A synergistic approach to SWOT Ocean Calval

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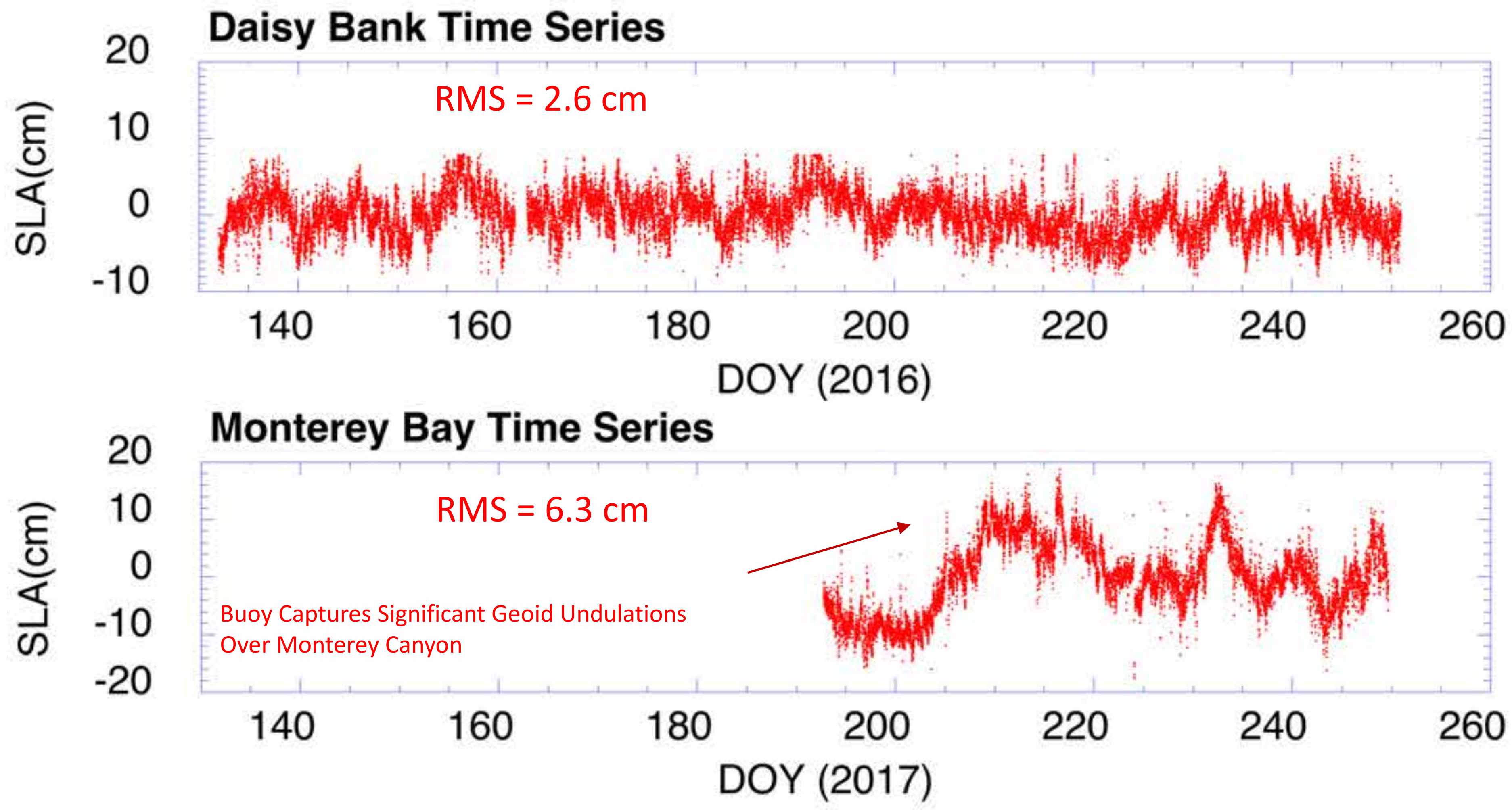
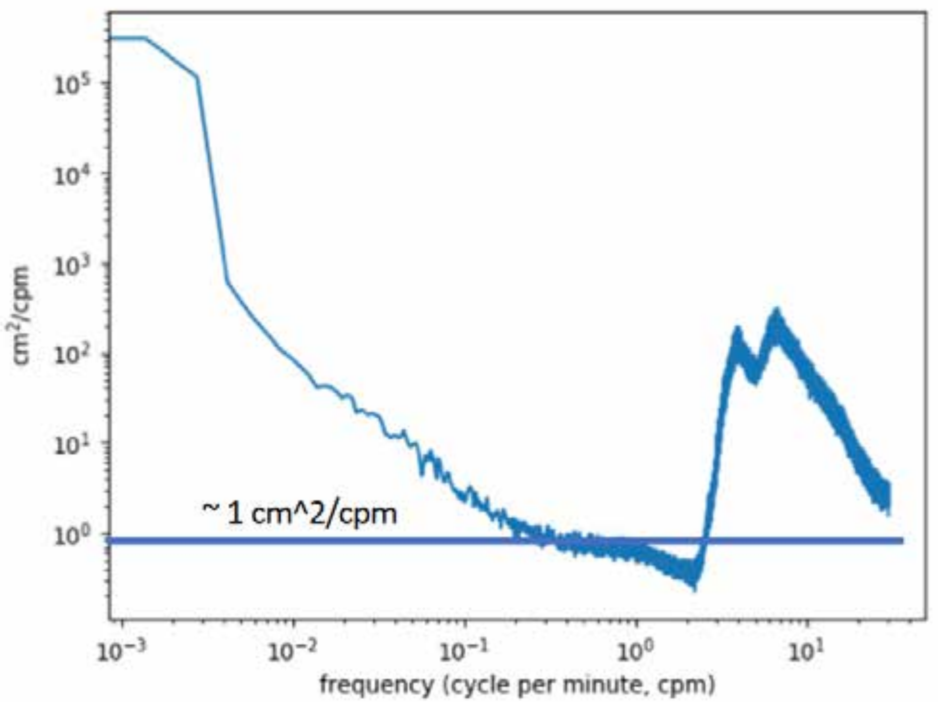
CL#18-3689

