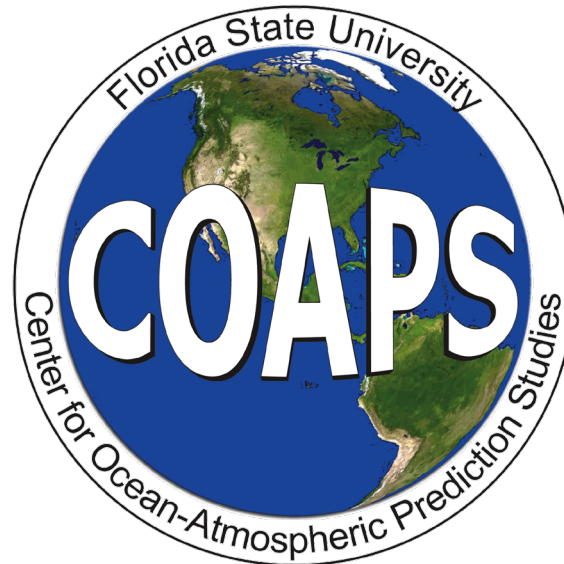


# Using SWOT to assess the realism of km-scale models

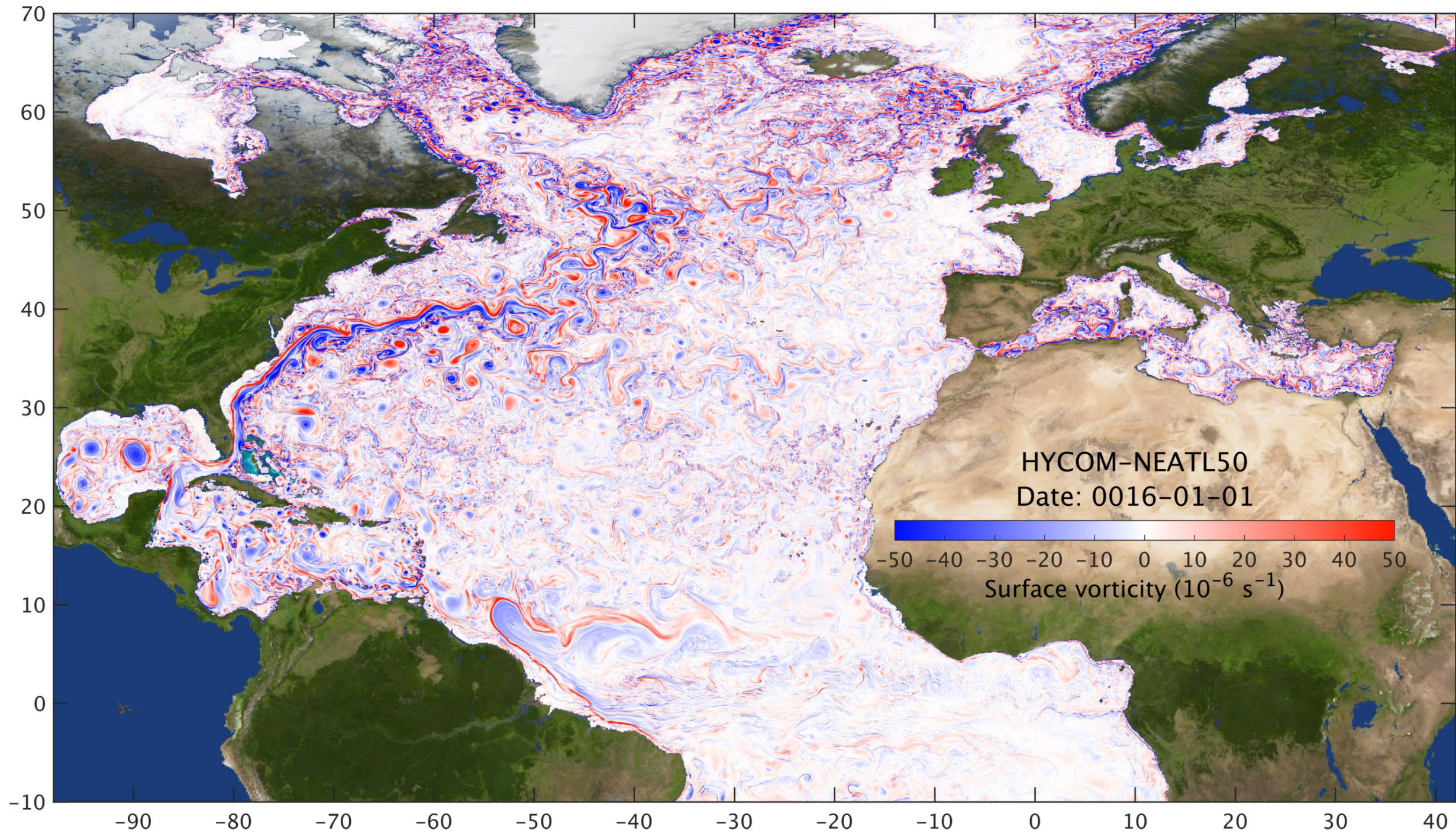
Eric Chassignet

Florida State University

In collaboration with X. Xu, A. Bozec, A. Wallcraft , and T. Uchida



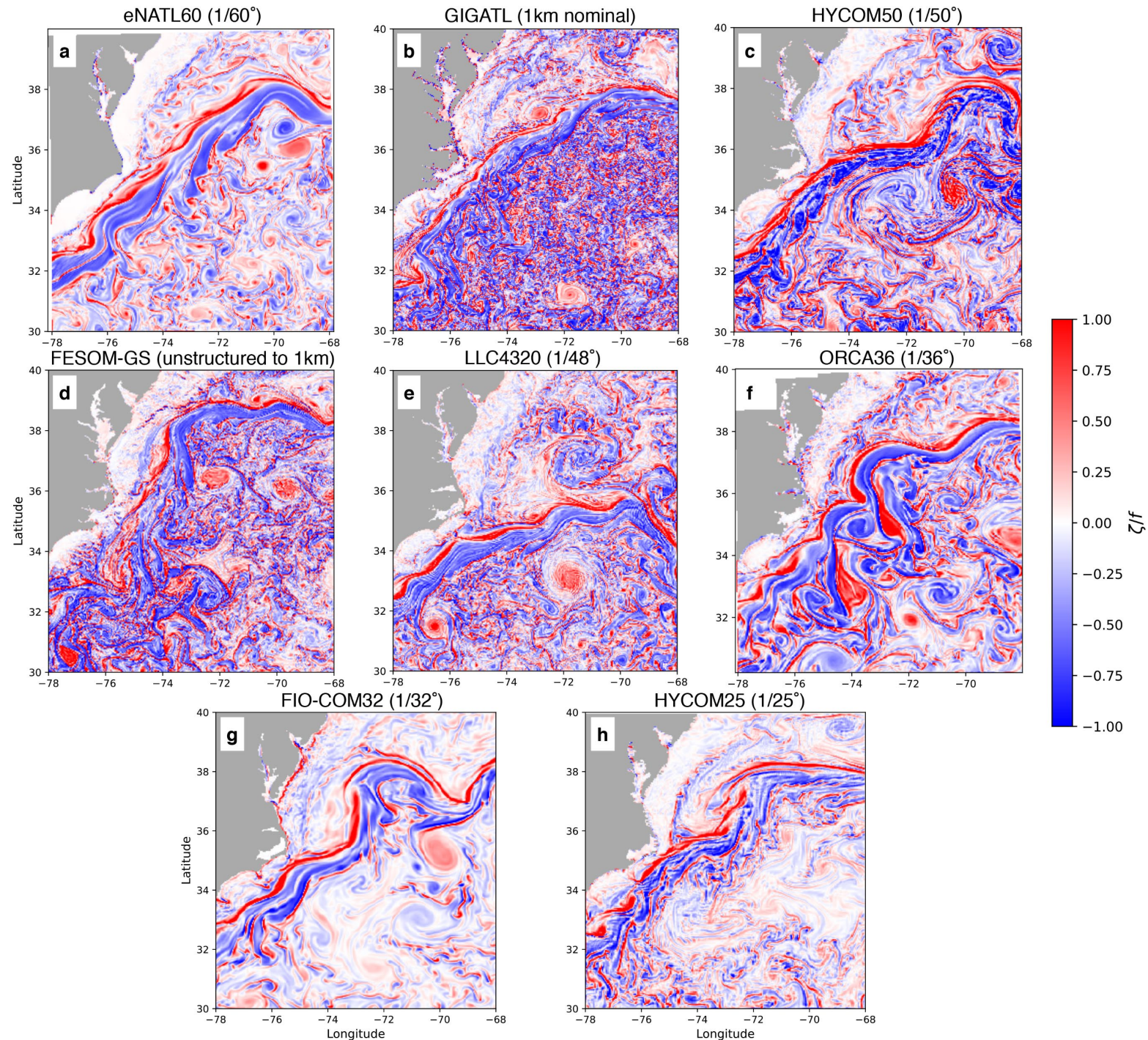






# Uchida et al. (2022)

- Five 1-km scale models with very different behavior.
- Which one is closer to reality?
