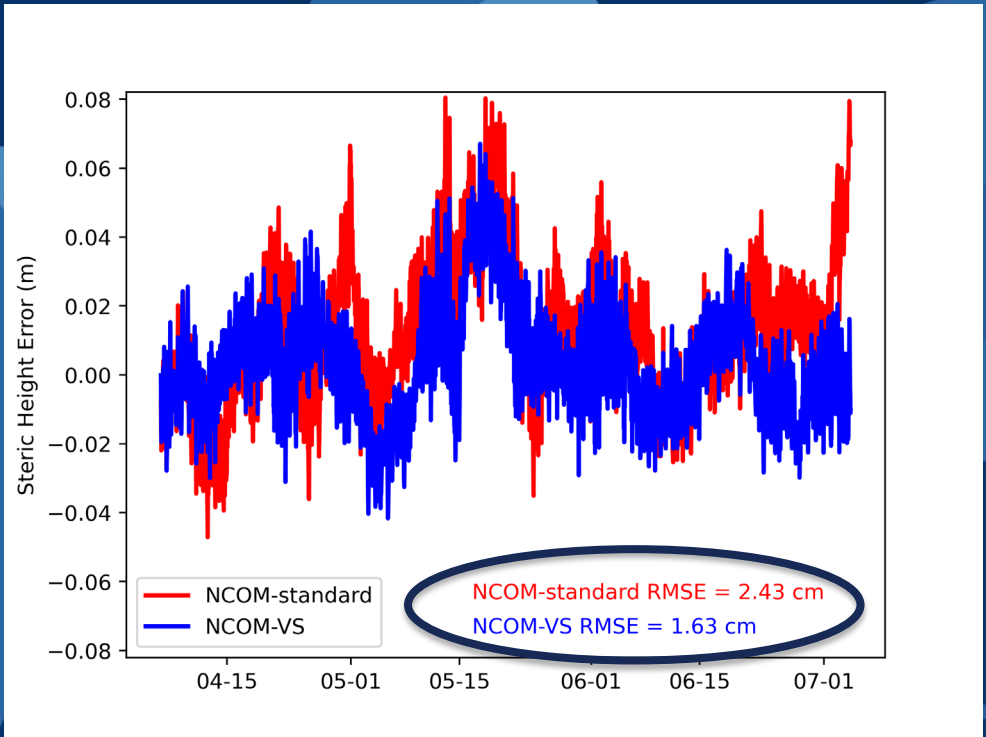
Assimilative ocean modeling during SWOT cal/val and next steps



Joseph M. D'Addezio[1]

Gregg A. Jacobs[1], Chris Dehaan[2], Brent Bartels[2], Clark Rowley[1], and Jackie May[1]

[1]Naval Research Laboratory, Ocean Dynamics and Prediction, Mississippi USA

[2]Peraton, Mississippi USA

- **Two model simulations have steric height errors of ~2 cm.**
- **Data available upon request.**
- **SWOT data can be processed and we plan to assimilate them soon.**

