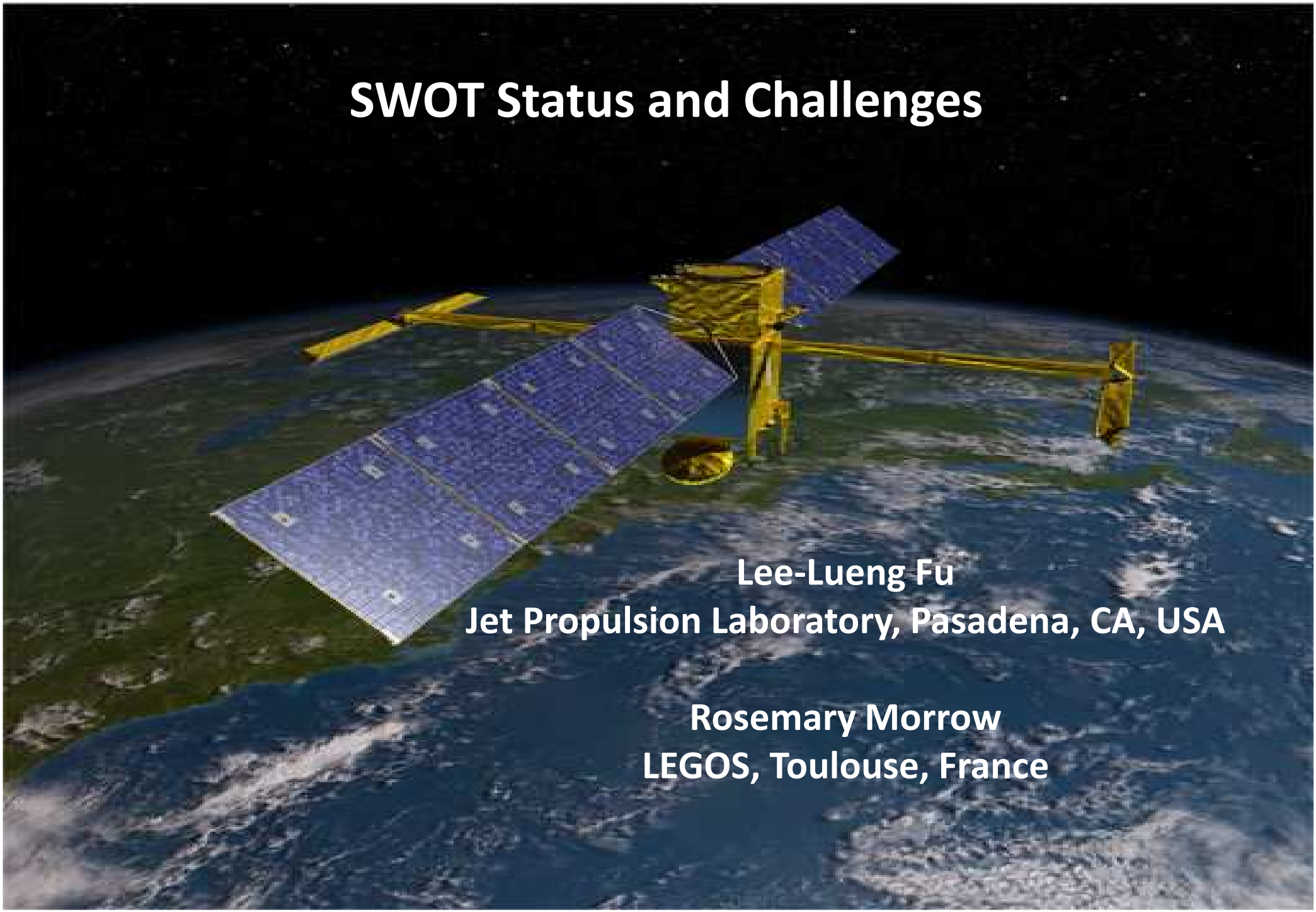
SWOT Status and Challenges



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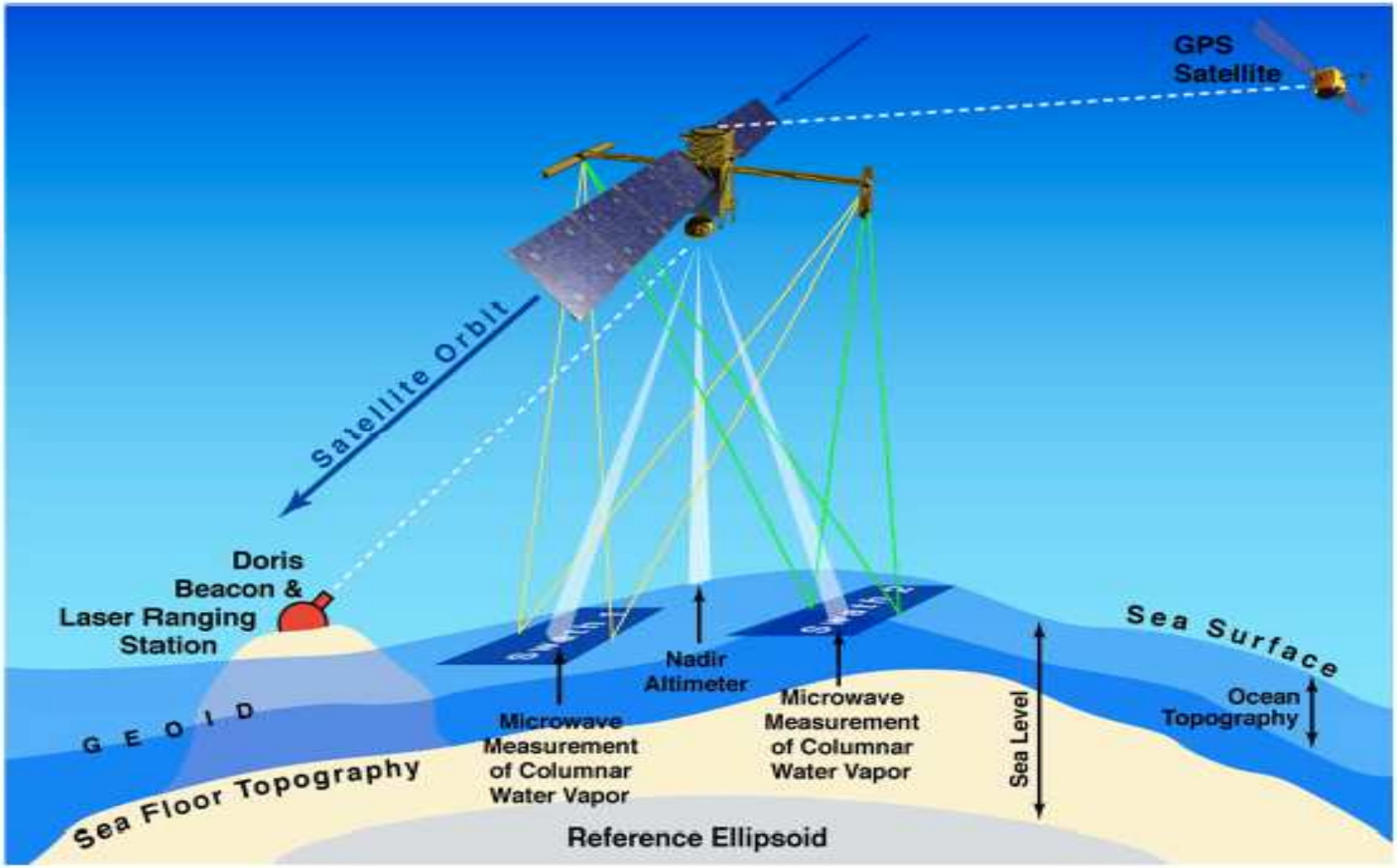
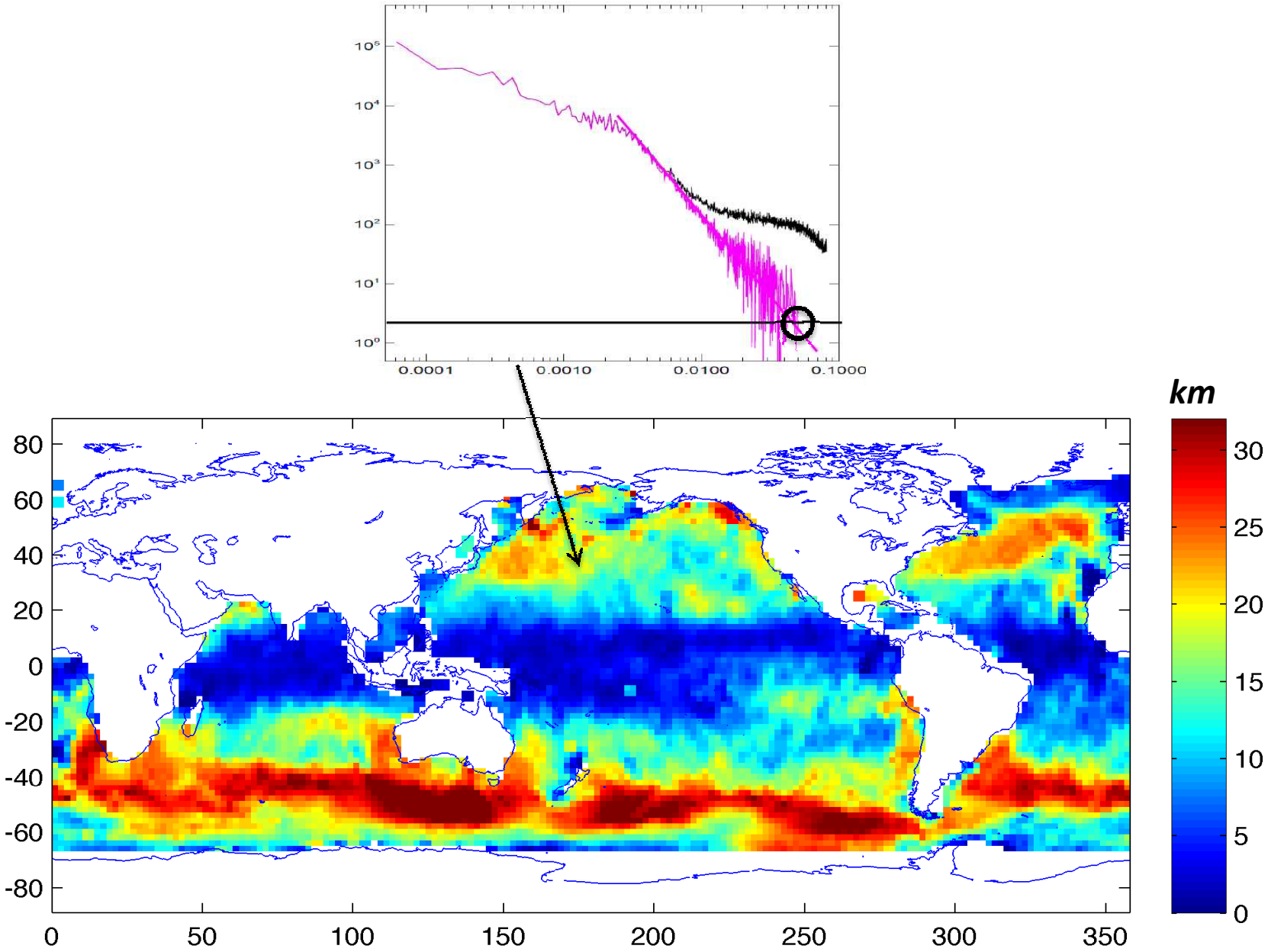
Mission Development Status

- Mission Definition Review (May 2014)
- NASA Key Decision Point (KDP-B) Review (June 2014)
- Mission is now in Phase B (July 2014).
- UK Space Space Agency has joined NASA, CNES, and CSA to be a mission partner.
- A Jason-class nadir altimeter has been confirmed to be part of the payload.
- Two Science Definition Team meetings (January, June, 2014)
- The SDT will expire at the end of 2015
- A new Mission Science Team will be formed to start in 2016
- ROSES and TOSCA call for proposals in February 2015