Sea Level Anomaly from 6-minute GPS Buoy Data:
Daisy Bank (2016) vs. Monterey Bay (2017)

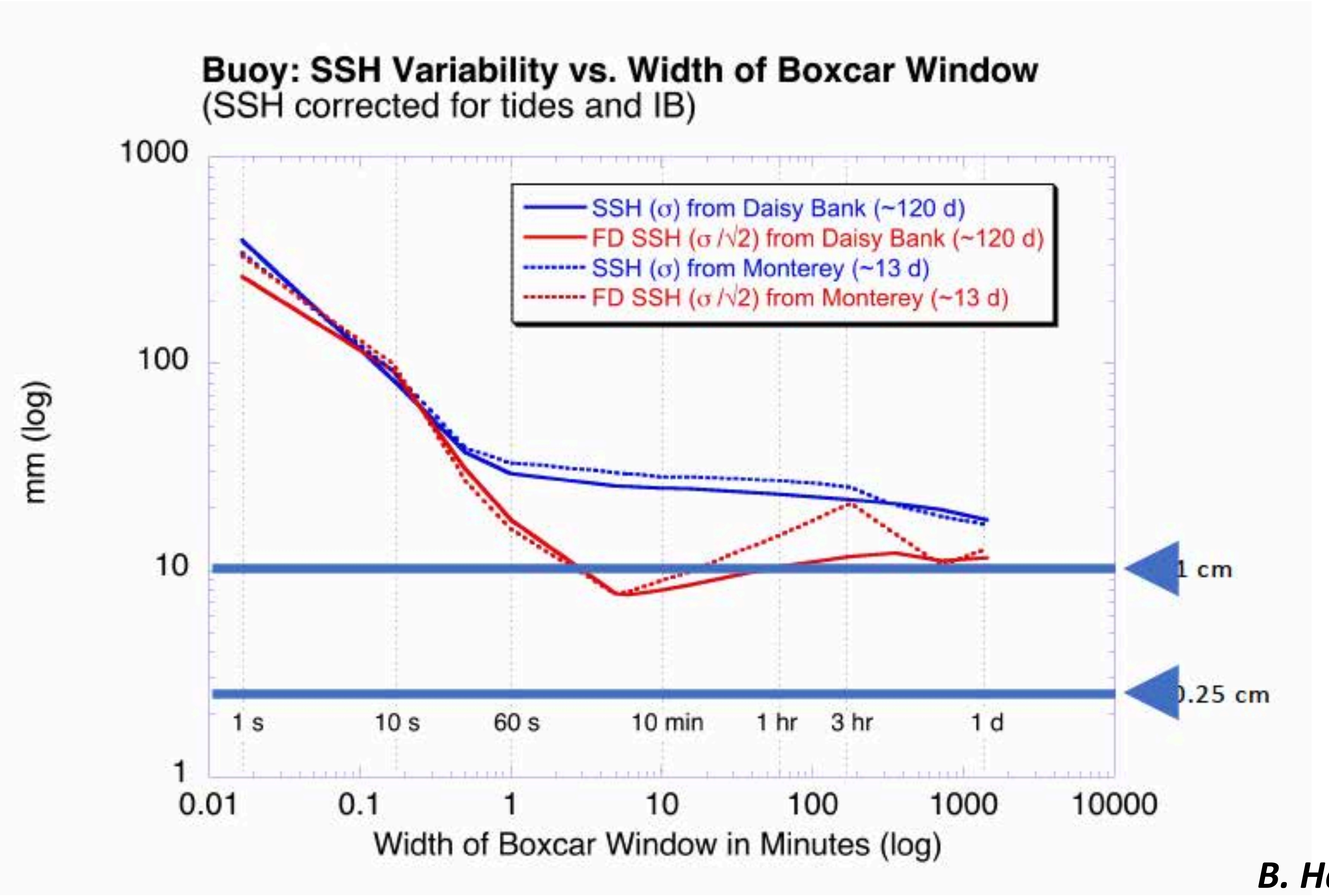


Geodetic Objectives by an array of GPS buoys

- Using an array of GPS buoys acting as open ocean tide gauges
- Each buoy is anchored to the bottom to provide time series at a fixed location.
- The dense SWOT sampling allows collocation between SWOT and buoys.
- To meet the SWOT SSH accuracy on the 7.5 km x 7.5 km nominal grids, the in-situ measurement must meet 0.4 cm (rms) accuracy.
- The wave signals are band-limited and can be mostly removed by low-pass filtering.
- The noise floor leads to errors less than 1 cm (rms) at periods >1 min, or, ~ 0.25 cm at >15 min
- Minimal MSS error over the scale of the watch circle (~ 4 km radius).



