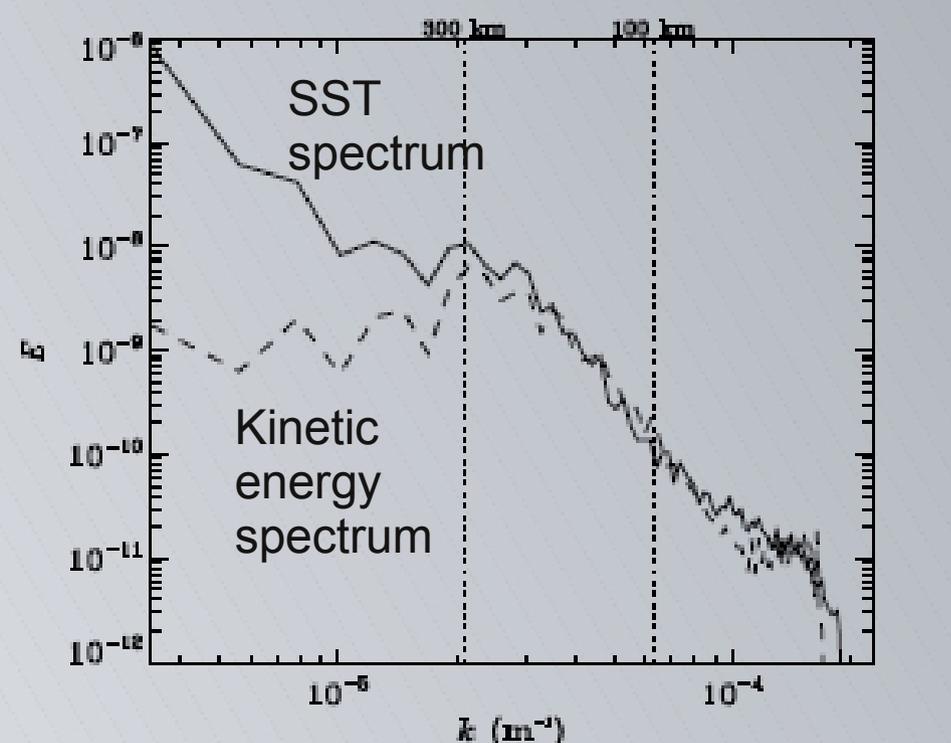
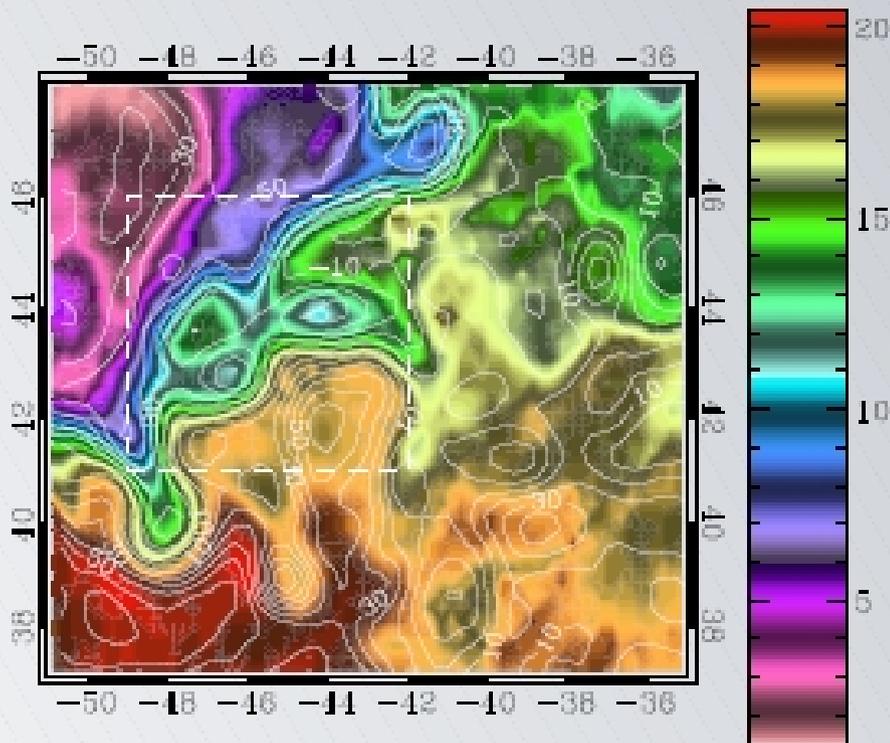