SWOT Measurement Principle

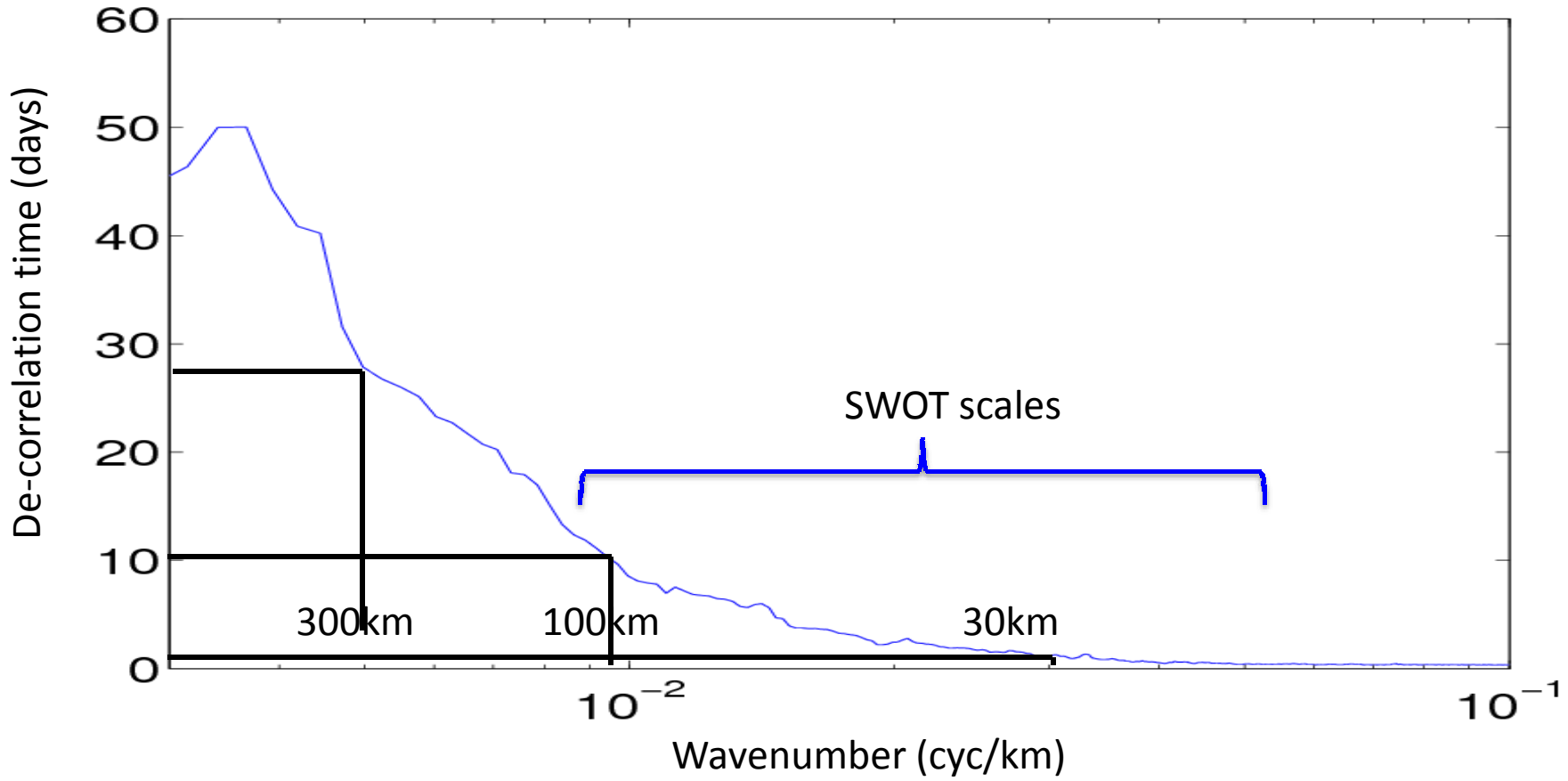


SWOT SSH resolution in the global ocean



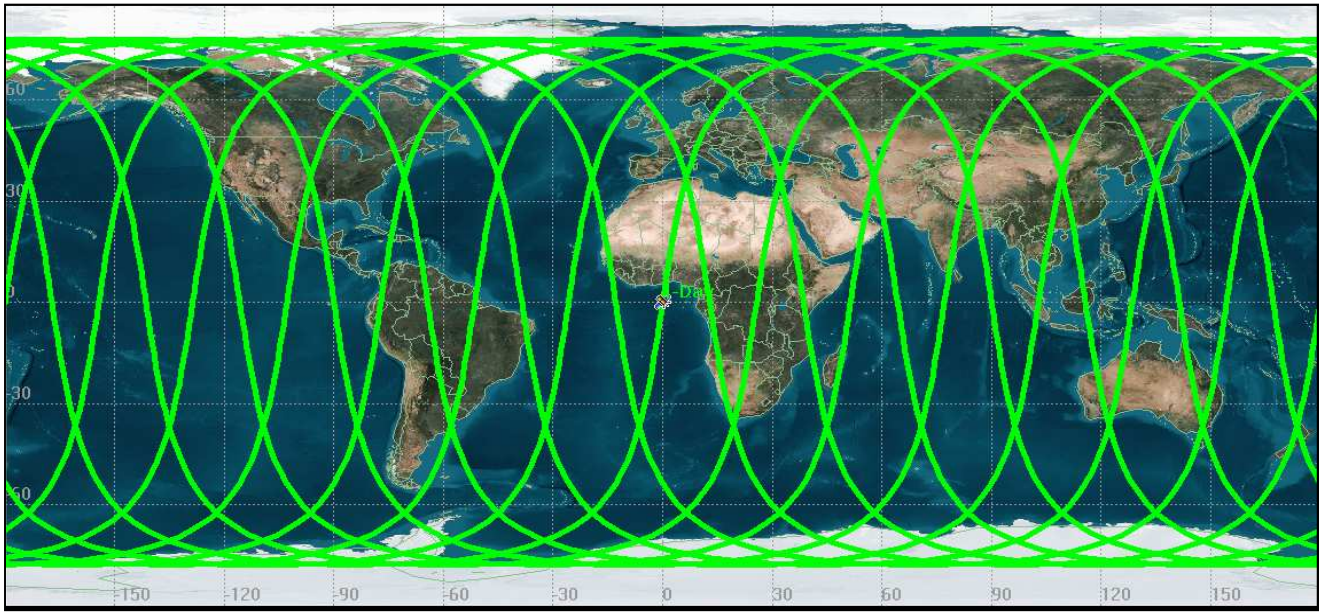
Fu and Ubelmann (2013)

