A first (very quick) look at SWOT spectra

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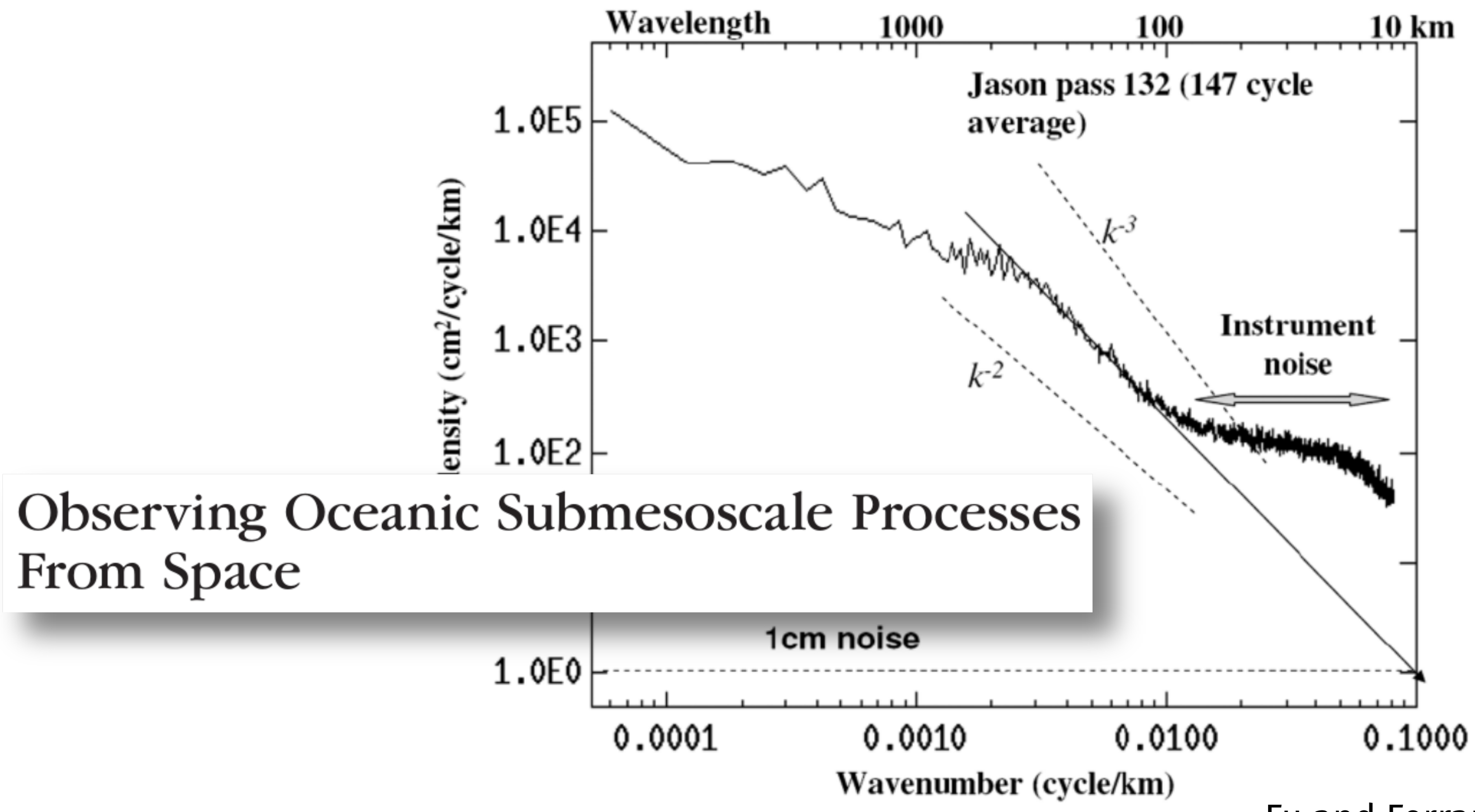
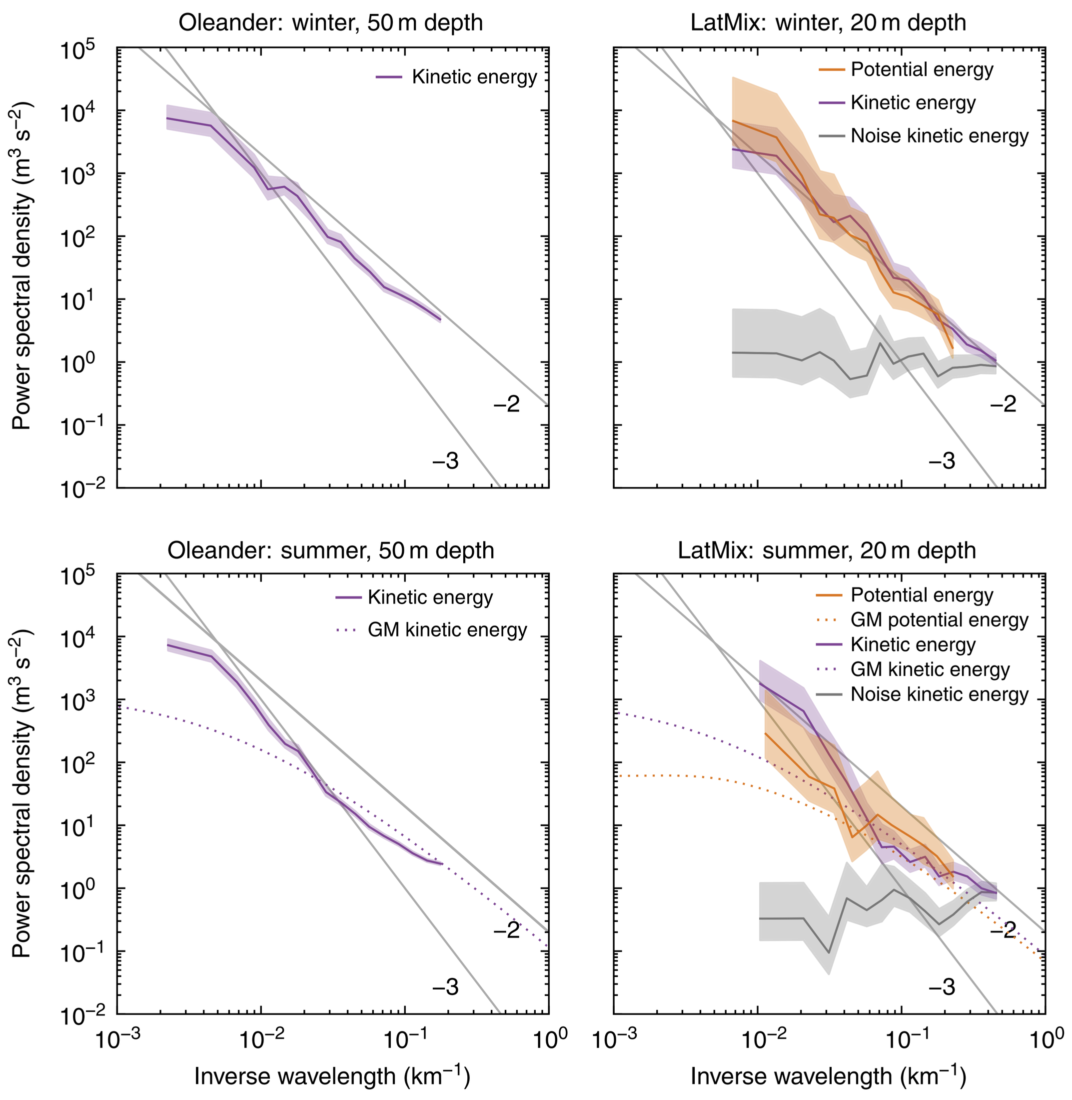
What are we expecting to see?



