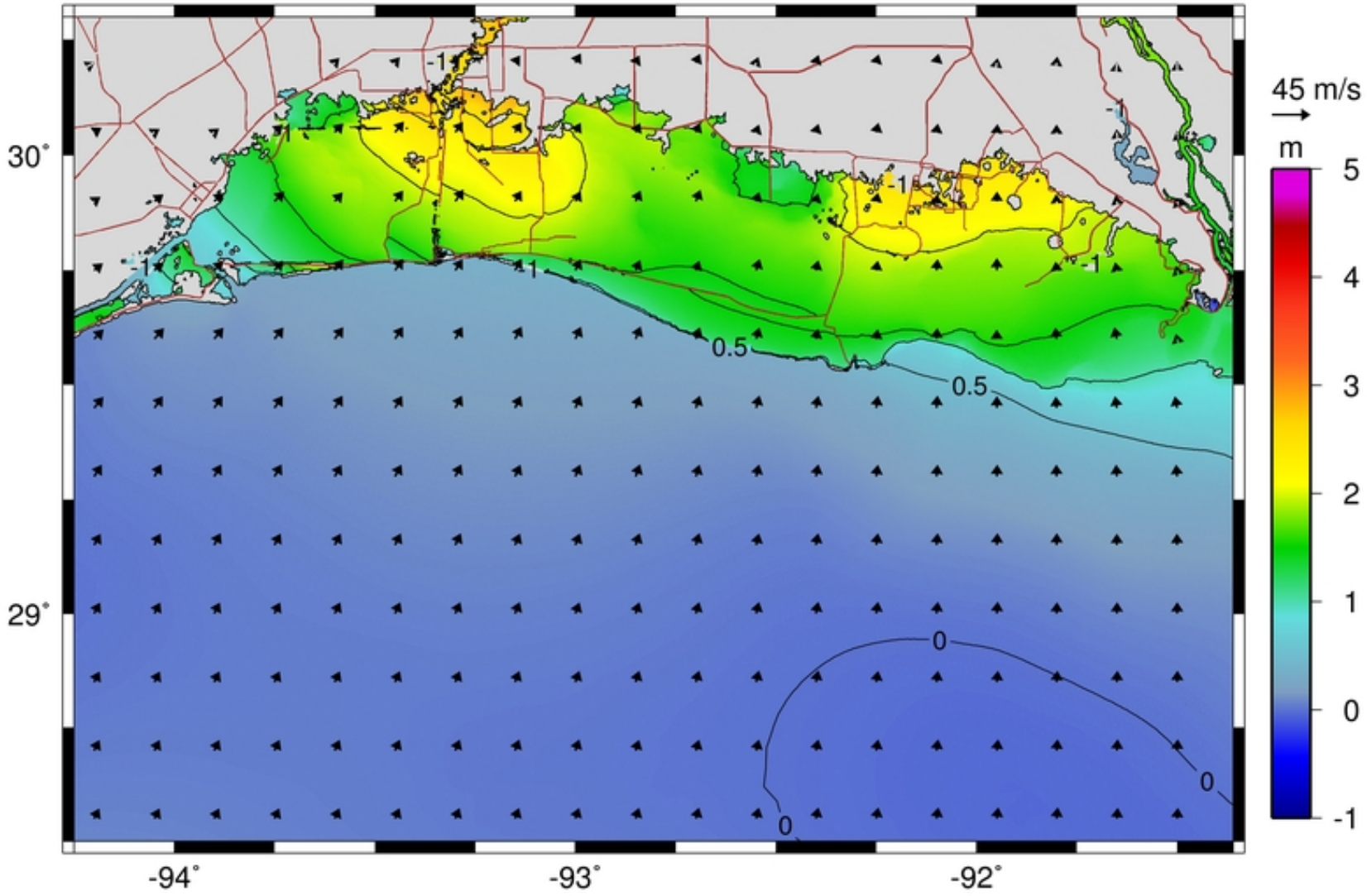

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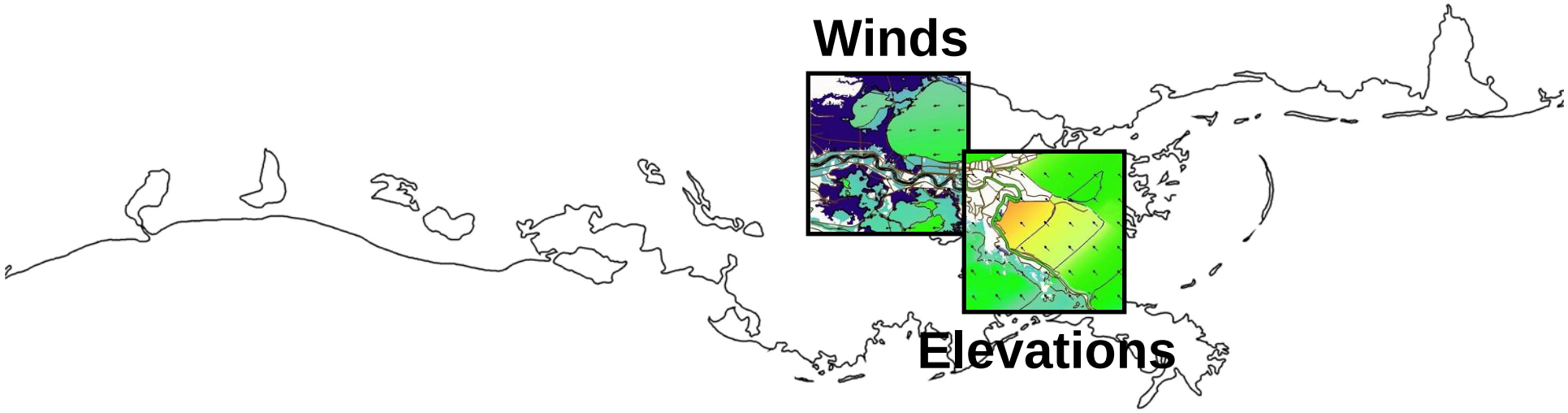

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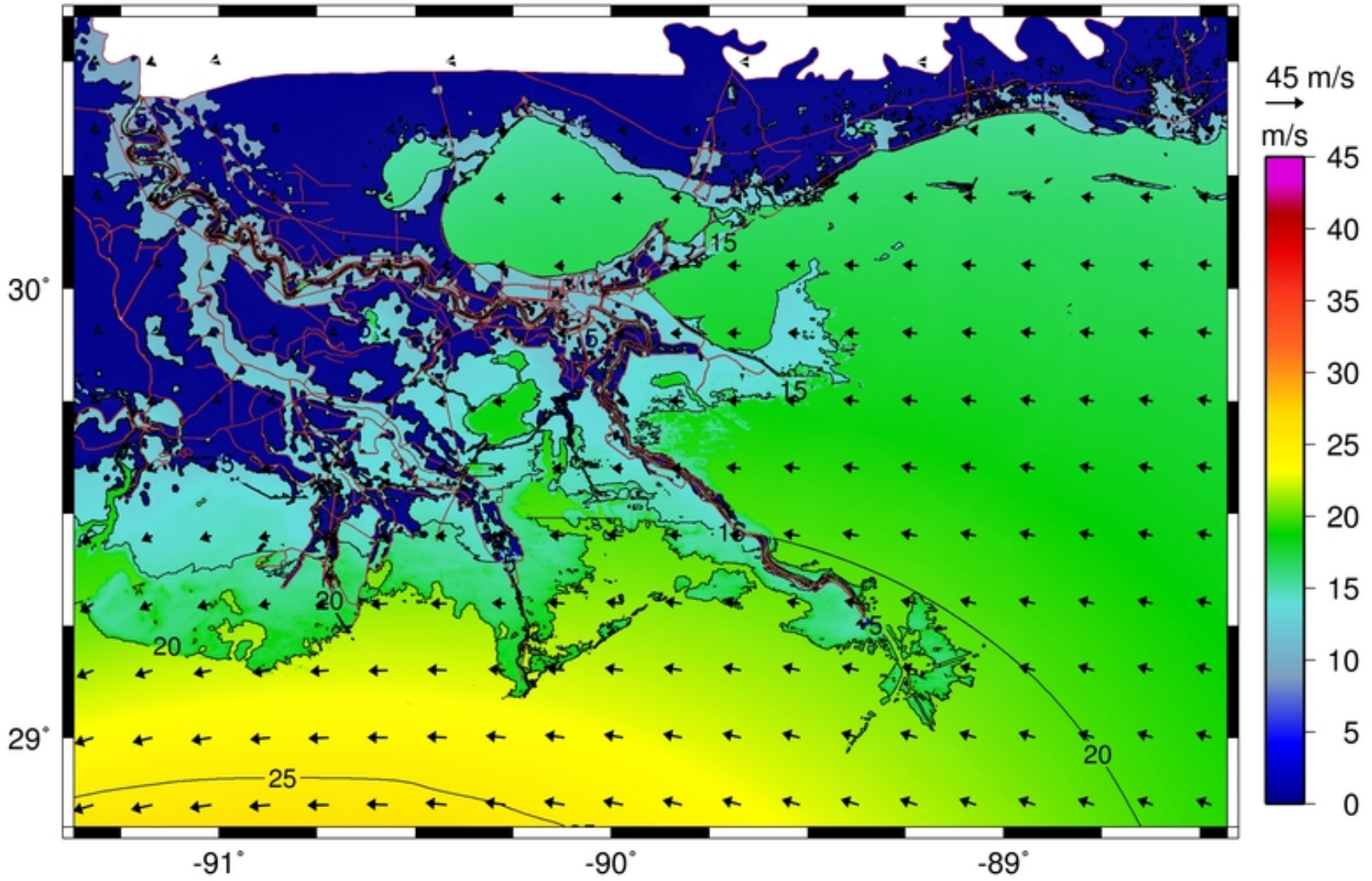

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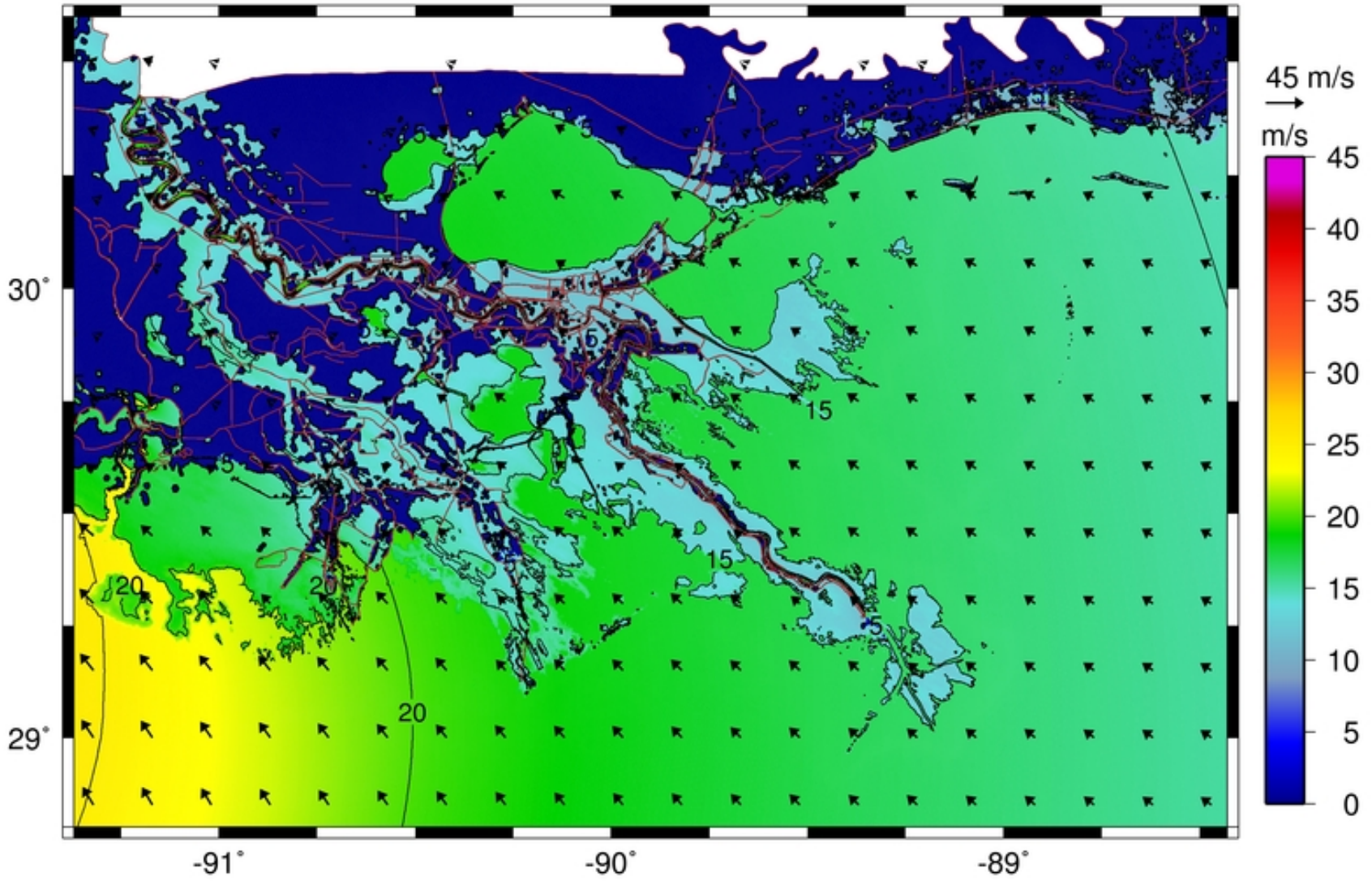

