Effective Flow Visualization

(NOT Modeling)

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Staff

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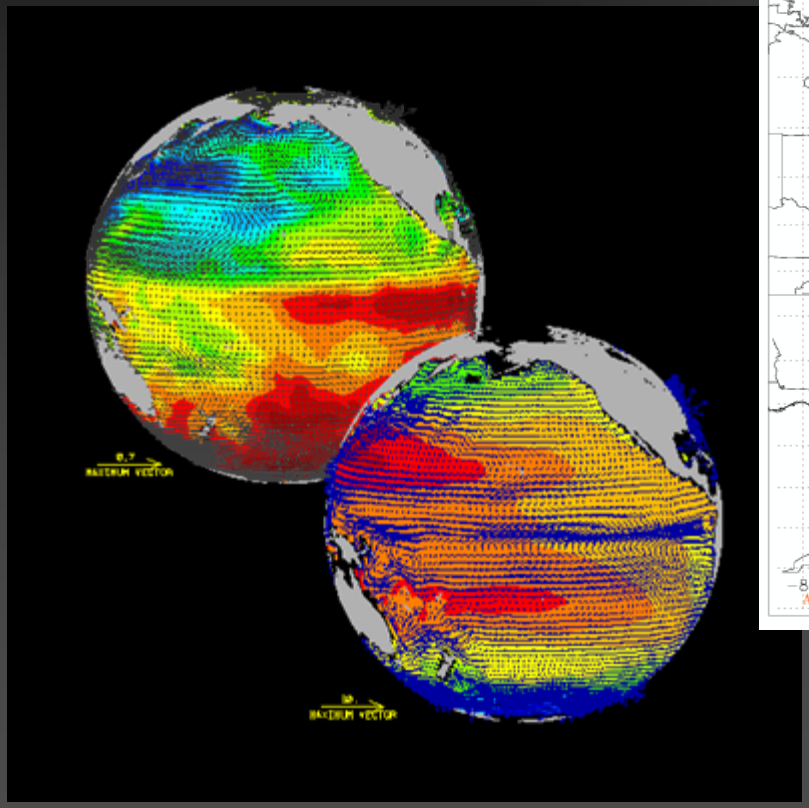
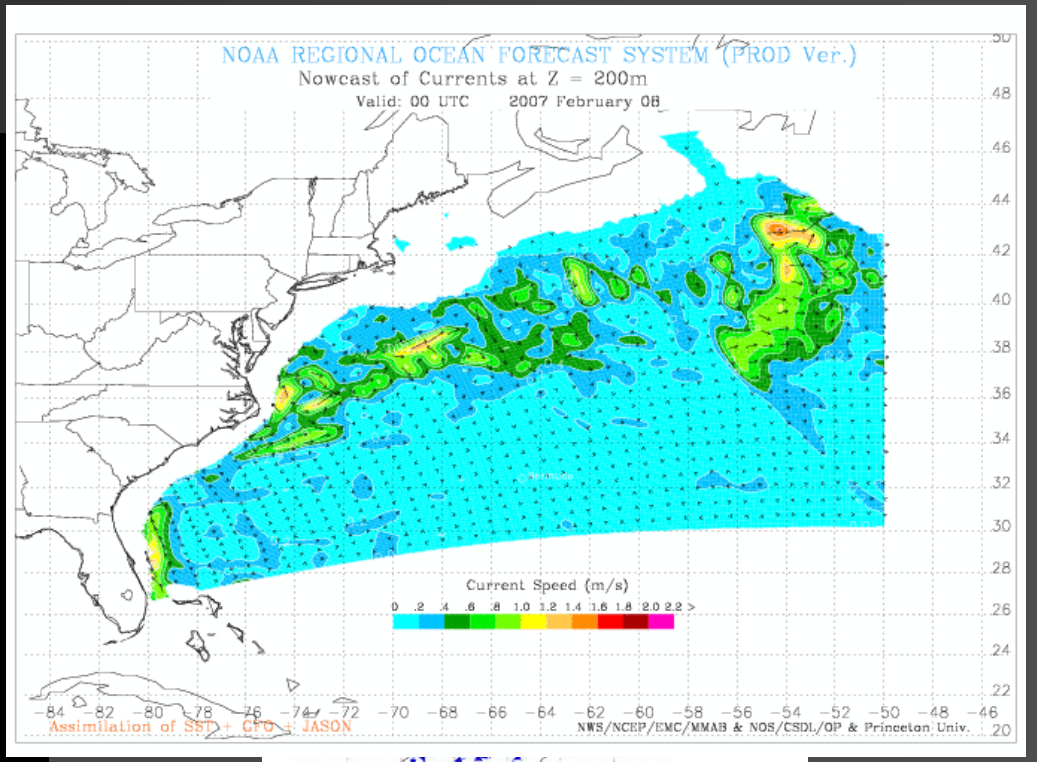
Briana Sullivan (Flow vis)
Matt Plumlee (COF)

Students

Pete Mitchell (Flow vis)
Stephan Schaeffer (Flow vis)
Dan Pineo (Flow vis).

We can do better than this





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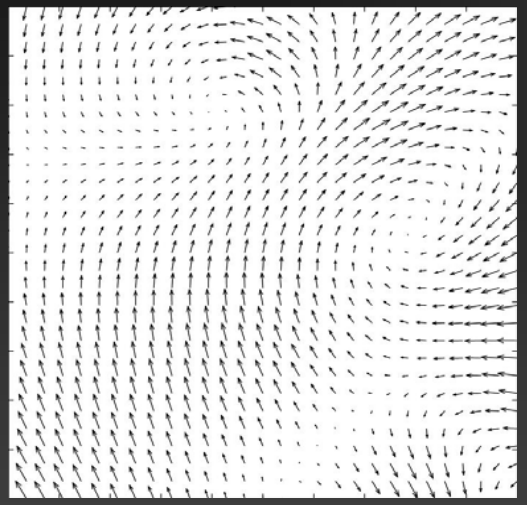
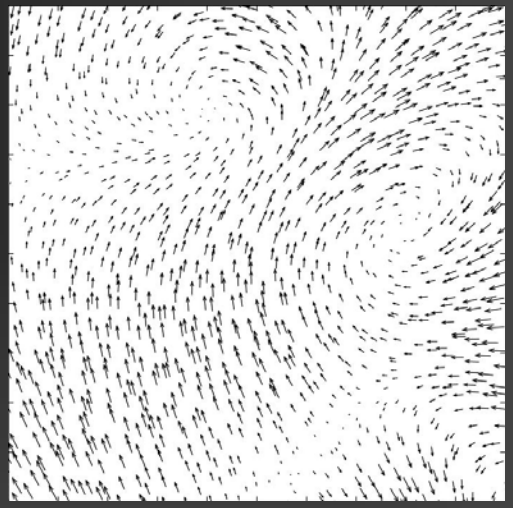
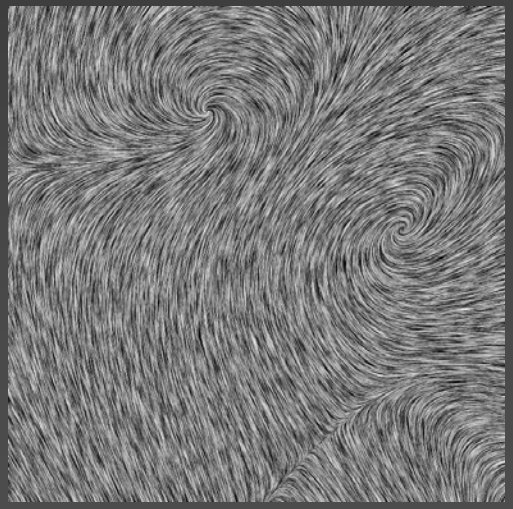
2D Flow visualization

