

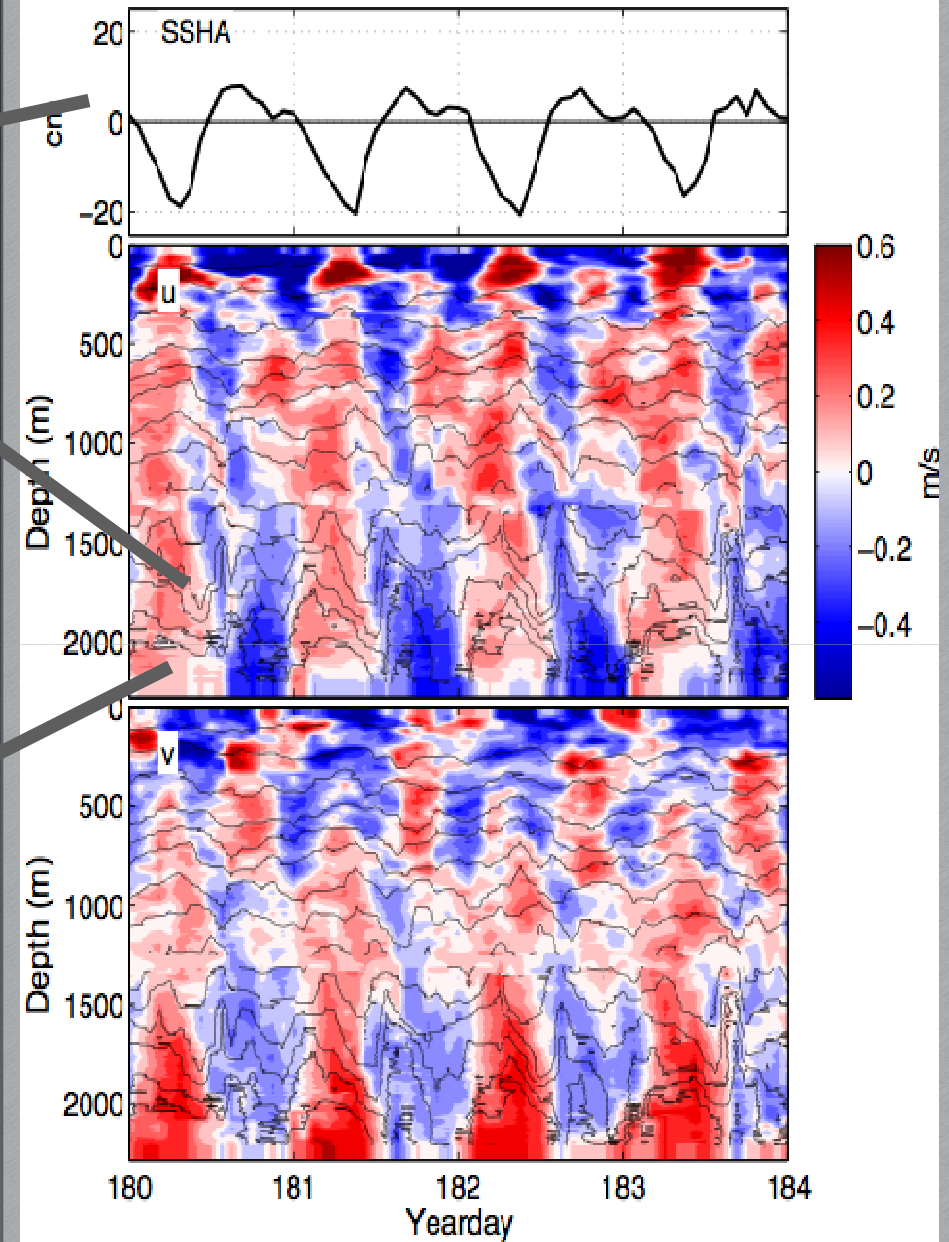
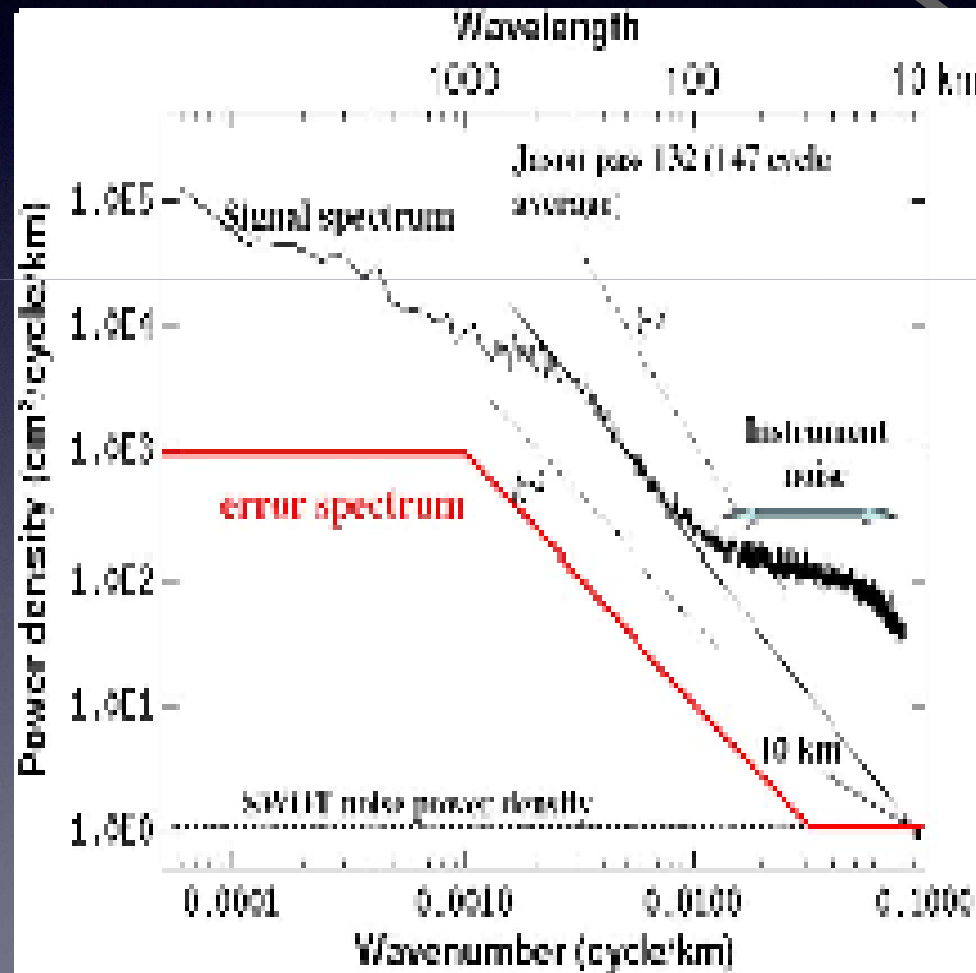
# SSH signature of the internal wave spectrum inferred from profiling moorings

Matthew H Alford, Scripps Institution of Oceanography

James Girton and Brian Chinn, Applied Physics Lab/University of Washington

OSTST meeting, Reston, VA October 2015

isopycnals: 500-m peak-peak



Luzon Strait (Alford et al, Nature 2015)