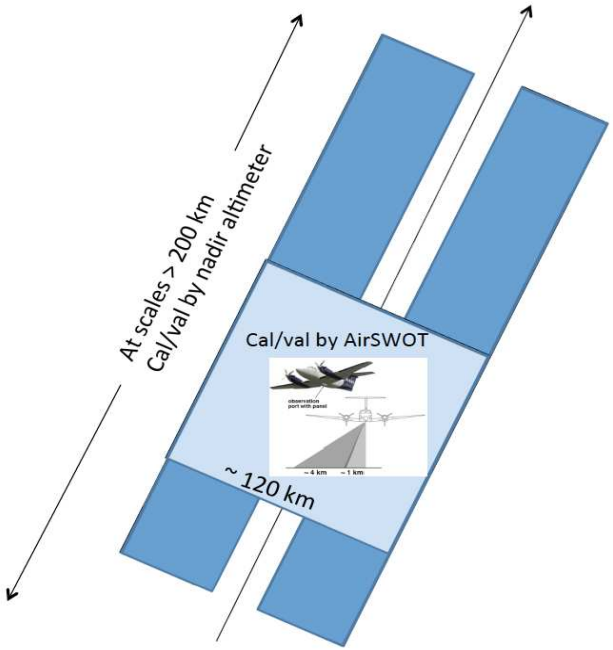
Time scales of ocean variability decrease with spatial scales



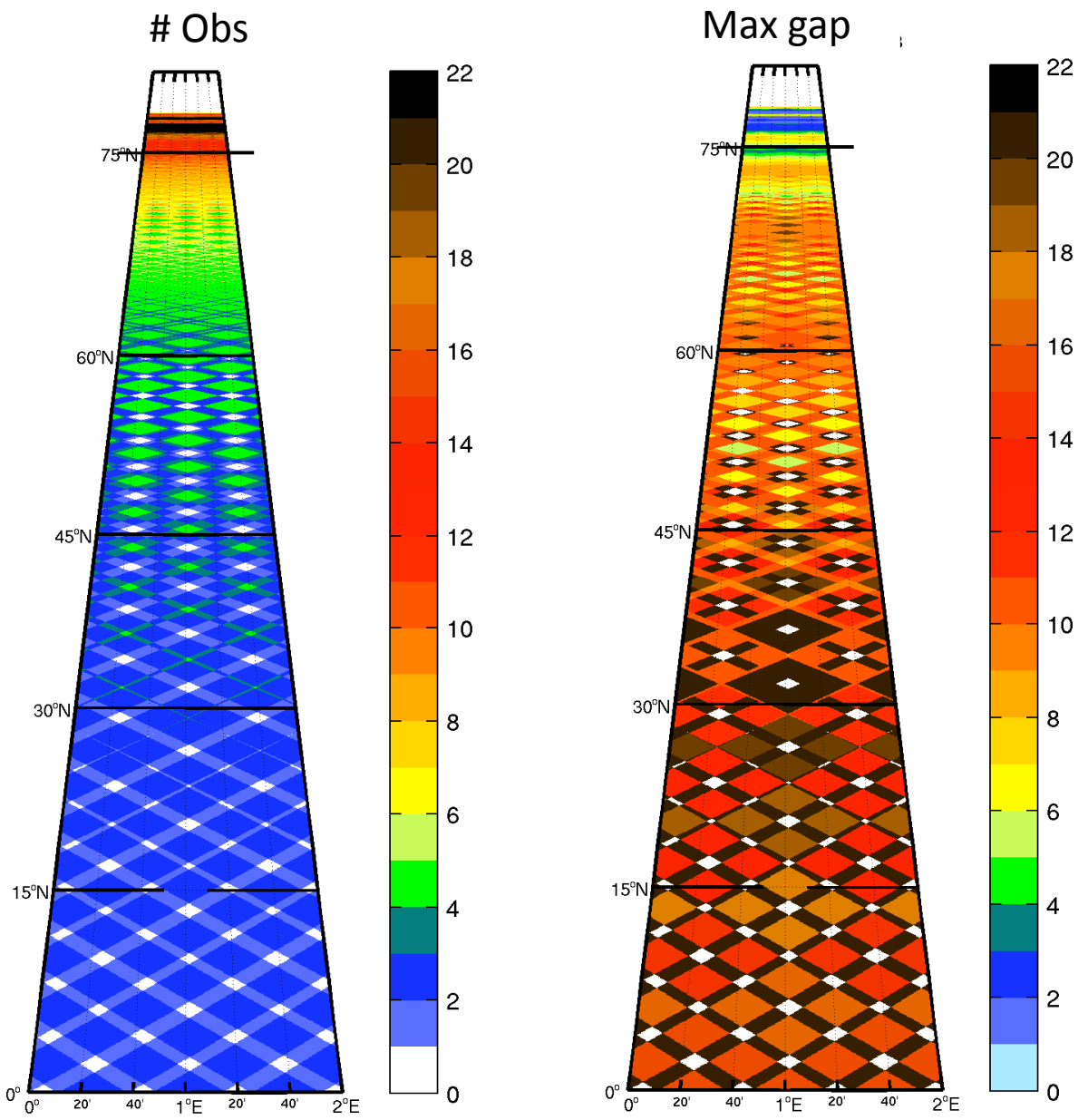
One-day repeat phase for initial Cal/Val