Residual high-frequency variability after tamporal smoothing



B. Haines/JPL

High-resolution SSH by airborne laser

Reciprocal passes across the Loop Current

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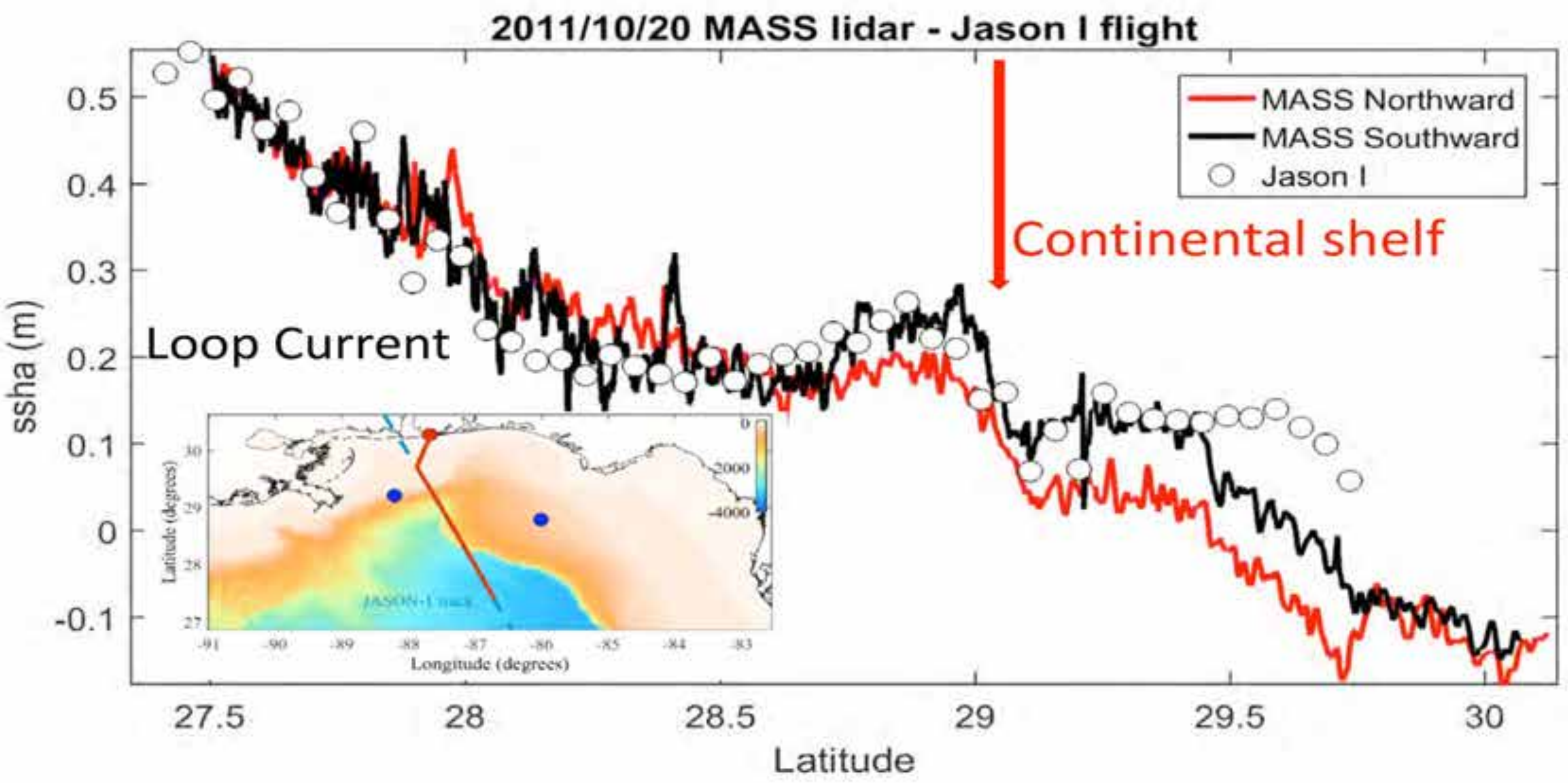
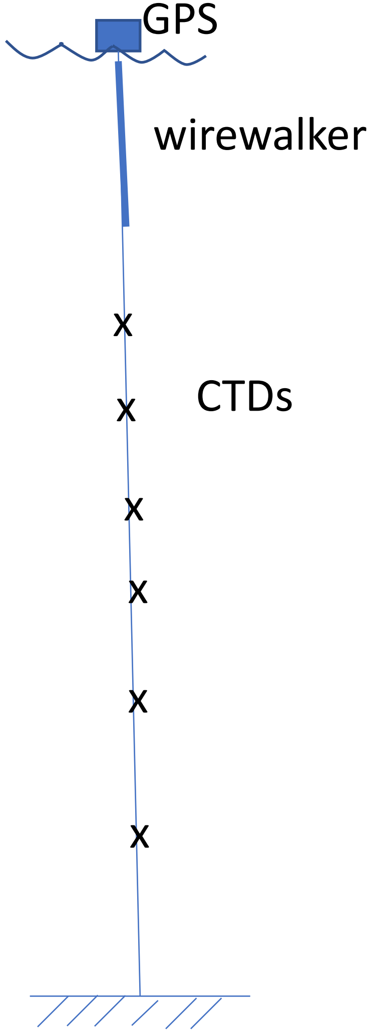


Fig. 6: SSHA estimated from two MASS lidar passes (“northbound” and “southbound”) over the same Jason-I track (see insert). Note that the satellite pass occurred in the middle of the southbound lidar pass (black).

