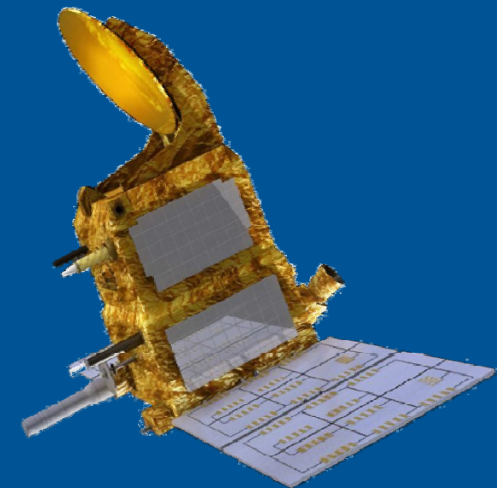
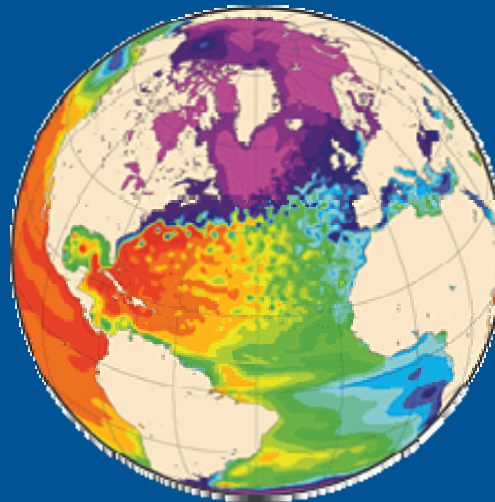
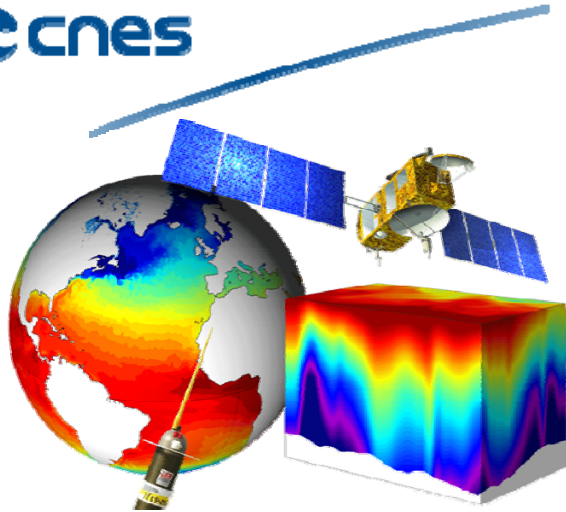