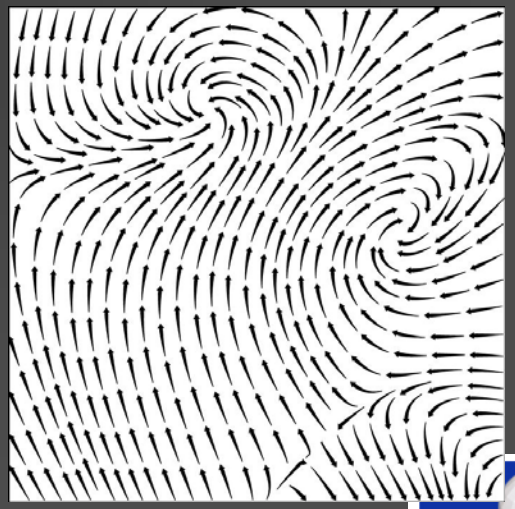
- A landmark study Laidlaw et al





- Orient
- VSB
- Magnitude





- Image courtesy of D.Laidlaw et al. (2001)

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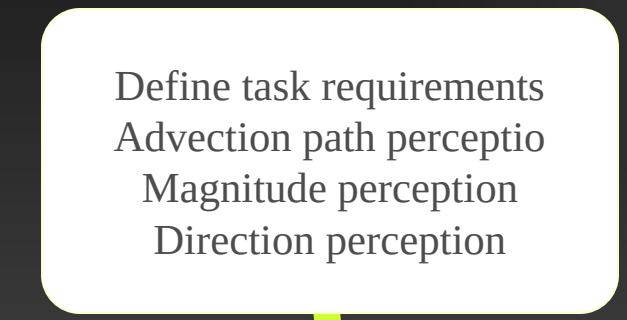
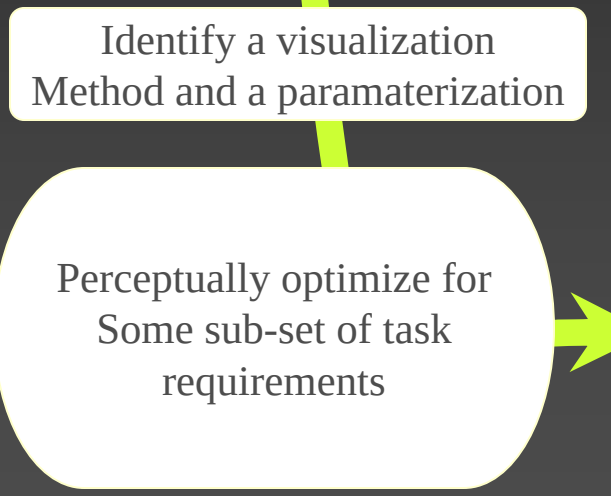
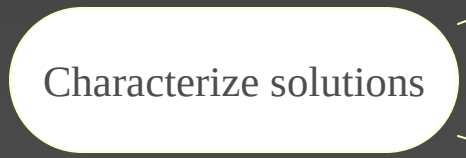
An optimization process (NSF ITR)



Streaklets:
A generalized
Flow vis technique



Human In the Loop



Actual solutions
Guidelines
Algorithms
Theory

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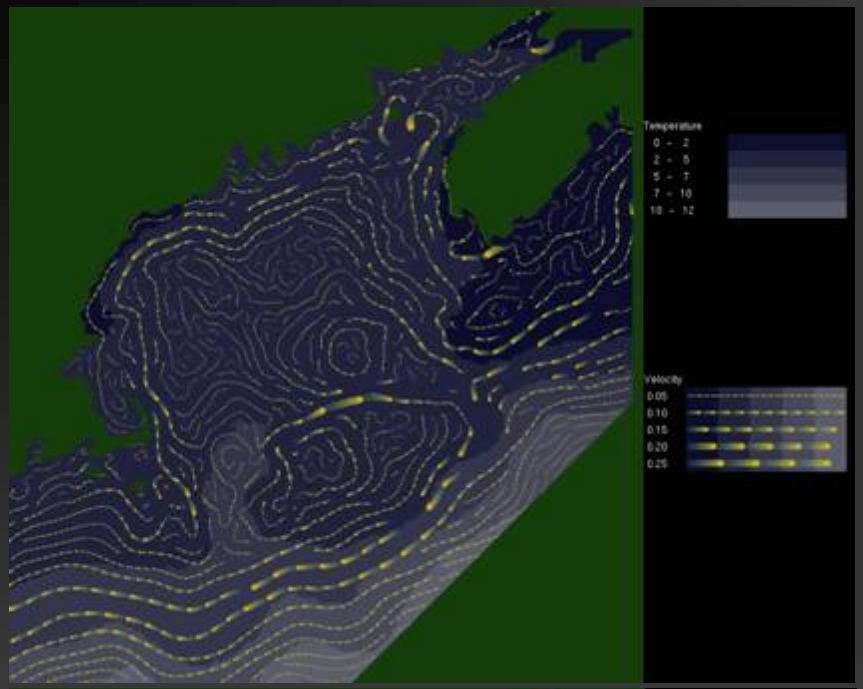
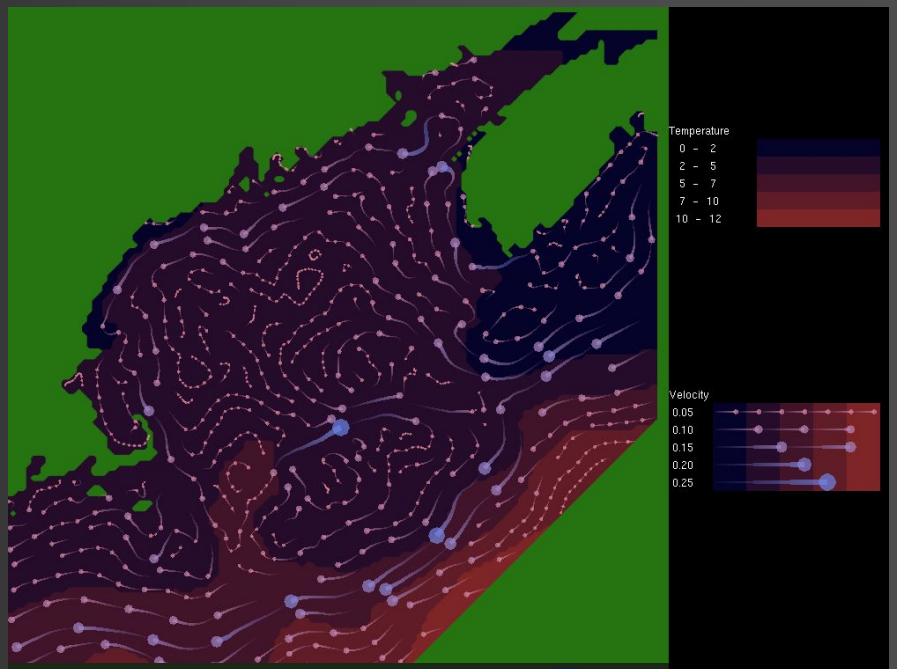