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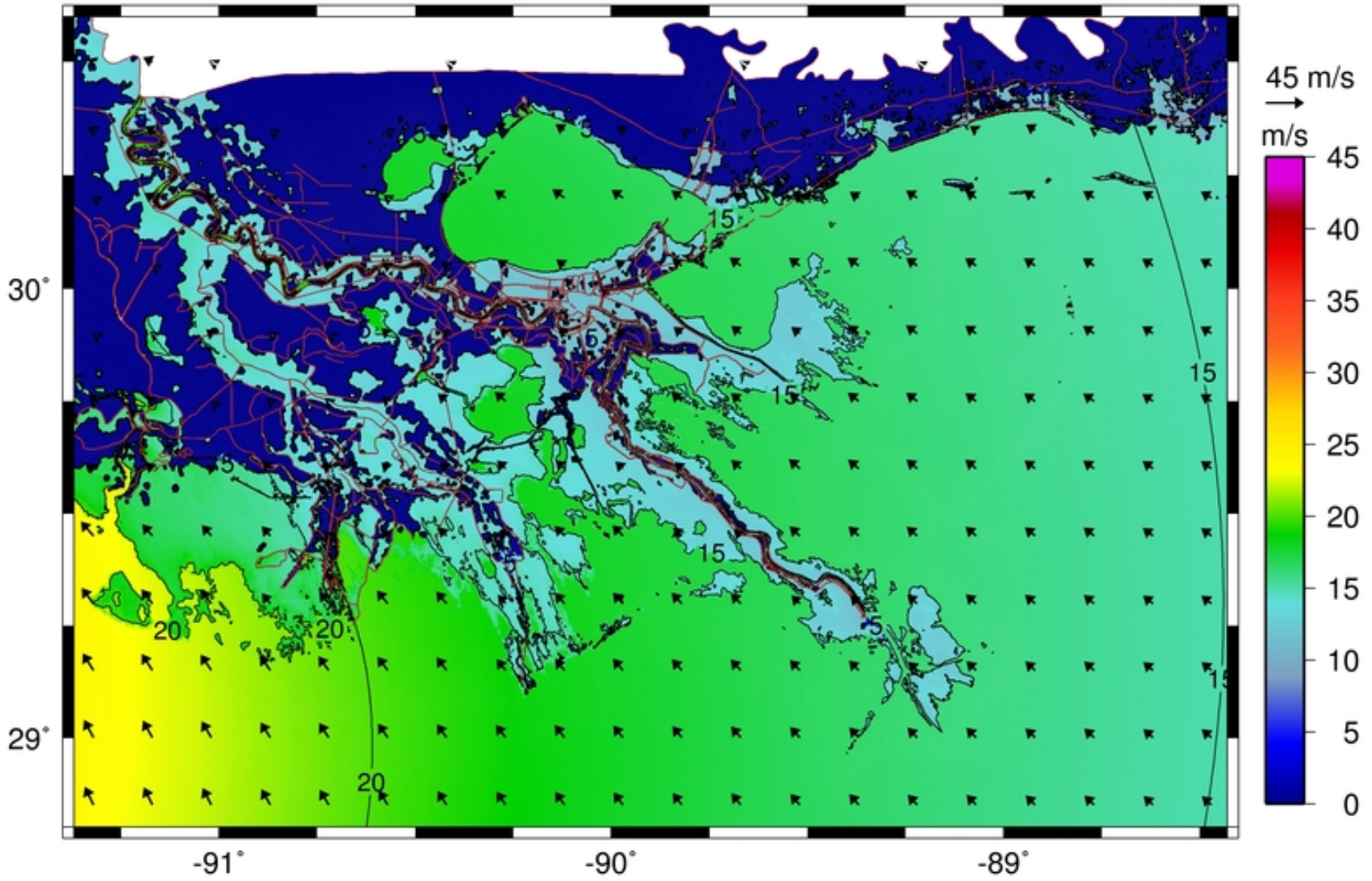

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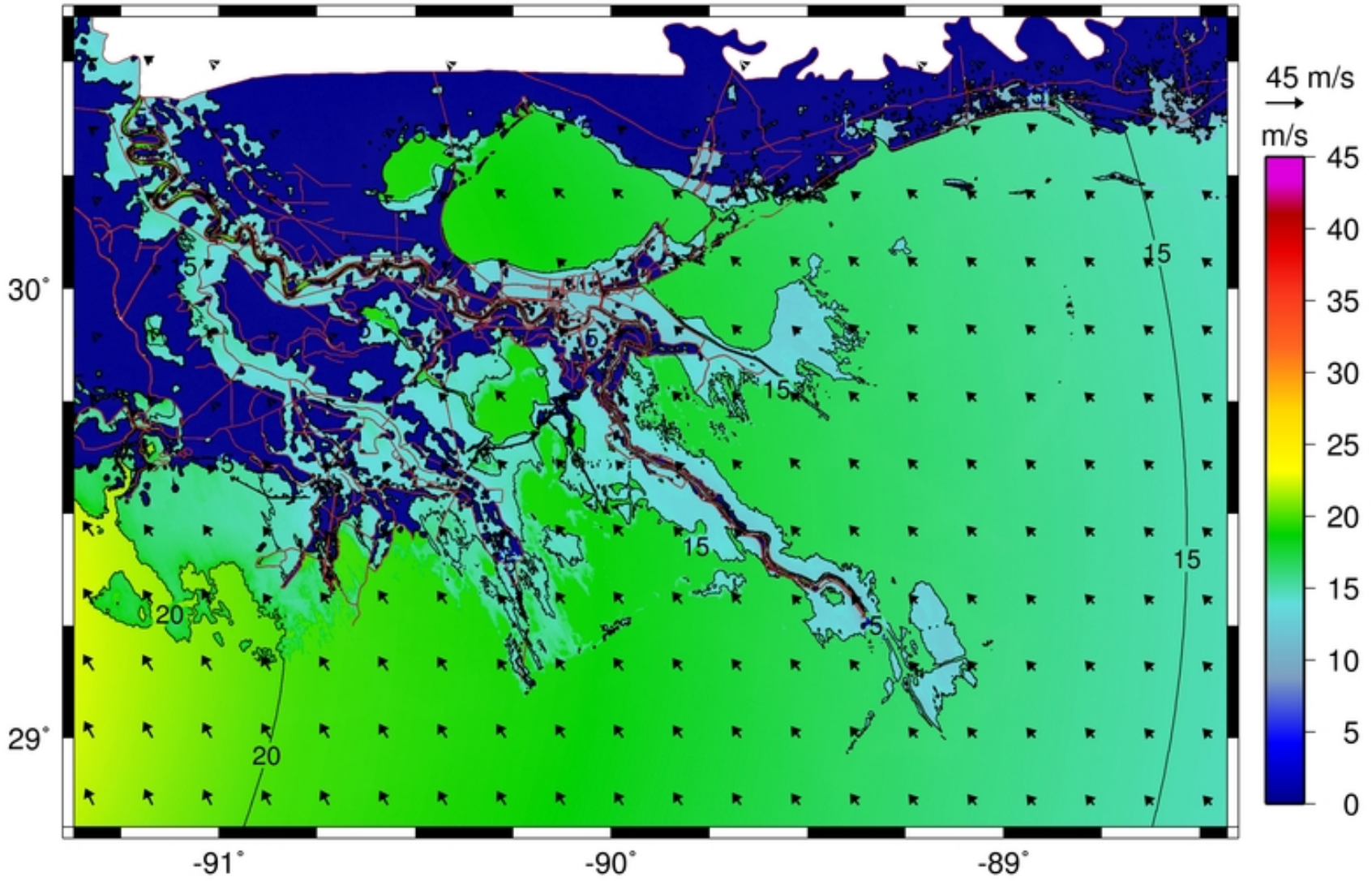

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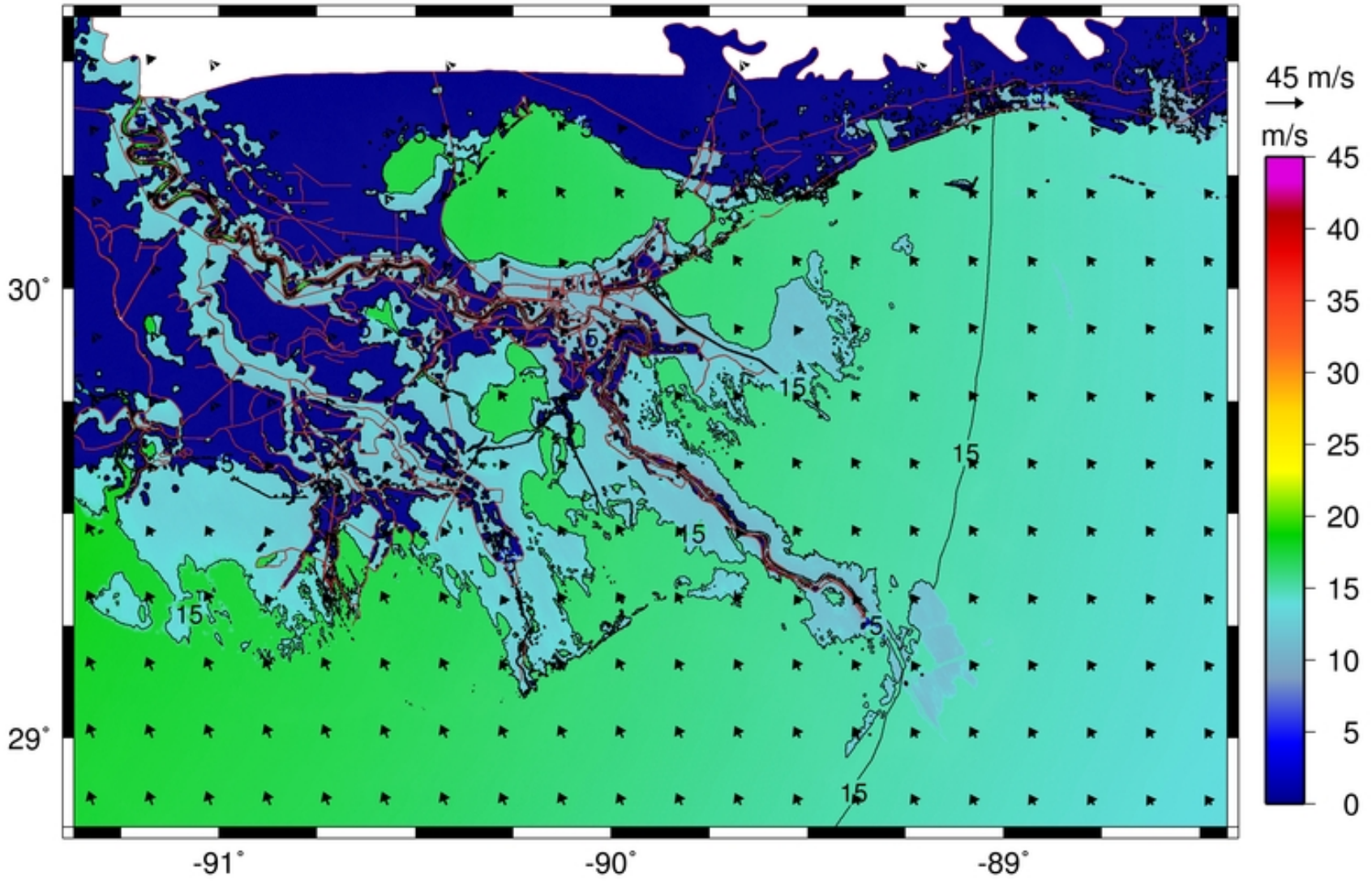

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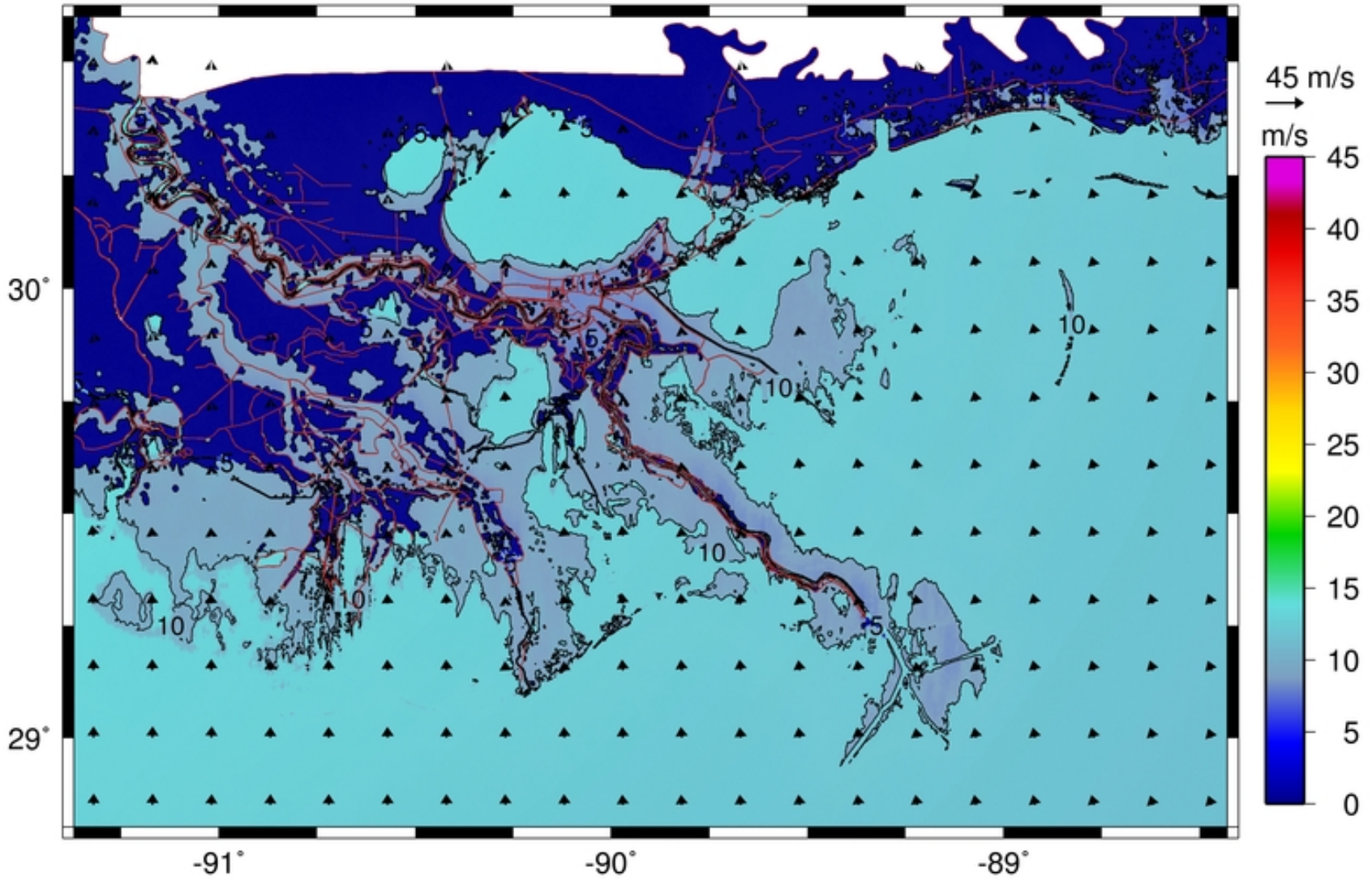