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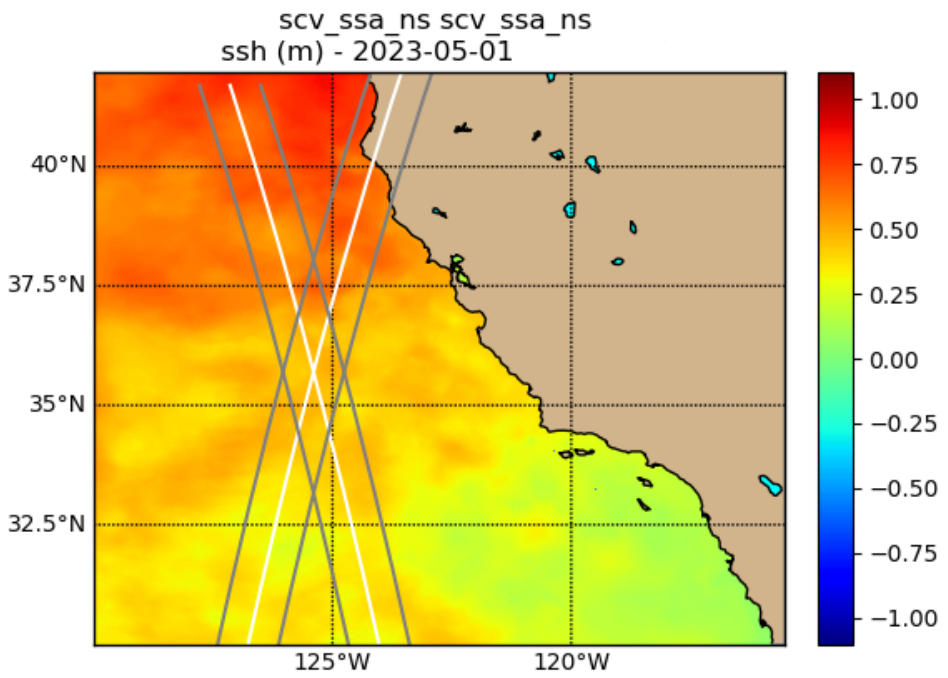
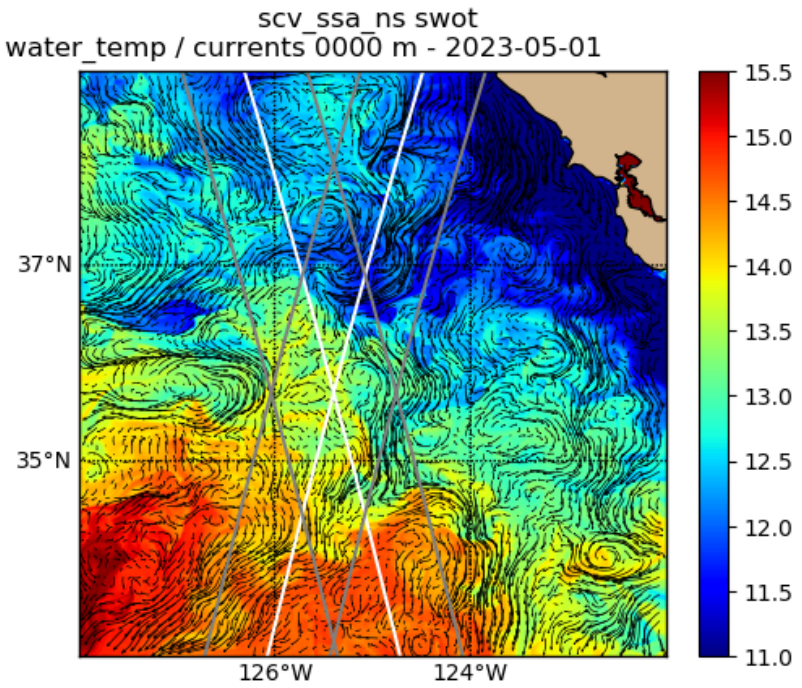
Modeling

- The SWOT cal/val region off of California was modeled during the entire exercise.
- The Navy Coastal Ocean Model (NCOM) was used.
- The horizontal resolution was 1 km with 100 vertical layers.





- All available regular observations were assimilated.
- SWOT cal/val mooring data along with associated gliders and floats were also assimilated.
- SWOT data were NOT assimilated.