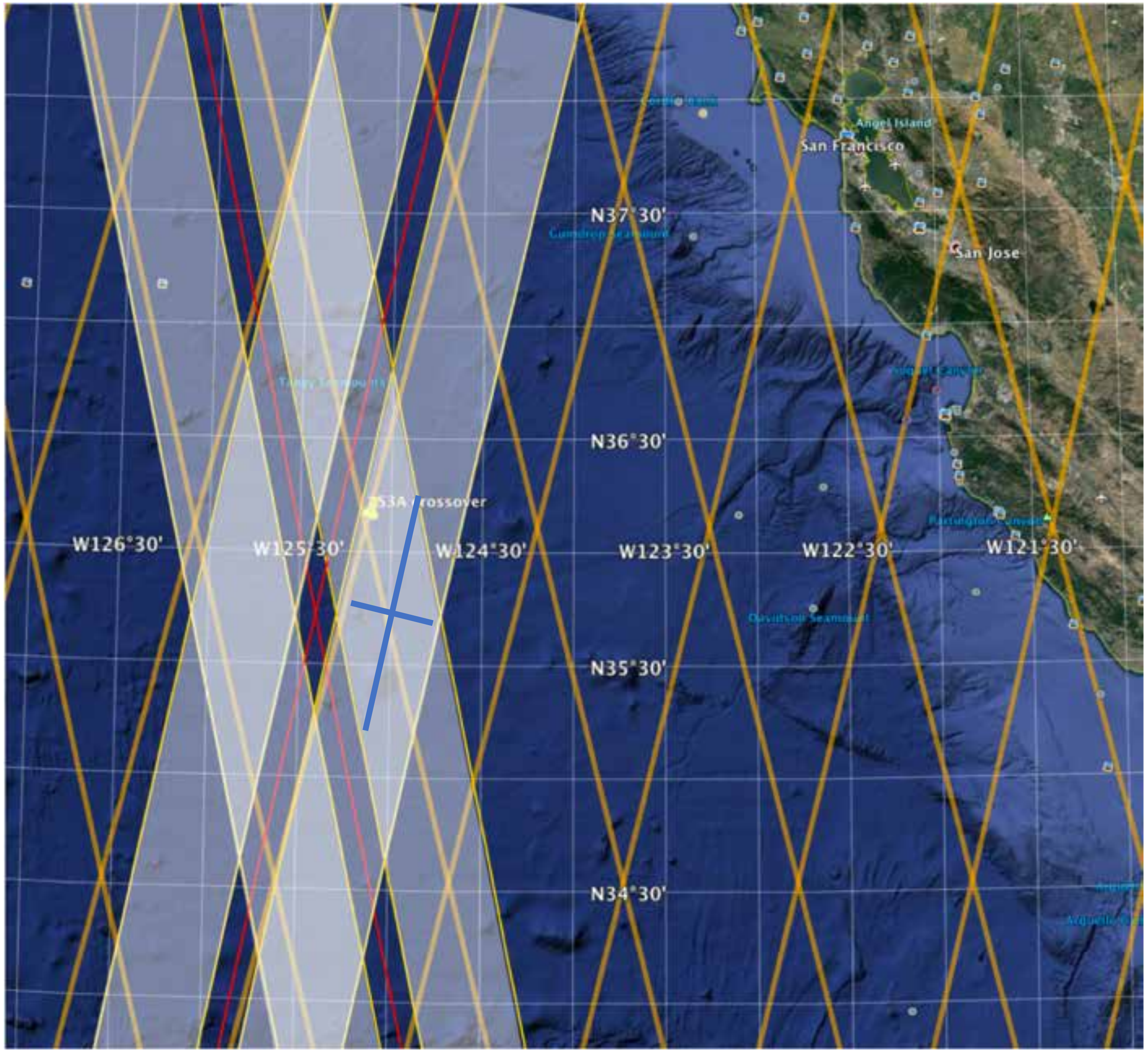
K. Melville and L. Lenain /SIO

Oceanographic objectives by an array of hydrographic sensors

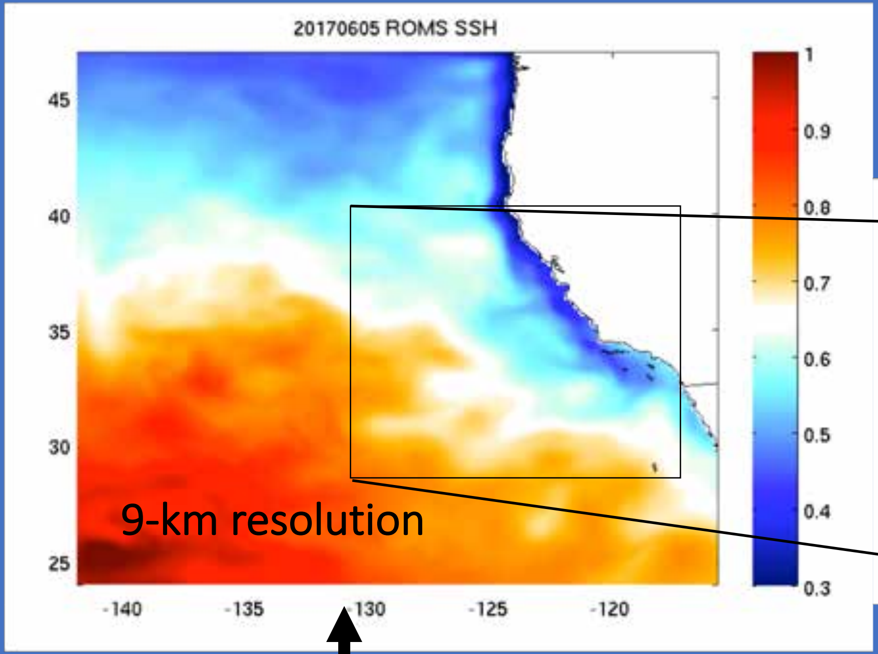
- Pending the results of the pre-launch experiment, we might replace gliders with moored wirewalkers.
- If the variability below 500 m is significant, we might need to add CTDs below the wirewalker.
- If GPS proves able to meet the requirement for validating the SSH spectrum, a GPS sensor will be mounted on top of the wirewalker.