# CNES ocean program status

Juliette Lambin

October 2011

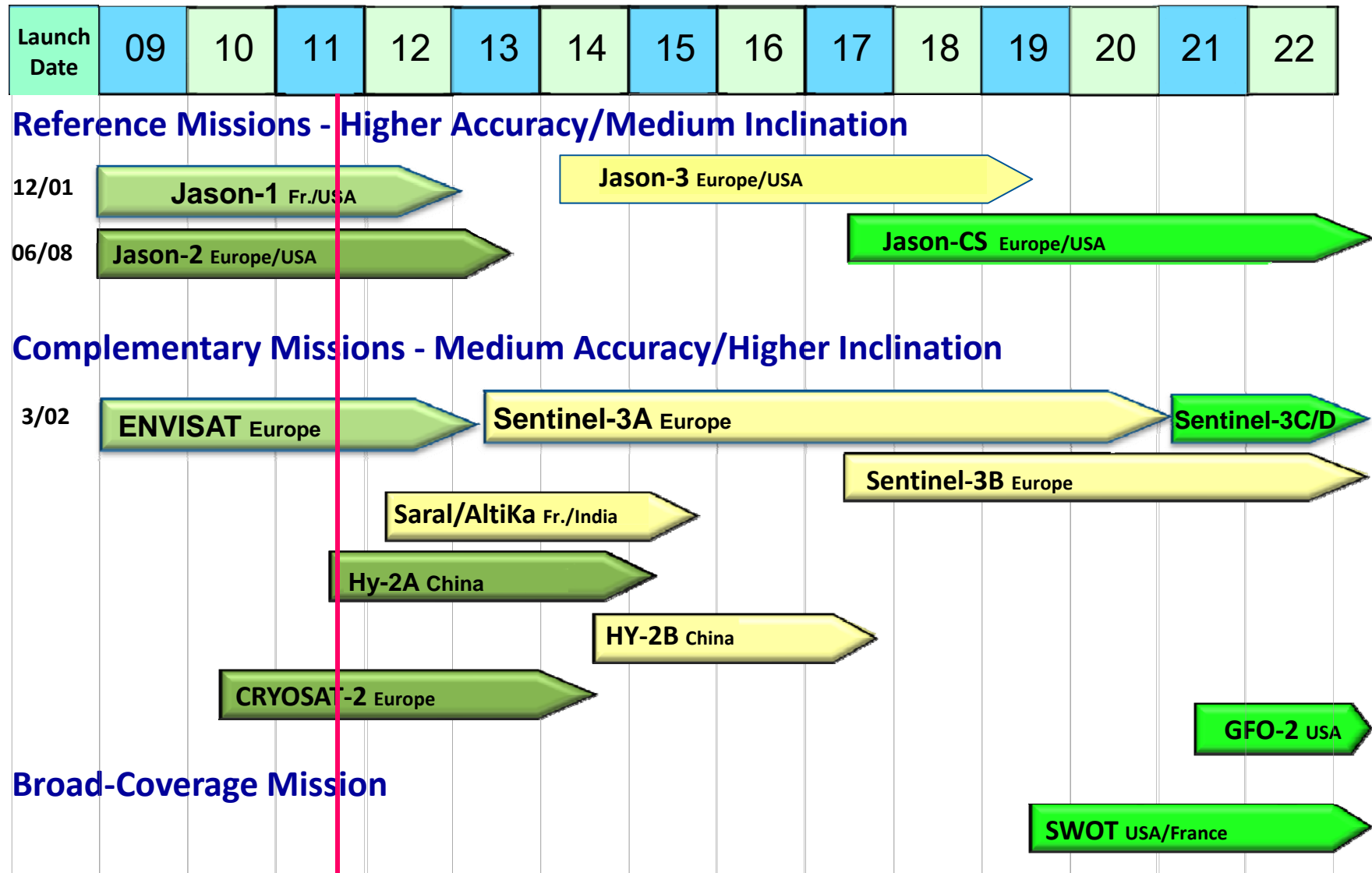




# CNES involvement in oceanography

- **Promote the development of operational oceanography**
  - ◆ Secure the « reference mission » continuity and performance: TP/J1/J2/J3/J-CS
  - ◆ Contribute to the altimetry constellation: ERS/ENVISAT/SENTINEL-3, Hy-2A
  - ◆ Enhance synergies between altimetry missions through AVISO/DUACS
  - ◆ Involvement in CORIOLIS, partnership with Mercator...
- **Future of altimetry: new instruments**
  - ◆ **AltiKa: Ka-band altimetry**
  - ◆ **Contribution/Interest in Delayed Doppler altimetry (Cryosat, Sentinel-3...)**
  - ◆ **SWOT: wide-swath altimetry**
- **Explore new measurements of ocean parameters**
  - ◆ **SMOS: ocean surface salinity**
  - ◆ **CFOSAT: directional wave spectrum**
  - ◆ **Ocean colour**