- Minimum 60 days up to 90 days before the 21 day repeat Science Phase
- AirSWOT is the main tool for cal/val at scales of the swath width, ~120 km.
- Nadir altimeter provides cal/val at longer scales
- The longitudinal crossing of the orbit is dictated by having a crossover point in coastal zone accessible by AirSWOT.
- Objectives are to characterize measurement errors and high-frequency geophysical processes

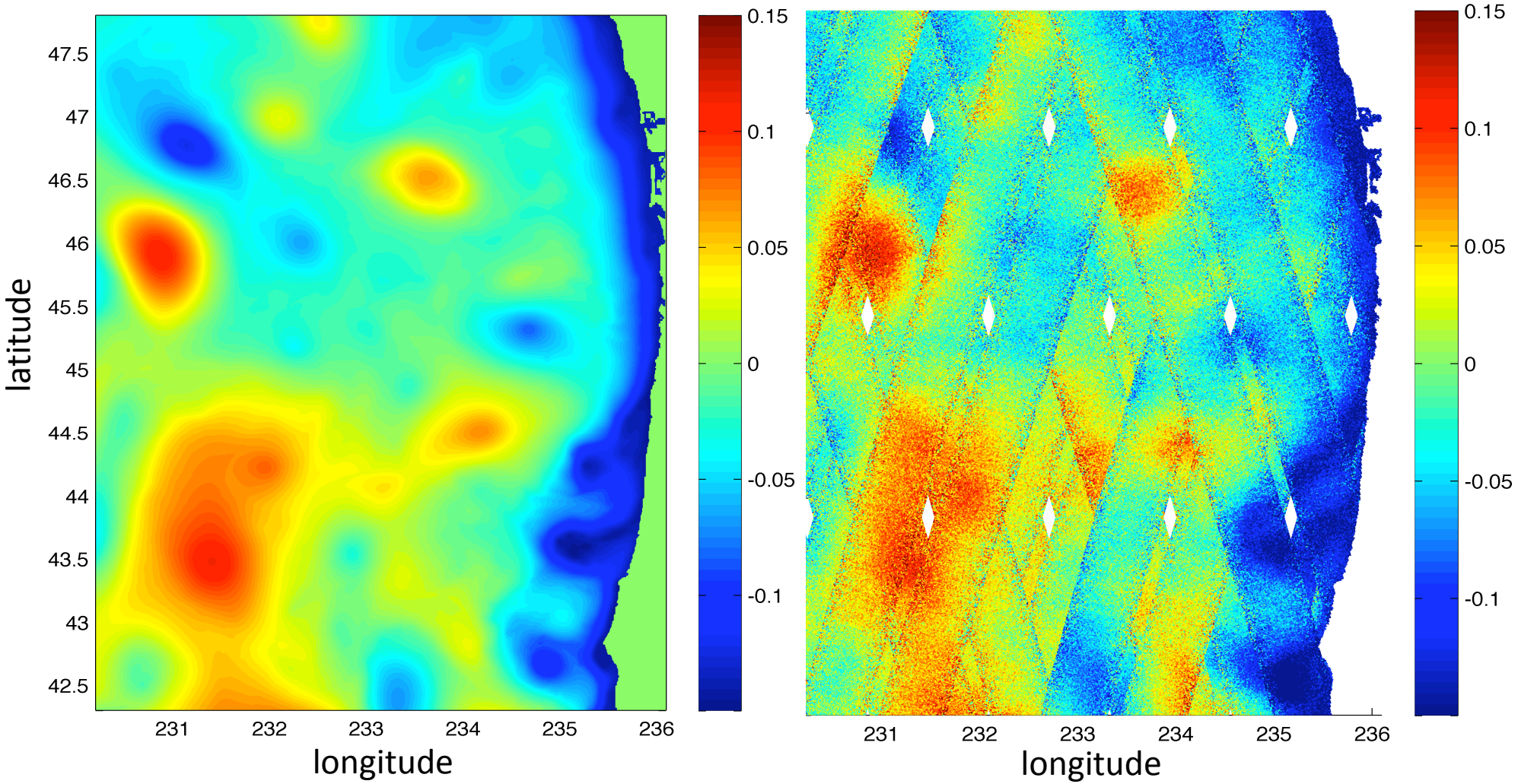




Sampling pattern of the 21-day orbit for the Science Phase

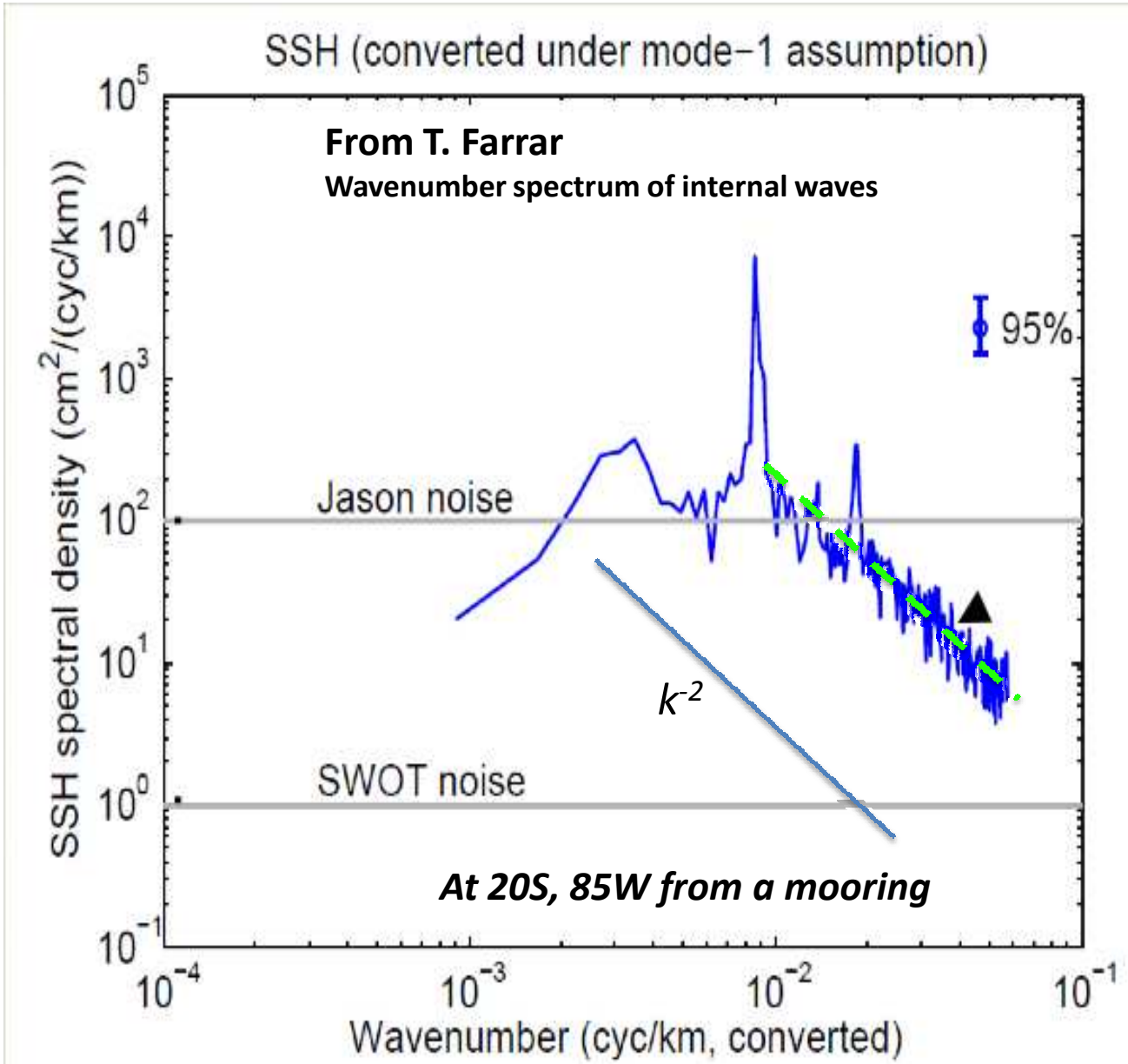


Challenges: Reconstruction of ocean state from irregular sampling