Temperature
0 - 2
2 - 5
5 - 7
7 - 10
10 - 12
Velocity
0.05
0.10
0.15
0.20
0.25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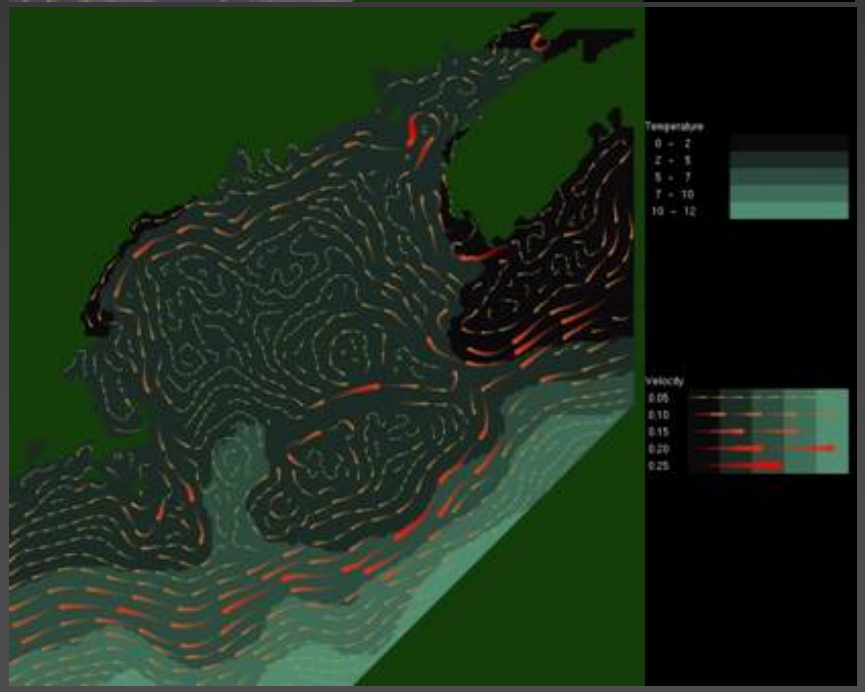
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