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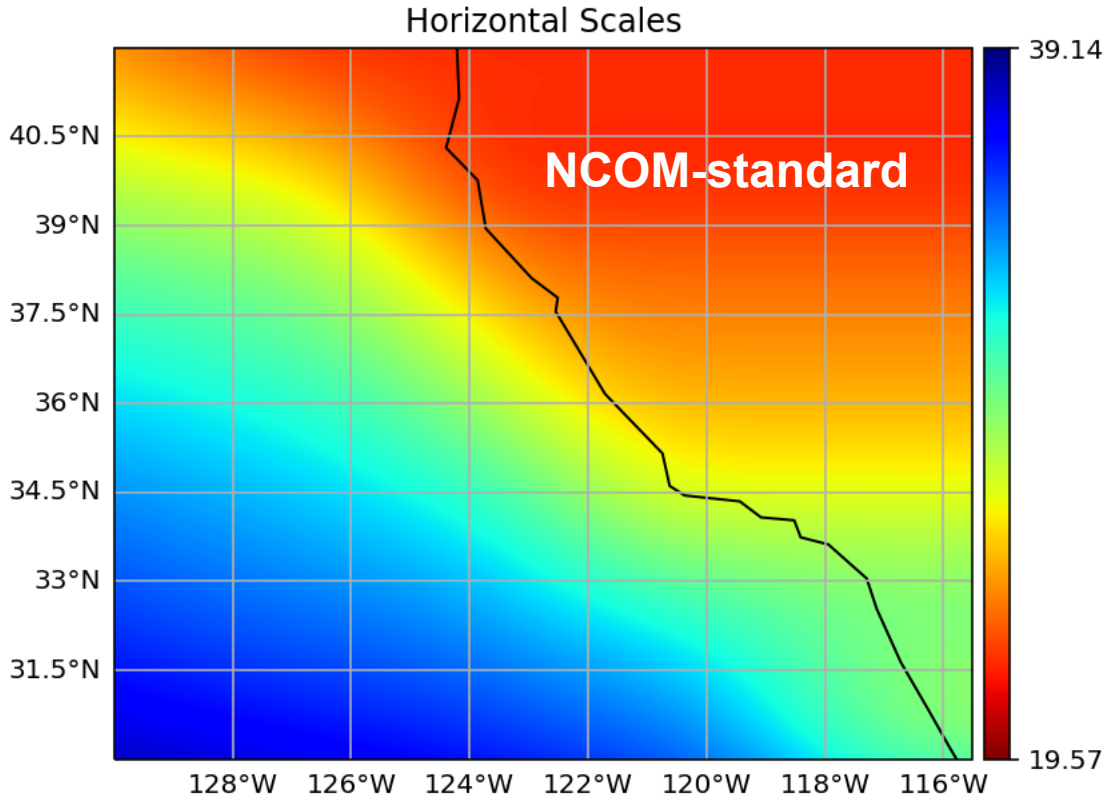
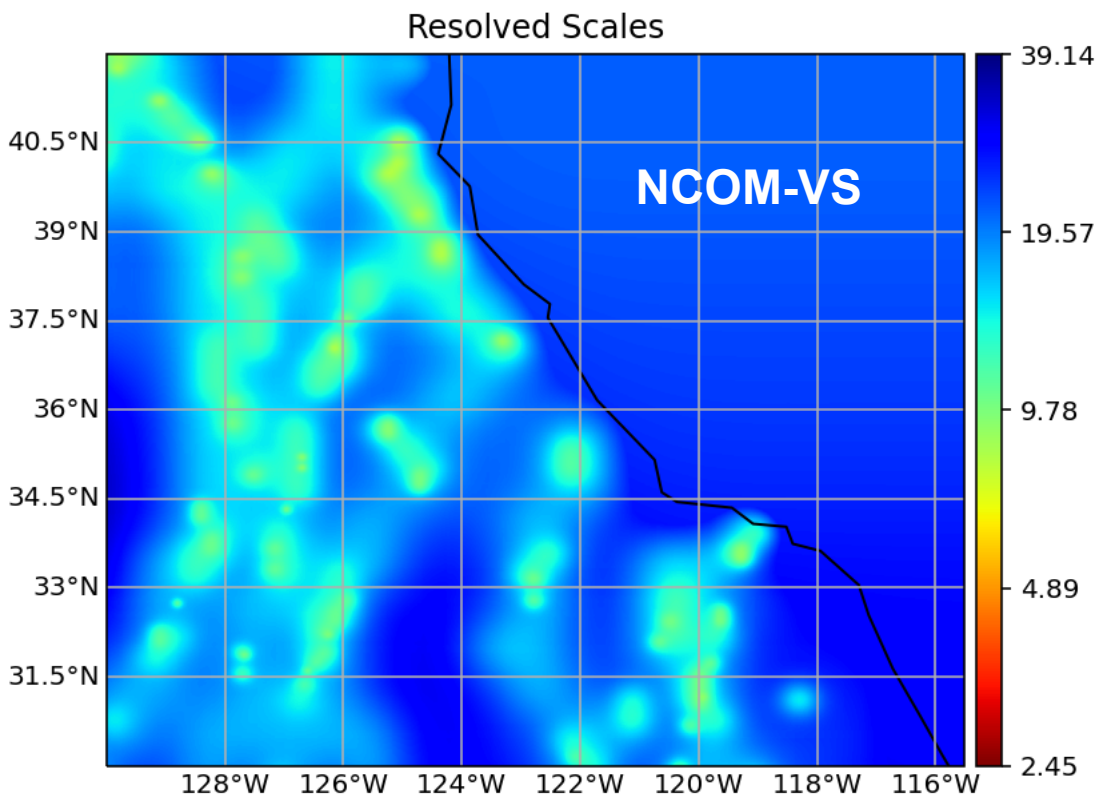
Assimilation methods

- Using the same modeling parameters in each, two simulations were created, each with unique spatial scales used in the assimilation:

1. NCOM-standard: assimilation scales based on the Rossby radius of deformation.
2. NCOM-VS: variable assimilation scales based on observation density (Jacobs et al., 2023; Ocean Modelling).