- Can SWOT help?
- CNES postdoc (to be hired-start date July 24) to quantify differences and identify what can be compared to SWOT data
  - Spectral analysis
  - Log-likelihood of (sub)mesoscale structures (machine learning)
  - Energy cascade analysis



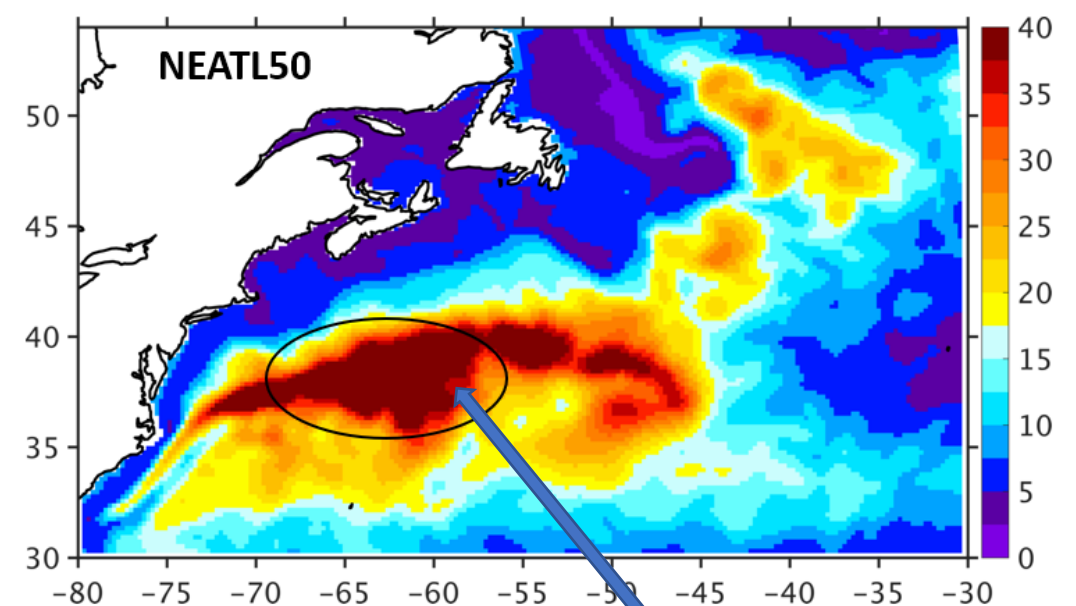
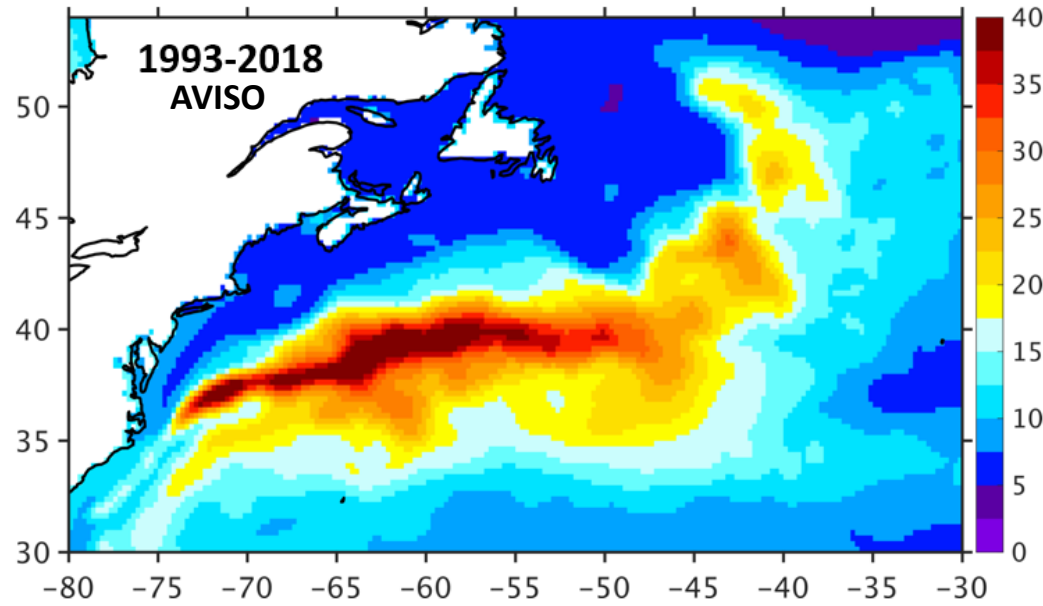
# Km-scale models are sensitive to numerical/physical choices