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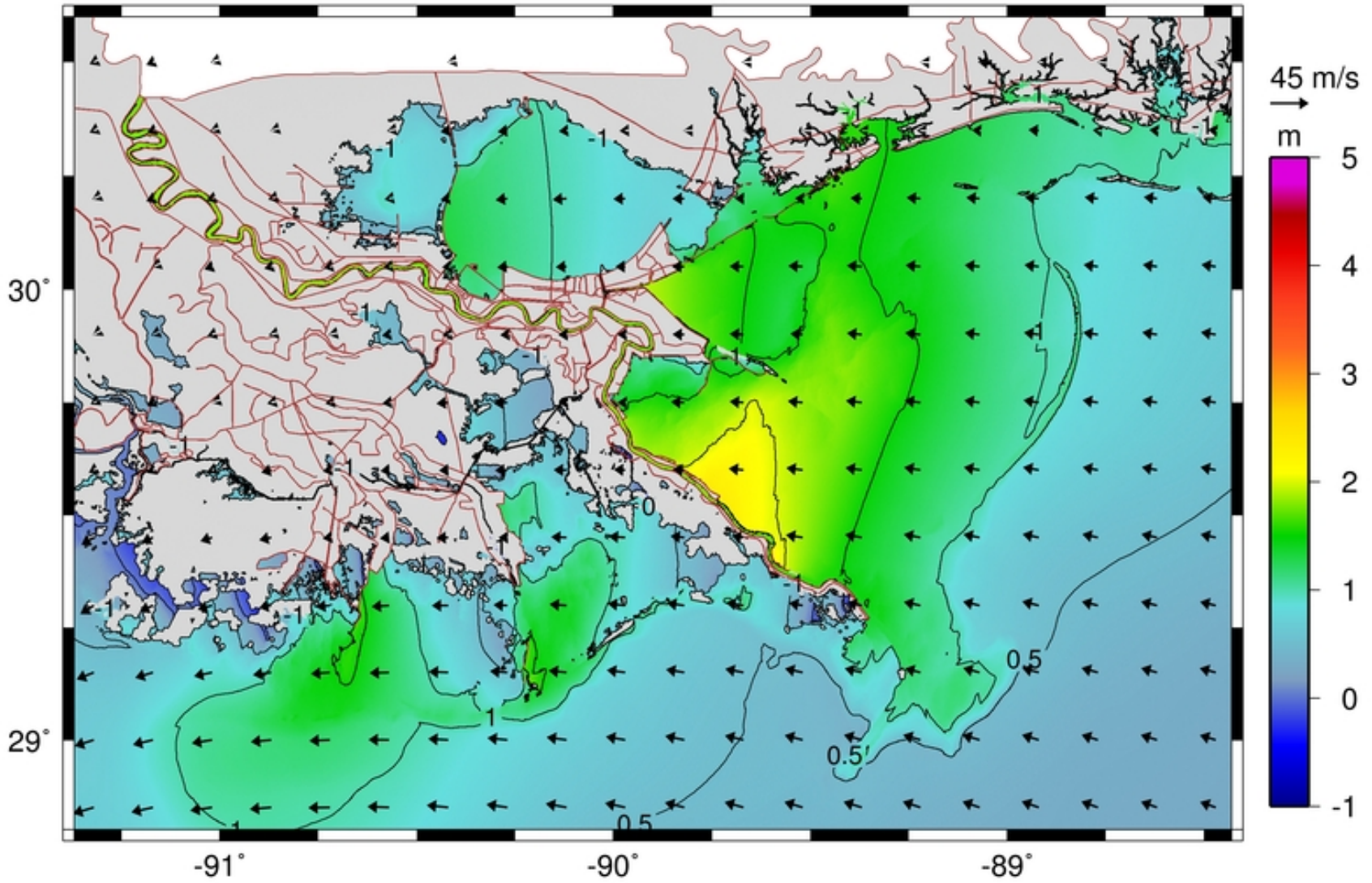

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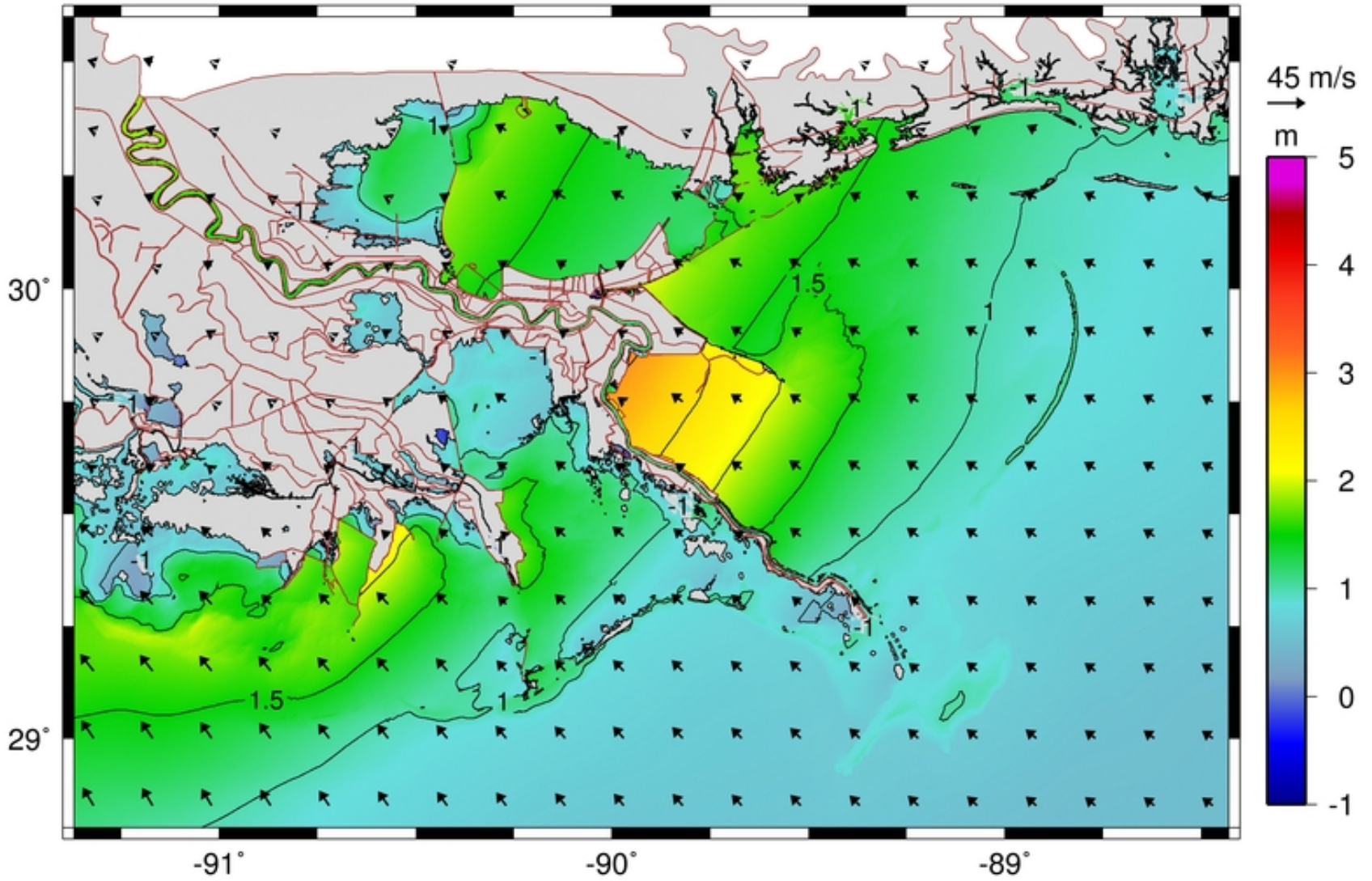

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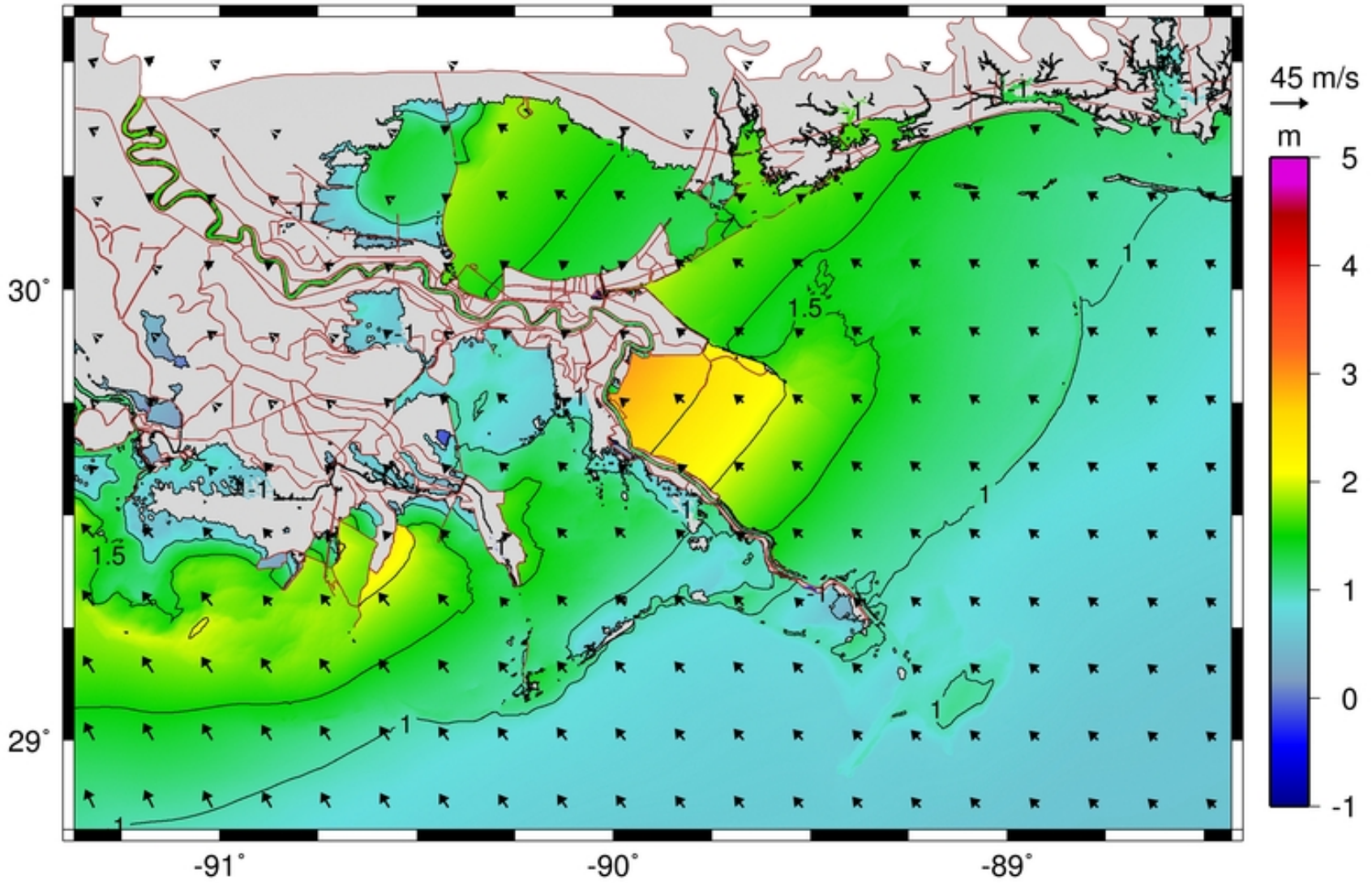