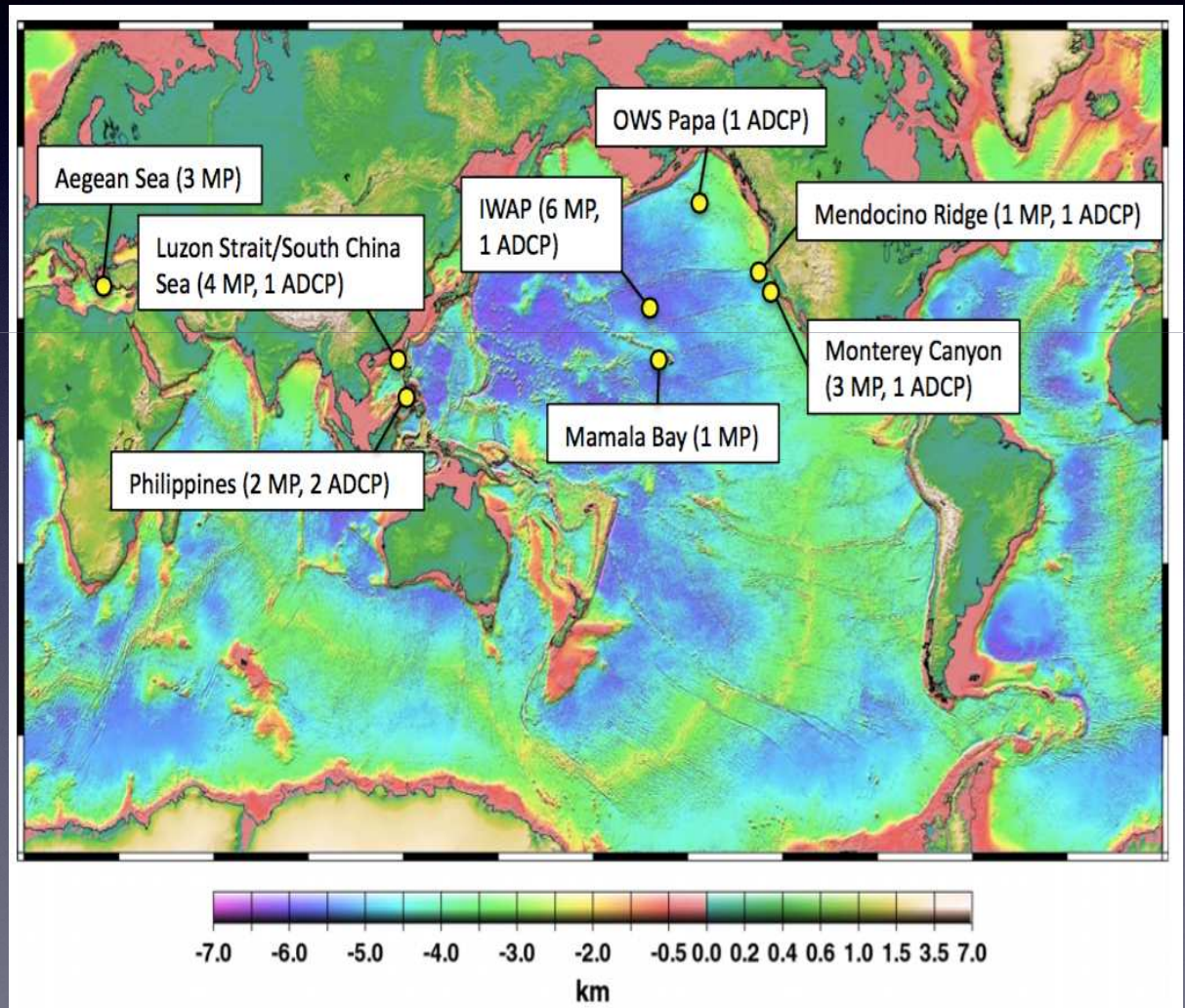
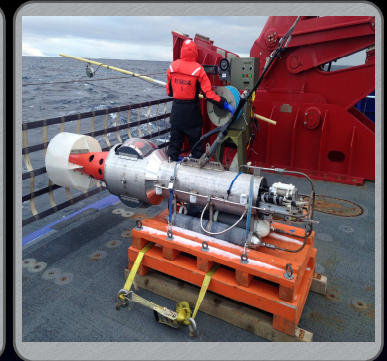


horizontal wavenumber spectra  
using:

- Profiling, full-depth moorings
- Long horizontal tows
- Frequency spectra from ARGO floats

Goal (we didn't  
make it!):

Determine a global map of  
where internal wave SSH will  
dominate observed SWOT  
signals.





# Wavenumber

Sensitive to modal content!

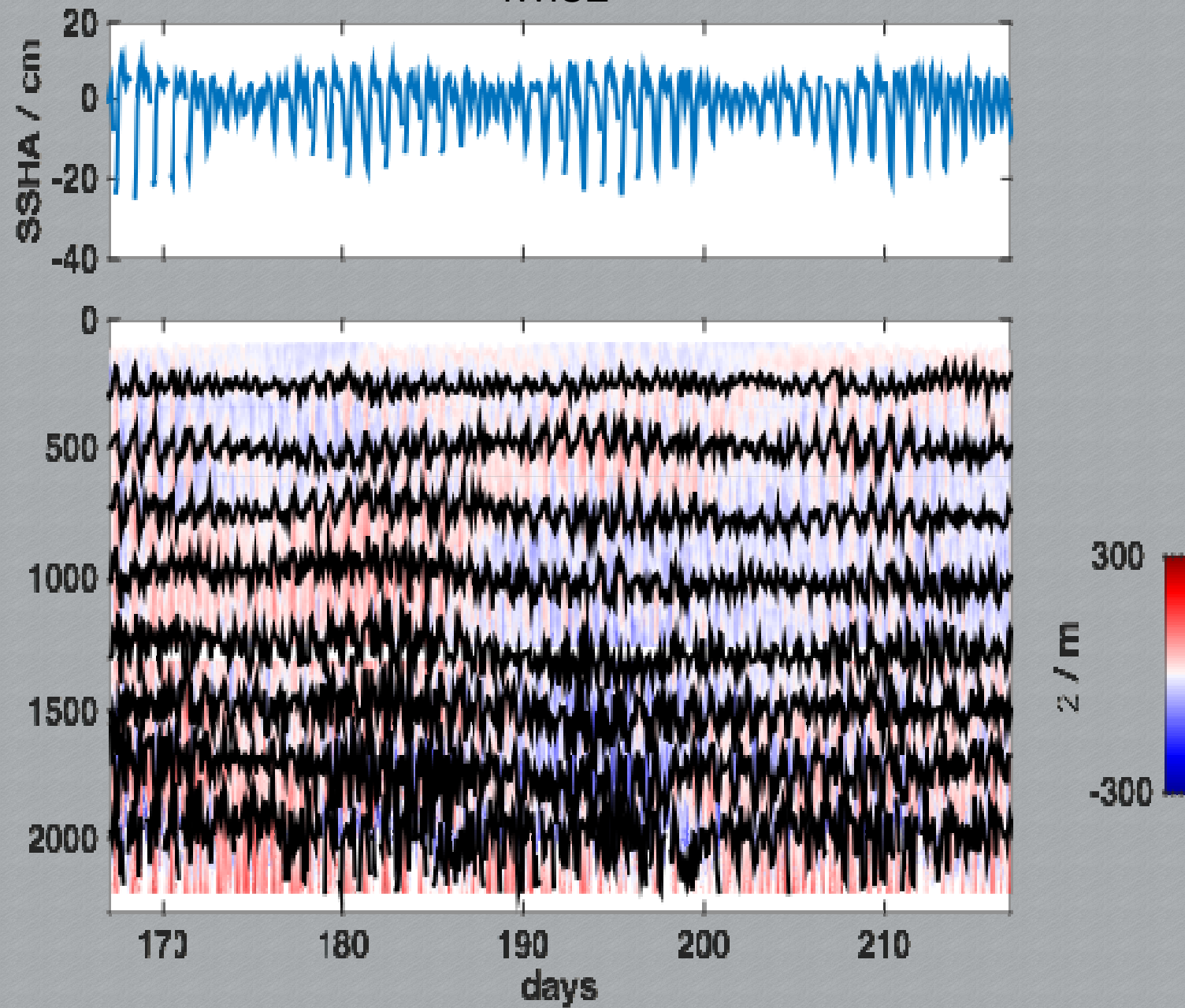
- Step 1: Compute SSH from density anomaly.
- Step 2: Transform frequency to horizontal wavenumber.
- Each wavenumber and frequency transforms differently.