- Bathymetry
- Atmospheric forcing

=> Better quantification using SWOT – examples follows

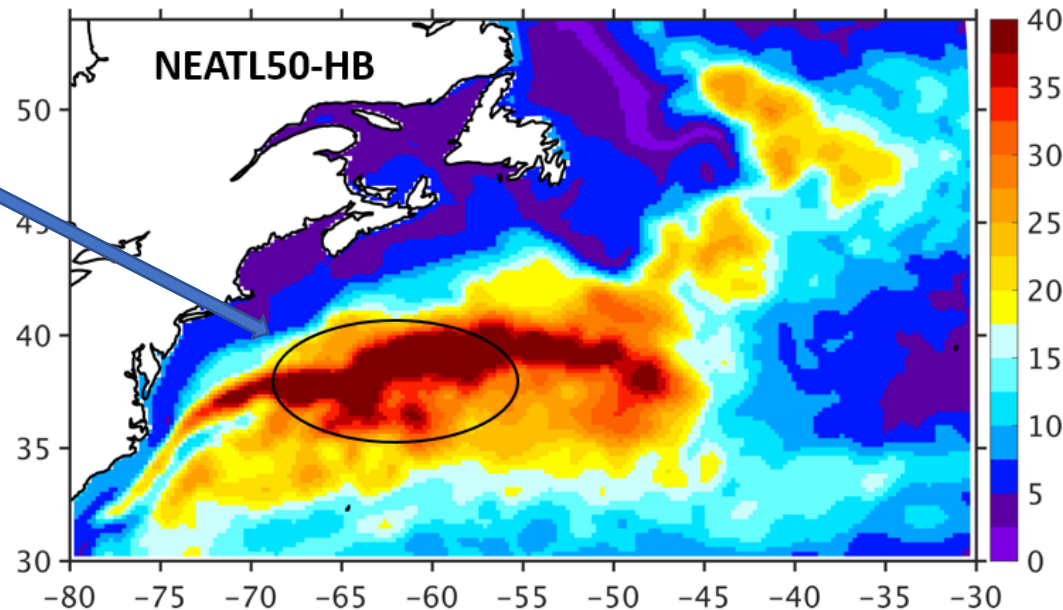


# Impact of bathymetry on surface EKE



Bathymetry resolution  
= 6 km

Bathymetry resolution  
= 1.5 km

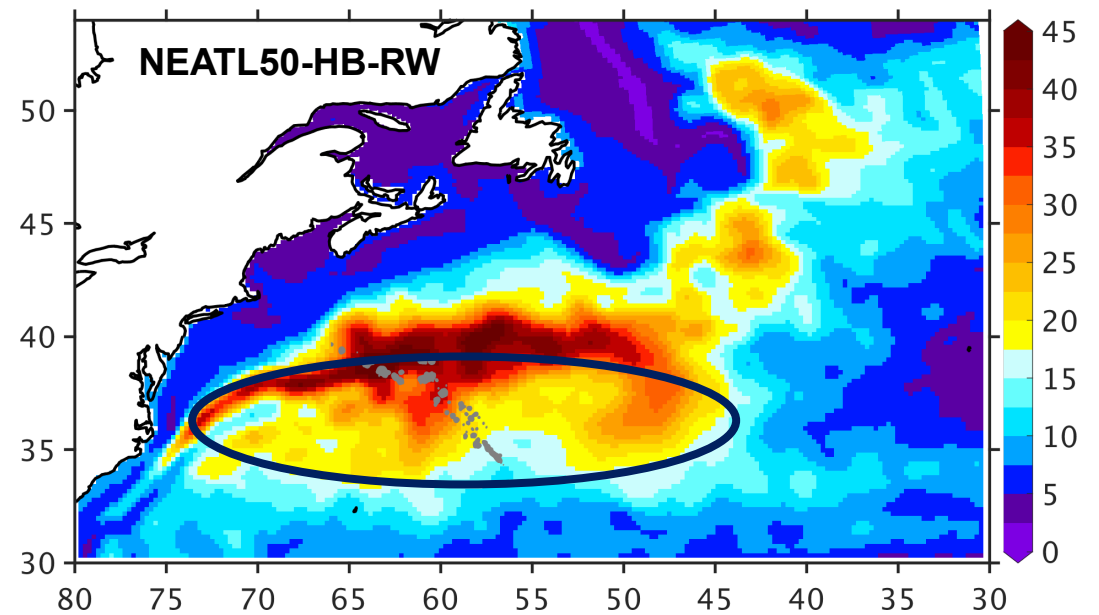
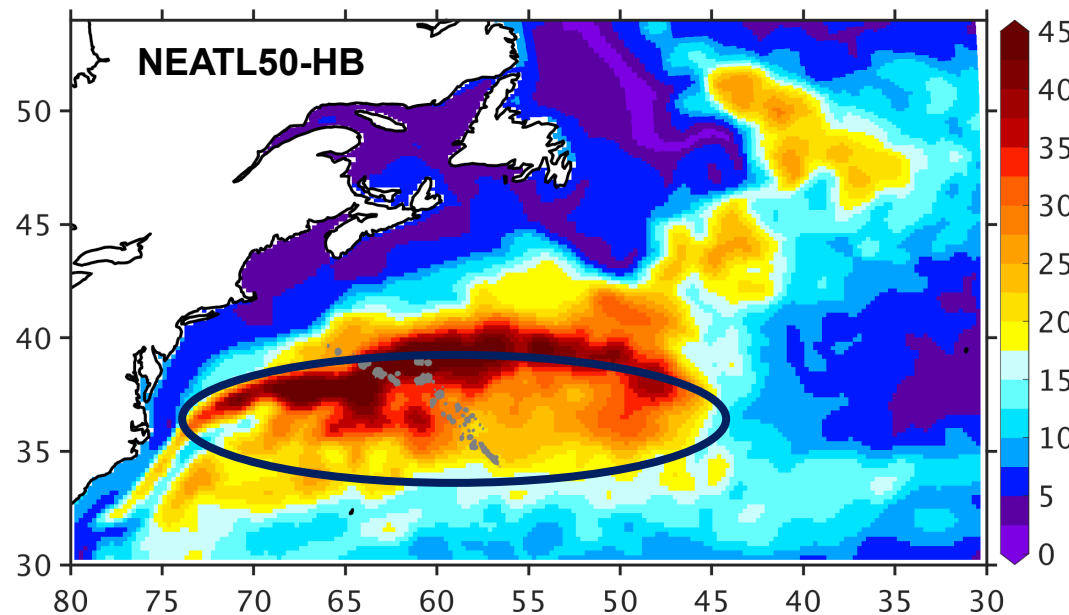
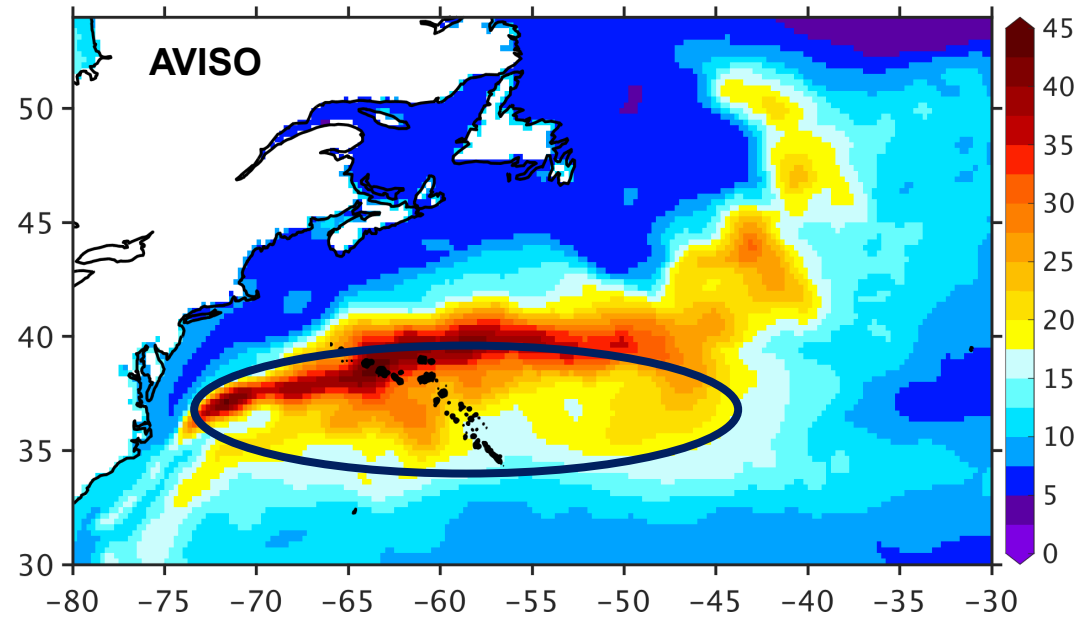


Chassignet et al. (2023, JPO)