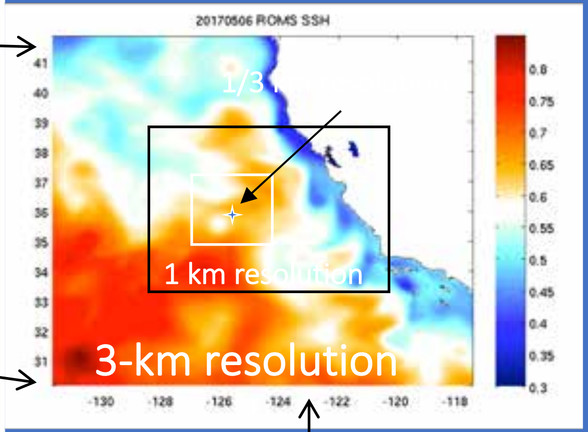
Possible configurations of the ocean in-situ arrays



Cal/Val Model Configuration



66 Vertical Levels



Star at
(125.5W, 35.7 N)

Tidal forcing (10 constituents)

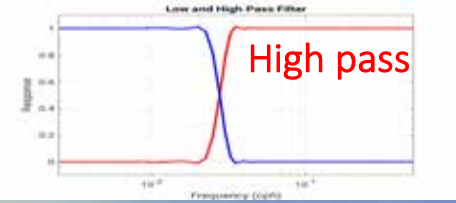
(The 3-km domain size smaller than 1/5 of the semi-diurnal barotropic tidal wavelength)

Climatological WOA13 + monthly anomaly T/S and geostrophic velocities from gridded Argo, and AVISO SSH.

