Towards High-Resolution of Ocean Dynamics and Terrestrial Surface Waters from Space

21 – 22 October 2010
Lisbon International Fair
Lisbon, Portugal

Meeting Background

The last two decades of satellite altimetry observations have allowed scientists to make enormous progress in understanding ocean dynamics and in improving our knowledge of the science of lakes, rivers and wetlands.

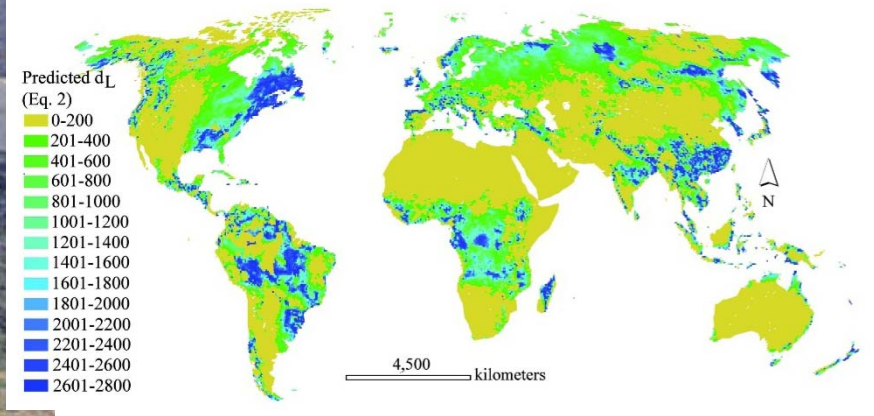
The objective of this meeting is to provide a forum for scientific discussion on the “state of the art” of higher resolution applications and techniques for ocean and hydrological studies.

High-resolution Terrestrial Surface Waters from Space

We will focus on

- water storage changes in terrestrial surface water bodies (lakes,rivers, flood plains)
- estimation of river discharge.
- advances in surface water science through high-resolution spaceborne measurements, e.g. wetland dynamics.