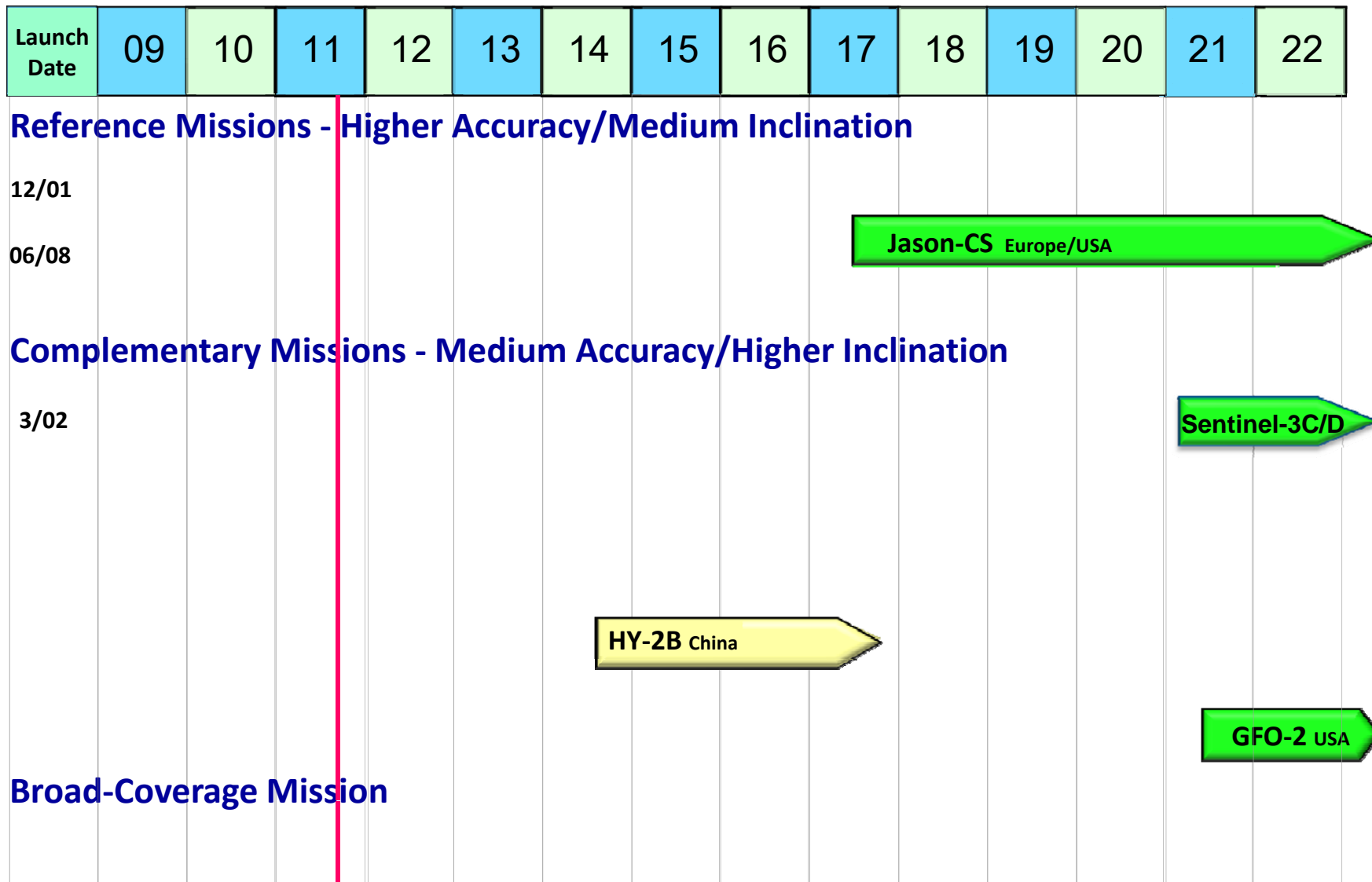
# GLOBAL ALTIMETER MISSIONS





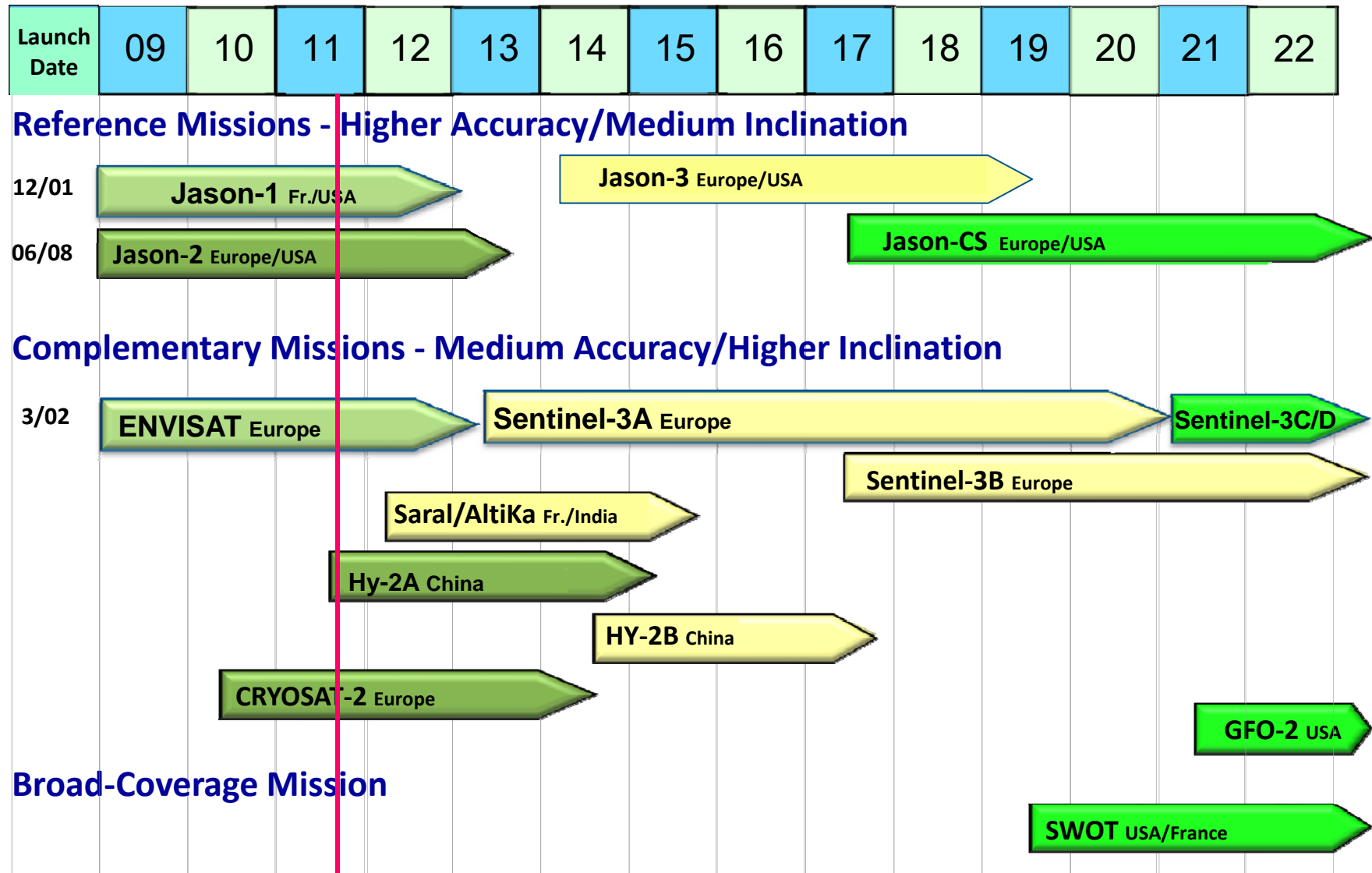
# "NO-CNES-INVOLVED" ALTIMETER MISSIONS (2/3)

*Removing Missions with CNES participation in DORIS & POD*





# GLOBAL ALTIMETER MISSIONS





## ■ « Reference mission » altimetry :

- ◆ 2001 – present: Jason-1
  - Poseidon-2 altimeter, DORIS, Proteus platform, ground segment
- ◆ 2008 – present: Jason-2 (~same)
- ◆ ~2014 Jason-3 (~same)
- ◆ ~2017 Jason-CS
  - TBD; so far support to ESA/EUMETSAT in mission design

## ■ Other missions:

- ◆ 2011 Hy-2A
  - support to DORIS, POD processing, level-3/4 data
- ◆ ~2013 Sentinel-3 A&B
  - DORIS, technical support to ESA

## ■ And always:

- ◆ « mission exploitation project » SALP: responsible for Jason-1/2, AltiKa, Hy-2, DORIS, AVISO
- ◆ Support to Mercator, CORIOLIS, OSTST, GODAE...