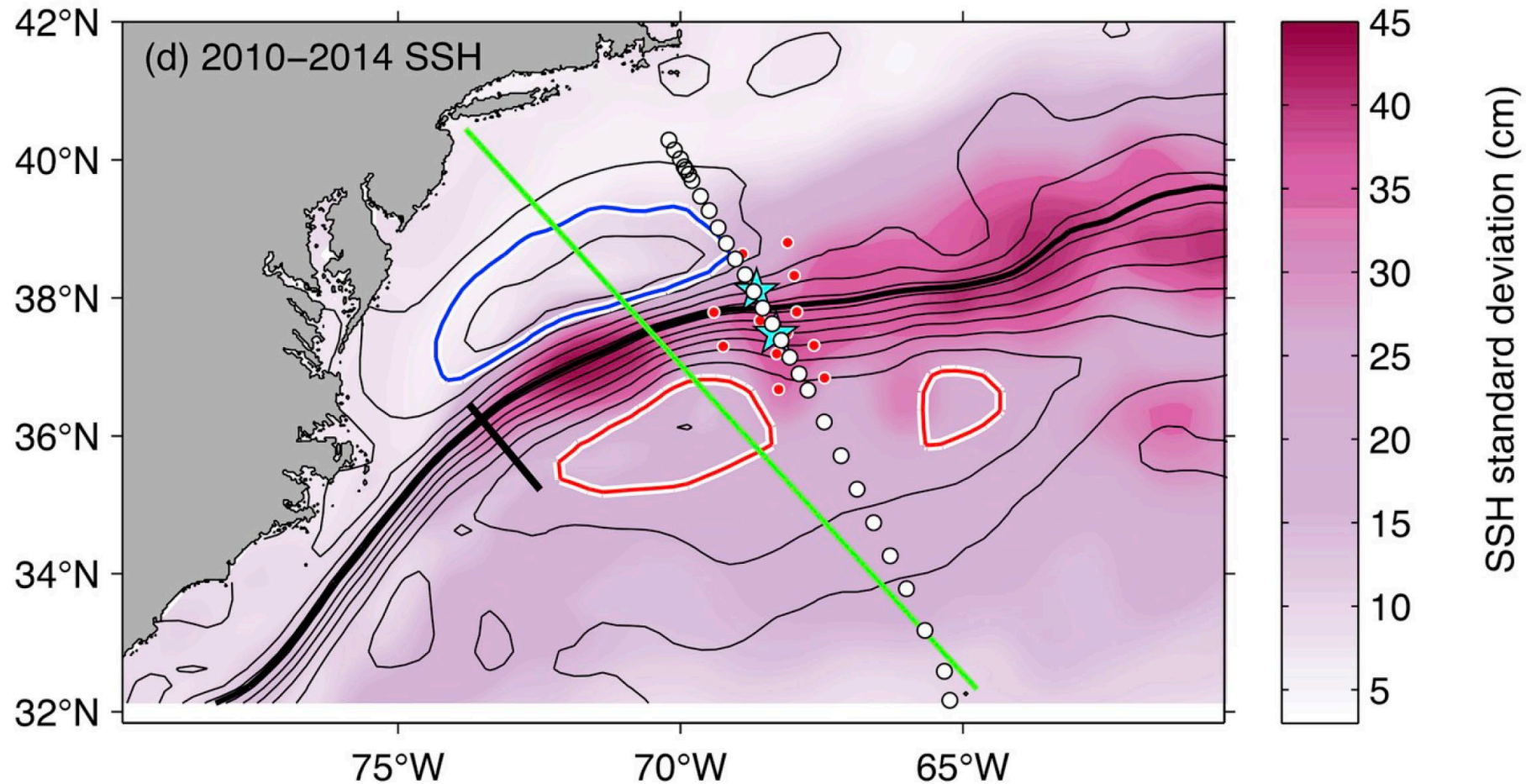
# Relative wind impact on surface EKE

Renault et al.  
(2019) proposed  
a 70% relative  
wind stress  
formulation to  
take into  
account ocean-  
atmospheric  
feedback.