Assimilative ocean modeling during SWOT cal/val and next steps

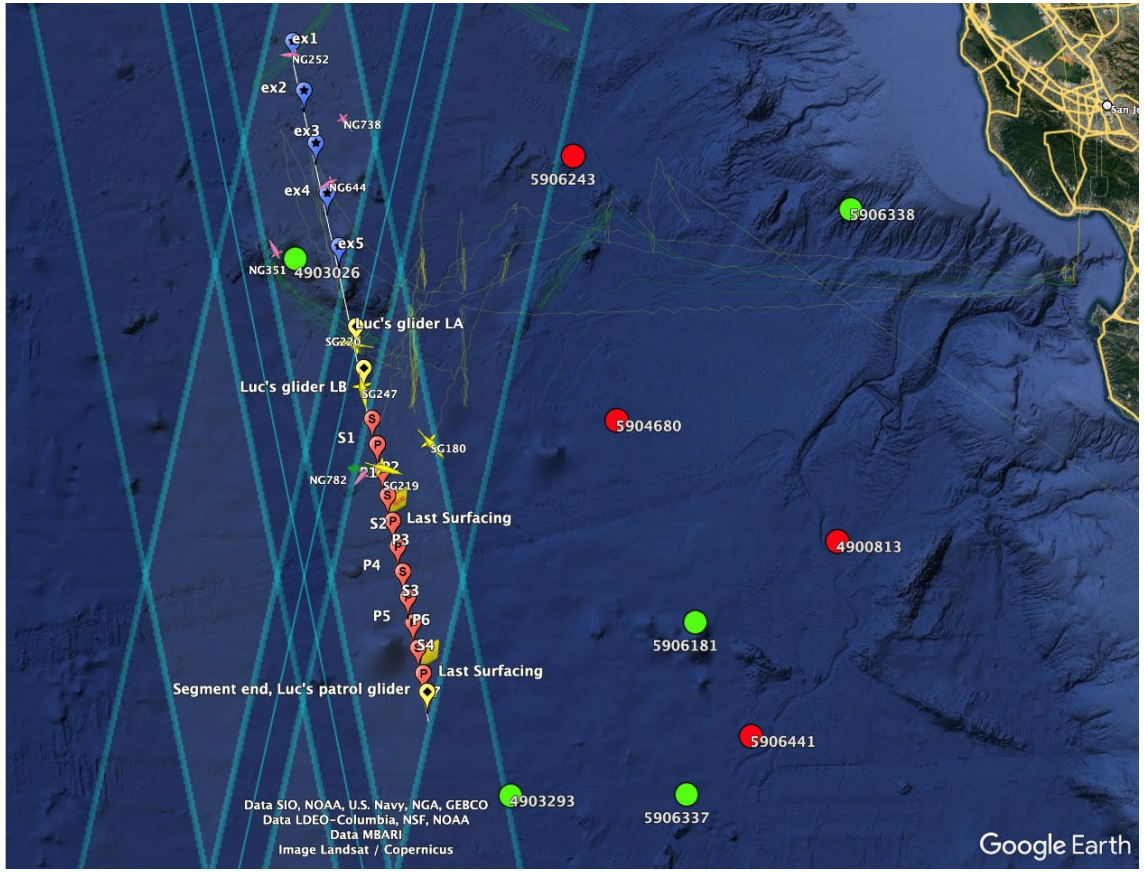
Model error evaluation

- Primary metric is 0-500 dbar integrated steric height:

$$SH = g^{-1} \int_{500}^{0} \frac{1}{\rho(S,T,P)} - \frac{1}{\rho(35,0,P)}\, dP$$

- Calculated steric height at each of the moorings and for each model simulations at the same approximate locations and times.