OSTST 2011 – Juliette Lambin

## ■ AltiKa

- ◆ Ka-band altimetry

## ■ CFOSAT

- ◆ Directional wave spectrum

## ■ SWOT

- ◆ Wide-swath altimetry

## ■ ...

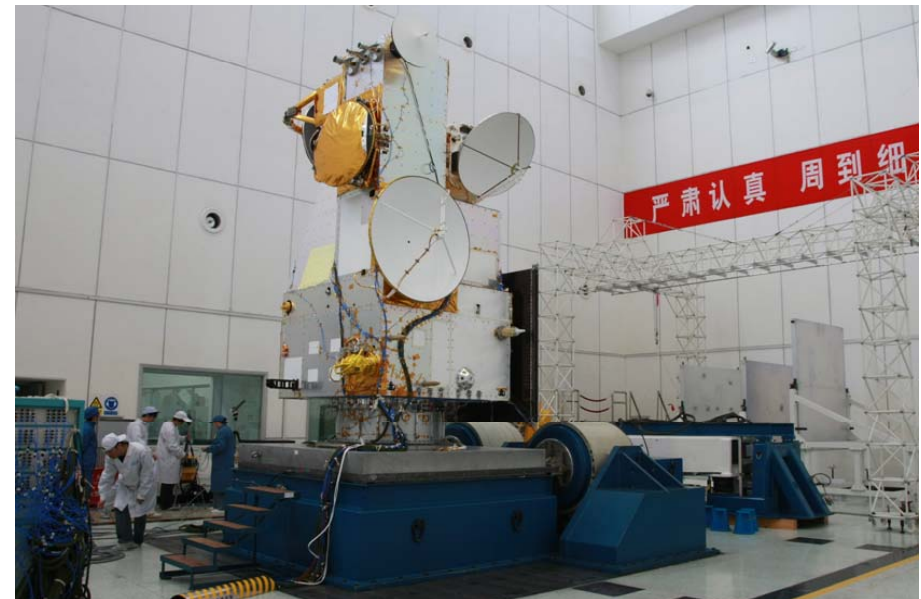
Always strong support in providing quality data, and sustaining science studies and use of altimetry



- Physical oceanography satellite from "China National Space Administration" (CNSA),
  - ◆ Altimetry payload: Ku-C altimeter, Ku/K/Ka radiometer, LRA, GPS, DORIS
  - ◆ Ku-band Wind scatterometer
  - ◆ 5-frequency radiometer (SST°)
- CNES participation:
  - ◆ POD processing
  - ◆ Inclusion of altimetry data into AVISO multimission product (after validation)
- Launched August 15, 2011
  - ◆ DORIS, GPS « on »: August 31th, 2011
  - ◆ Altimeter, radiometer « on »: Sept 1st
  - ◆ Final orbit reached on Sept 28th
- Orbit data of good quality
- Testing on-going
- Altimeter data expected at CNES end of Dec.



*HY for Hai Yáng (ocean)*  
*SSO orbit, ~970 km*  
*14-day cycle (2 years), then*  
*168-day (geodetic) orbit for 1 year*



## One slide on... SARAL Satellite for Argos and ALtiKa

- Cooperation with ISRO (India Space Research organization)
- Ka-band nadir altimetry mission
  - ◆ Gap filler between ENVISAT & SENTINEL3
  - ◆ Same orbit as ENVISAT (35 days, SSO)
  - ◆ New Ka-band altimeter, higher precision, compact design, integrated radiometer/altimeter
  - ◆ POD: DORIS, LRA
  - ◆ Other CNES payload Argos-3 instrument, X-band telemetry
- Status (CNES side)
  - ◆ Payload module finished, ready to be shipped to India
  - ◆ Ground segment ready
- India side: launched currently planned in April 2012
  - ◆ PSLV launcher #20
  - ◆ note that #18 successfully launched CNES-ISRO Megha-Tropiques mission on Oct 12
- *Data policy : ~ the same as JASON missions*
- *PI: Jacques Verron (CNRS)*