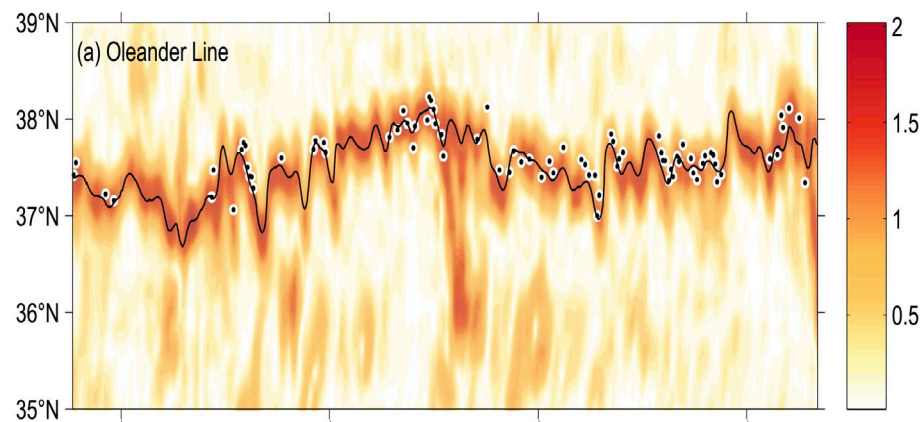


# Comparison with Oleander & W line results (Andres et al., 2020)



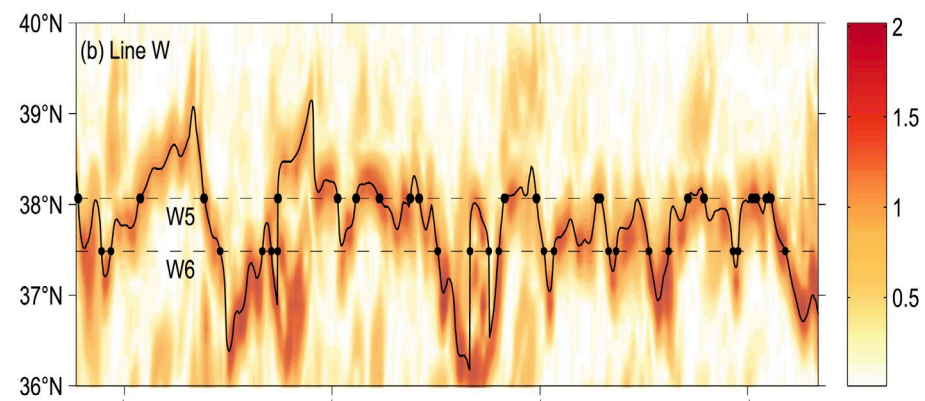


# Oleander-Line

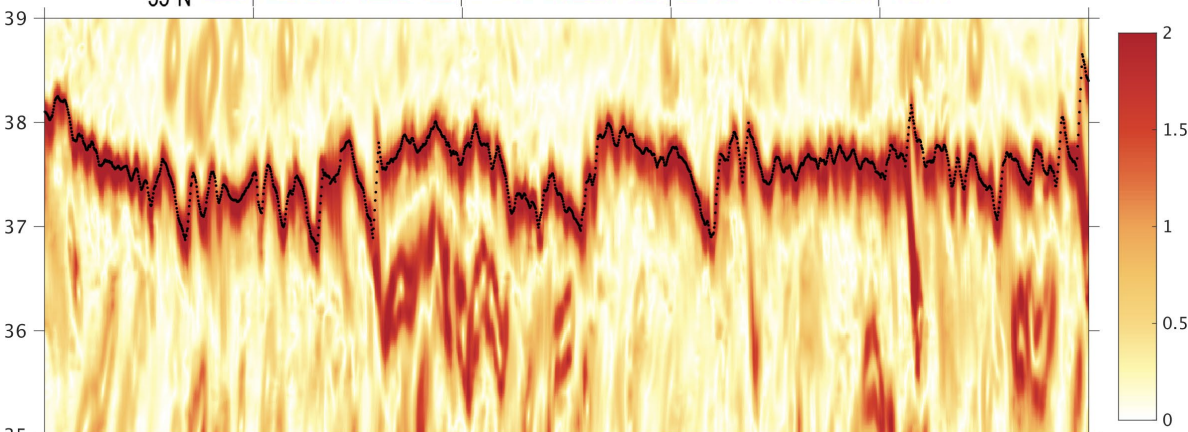