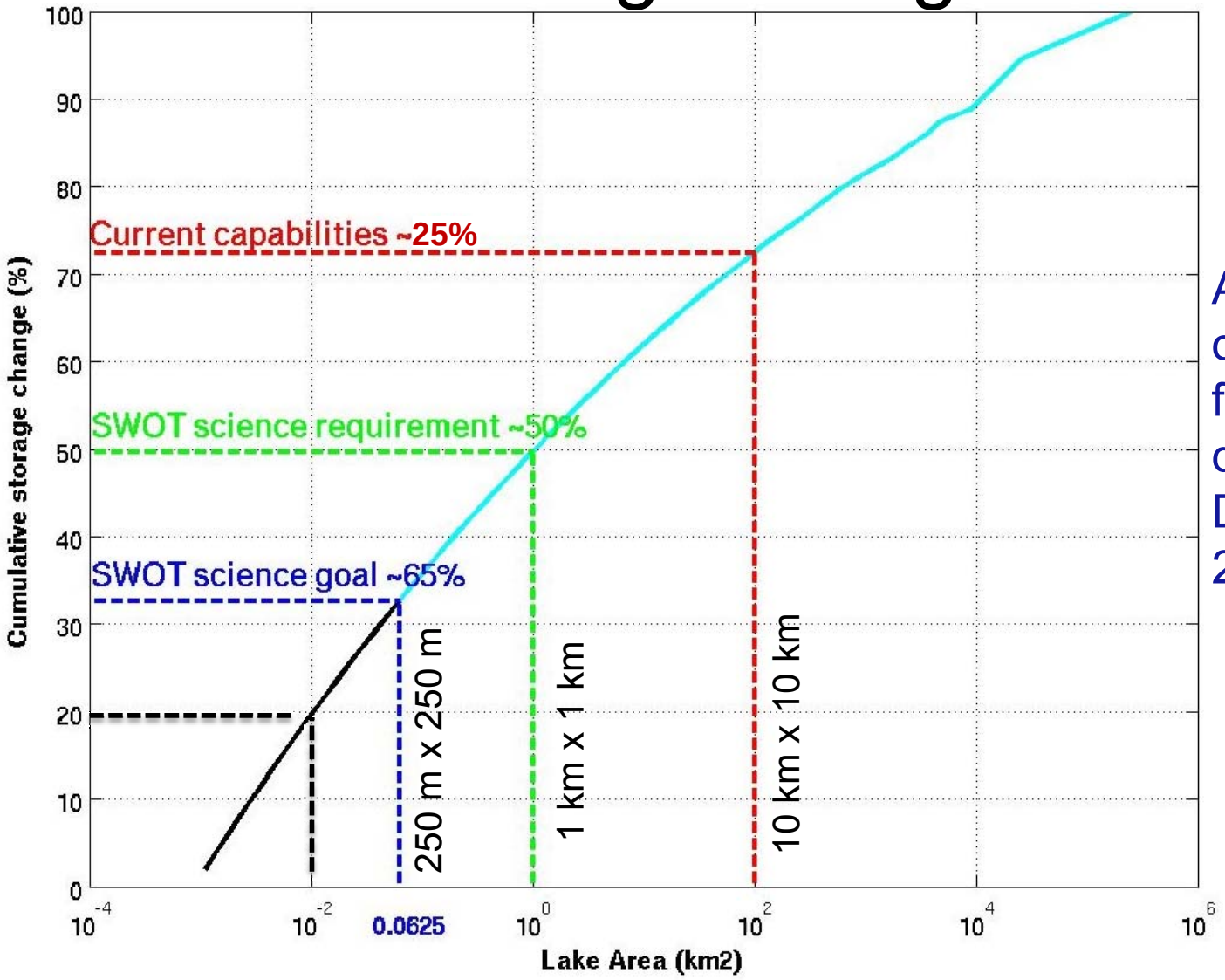
Photo: Larry Smith



Downing et al., 2006

Photos: K. Frey, B. Kiel, L. Mertes

SWOT capability to measure global storage change



Analysis based on global lake frequency-area distribution by Downing et al., 2006

Courtesy: Sylvain Biancamaria, CNES

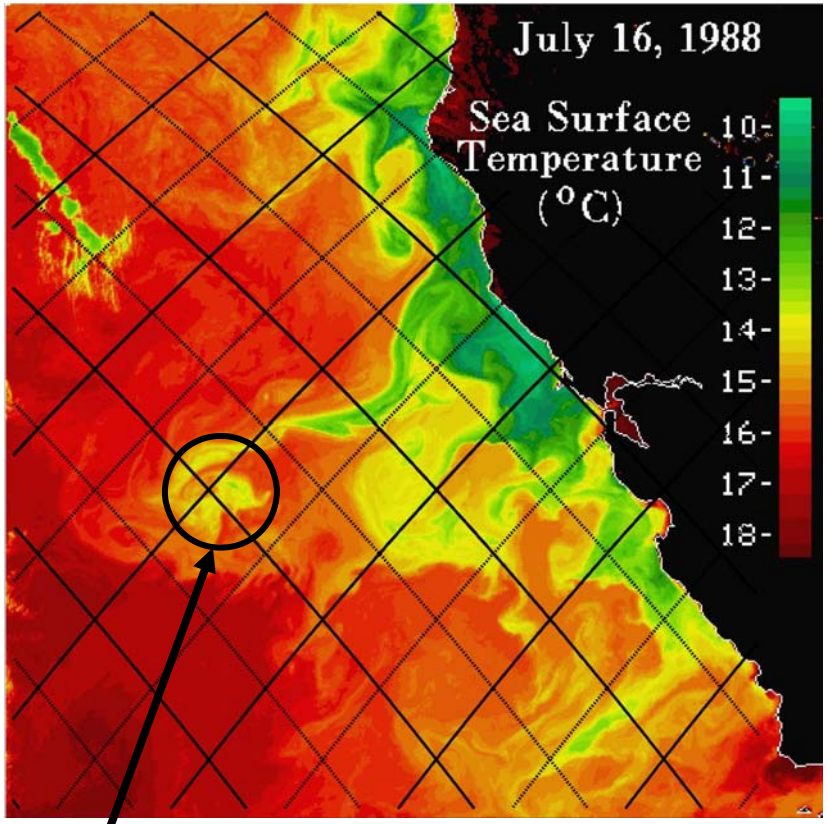
High-Resolution of Ocean Dynamics from Space

We will focus on the **dynamics of mesoscale and sub-mesocale processes** at scales shorter than 300 km, such as :

- the **formation, evolution, and dissipation of eddy variability** (including narrow currents, fronts, and quasi-geostrophic turbulence),
- **internal tides** and
- their **role in air-sea interaction**.