# One slide on... **SWOT**

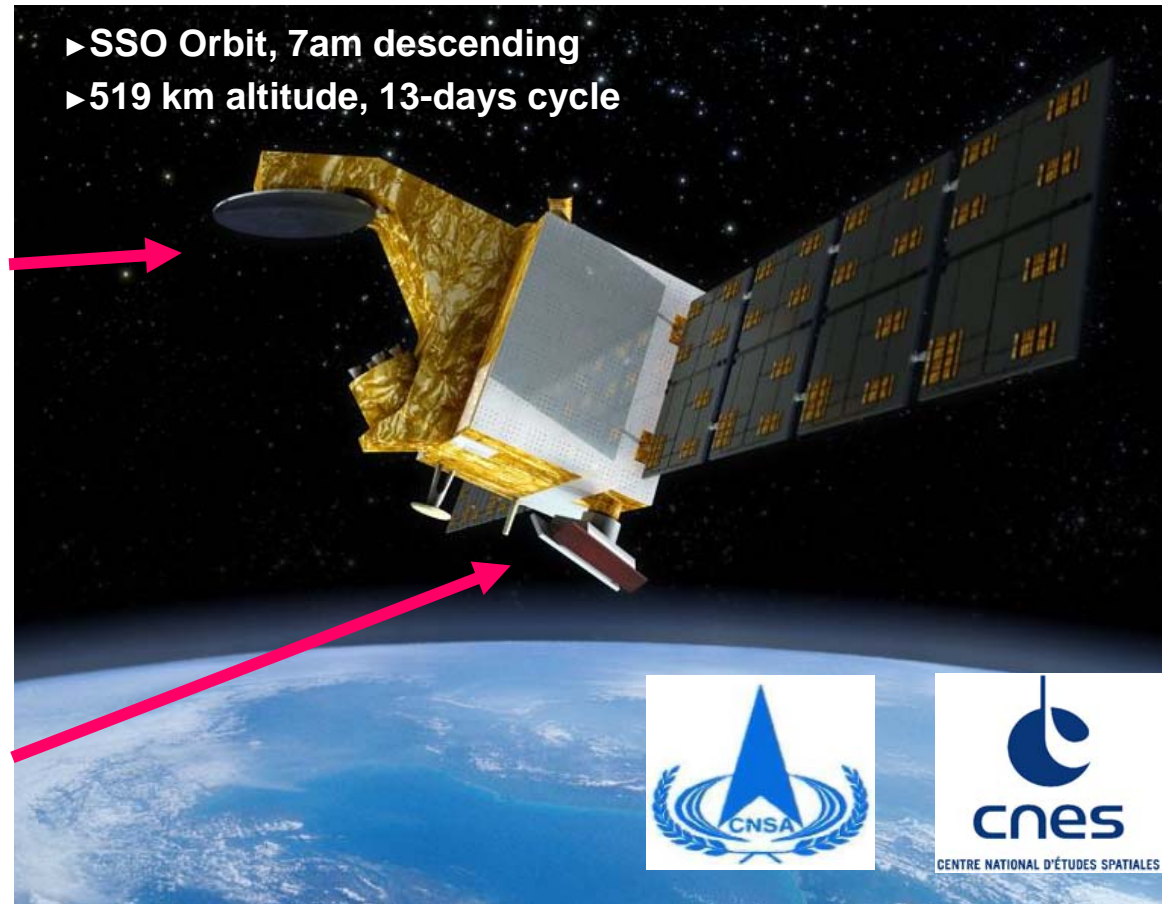
## Surface Water and Ocean Topography

- Hydrology and Oceanography mission
- Baseline payload :
  - ◆ Ka-band interferometric altimeter (KaRIn)
  - ◆ Traditional altimetry payload
- CNES budget secured in March '11 through General Investment Fund
- NASA/CNES Cooperation scheme approved
- CNES involvement:
  - ◆ Participation in KaRIn
  - ◆ DORIS, Altimeter
  - ◆ Platform
  - ◆ Ground segment
- “Phase A” underway at CNES, “pre-phase A” at NASA/JPL
- Next step: Mission Concept Review in 2012
- Launch possible in ~2019