## Observations

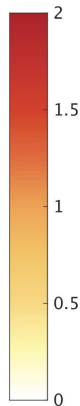
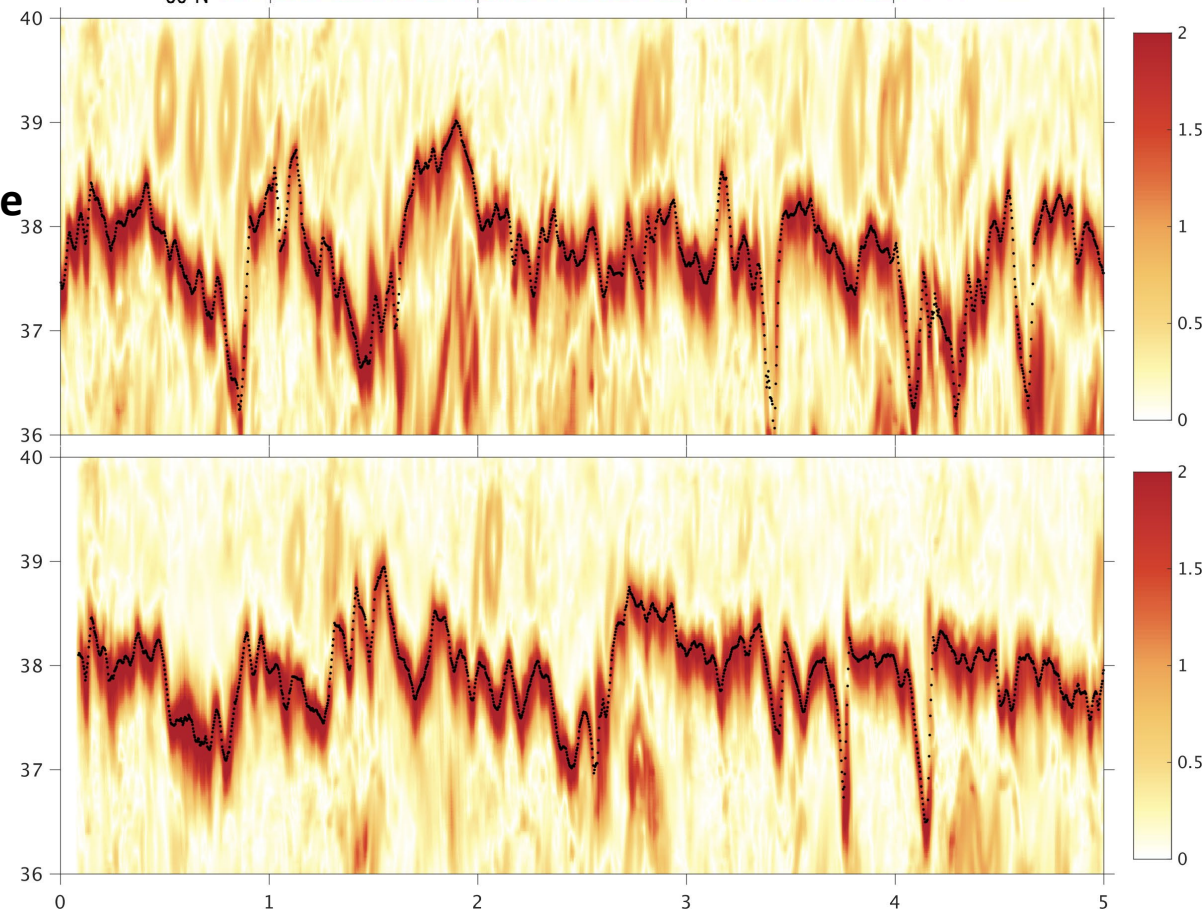
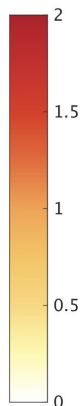
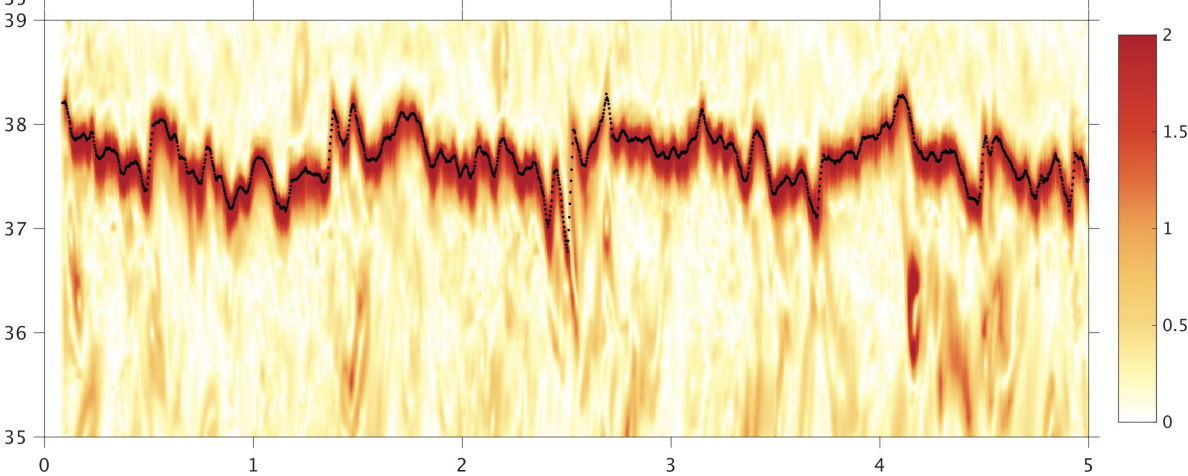
# W-Line



