Combine satellite sensors for diagnosing the upper ocean

Bertrand Chapron (LOS, IFREMER, Brest), Guillaume Lapeyre (LMD, Paris)

Relationships exist between SST and SSH (Lapeyre, Klein 2006) (known as Surface Quasi-geostrophic balance):
- same phase and relation between power spectra
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Relationships exist between SST and SSH (Lapeyre, Klein 2006) (known as Surface Quasi-geostrophic equilibrium):

What about other quantities (SAR, Chlorophyll)?

Vorticity from SST at 250m resolution
Important potential issue with SWOT

- The SSH spectra seem to be quite flat (in $k^{-4}$).
- Implies that submesoscales will be very energetic in terms of kinetic energy.
- Vorticity field will be dominated by structures below 10km (second spatial derivative of SSH).
- Noise may tend to dominate at the 10km scale!
- Consequence: SWOT signal will not be dynamically interesting at these scales.
  (for instance to compute vertical velocities by eSQG)
- But Signal will be more physical at 30km.
Supporting SWOT objectives

Different sensors are available for measuring the upper ocean (SST, SSH, SAR, Chlorophyll)

- SAR provides convergence/divergence zones
- SSH provides access on horizontal geostrophic velocities

Assimilating together these different products will recreate the submesoscales (1km) properly and dynamically from data at 20km or more

Need to understand the physical relationships between different quantities for that purpose