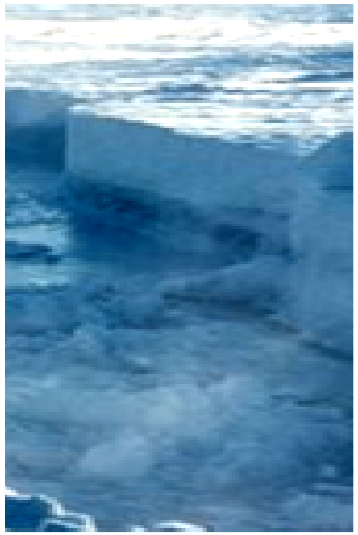
A software tool available for simulating SWOT-like observations for studying reconstruction methodology

Challenges: Dealing with Internal tides and internal waves



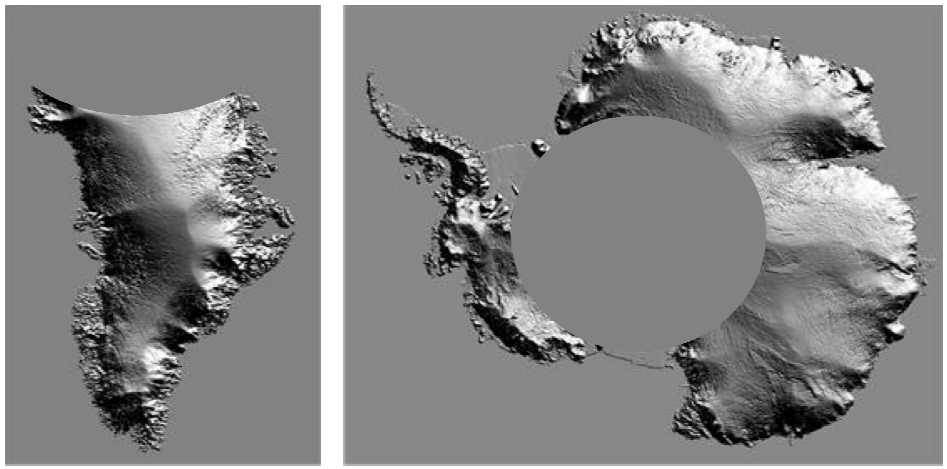
Synergistic Objectives
(not driving mission design)

Sea Ice Freeboard



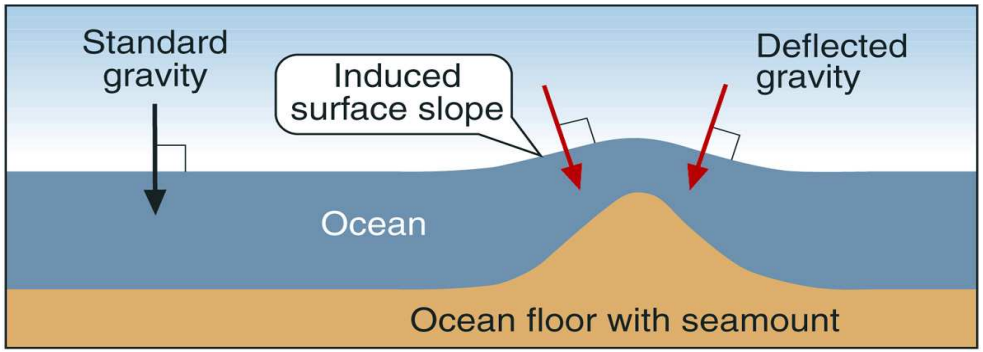
Sea ice thickness reflects the energy balance of the growth and decay of sea ice with great importance to climate change and societal applications.

Ice Sheet Topography



The melt of ice sheet is a major source of sea level rise from climate change.