Fu and Ferrari (2008)

In situ observations of submesoscale turbulence:

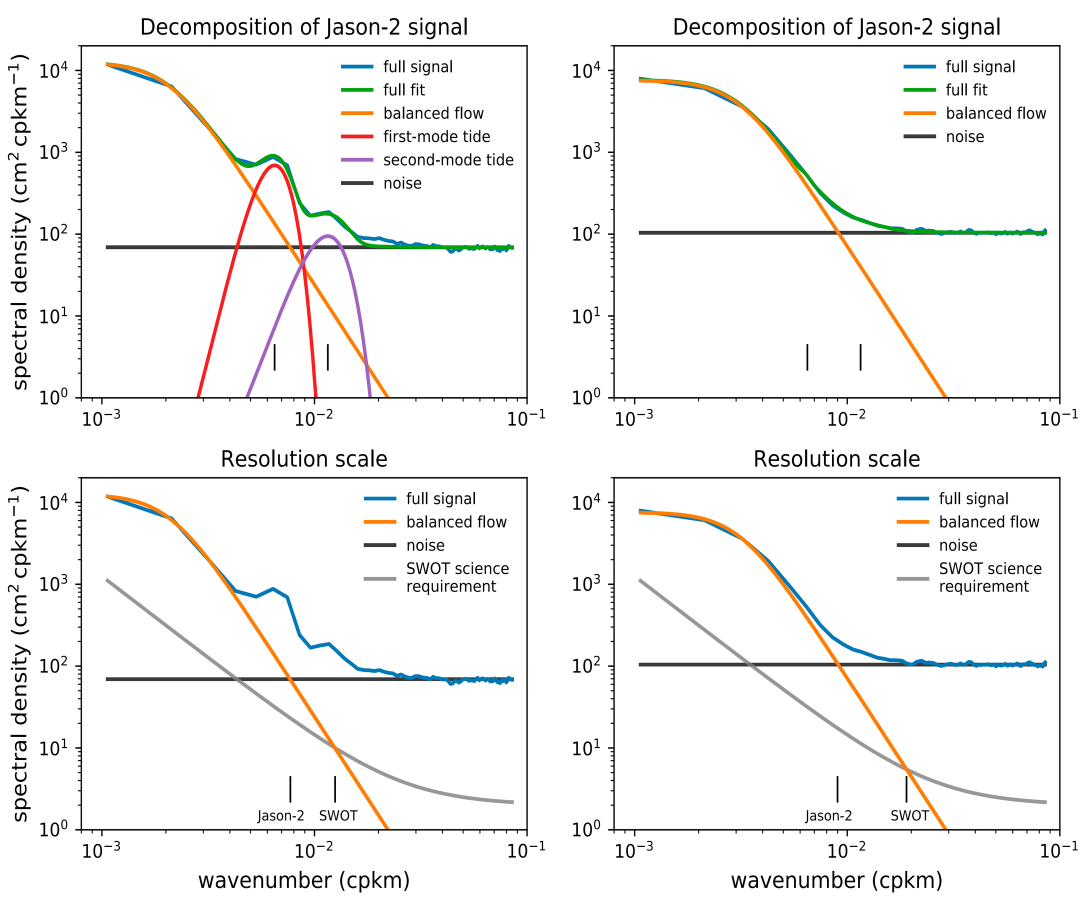


By geostrophic balance:

$$\langle|\hat{h}|^2\rangle = \frac{f^2}{g^2}\frac{\langle|\hat{v}|^2\rangle}{k^2} \sim k^{-4}$$

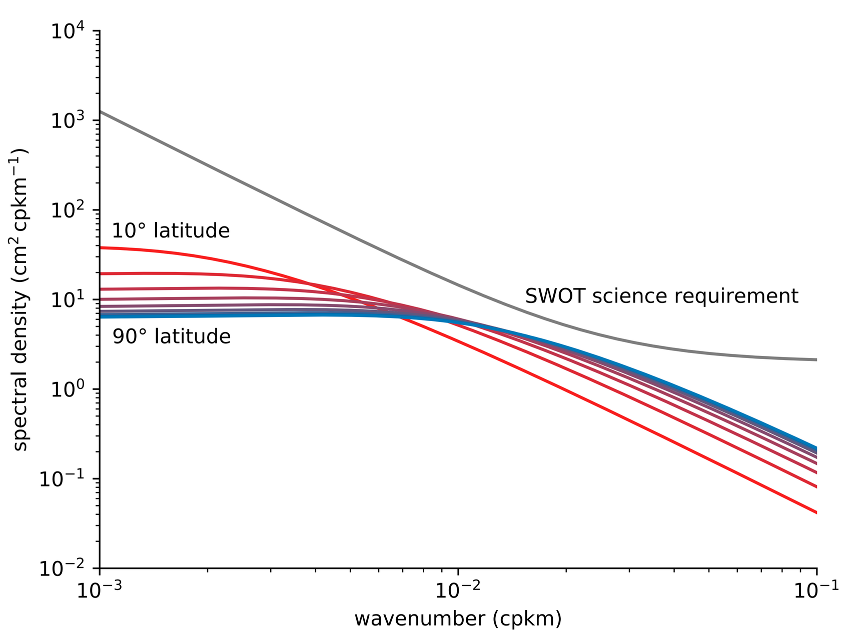
Callies et al. (2015)