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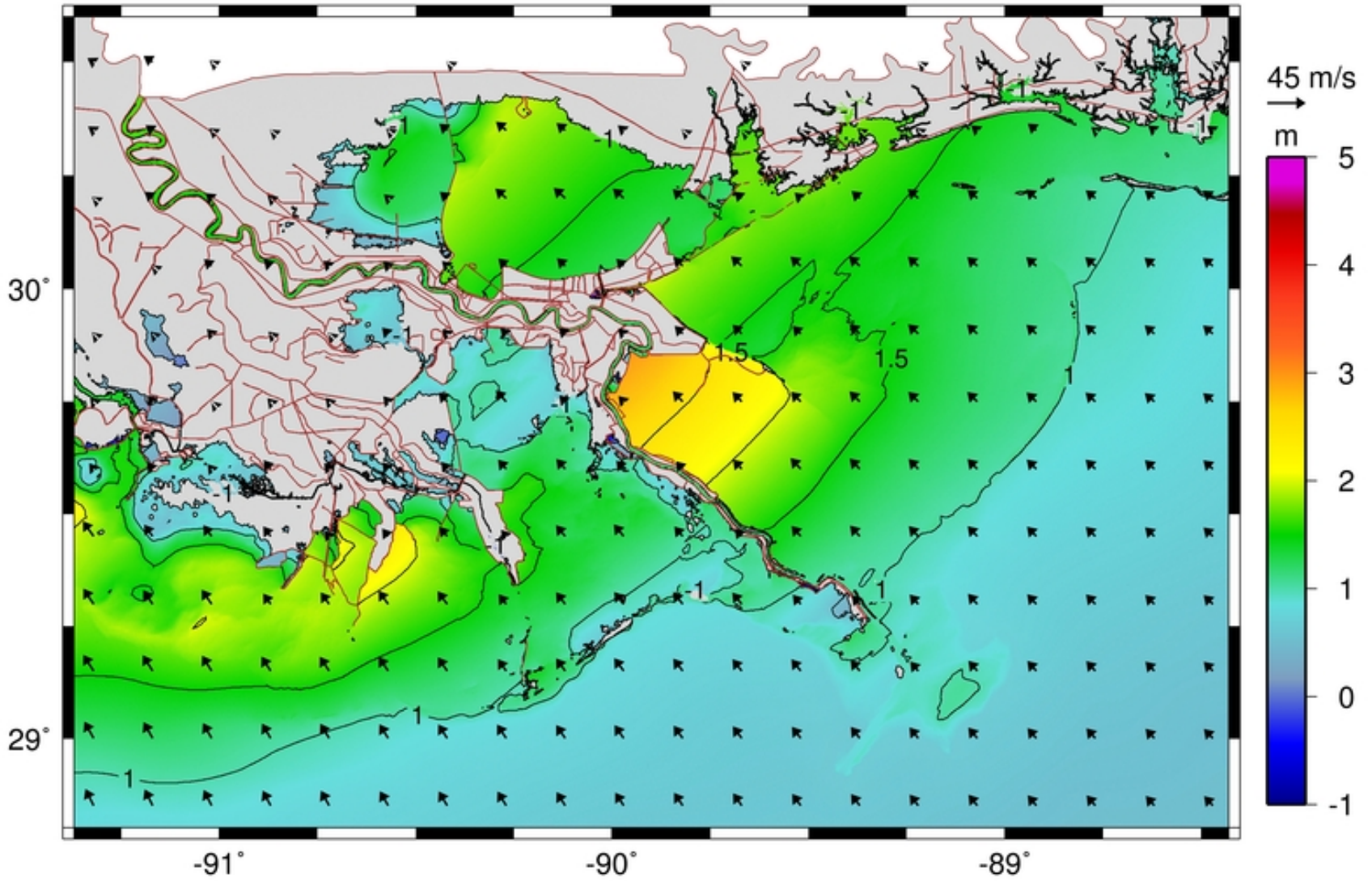

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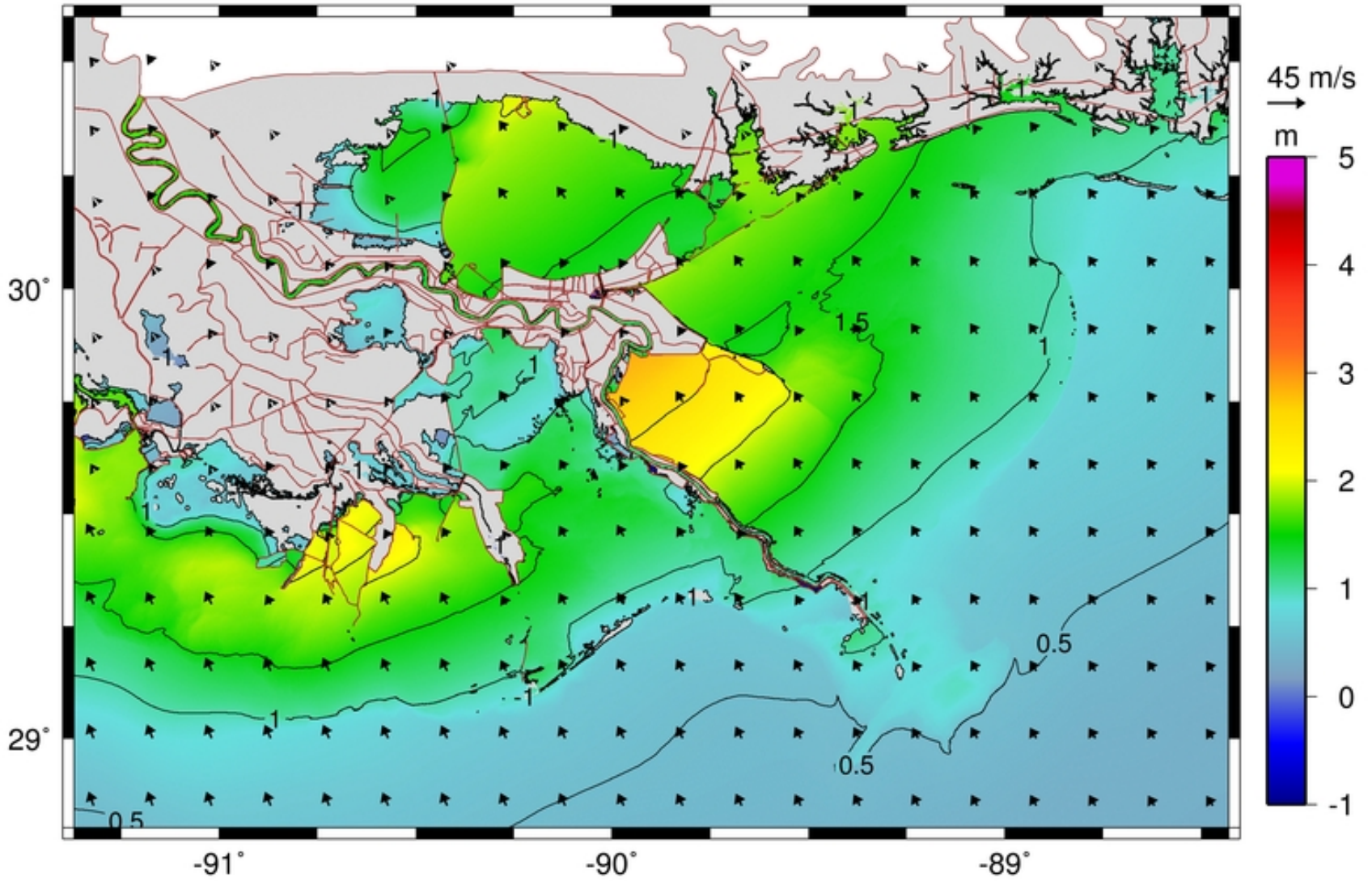

SE Louisiana

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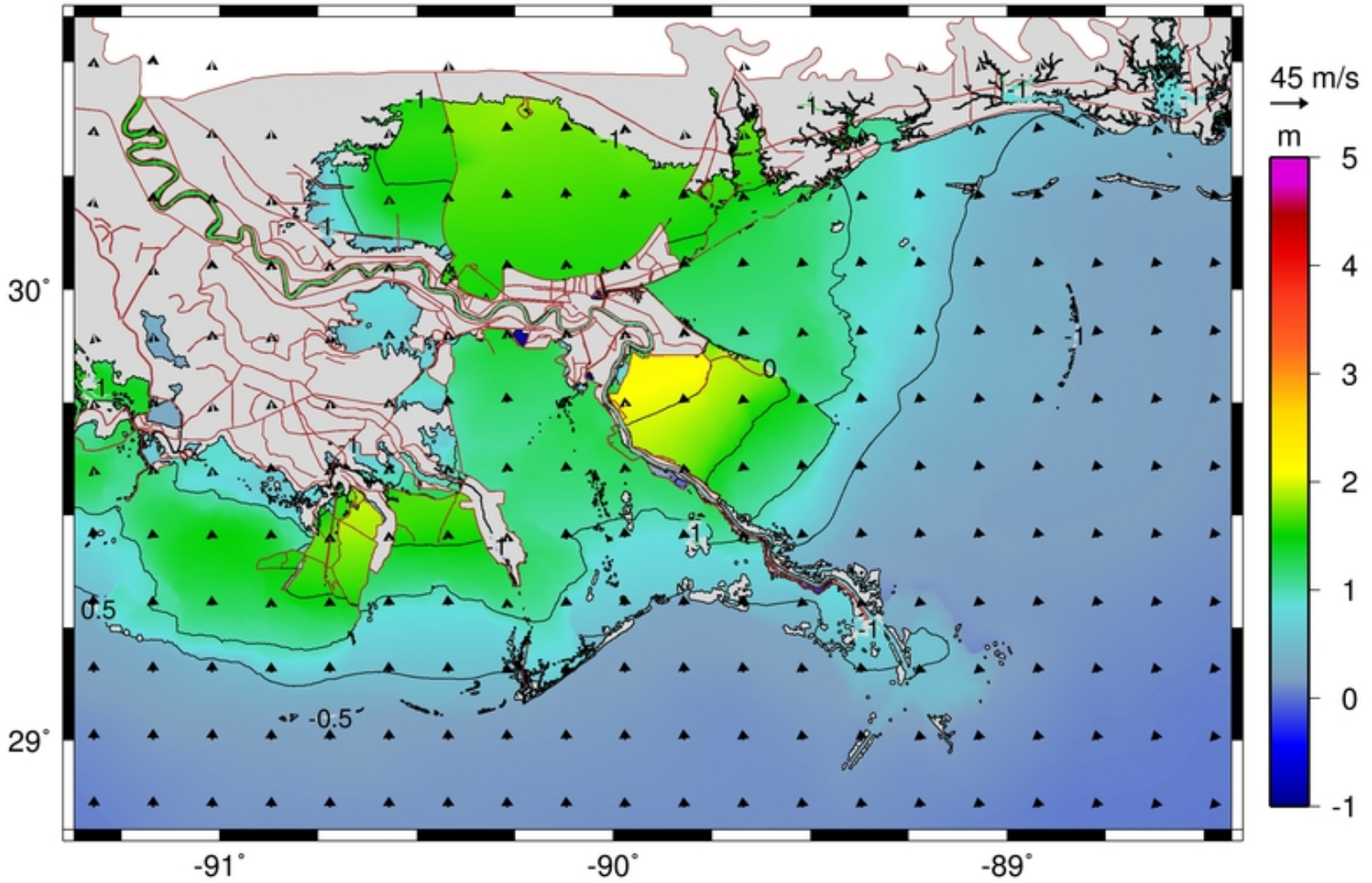
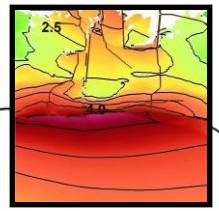
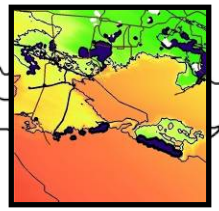