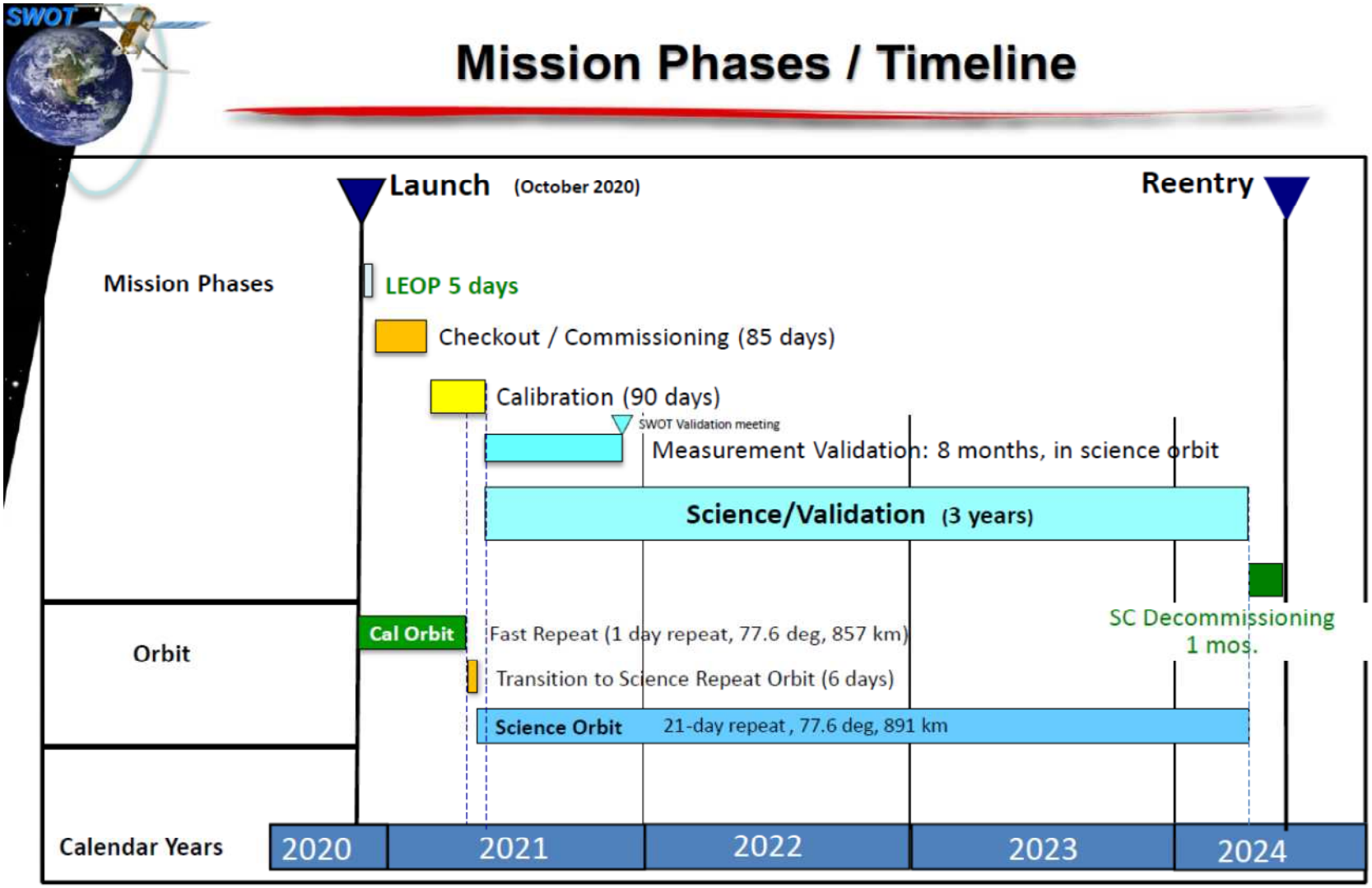
Ocean Bathymetry



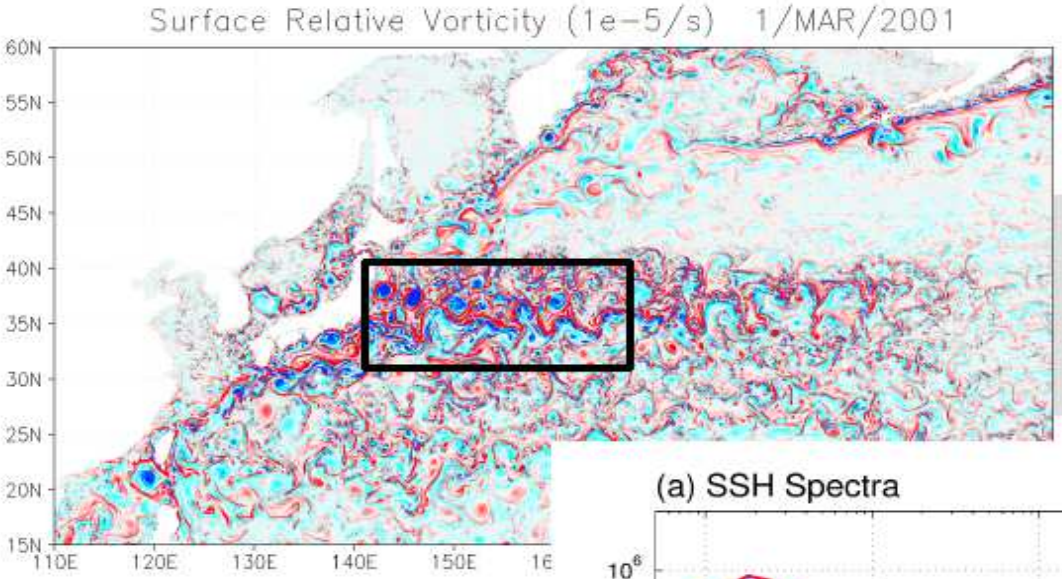
The high precision of SWOT measurement of sea surface height coupled with the full spatial coverage will make significant advance in the knowledge of ocean bathymetry with advances in both science and applications. (from 2 μrad to < 1 μrad)