Credit: NASA/JPL



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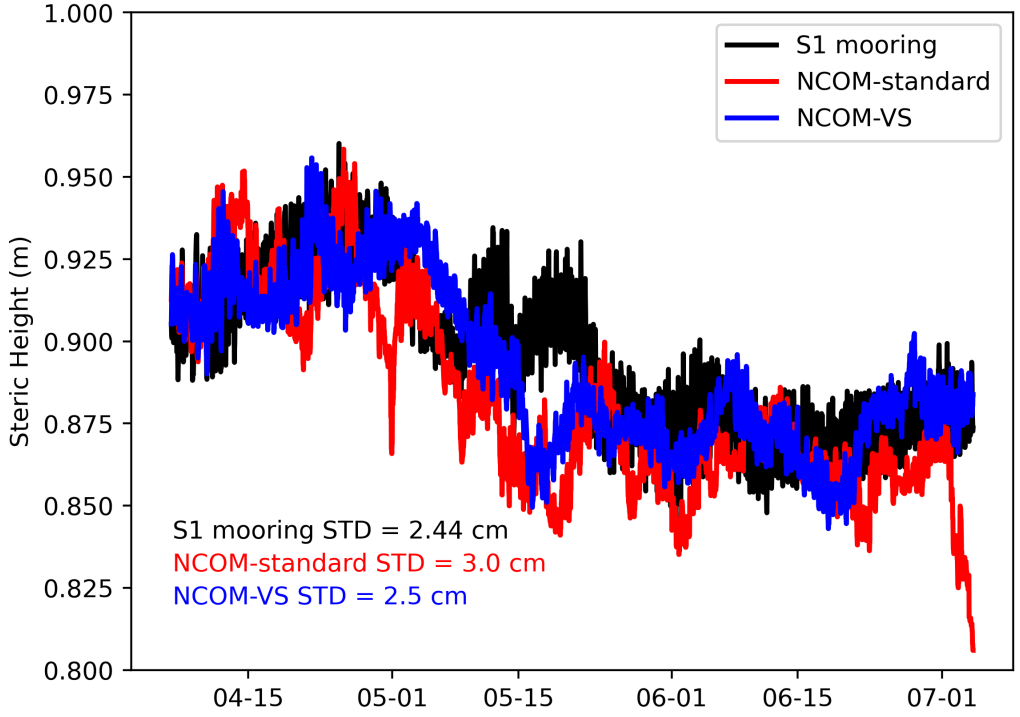
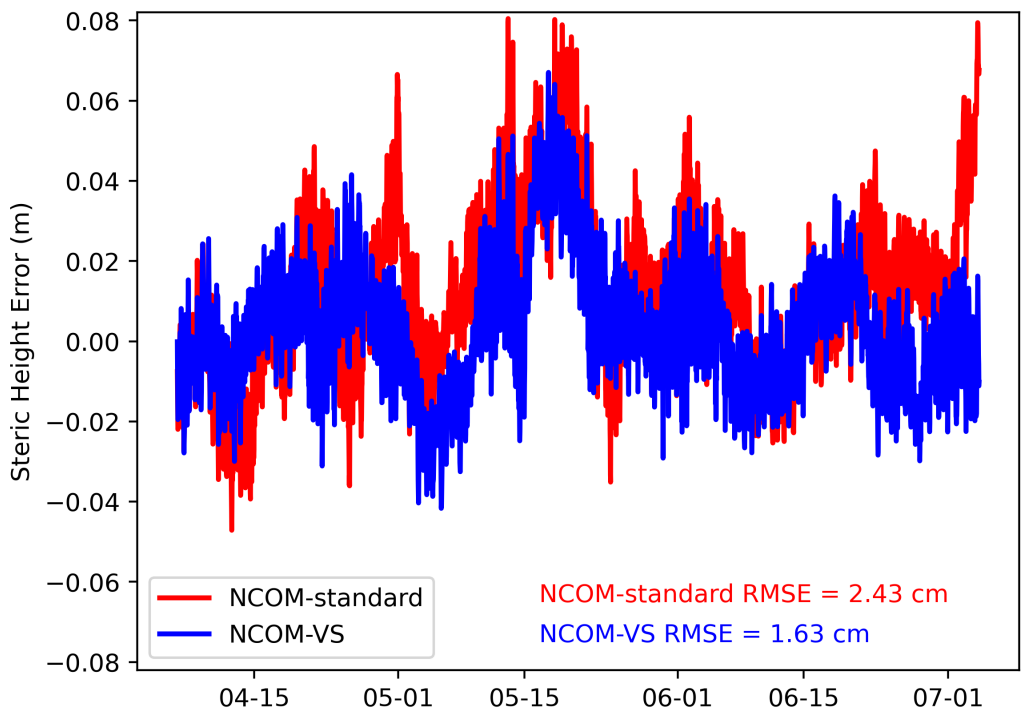
Model error evaluation





- Comparisons of 0-500 dbar steric height between the moorings and the models suggest that the models have reasonable skill at representing the variable.
- NCOM-VS outperforms NCOM-standard suggesting that the new approach is an advancement over current methods.

Assimilative ocean modeling during SWOT cal/val and next steps

Next steps

- NRL has the capability to process SWOT data and have begun for recently available 1-day repeat orbit data (right).
- We plan to assimilate these data ASAP.
- We have the capability to assimilate the SWOT data using the ‘variable scale’ approach (below).