Extrapolations from Jason data:



Callies and Wu (2019)

Internal-wave continuum:

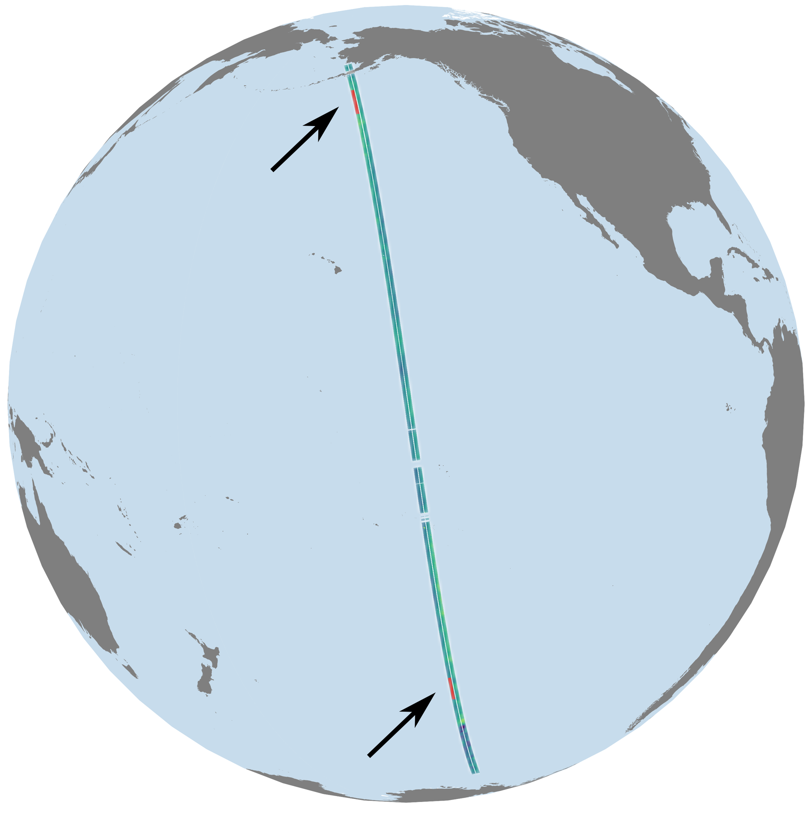


This is a crude estimate for the annual mean. Real variance levels should be within an order of magnitude.