$$p = \int \rho g dz$$

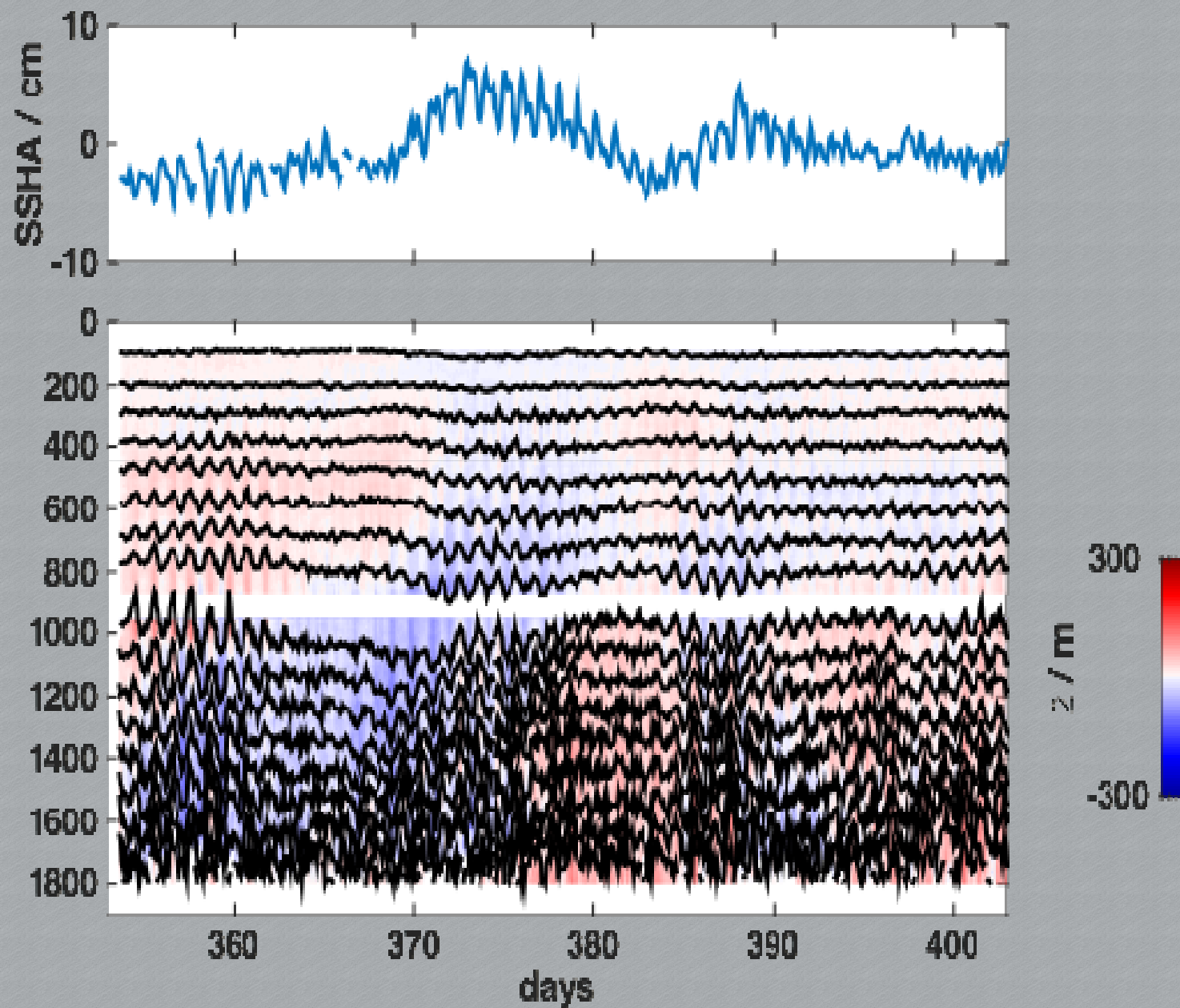
$$\Phi(k_H) = \frac{\partial \omega}{\partial k_H} \Phi(\omega)$$

$$\Phi(k_H, \omega) = \frac{\partial \omega}{\partial k_H}(m, \omega) \Phi(m, \omega)$$