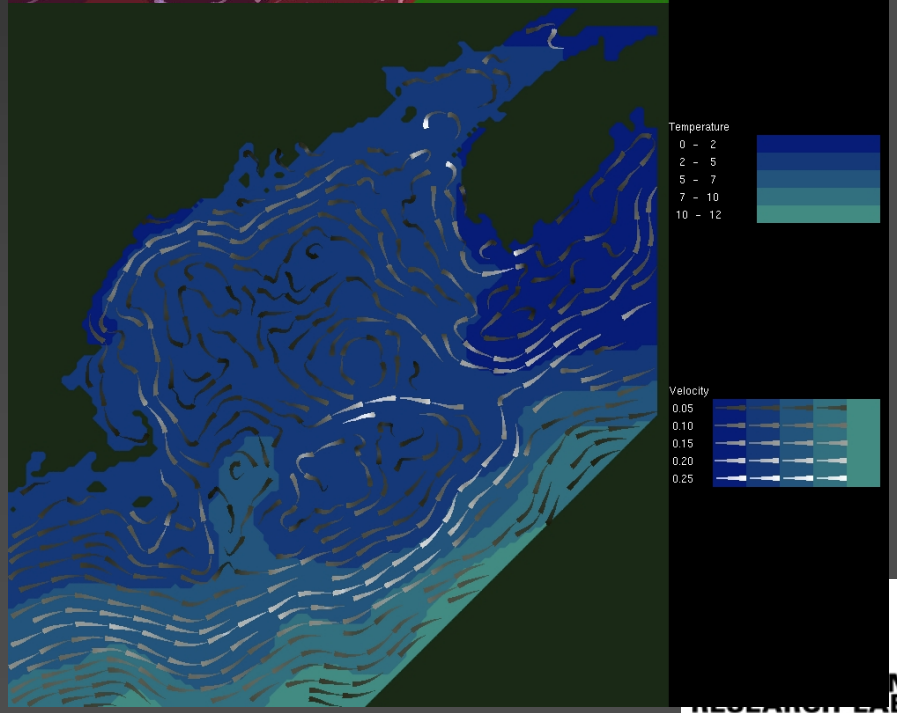
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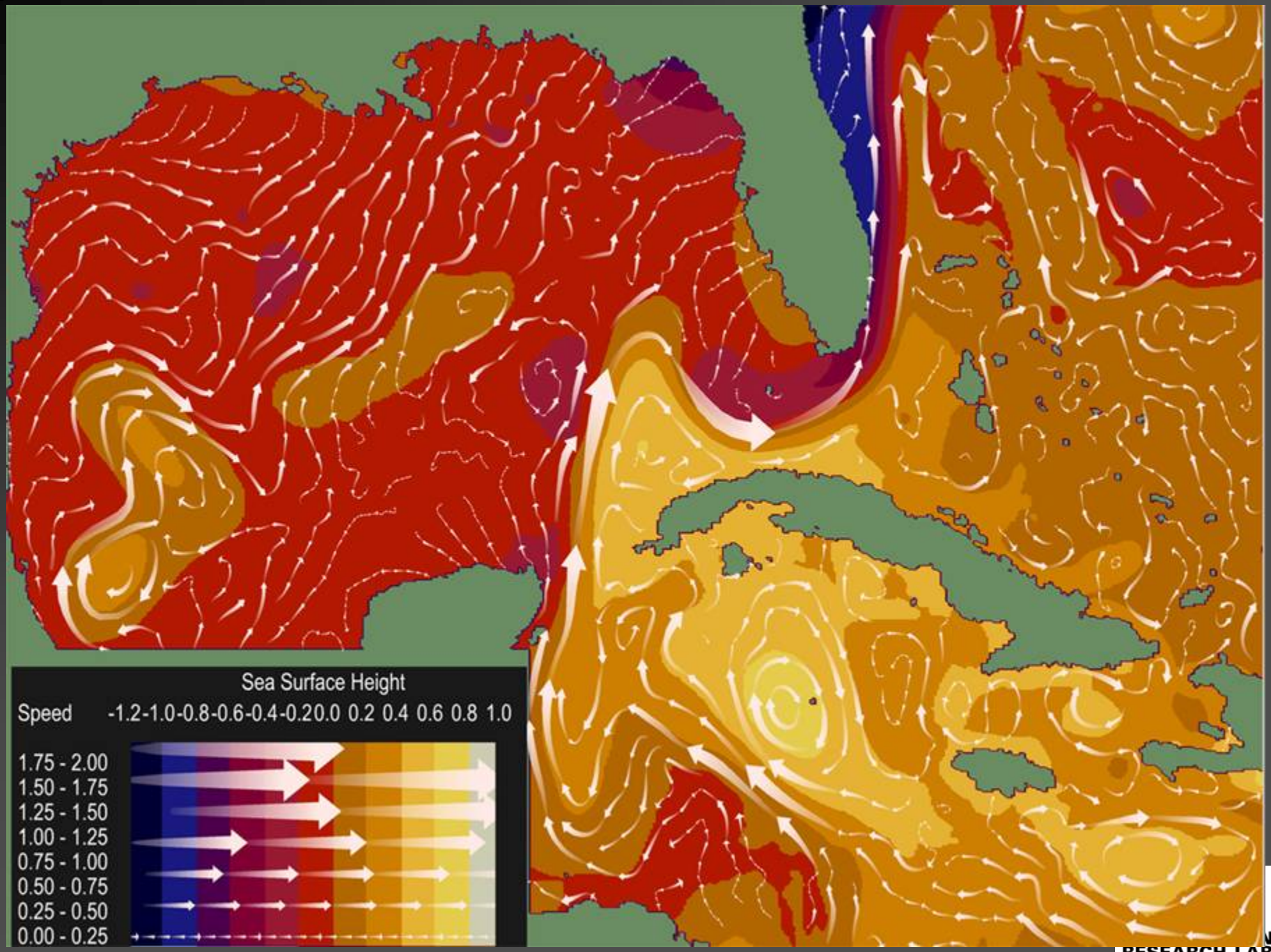
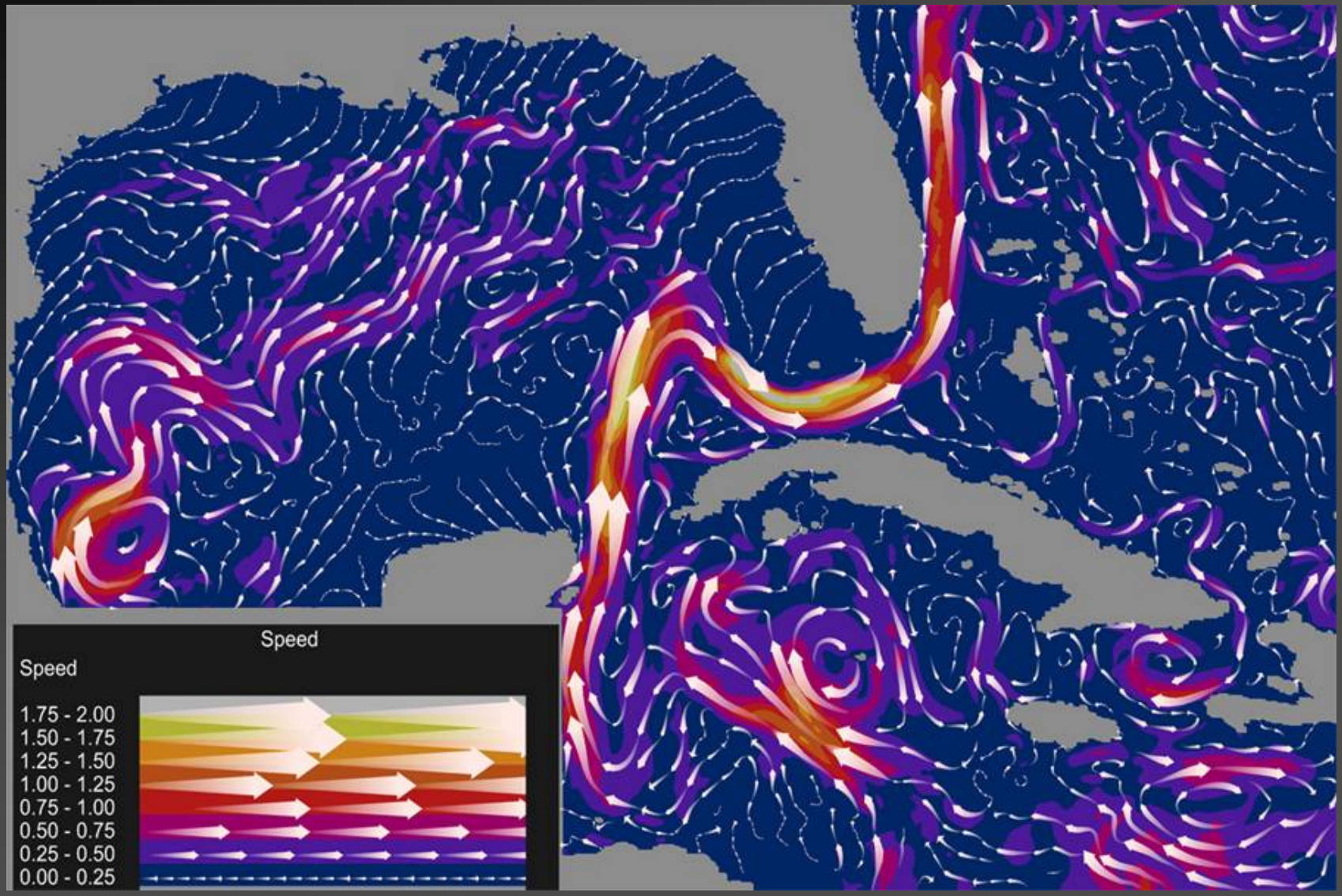
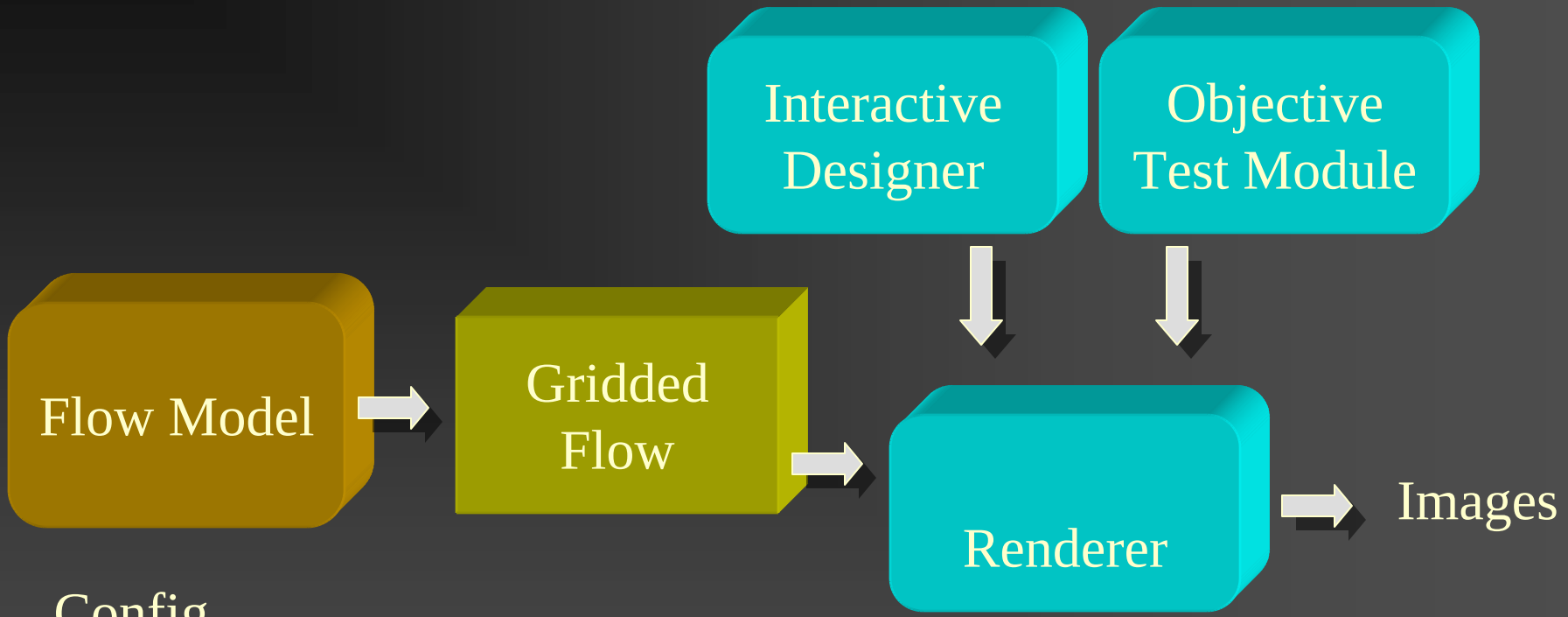