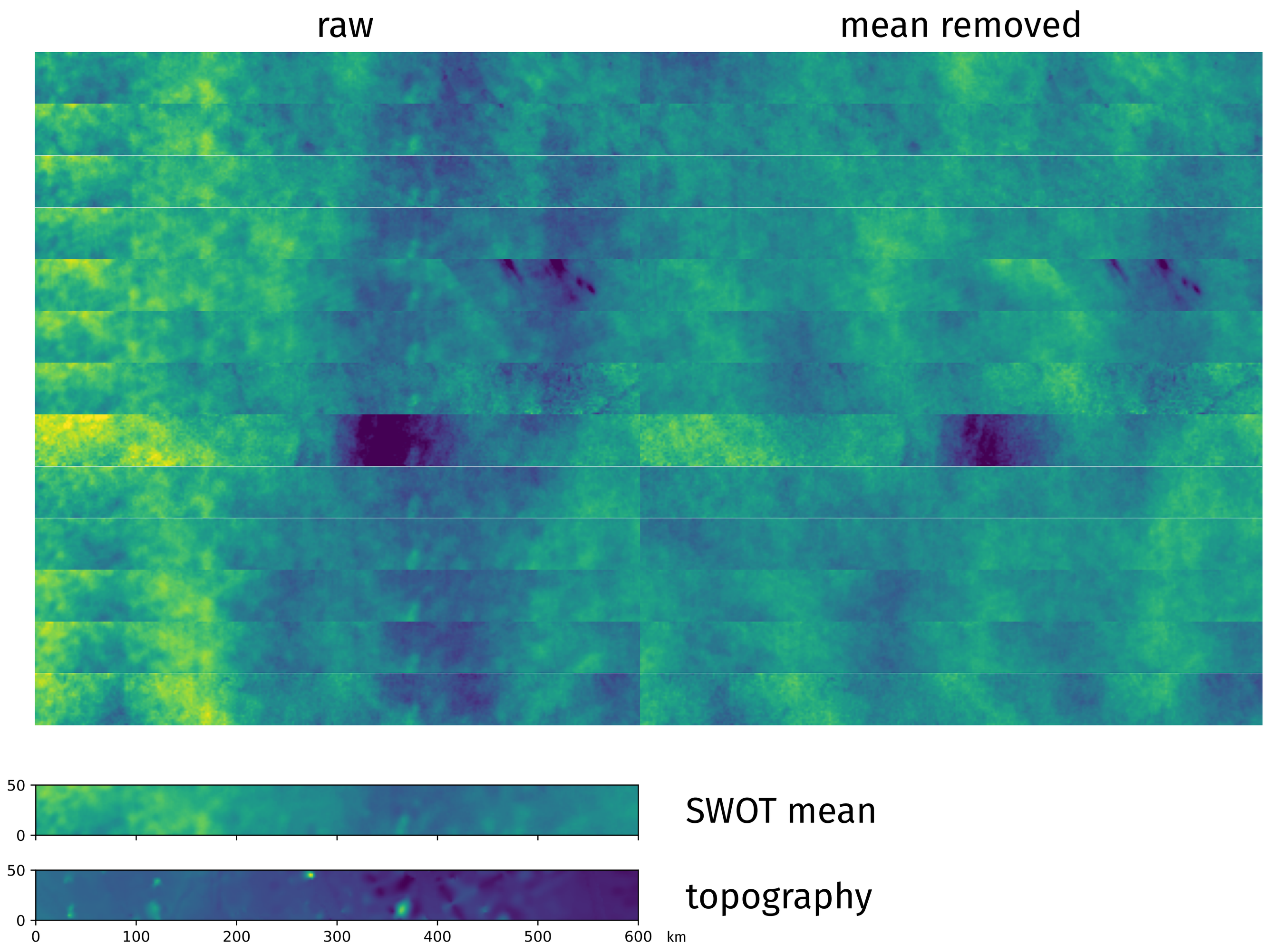
Callies and Wu (2019)