Contours of Maxima

Elevations

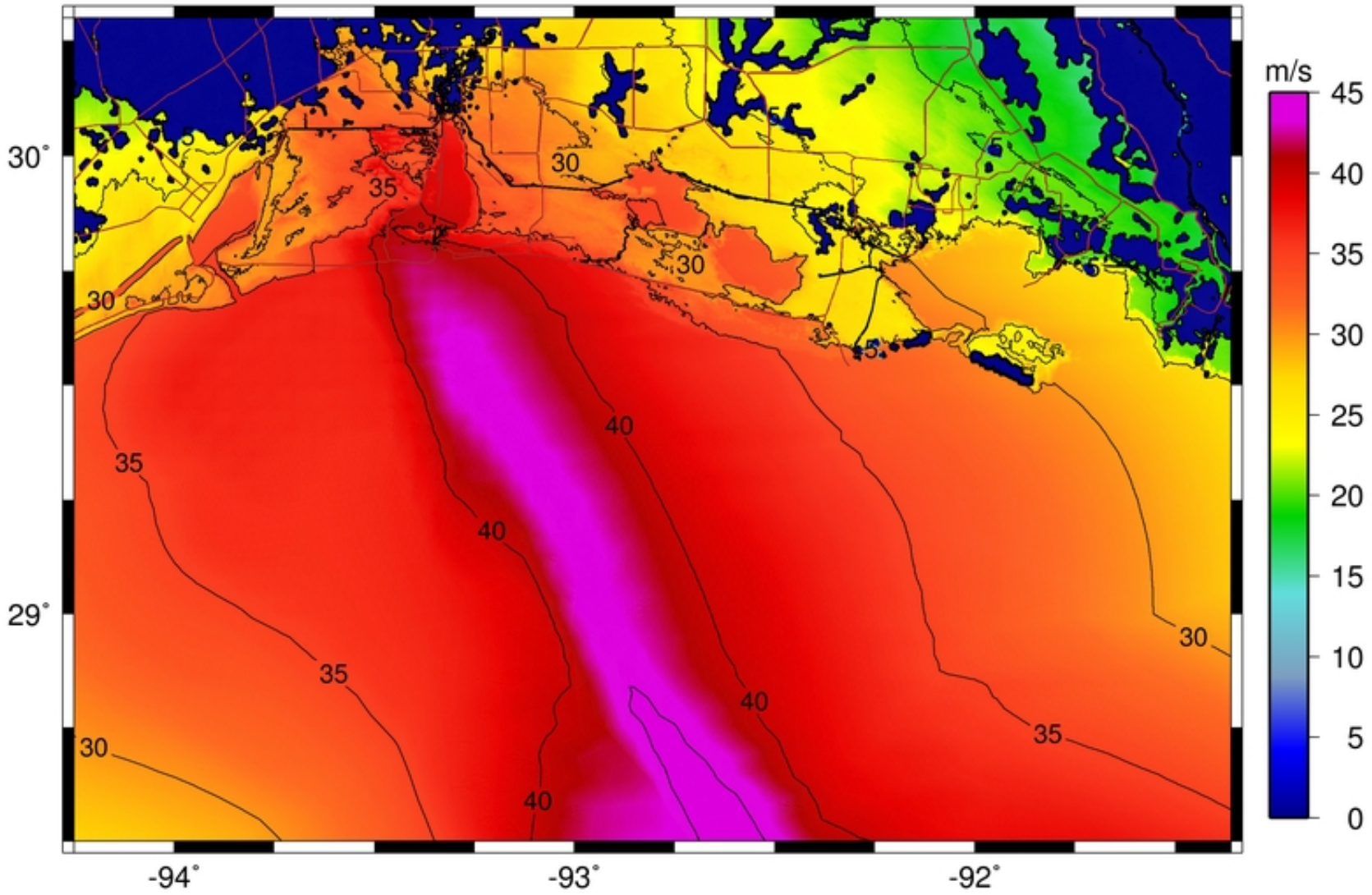




Winds

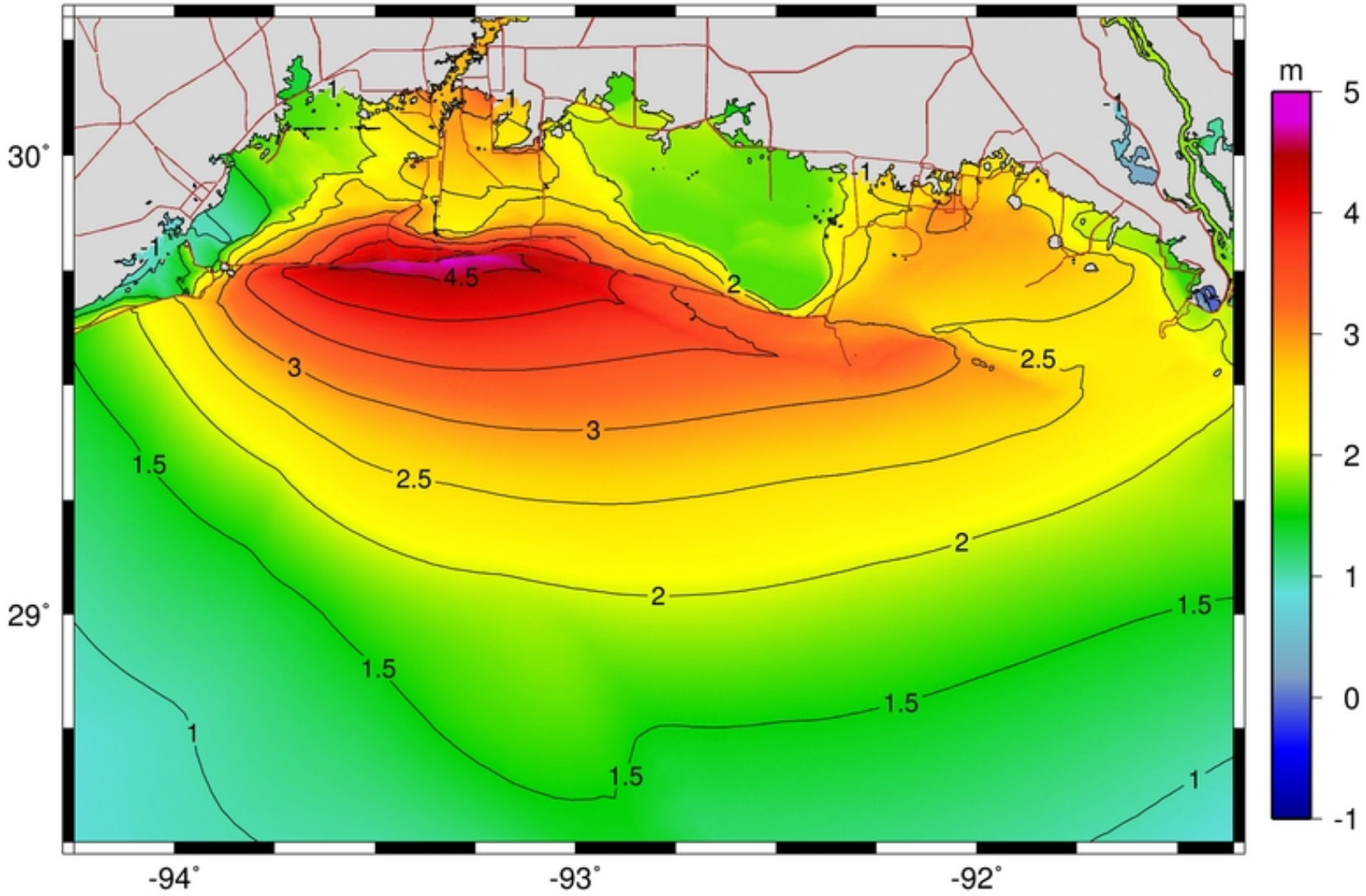
Contours of Maxima

Maximum Winds



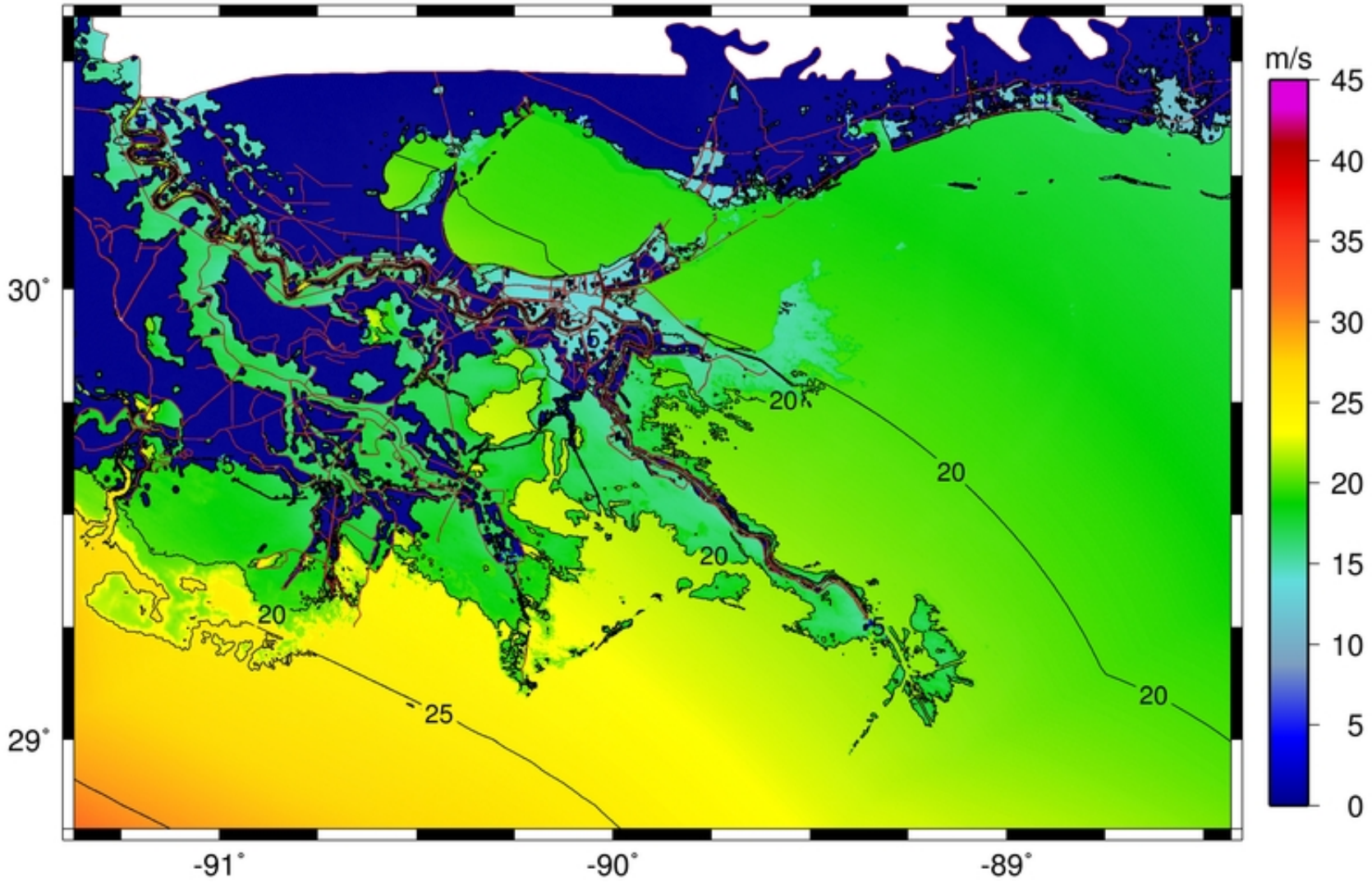
Contours of Maxima

Maximum Elevations



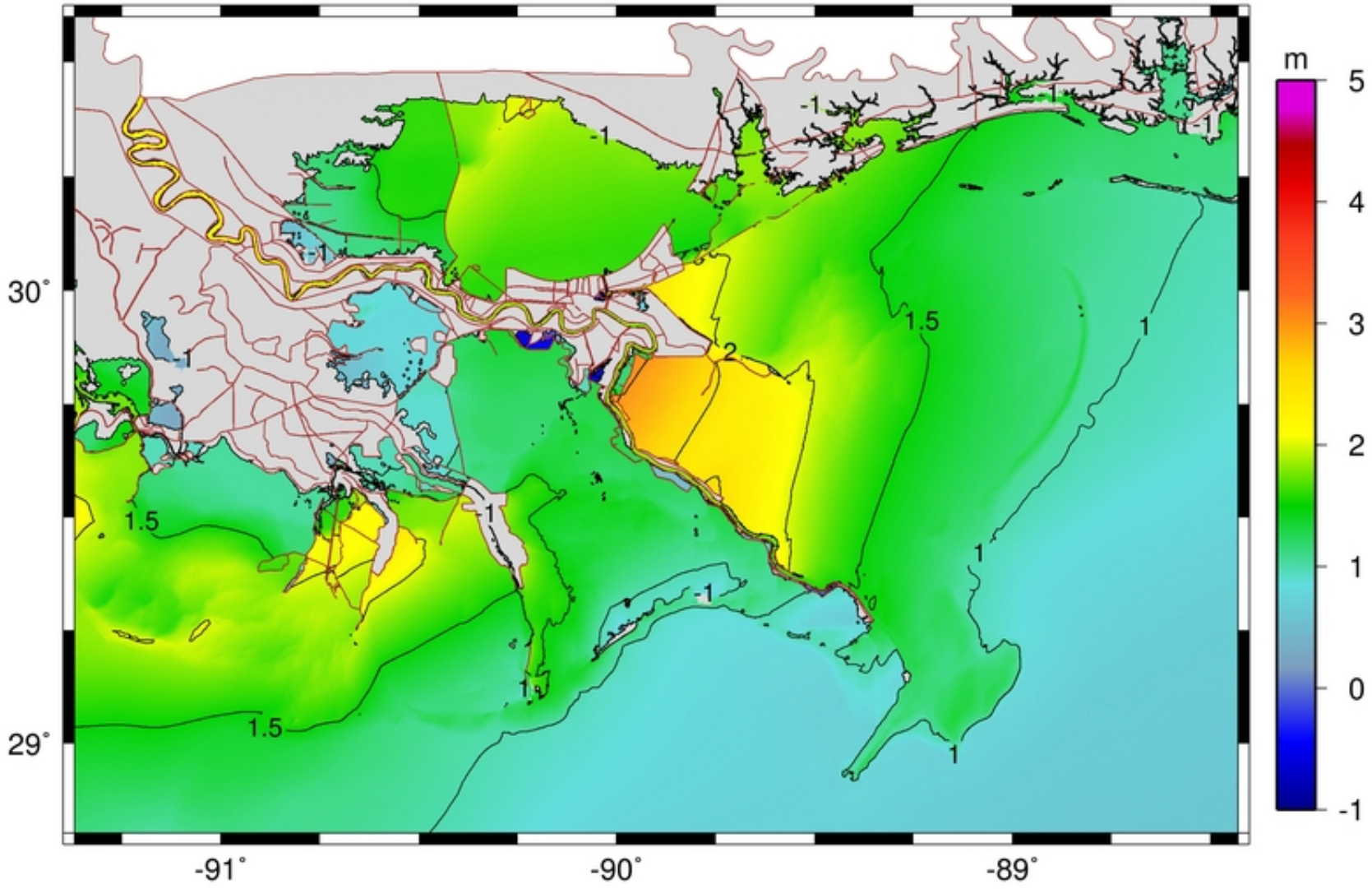
Contours of Maxima

Maximum Winds



Contours of Maxima

Maximum Elevations