RESEARCH LAB



DATA VISUALIZATION RESEARCH LAB

Production software



Config

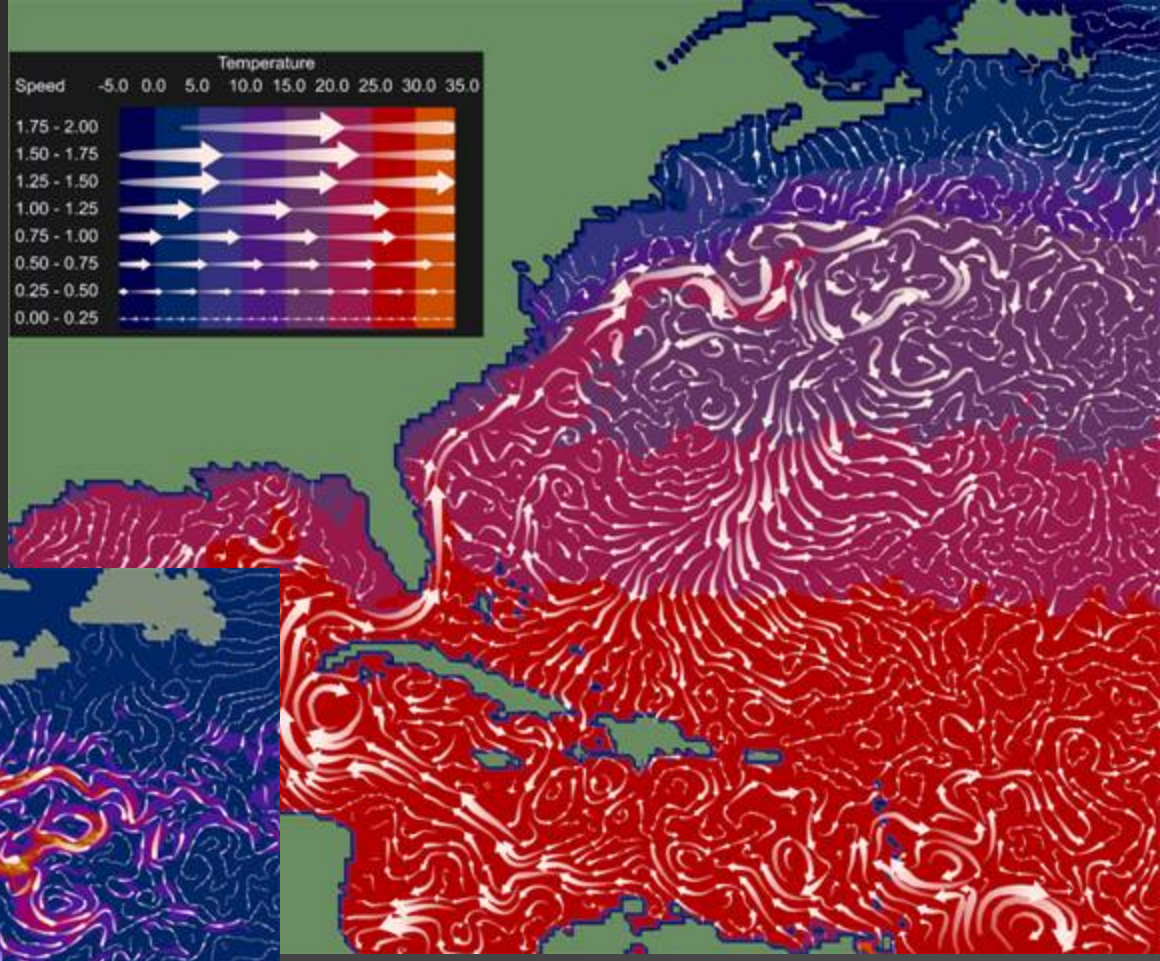
Source file
Region
Background
Etc

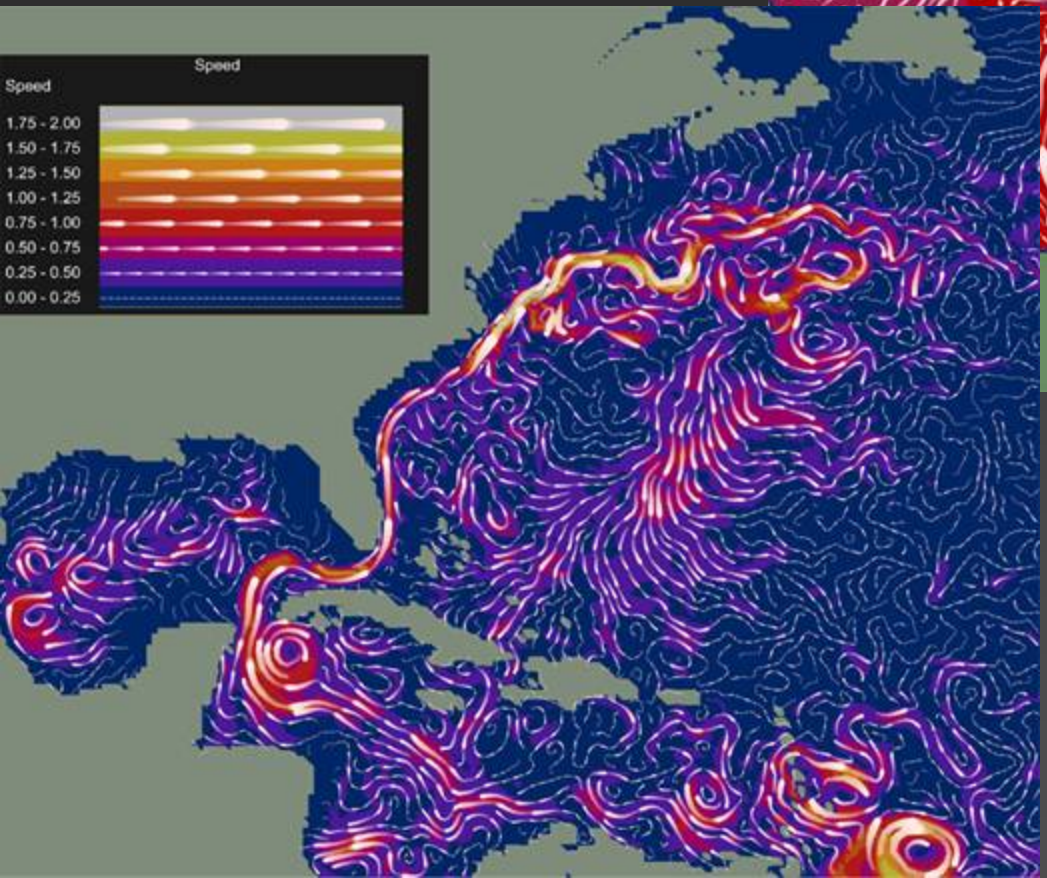
Ofs models
FVCOM
HYCOM
etc

Rendering parms

Grib2, NetCDF

DATA VISUALIZATION RESEARCH LAB





DATA VISUALIZATION RESEARCH LAB

Next steps