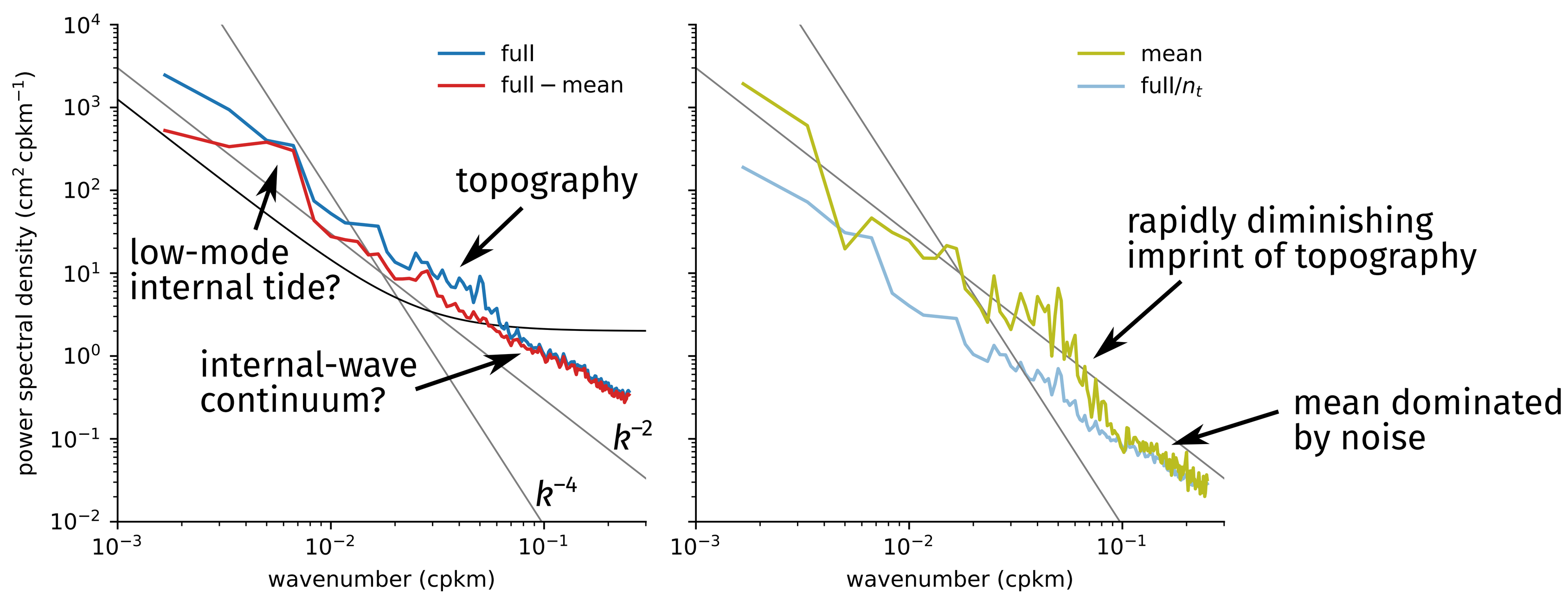
We expect a transition from geostrophic turbulence dominating at large scales to internal waves dominating at small scales. This transition is similar to what we see in KE but more pronounced in SSH variance because geostrophic turbulence has SSH variance spectra that fall off as k^{-4} or steeper, whereas the internal-wave continuum is expected to fall off as k^{-2}. Internal tides can contribute a strong signal at intermediate scales.

What are we seeing?