90% of the ocean's kinetic energy is carried by eddies which are not well resolved by a nadir-looking altimeter

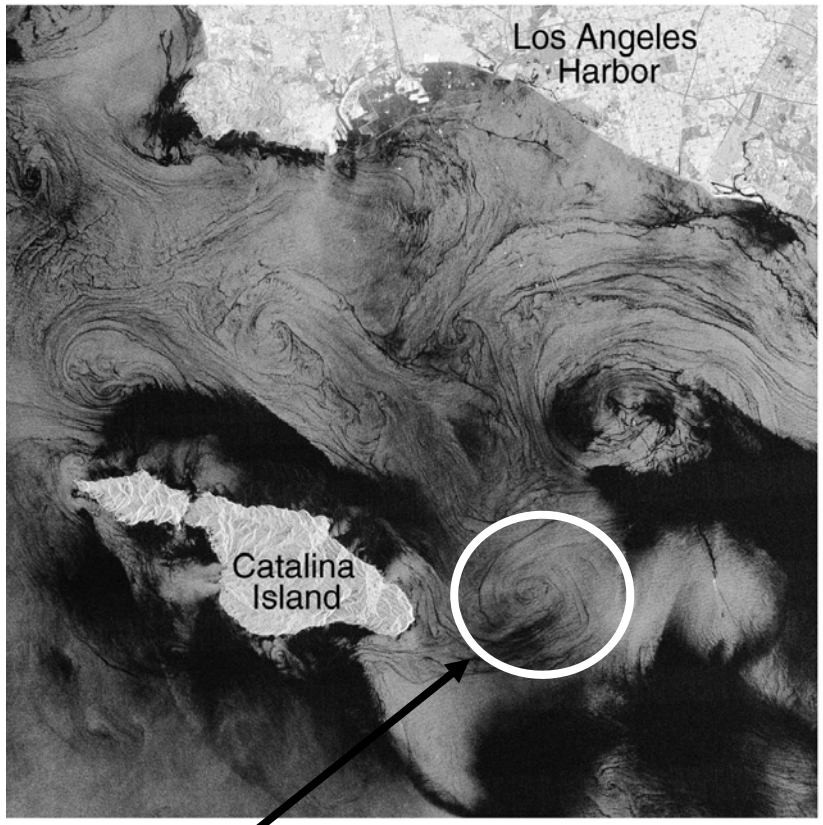
ground tracks of Jason (thick) and T/P (thin) Tandem Mission