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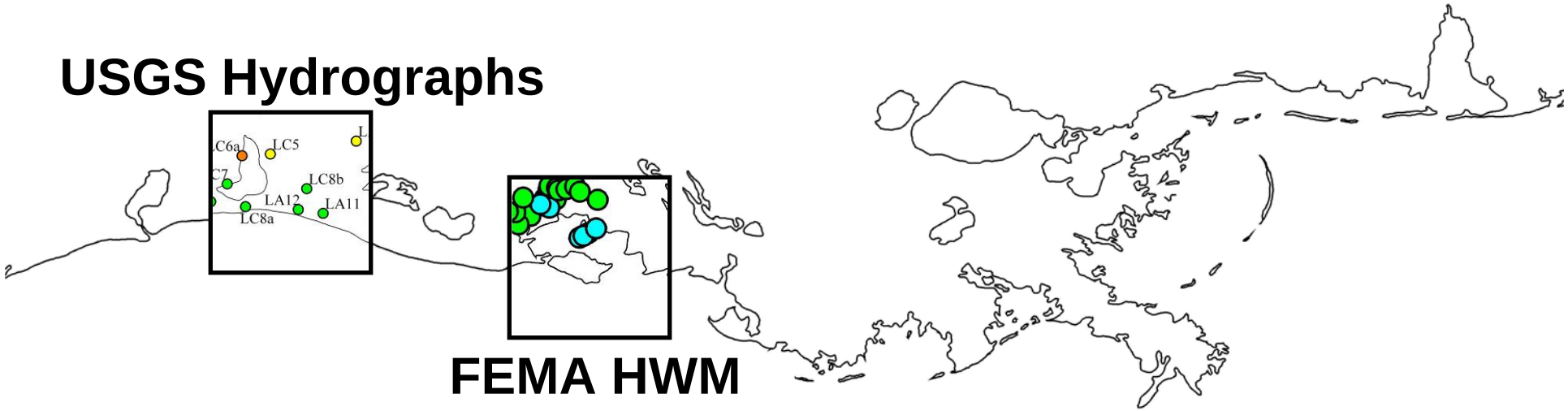
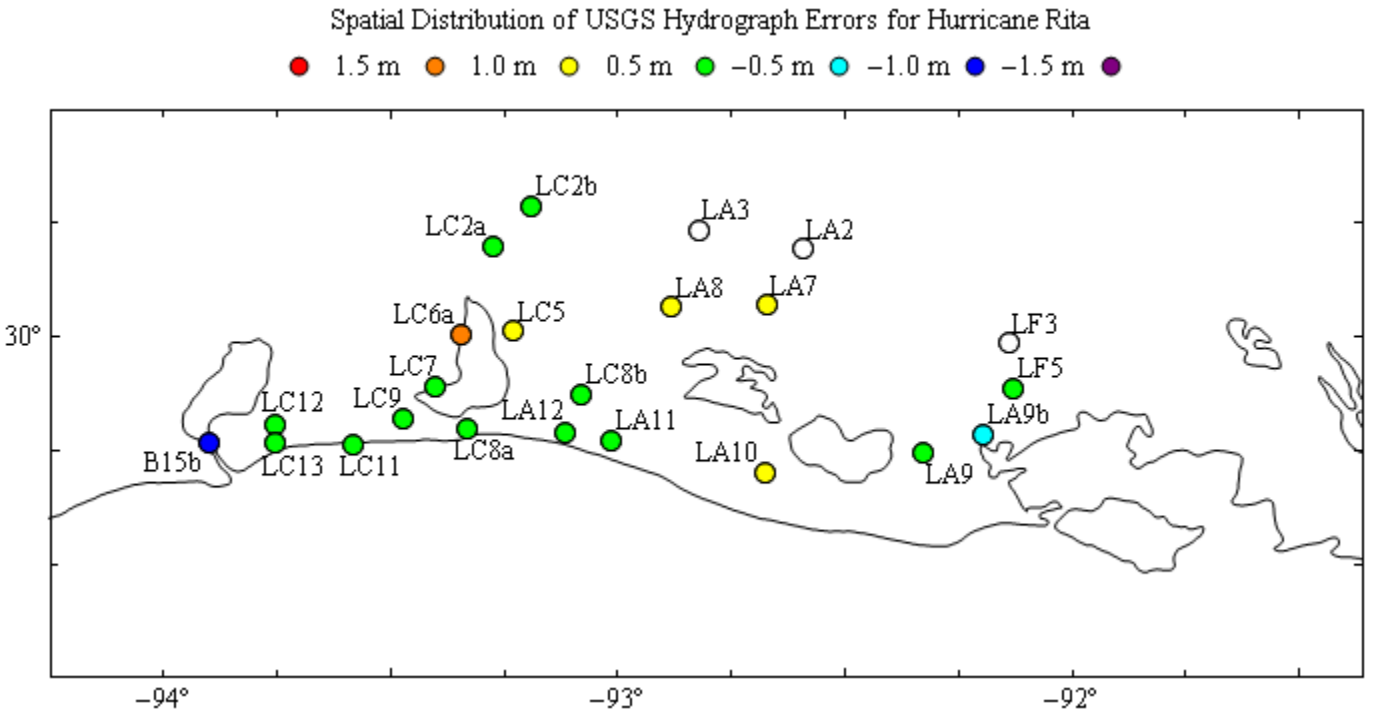


Validation

USGS Hydrographs



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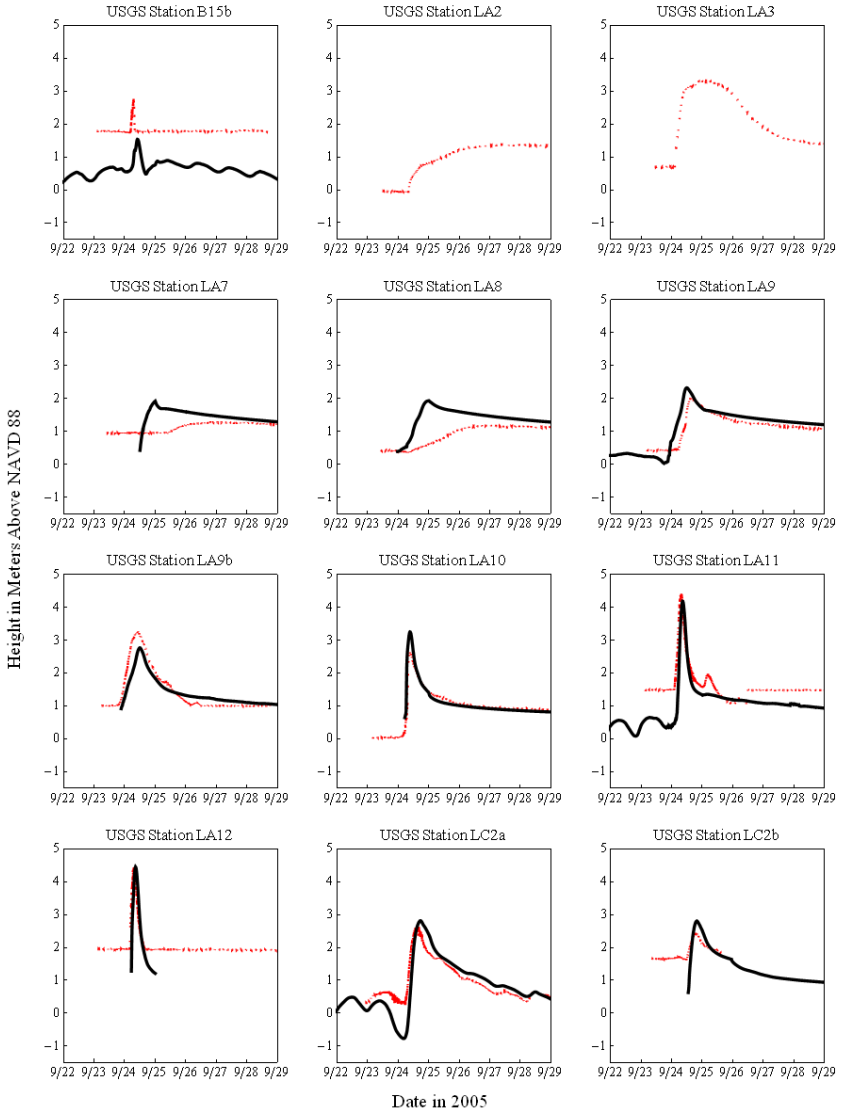

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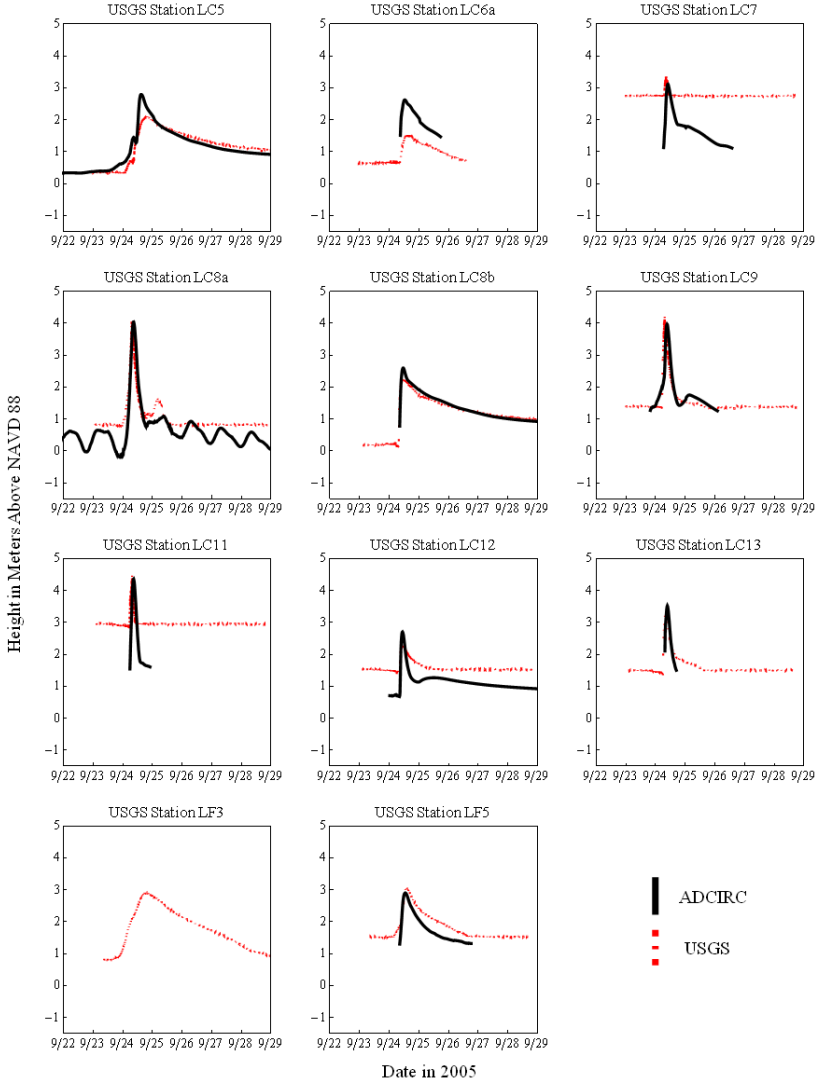
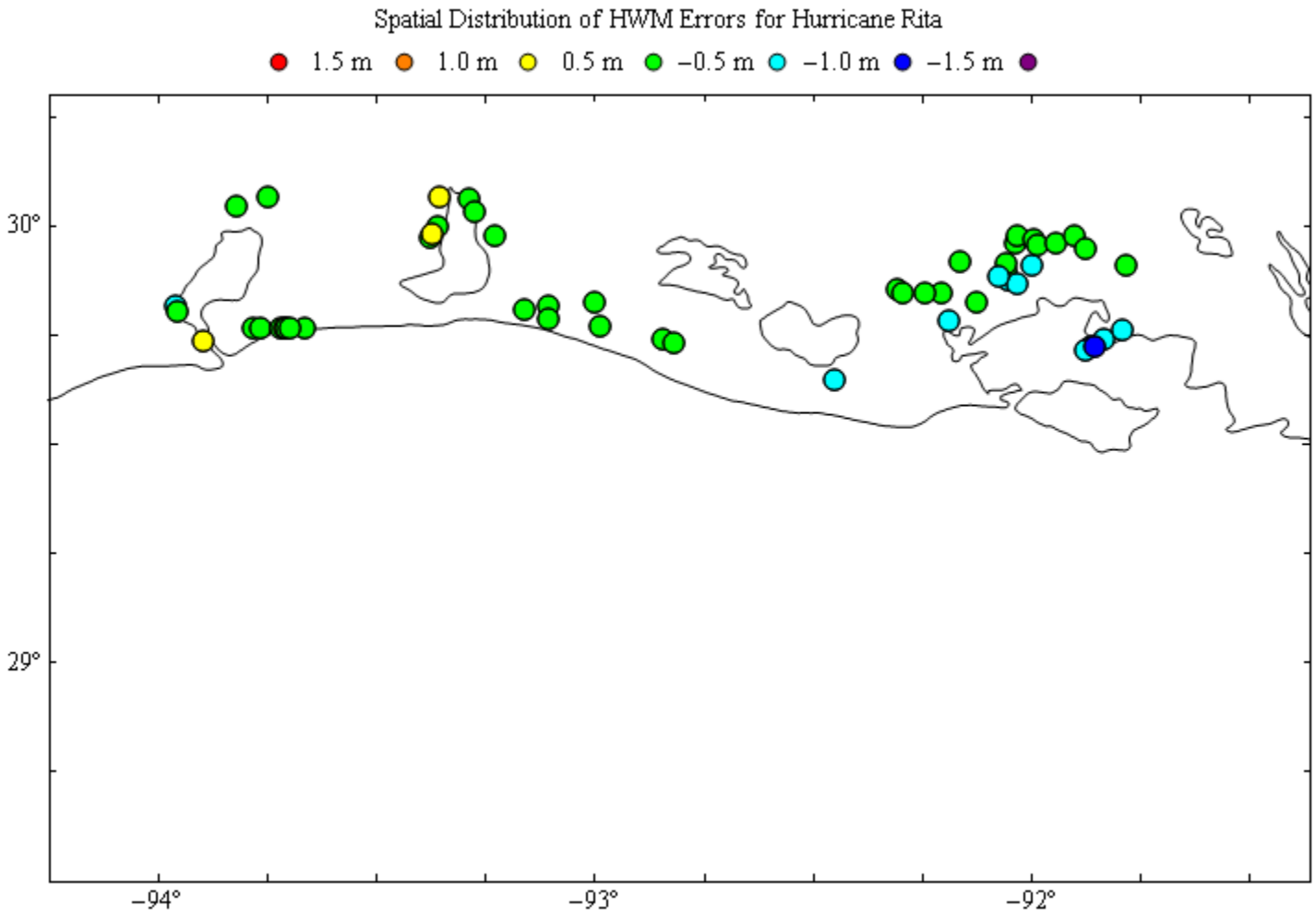