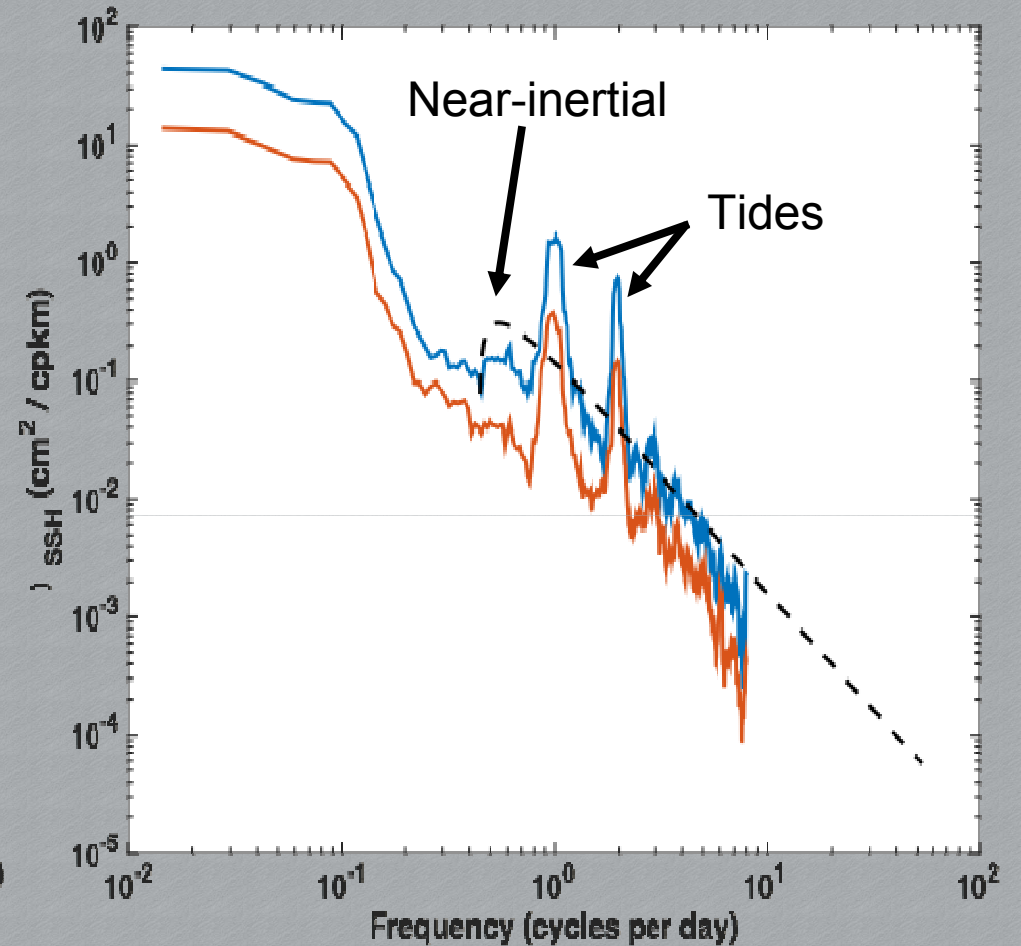
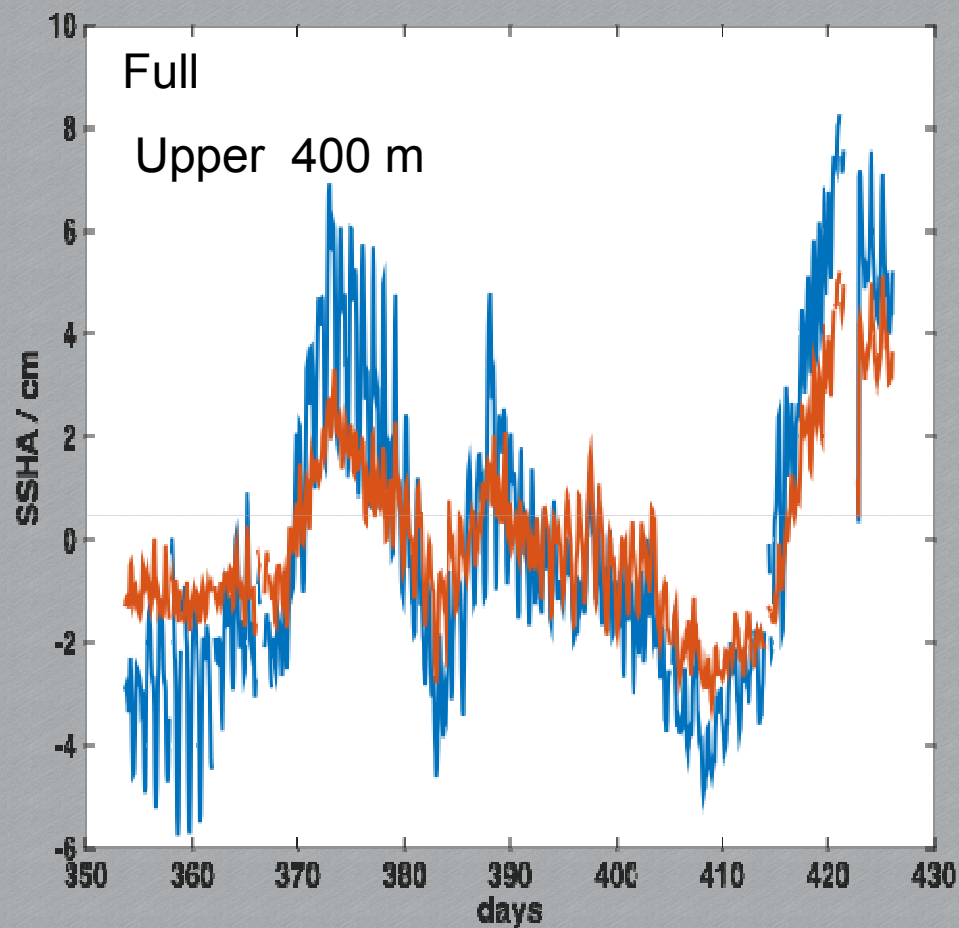
IWISSE



# PHILEX





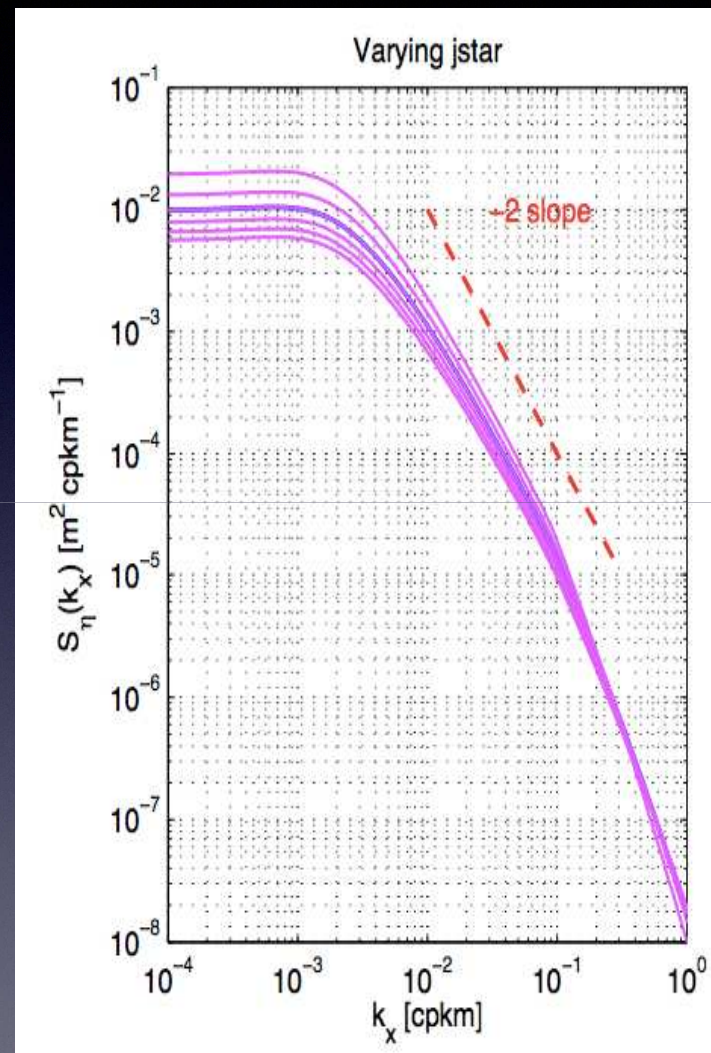
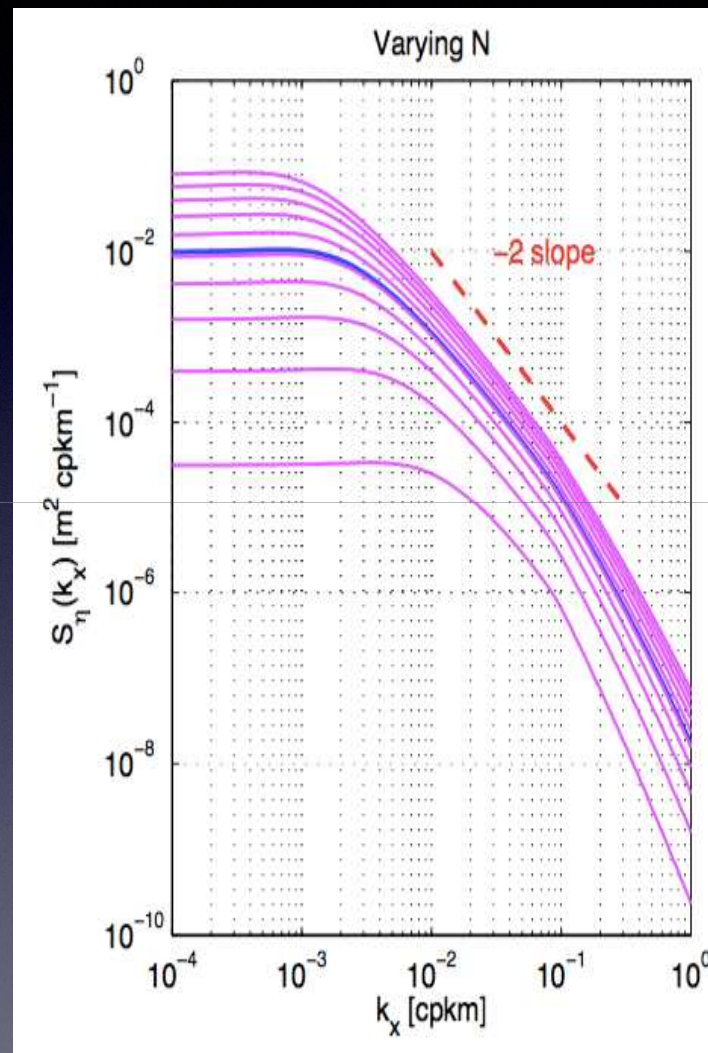