100 km scale eddies

100 km

RADARSAT - December 26, 1998

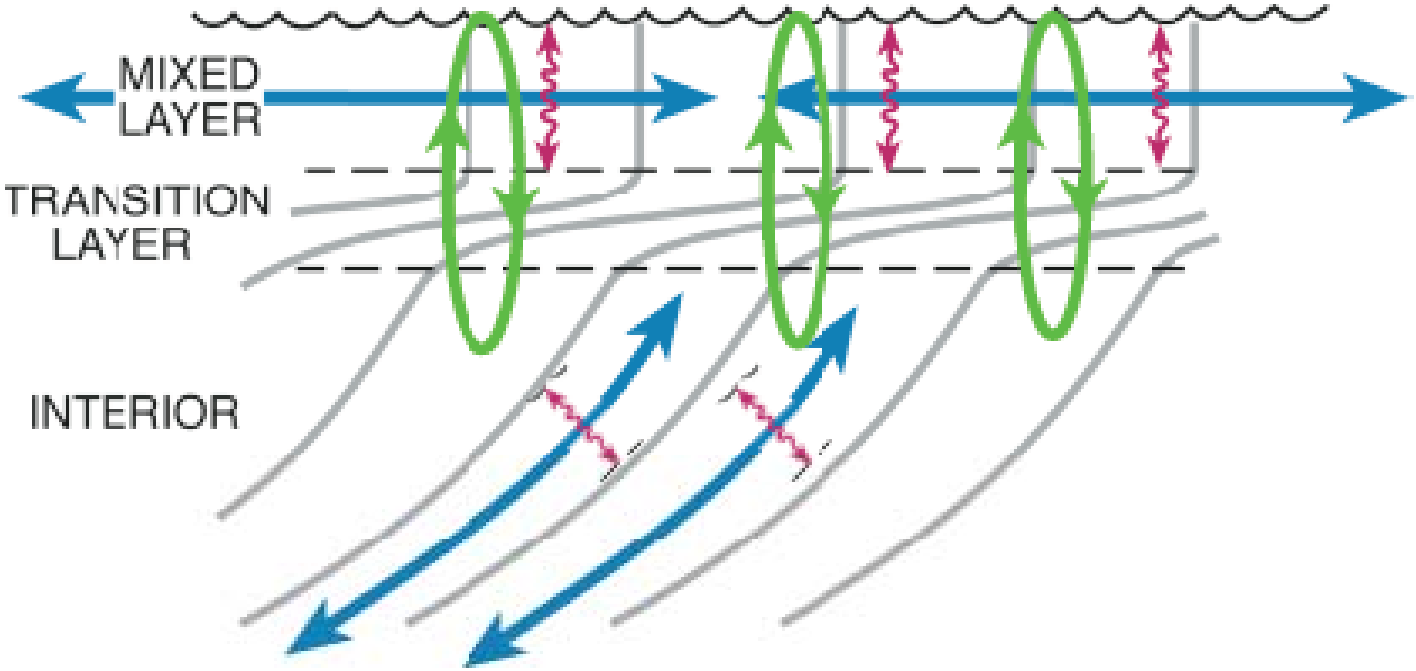


10 km scale eddies

The importance of oceanic submesoscales:

50% of the vertical motion in the world's oceans responsible for heat and CO_2 uptake takes place at the submesoscales

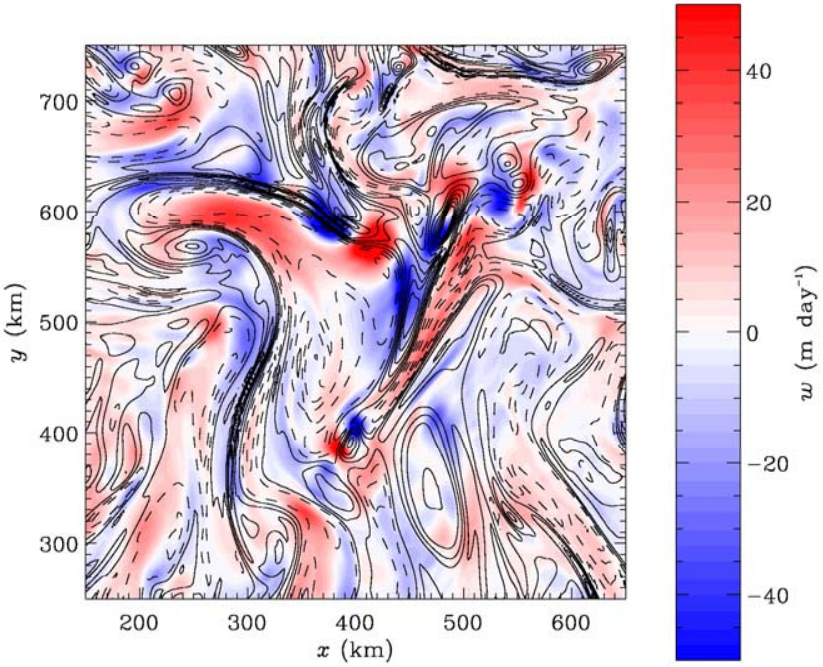
$$\bar{b}_t + \bar{\mathbf{u}} \cdot \nabla \bar{b} = \underbrace{-\nabla_H \cdot \overline{\mathbf{u}_H' b'}}_{\text{mesoscale}} - \underbrace{\partial_z \overline{w' b'}}_{\text{submesoscale}} + \underbrace{\partial_z \kappa \bar{b}_z}_{\text{boundary layer}}$$