- Integration into NowCoast with geotif output
- Animated output

Next steps

- 3D flow vis and marine mammals

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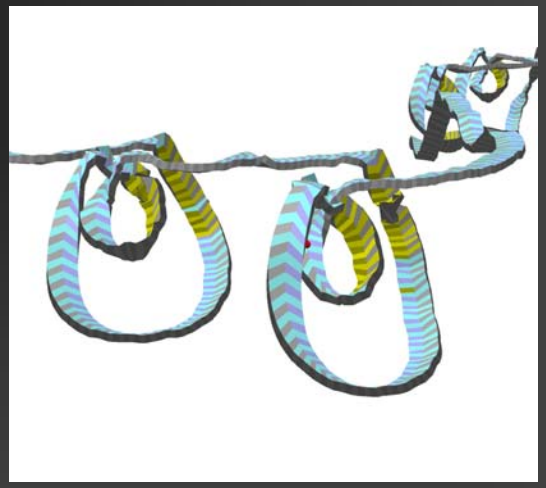
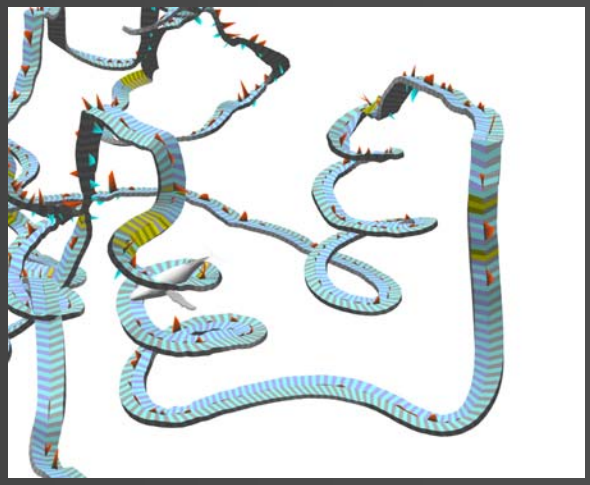
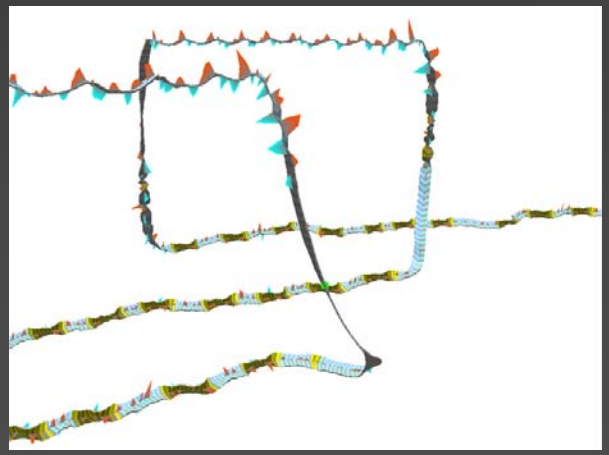
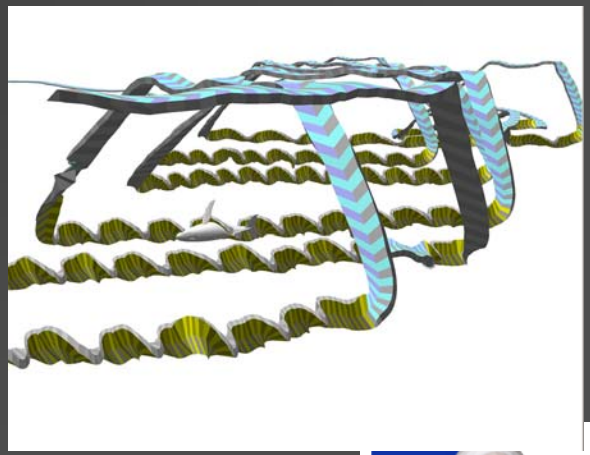
Marine Mammals and Currents