- SSH depends on the low modes (which depend on frequency!) so need full water column.

Step 2: transform to  
horizontal wavenumber.

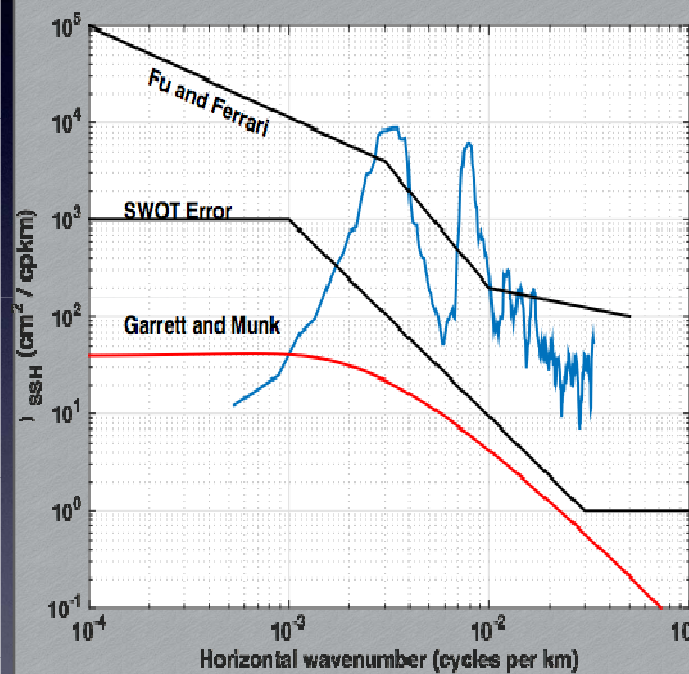
Use IW dispersion  
relations.