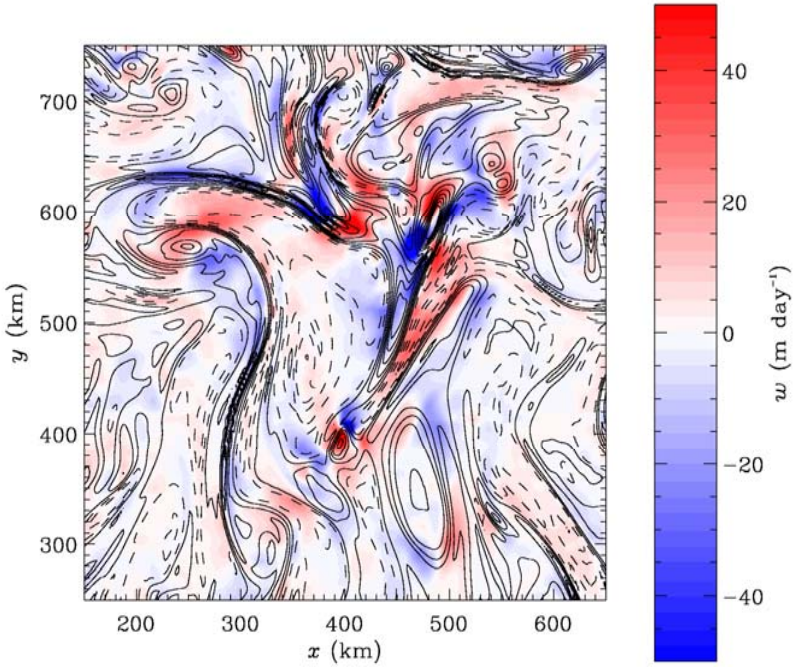
R. Ferrari (MIT)

Feasibility of estimating the vertical velocity of the upper ocean from SSH measurement