(Today's talk focus on the 1-km domain)

Regional Ocean Modeling System (ROMS)

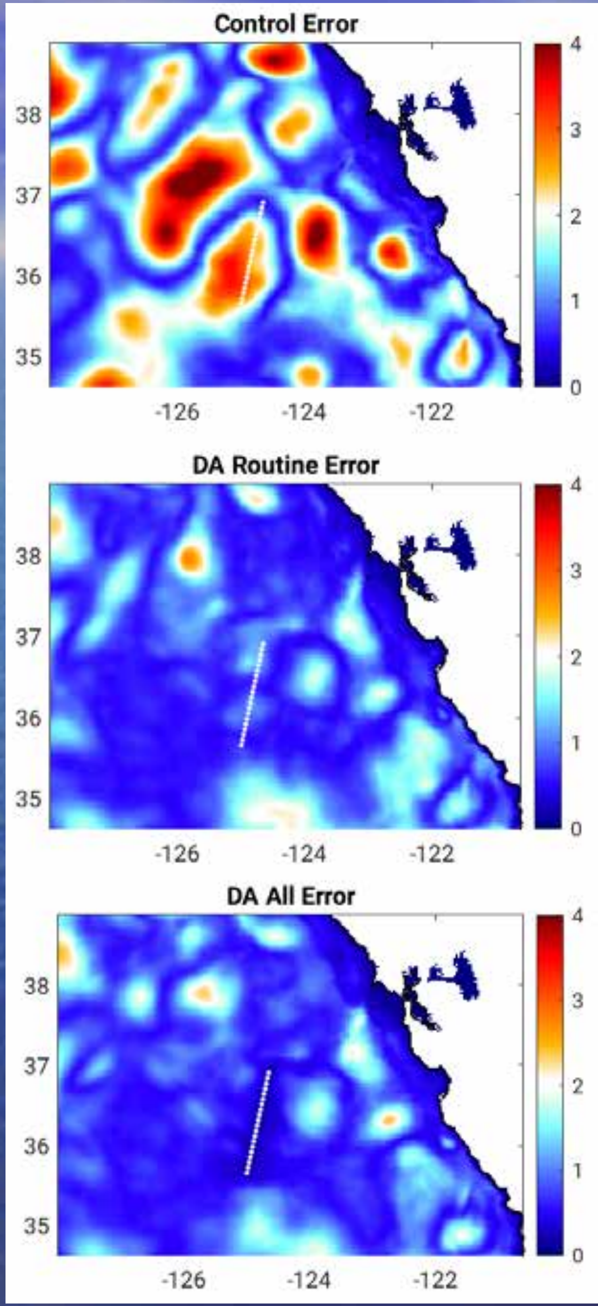
RMSE

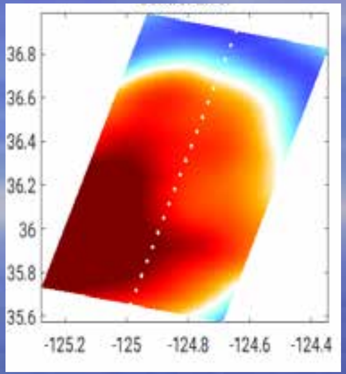


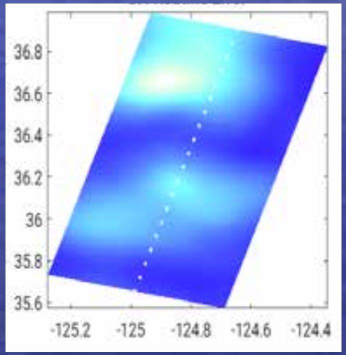
NO DA

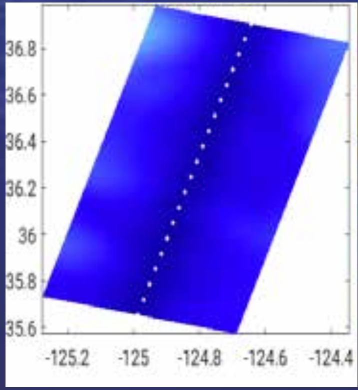
Routine DA

Routine and Glider DA

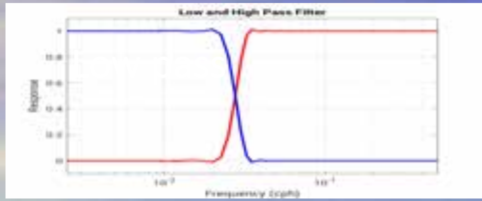








RMSE



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