Jody Klymak Garrett-Munk  
Toolbox, modified by  
James Girton

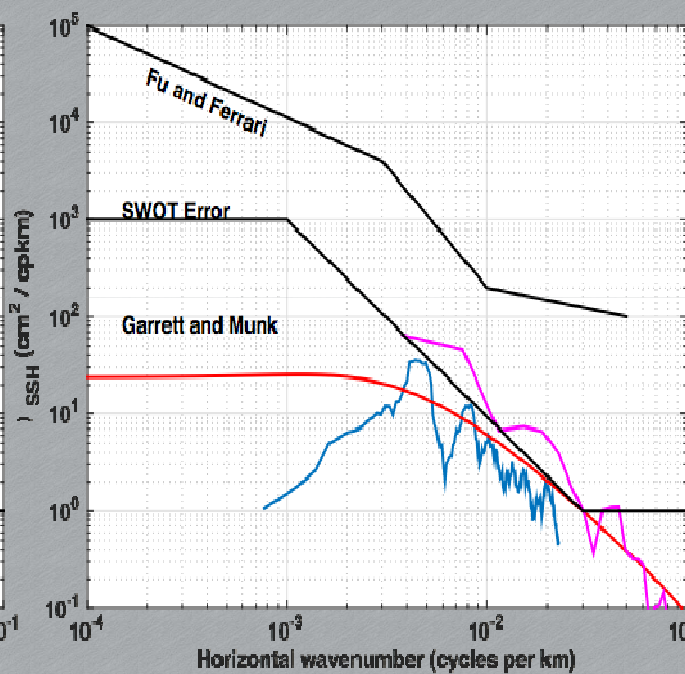




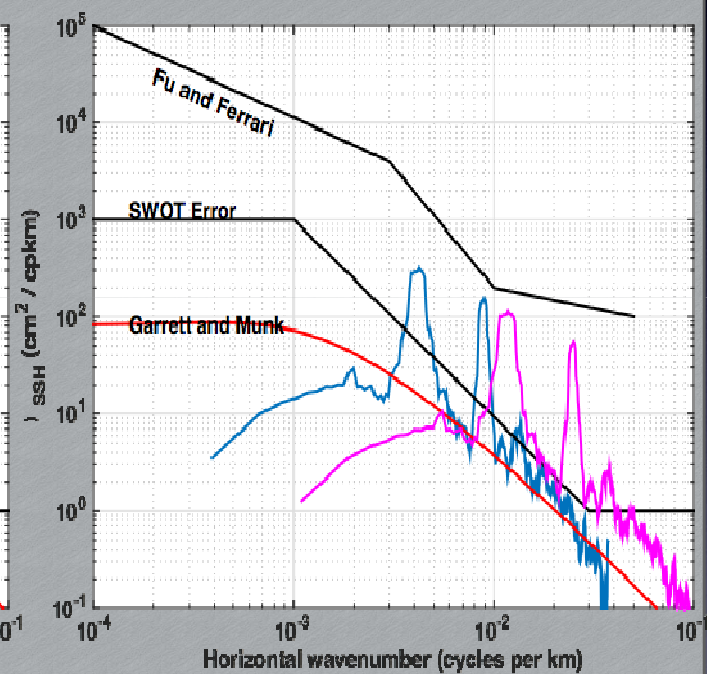
IWISE

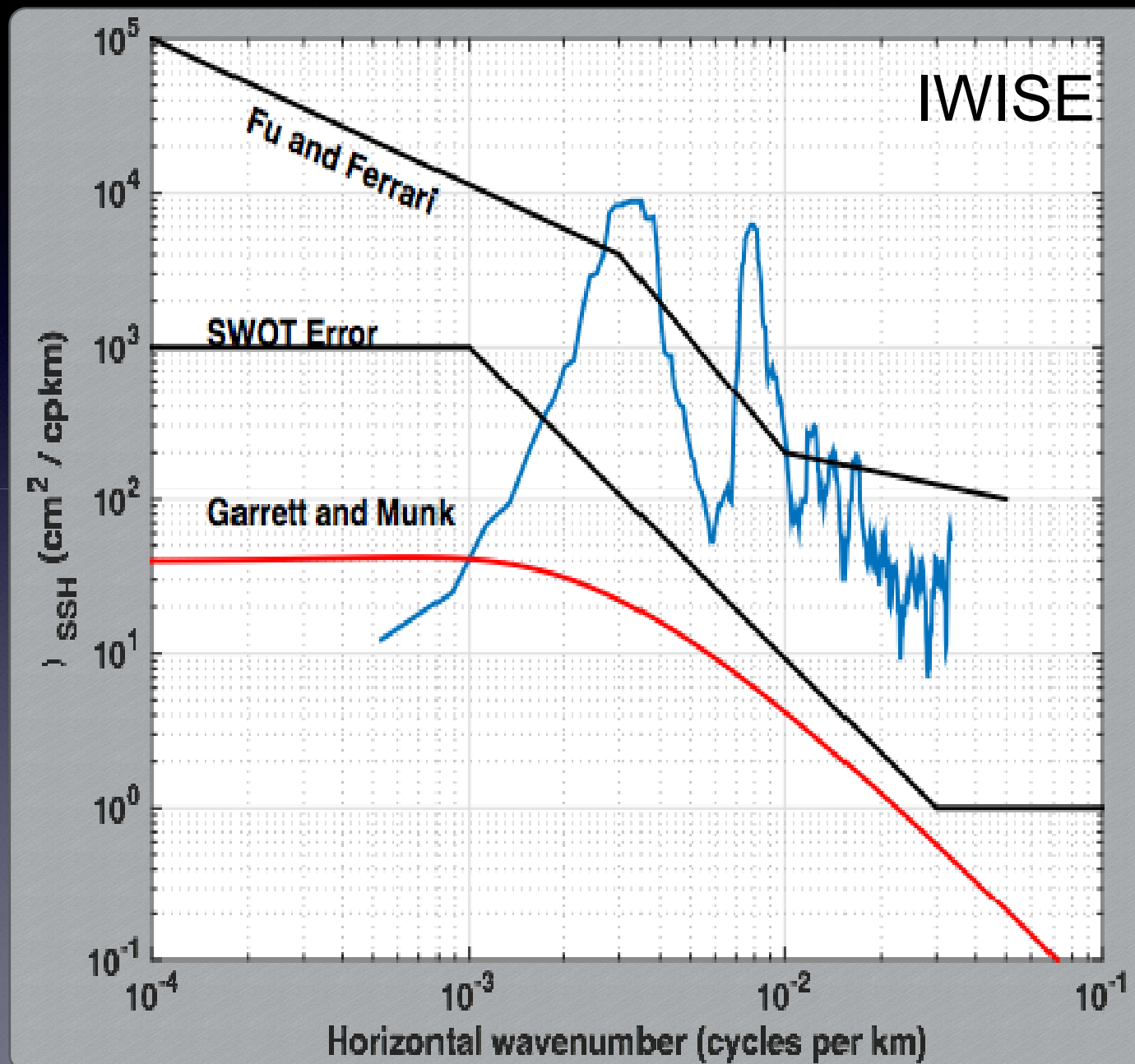


IWAP

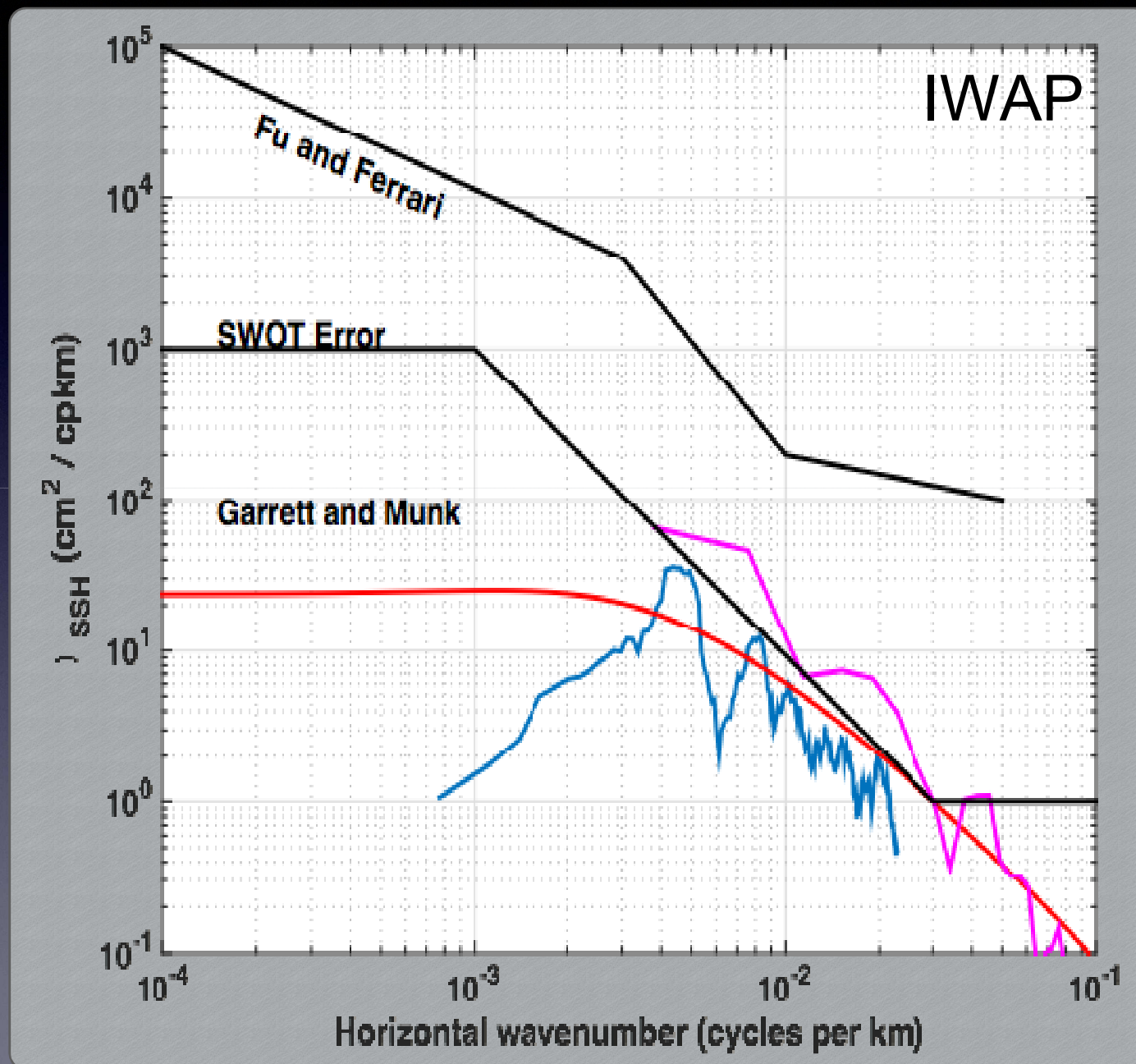


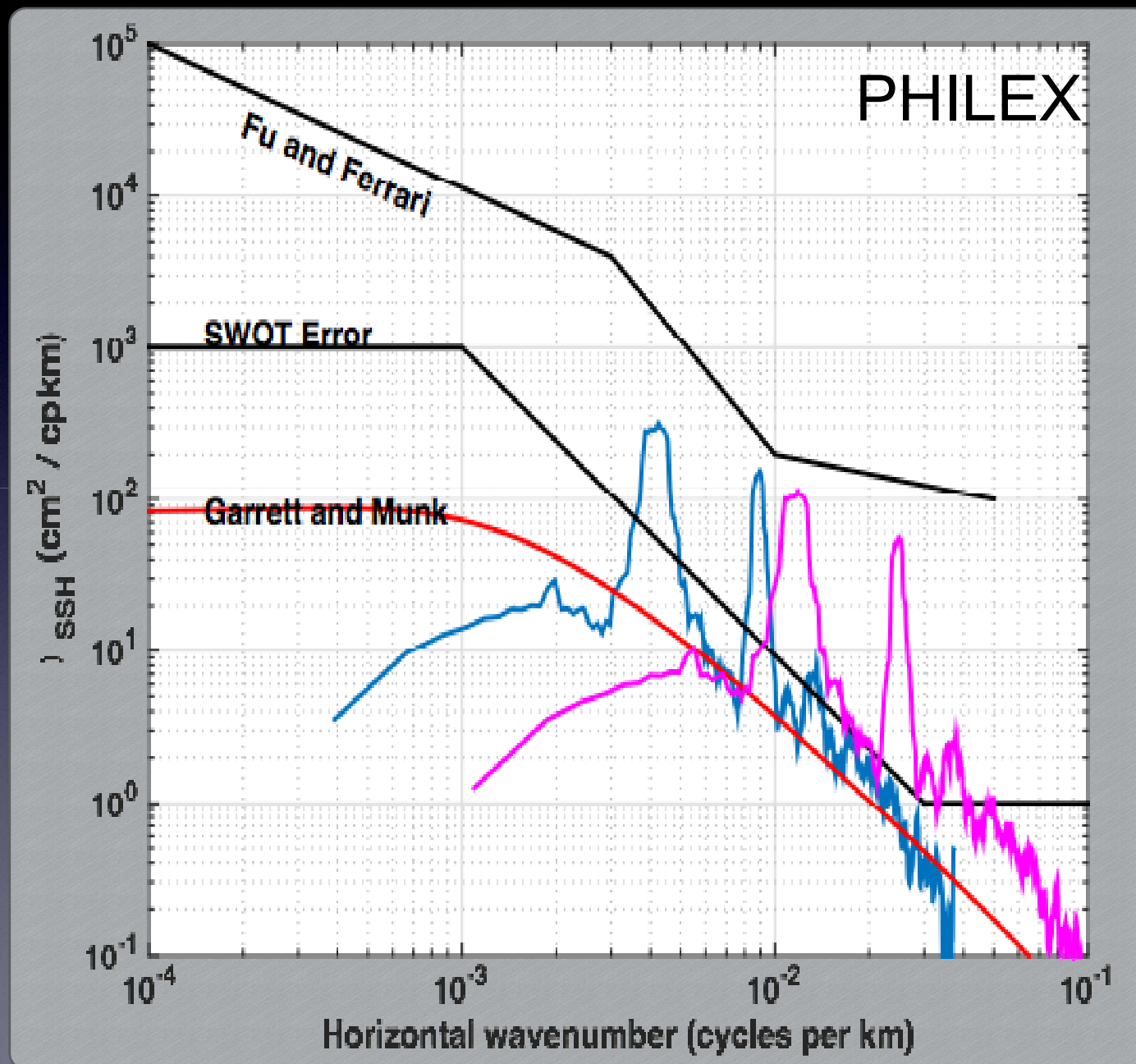
PHILEX





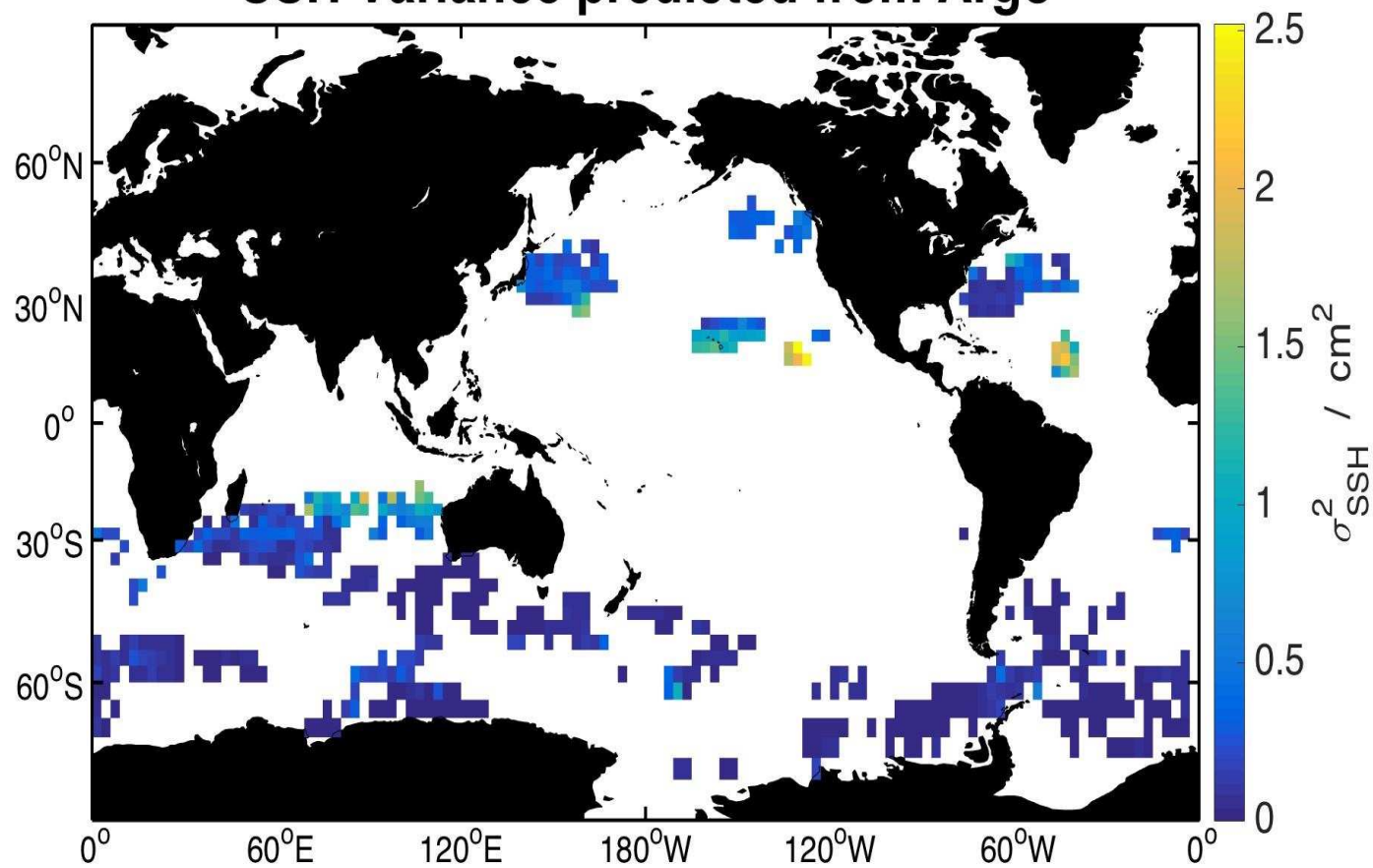