Simulated W by an OGCM



Reconstructed W from SSH

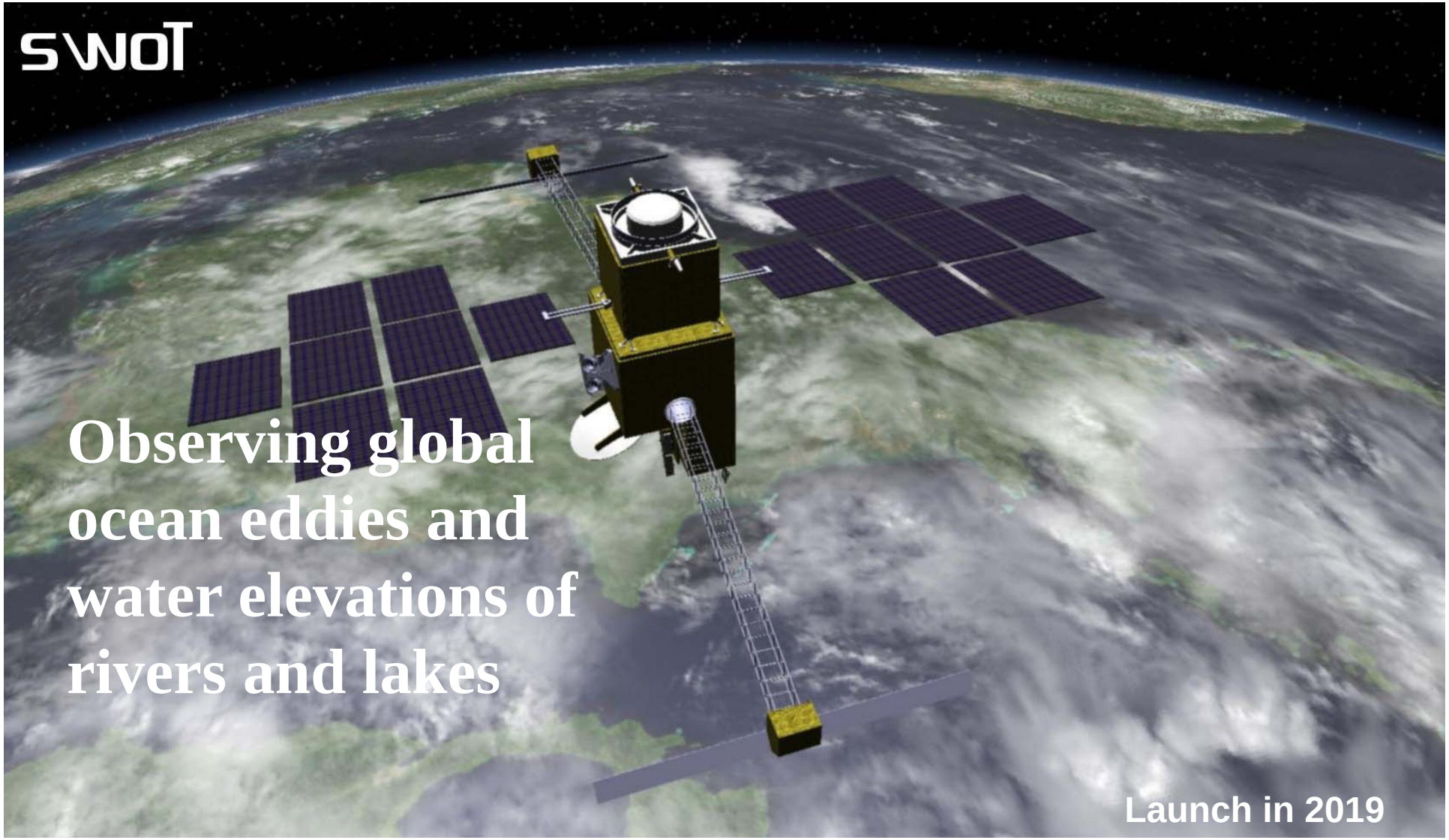


Contours are relative vorticity

P. Klein (IFREMER)

Meeting organised by SWOT Project Scientists

Doug Alsdorf(OSU), Nelly Mognard (LEGOS), Lee-Lueng Fu (JPL/NASA), Rosemary Morrow (LEGOS)