Validation

FEMA High Water Marks



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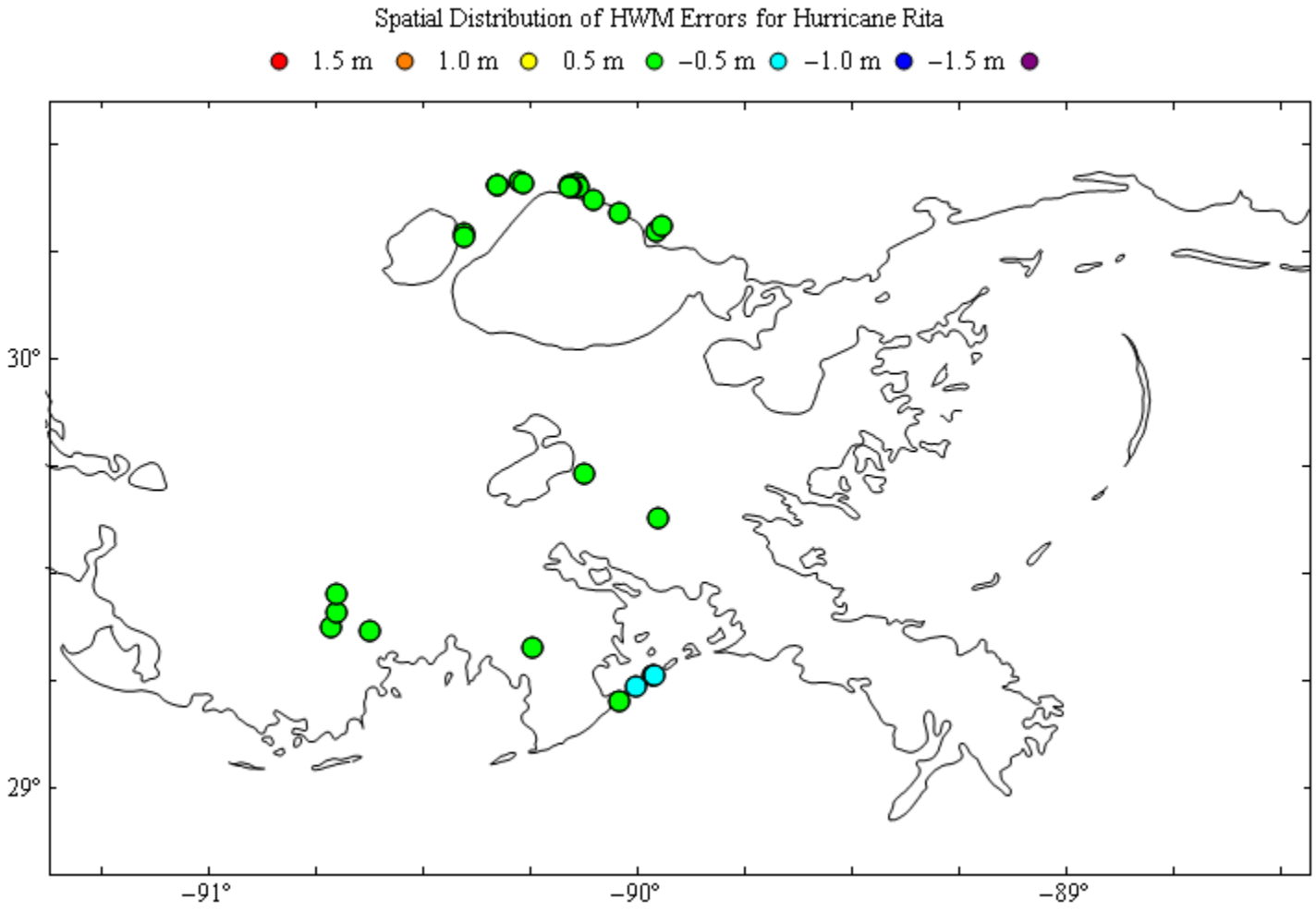

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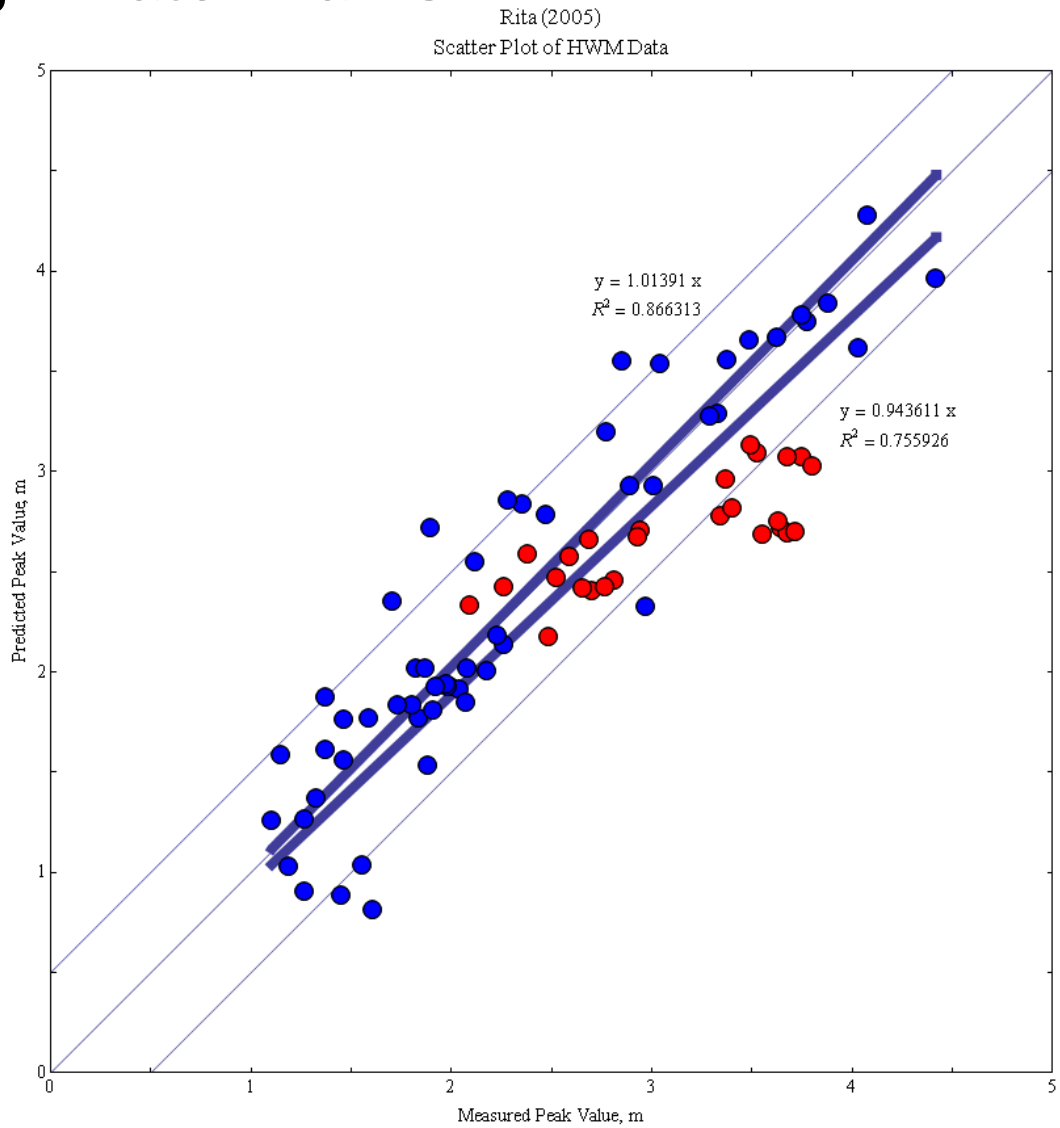
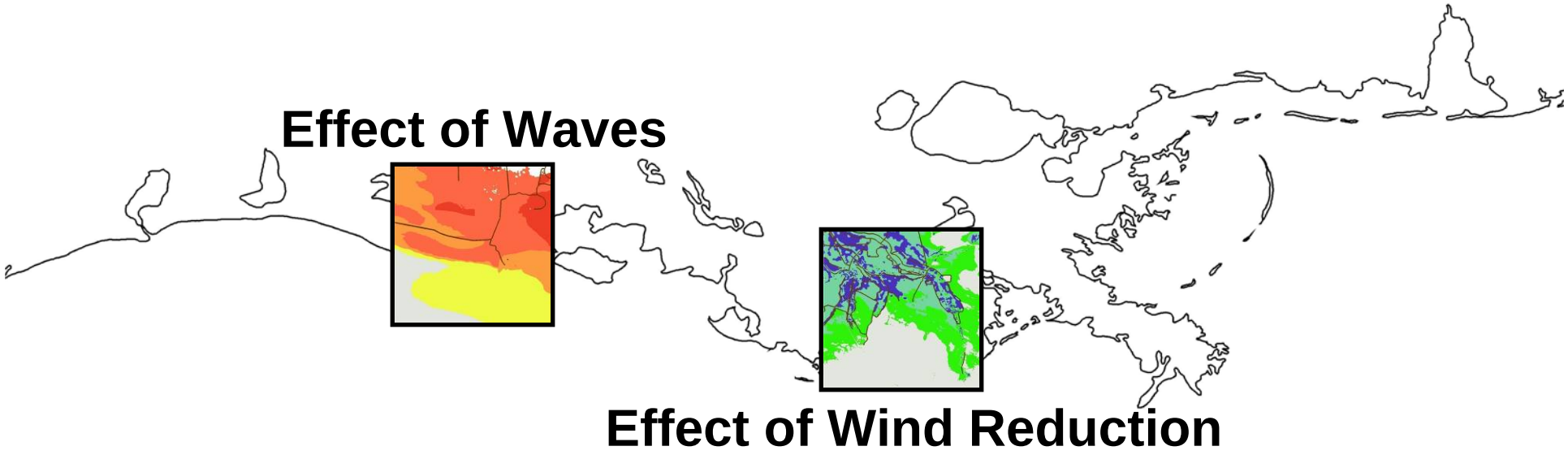
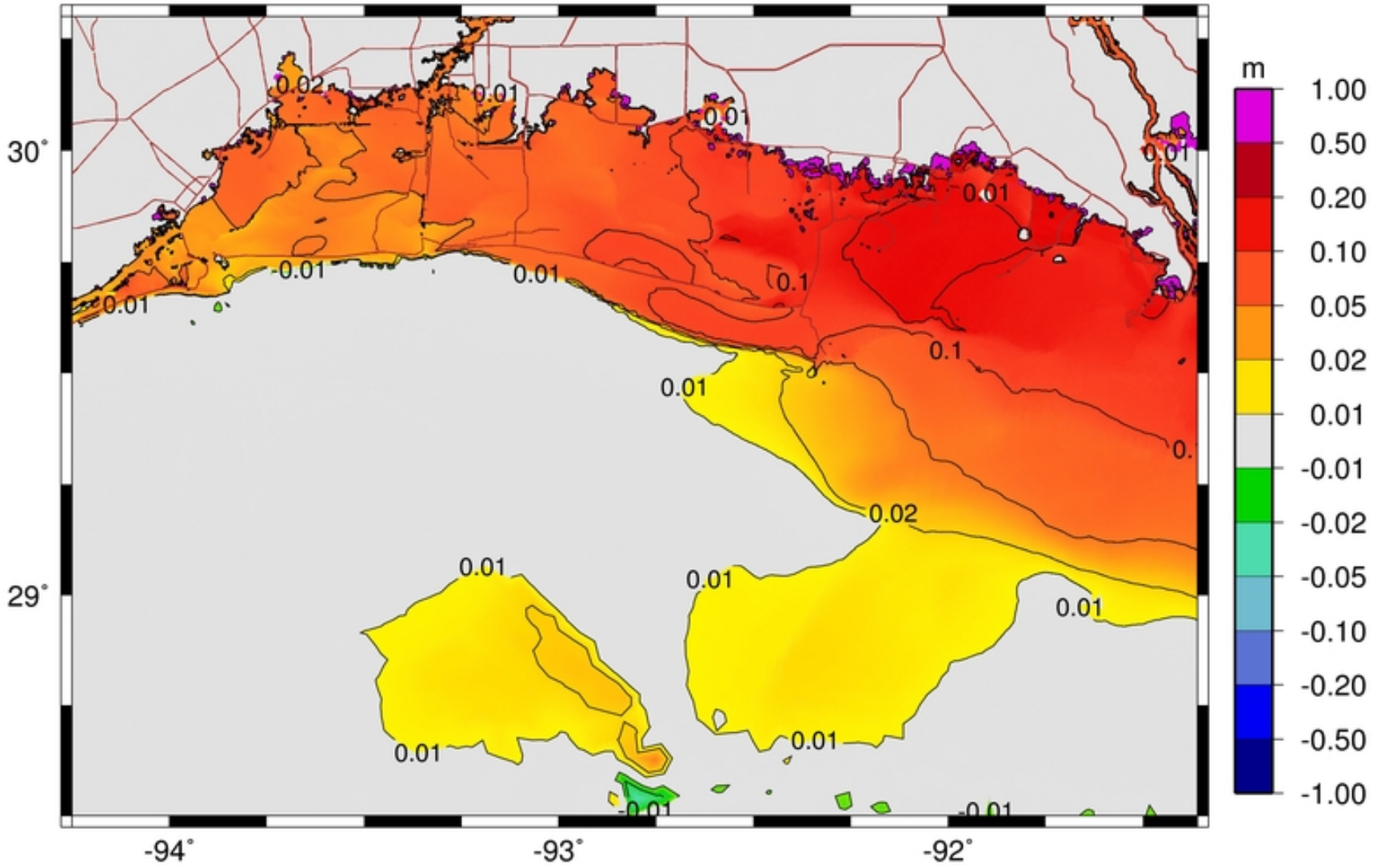