# Combine satellite sensors for diagnosing the upper ocean

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

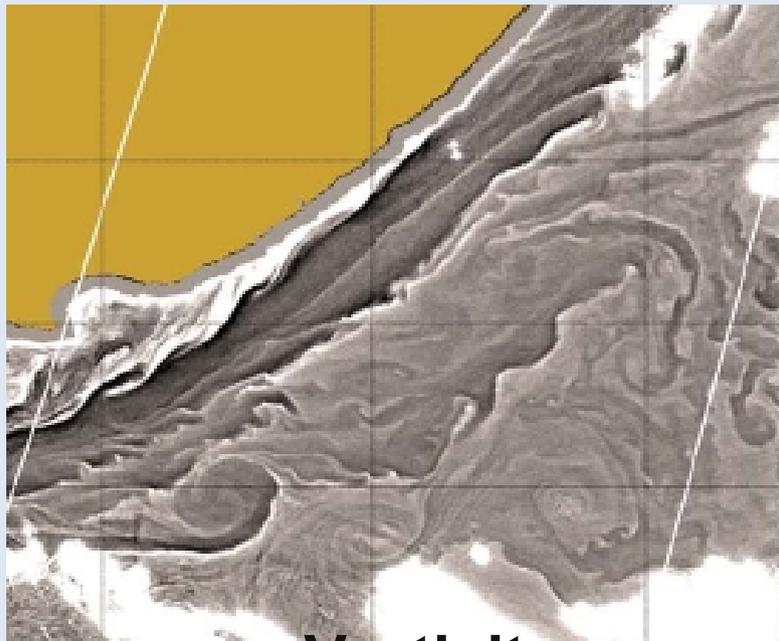


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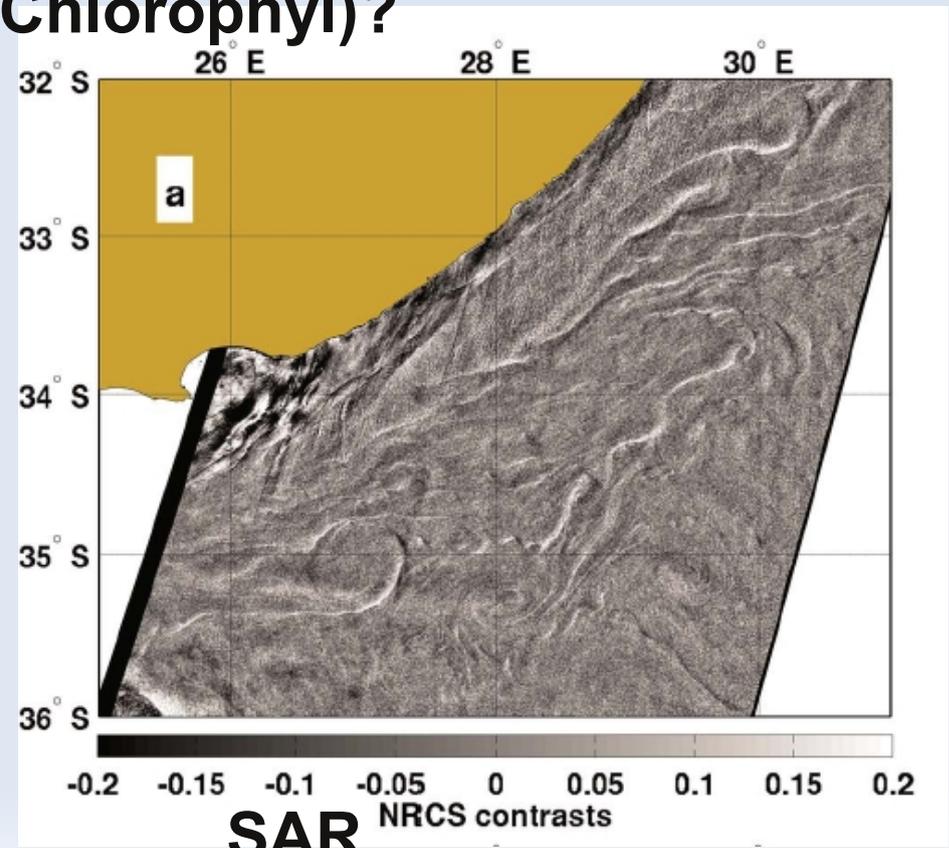
Relationships exist between SST and SSH (*Lapeyre, Klein 2006*)  
(known as **Surface Quasi-geostrophic equilibrium**):

**What about other quantities (SAR, Chlorophyll)?**



**Vorticity**

**from SST at 250m resolution**



**SAR**

NRCS contrasts

# 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**