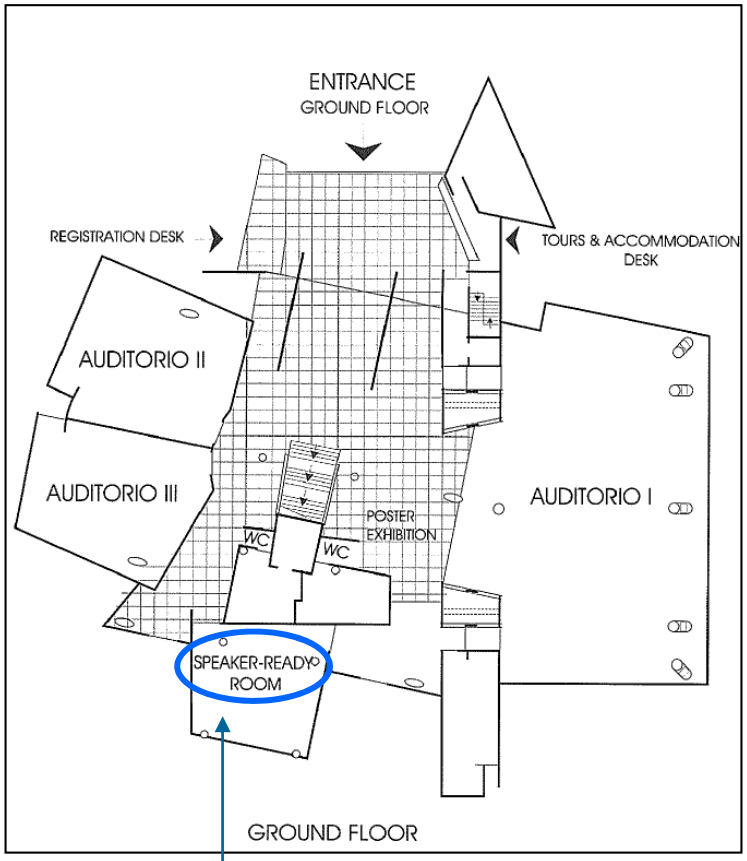


cnes EUMETSAT NASA JPL LEGOS

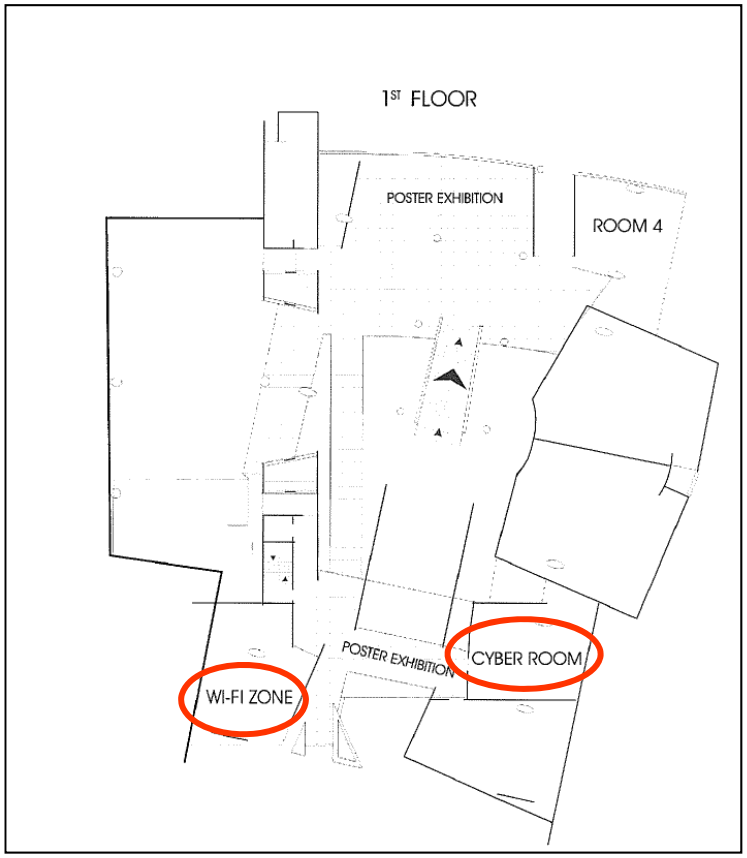
Purpose of this meeting

The symposium is designed to bring together scientists working on theoretical and modelling applications, as well as observational applications from different satellite systems and in-situ observations.

General information



Presentation to be uploaded in the **speaker-ready room,** **Ground floor**



Wifi areas:
Ground floor foyer (but not in the Auditoriums)
1st floor: **Wifi zone** & **Cyber Room**

Buffet lunches

served in the « CRFIL Restaurant », hostesses will guide the way

Coffee breaks

served on the ground and 1st floors

Workshop Cocktail

This evening, 21 October: at FIL from 6pm to 7:30 pm

Proceedings

- an USB card including workshop abstracts is given to each participant at registration

- Full presentations will be posted online after the conference on the AVISO&JPL websites in secured pdf format. They are collected from the speaker-ready room PC's . If you don't agree that your own presentation be posted, please contact us, we will remove it.

- Posters on the websites: send them in pdf to **aviso@oceanobs.com**
  Your posters will be available online at:
  http://www.aviso.oceanobs.com/

Thursday 21 October 2010

8:30 – 10:00	**▶Opening Plenary Session**	**AUDITORIO I**
8:30	**Introduction to the Meeting**	N. MOGNARD (CNES), R. MORROW (LEGOS)
8:45	**The role of SWOT in water cycle science**	D. LETTENMAIER (University of Washington)
9:15	**The altimetric future of oceanography**	C. WUNSCH (MIT)
9:50 – 10:30	**Session I: Joint Hydrology Oceanography : Science Linkages : estuaries & coastal zones, impact of inland waters on sea level change**	**AUDITORIO I**
9:50	**Effects of land waters on sea level**	A. CAZENAVE (LEGOS/CNES)
10:10	**Ocean modeling and data assimilation: linking river discharge with coastal processes**	Y. CHAO (JPL)

10:30 ..... Coffee break

11:00 – 12:30 **▶Parallel Sessions**

AUDITORIO II	AUDITORIO I
Session II.1 Hydrology: Satellite based estimates of river discharge	**Session II.2 Ocean: Theory and models of mesoscale to sub-mesoscale ocean processes**