Perturbations



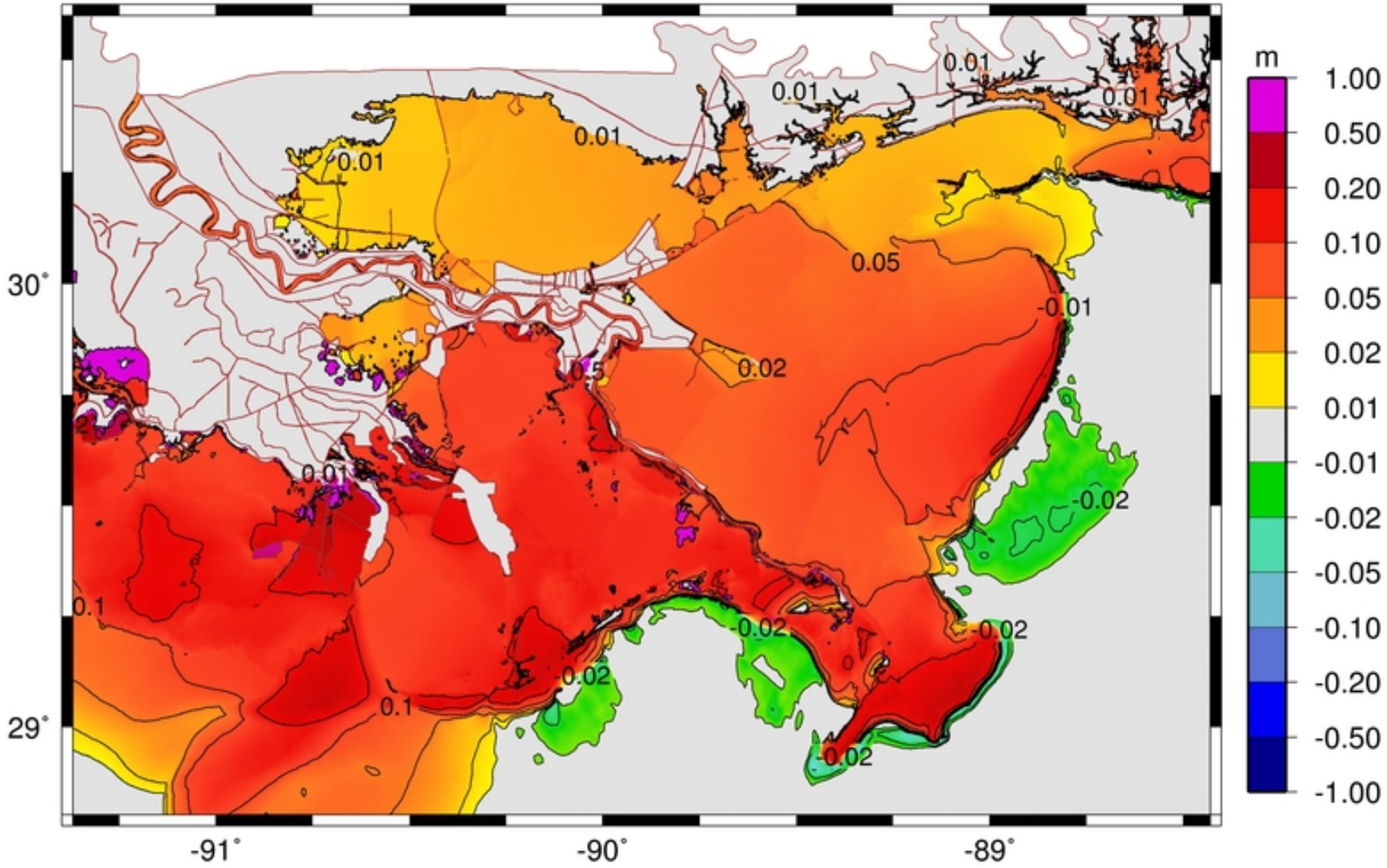
Perturbations

Effect of Waves – Maximum Elevations



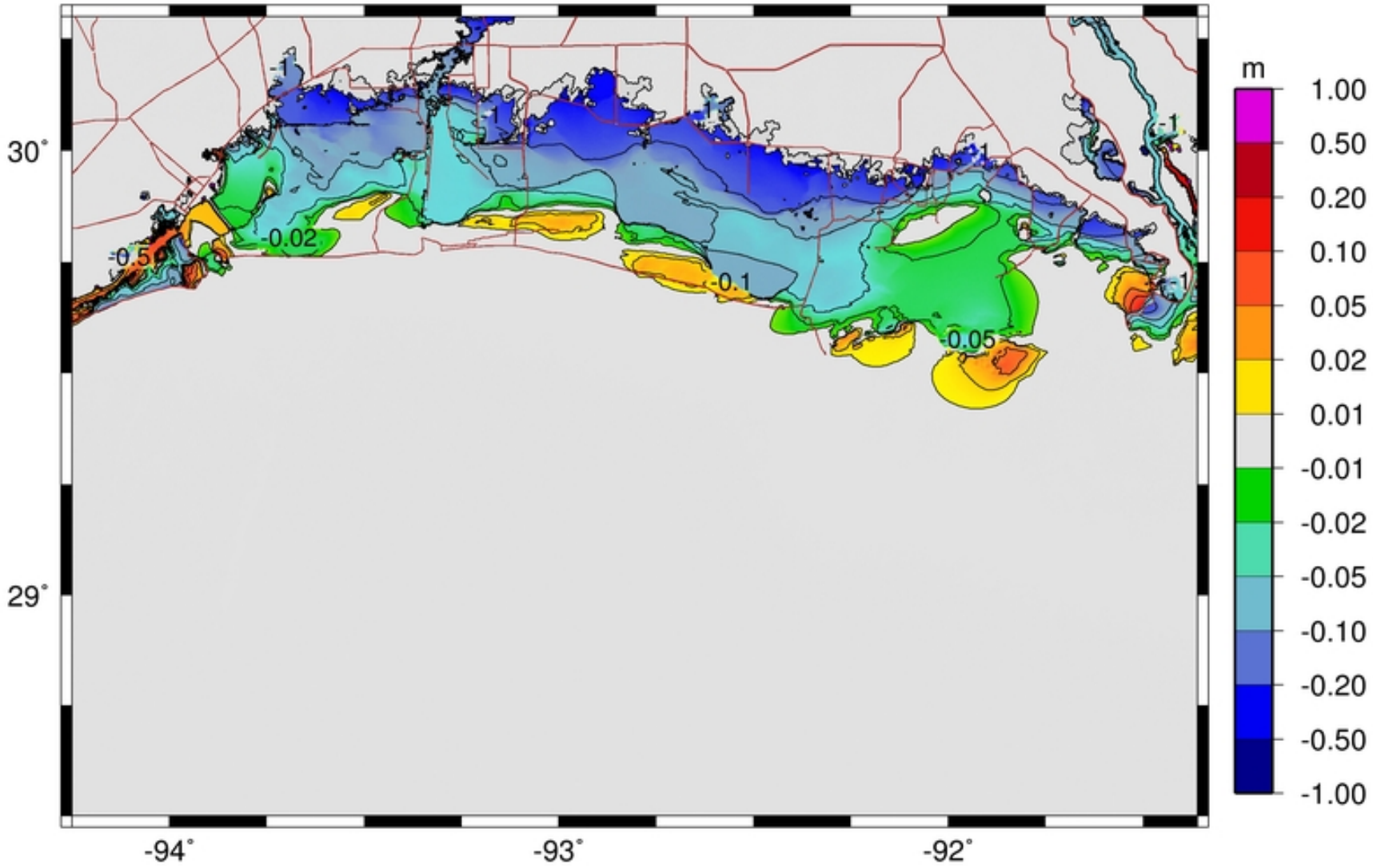
Perturbations

Effect of Waves – Maximum Elevations



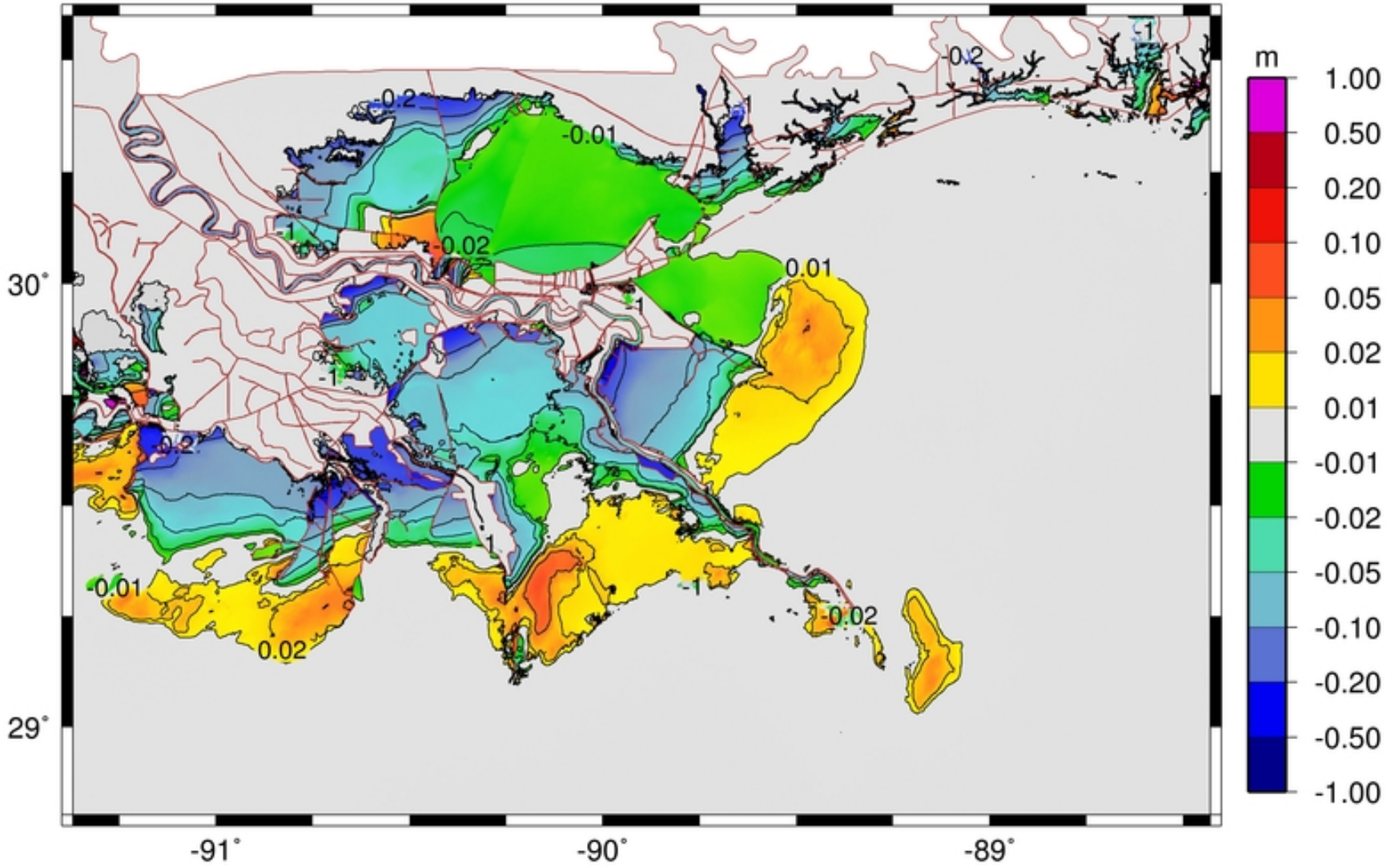
Perturbations

Effect of Wind Reduction – Maximum Elevations



Perturbations

Effect of Wind Reduction – Maximum Elevations



Conclusions

SW Louisiana:

- Winds blew along or away from the shore in the early stages of the storm
- Only when the winds were directed toward shore did significant surge build against the coast
- Surge then spilled inland

SE Louisiana:

- Consistent winds pushed water onto the shelf and against levees along the Mississippi River delta

Contours of Maxima:

- Wind speeds reach maximum of 45 m/s
- Elevations peaked at 5 m along shoreline south of Calcasieu Lake, and 3 m near New Orleans

Conclusions

Validation:

- Current model provides a good representation of the quantitative and qualitative behavior of Hurricane Rita
- More resolution is needed in some areas

Perturbations:

- Waves add 10-20 cm along much of the coastline
- Directional wind reduction prevents surge from flowing as far inland

Questions?