Flow direction
Internal waves
Fronts









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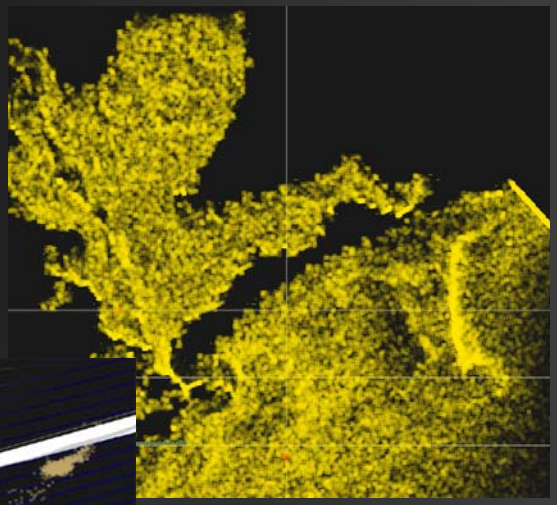
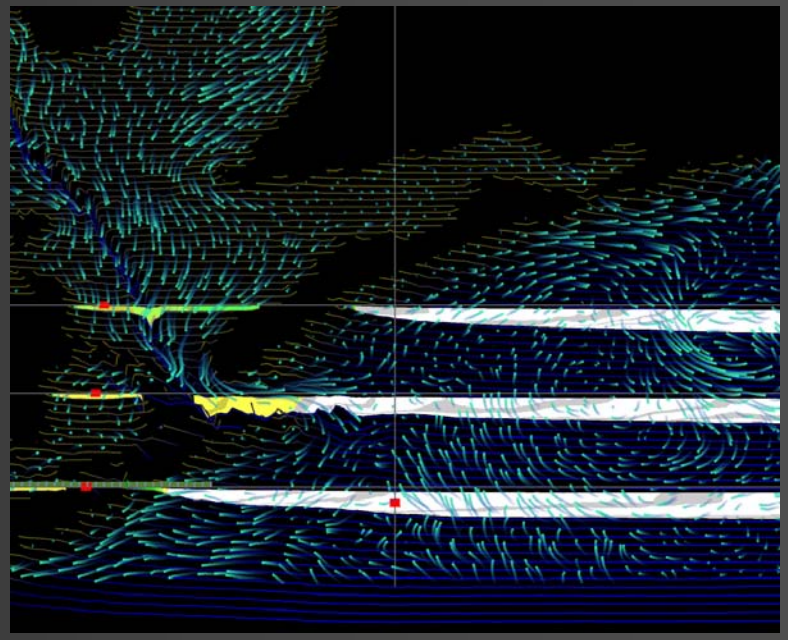
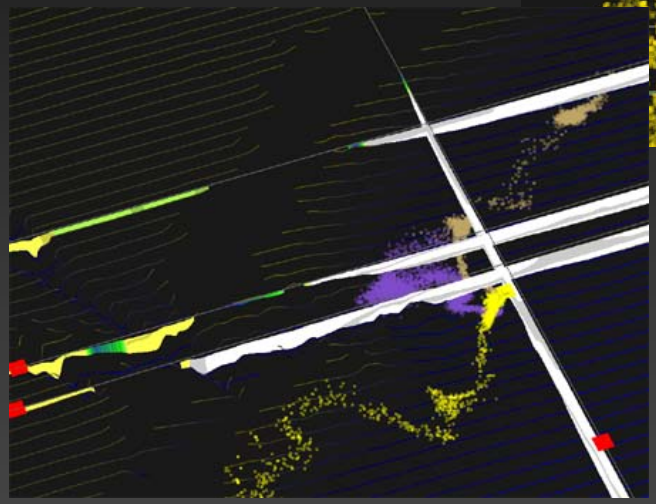
3D Flow Visualization Package for Operational Forecast Models