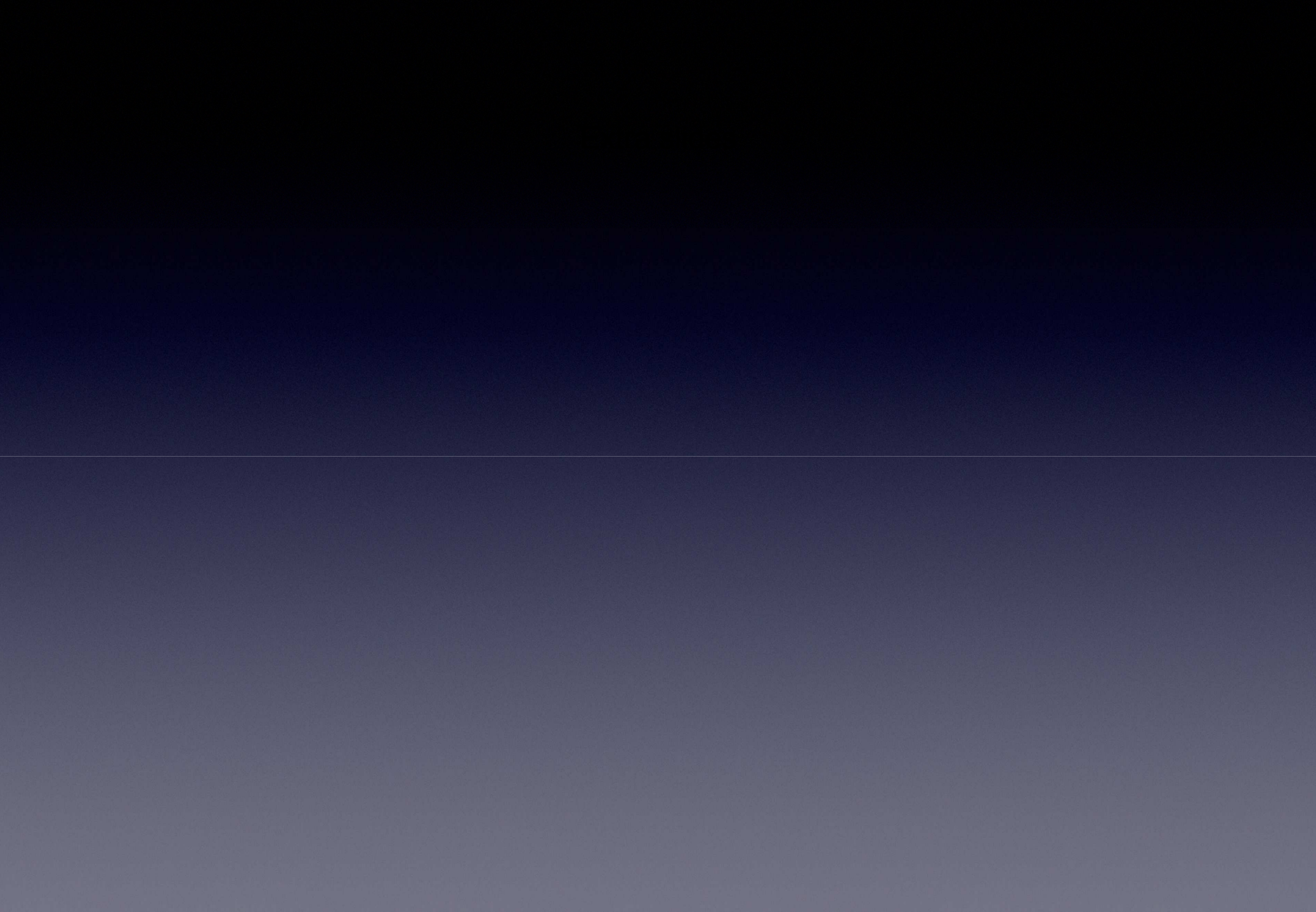
## SSH Variance predicted from Argo

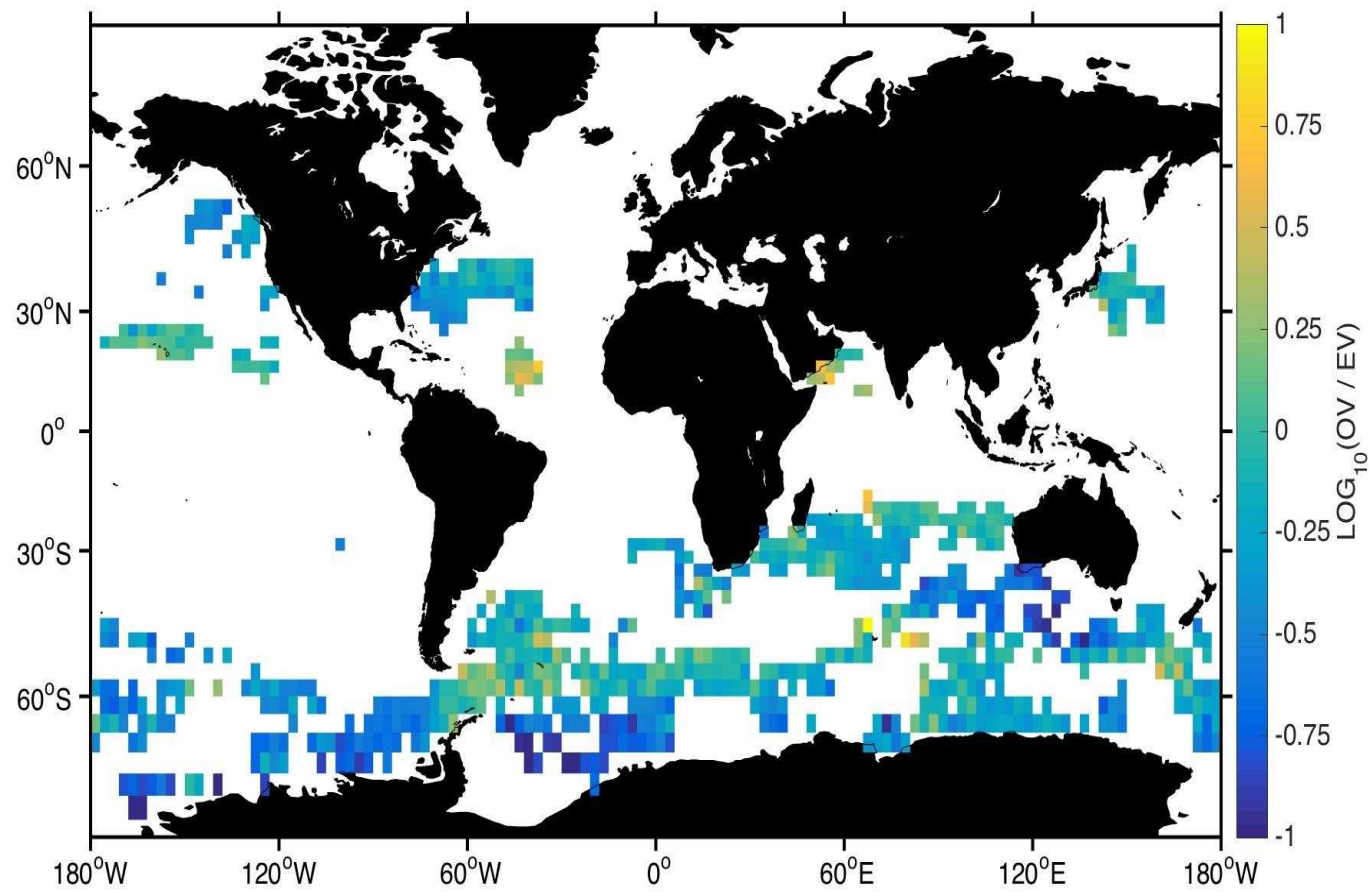


Tyler Hughen, UW

- Full-depth profiling moorings and tows confirm Farrar's hypothesis that IW's will be observable by SWOT at some locations.
- Modal content is key to 1) calculation of SSH and 2) wavenumber content but poorly constrained -> NEED FULL DEPTH.
- HORIZONTAL TOWS also ground truth horizontal wavenumber spectra.







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- The last slide was IT's only - how about the continuum? Acknowledge Tom Farrar. Existential crisis for SWOT.
- Show PAPA spectrum, possibly Tom's SSH kH spectrum? OR use GM spectrum to plot