BACK-UP

Mission Phases / Timeline



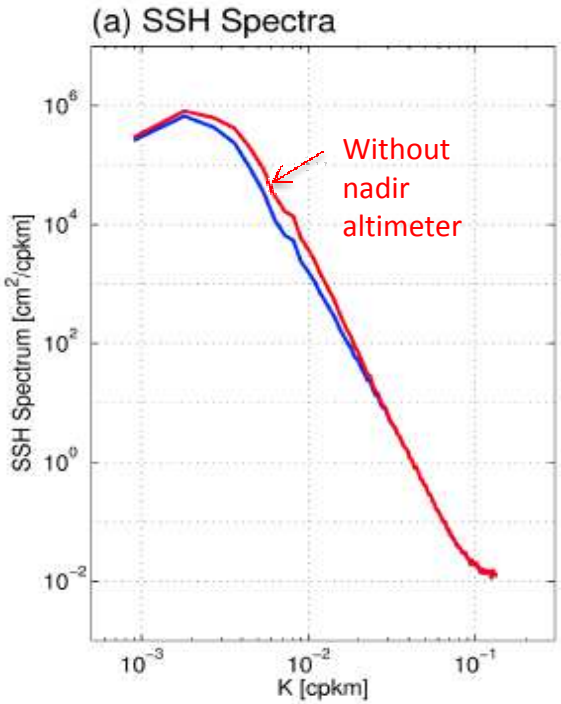
Impact of long length scales in oceanography

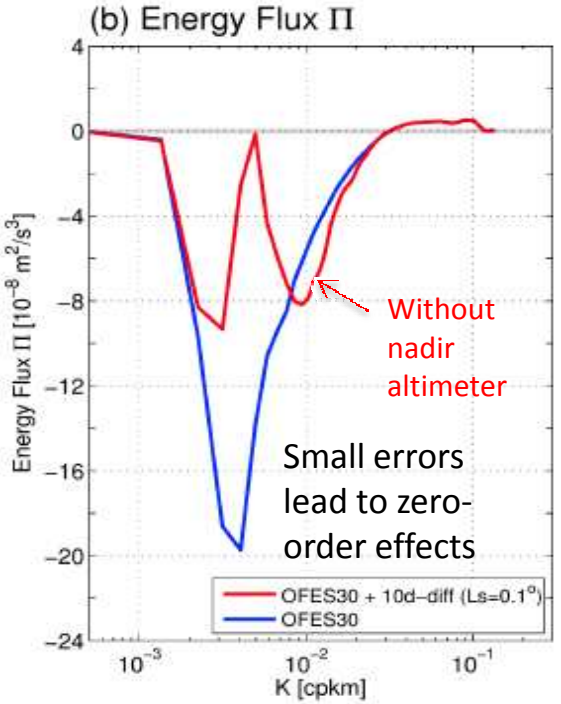


Spectral kinetic energy flux in the KE region with & without long-wavelength measurement errors

- **Accurate spectral flux evaluation requires correct information of both long and short length-scales**

$$\Pi_K \equiv \langle \mathbf{u}_K^< \cdot (\mathbf{u}_K^< \cdot \nabla \mathbf{u}_K^>) \rangle + \langle \mathbf{u}_K^< \cdot (\mathbf{u}_K^> \cdot \nabla \mathbf{u}_K^>) \rangle$$





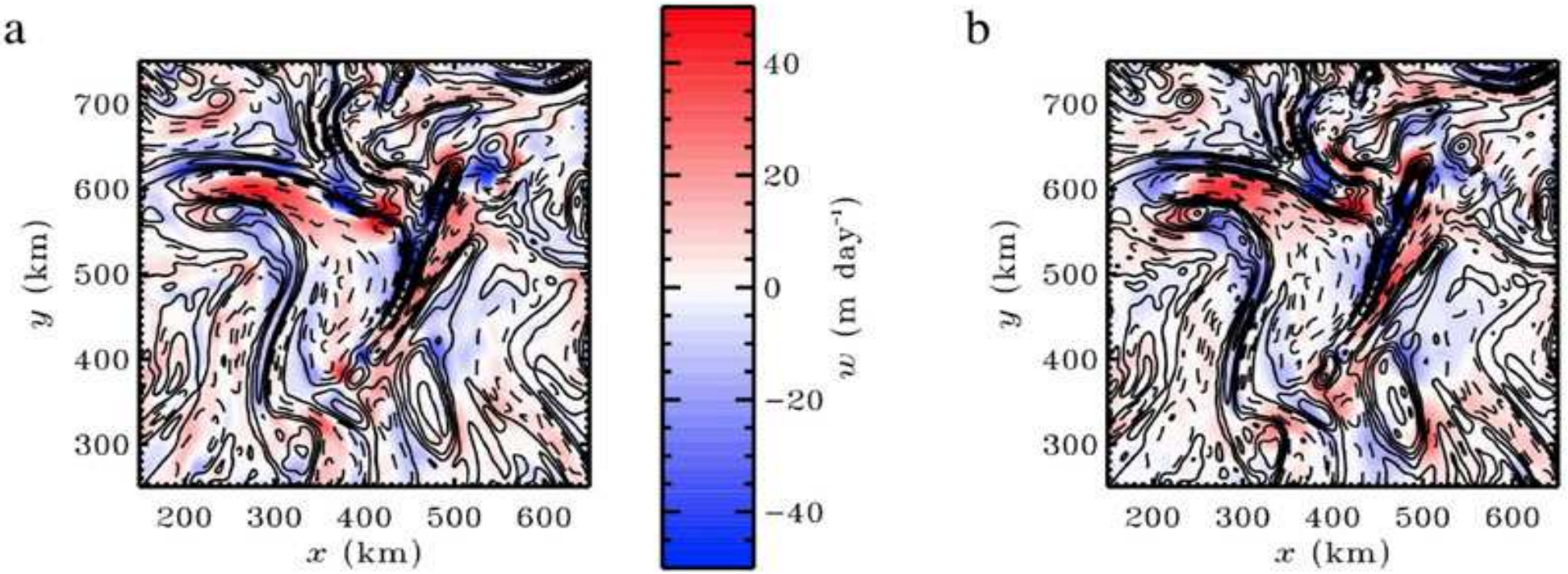


Figure 3.2-3. (a) Observed low-frequency vertical velocity (in colors) and relative vorticity (contours) at 200 m. (b) eSQG reconstructed vertical velocities (in colors) and relative vorticity (contours) at 200 m.

Challenges: Reconstruction of ocean state from irregular sampling