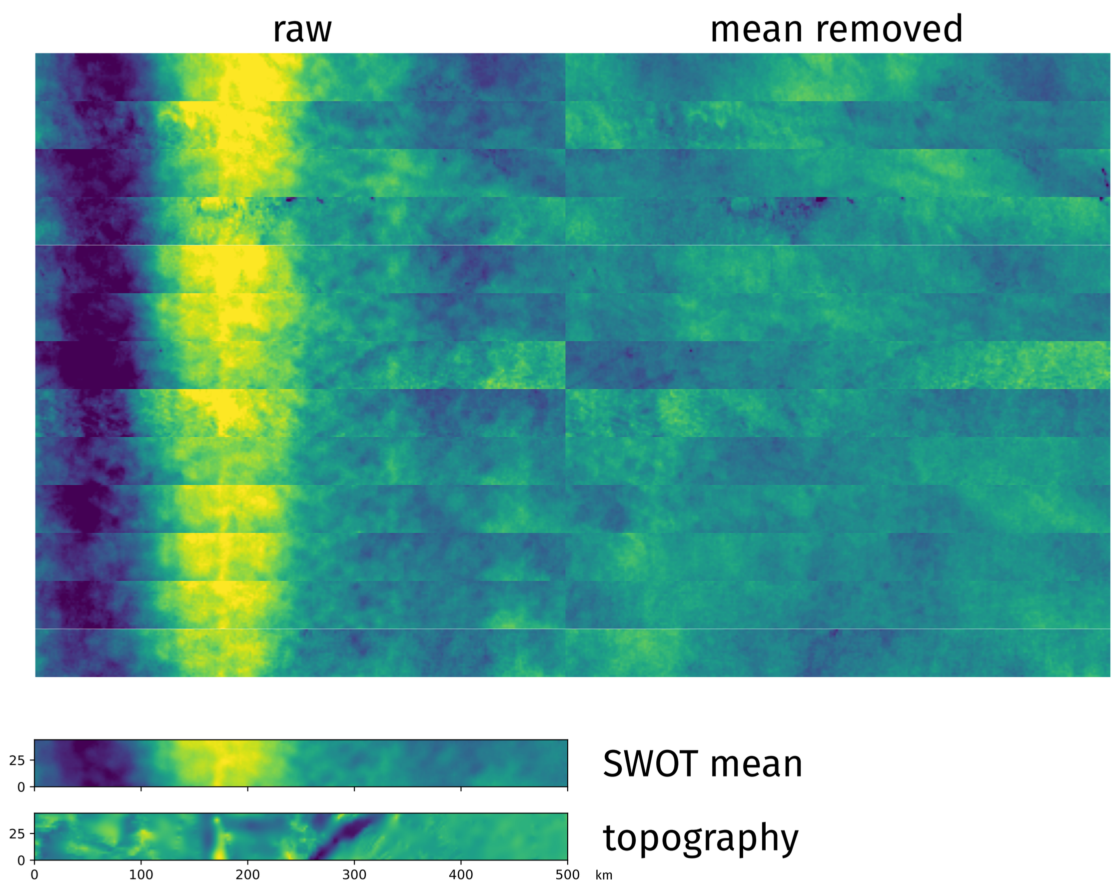


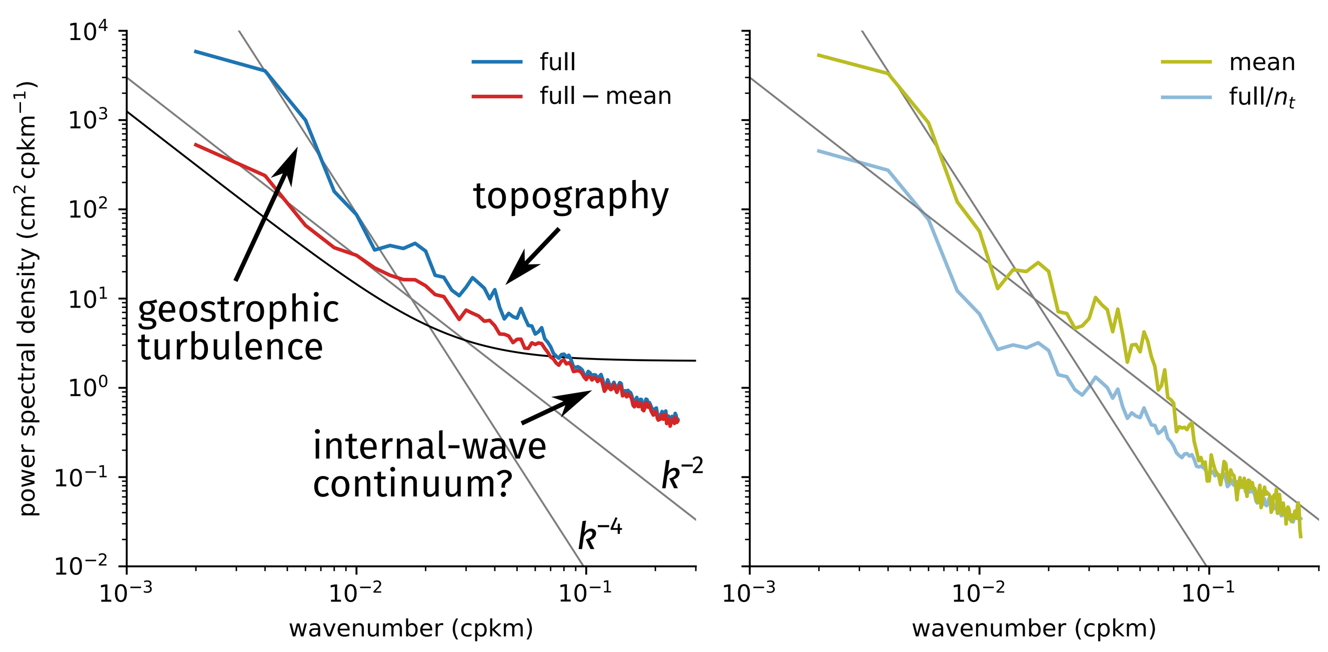
North Pacific:





South Pacific:





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