## Absolute Wind



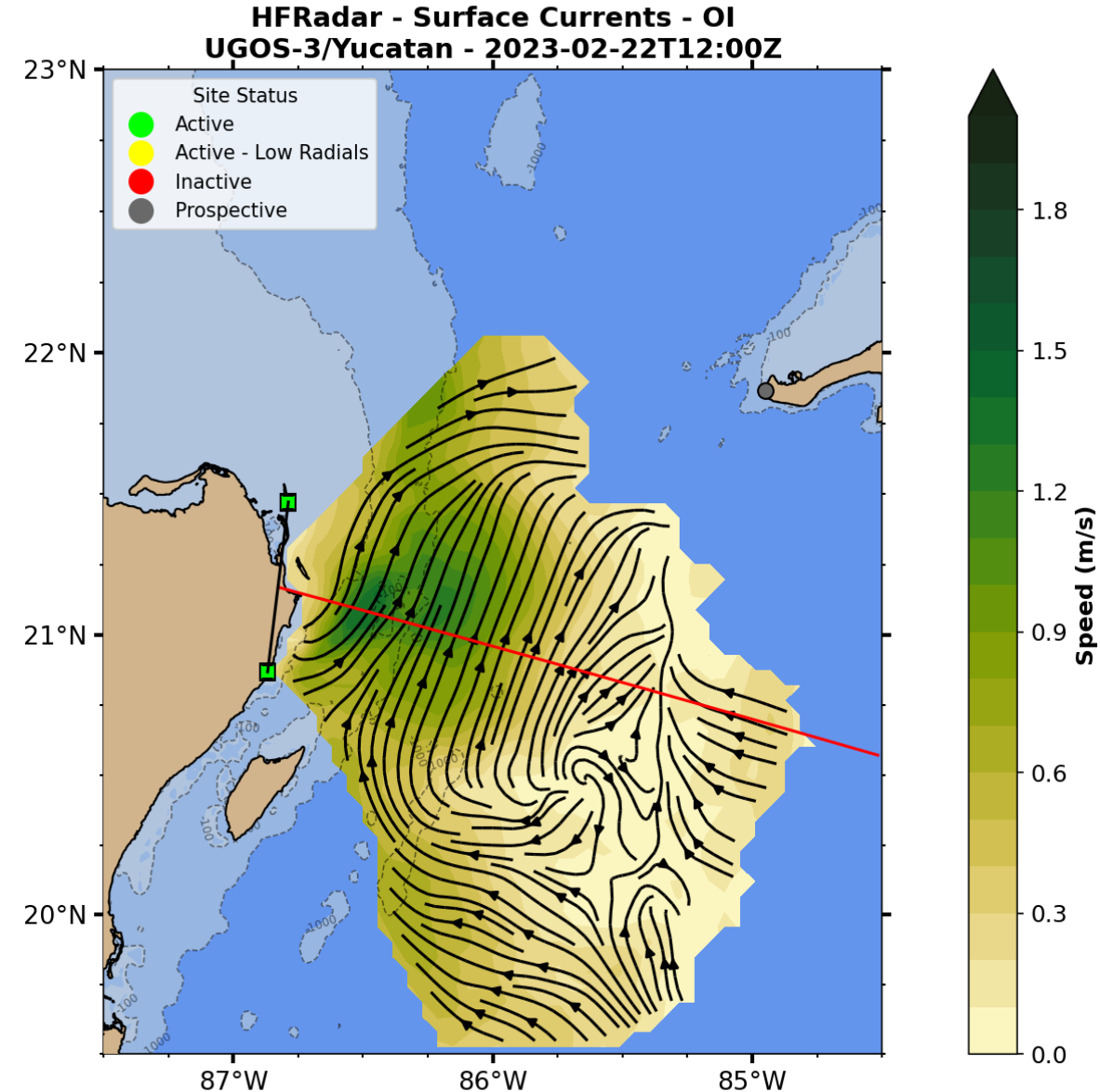
## Relative Wind





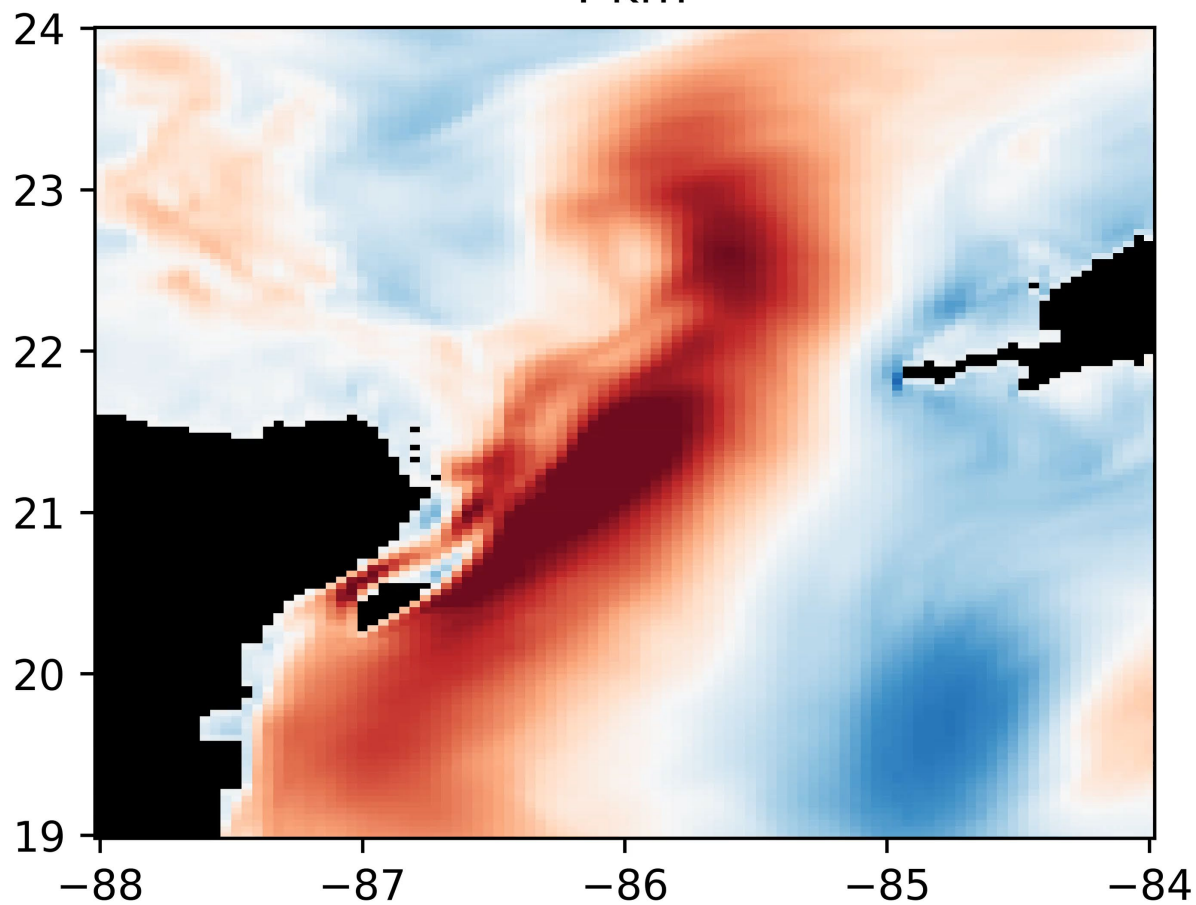
# Impact of resolution on Gulf of Mexico Loop Current