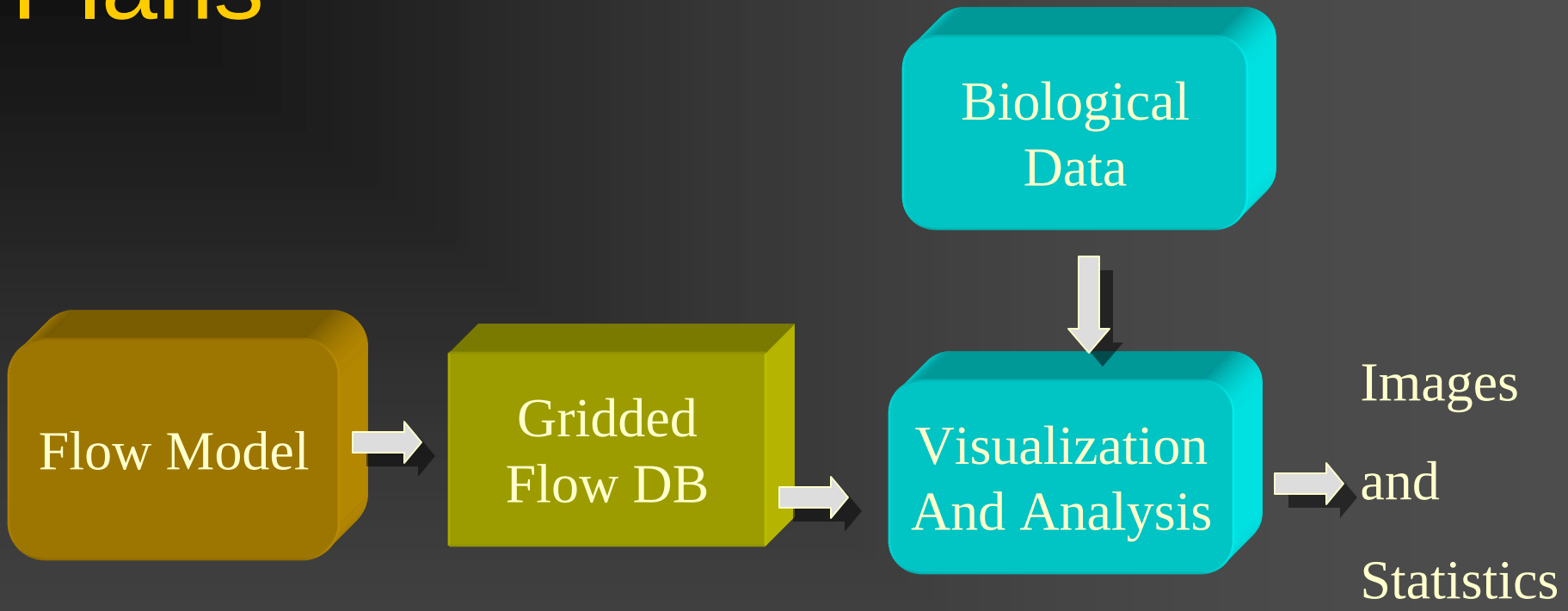






Status: Has 3D/2D modes.
Particle dye poles.
Streaklet Field or Particle fiel
Temp/salinity profiles
Works with space mouse.

Plans



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Plans

- Integrated Atmospheric and Ocean flow visualization. (Carlos Lozano, NCEP)
- Integrating flow models with behavior data (e.g. whales).

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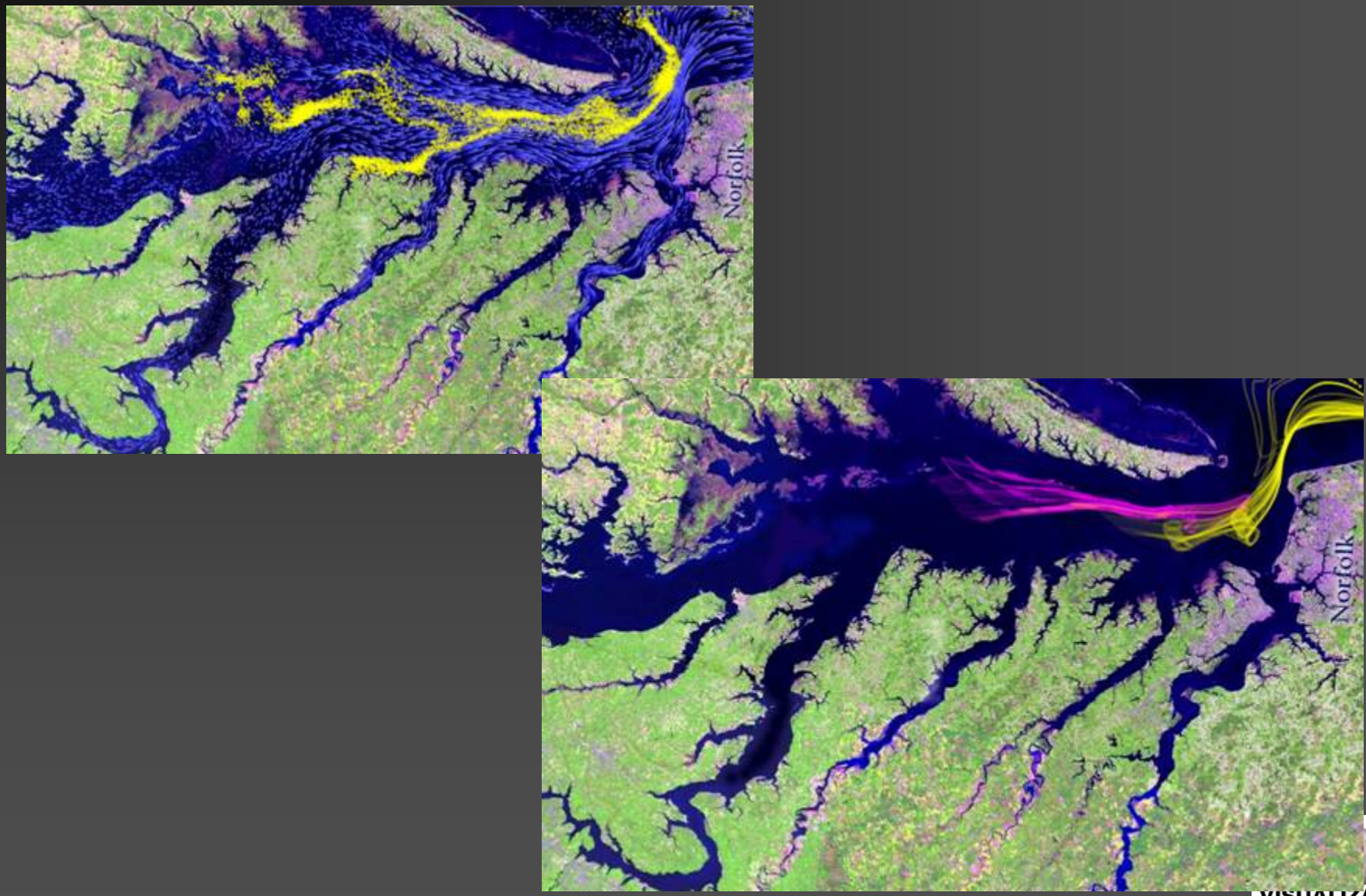
Interactive exhibits



VISUALIZATION RESEARCH LAB

Tools

- Dyepots
- Streaklet flields (for overall patterns)
  - Each streaklet is a pathline traversed as time progresses – can be moved up and down
- StreakPots to emphaize major currents
- Size Pots – equatorial upwelling

- Can be used to “paint” in the flow model and reveal flow patterns