1 km versus 4 km Gulf of Mexico  
HYCOM configuration

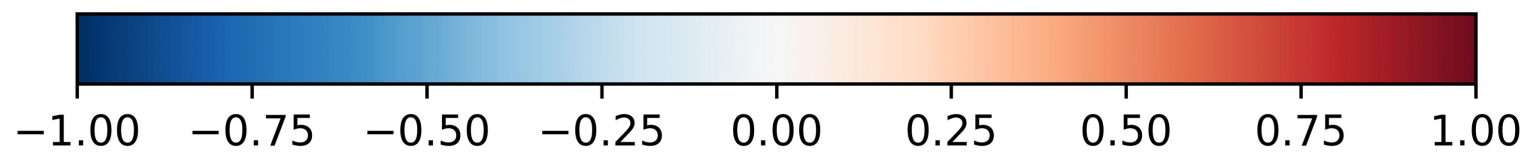
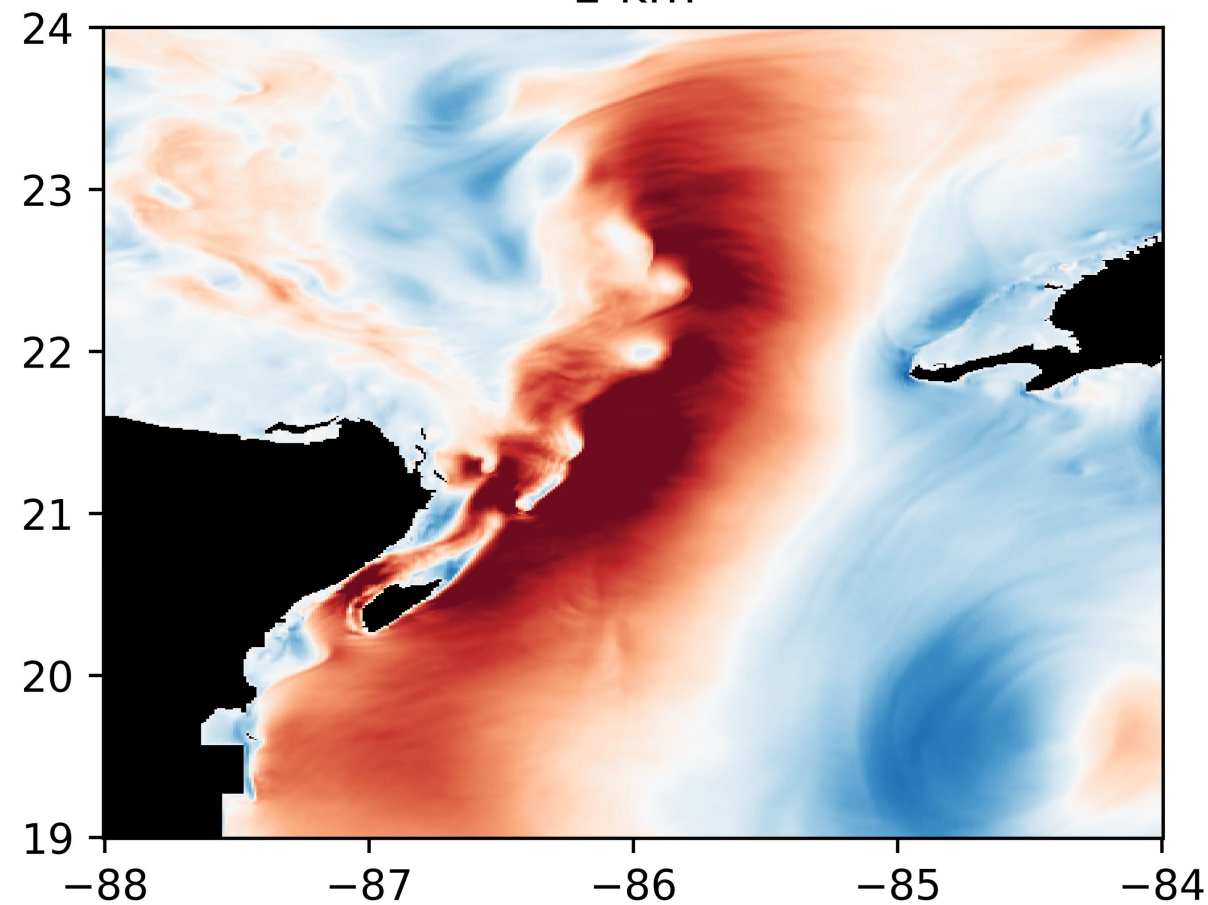


v-velocity, Date: 2020-01-22:00

4 km



1 km





v-velocity, Date: 2020-01-22:00