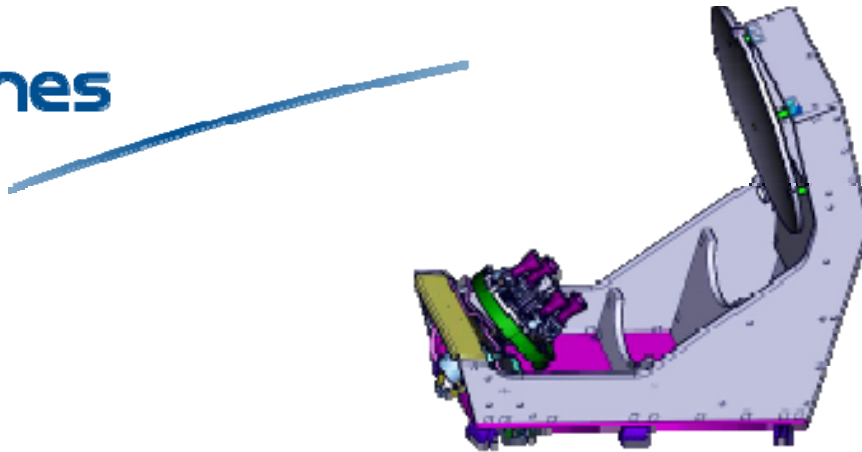
## Two slides on... CFOSAT China-France Oceanography SATellite

- **China-France Cooperation**
  - ◆ Currently in phase C/D
  - ◆ Launch date end of 2014
- **SWIM, new spaceborne instrument**
  - ◆ technology innovations (antenna, on-board digital processing)
  - ◆ Nadir channel ~altimeter
- **SCAT, new concept of wind scatterometer**
  - ◆ Ku-band, rotating fan-beam



- **Access to 2D wave spectrum with high angular resolution and with global scale**
- **Joint measurements of winds and waves**





# SWIM instrument

## Surface Waves Investigation and Monitoring

### Real aperture radar in Ku-band

6 incidence angles: 0°, 2°, 4°, 6°, 8° et 10°

Rotation speed: 5.7 rpm

### Will measure:

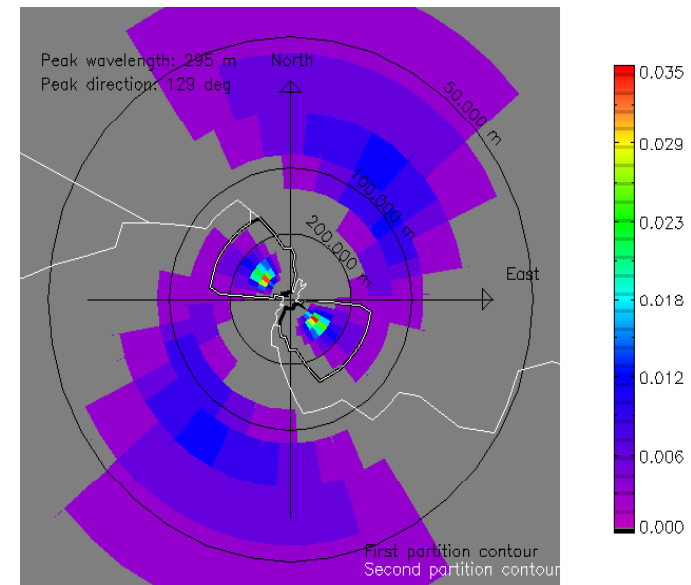
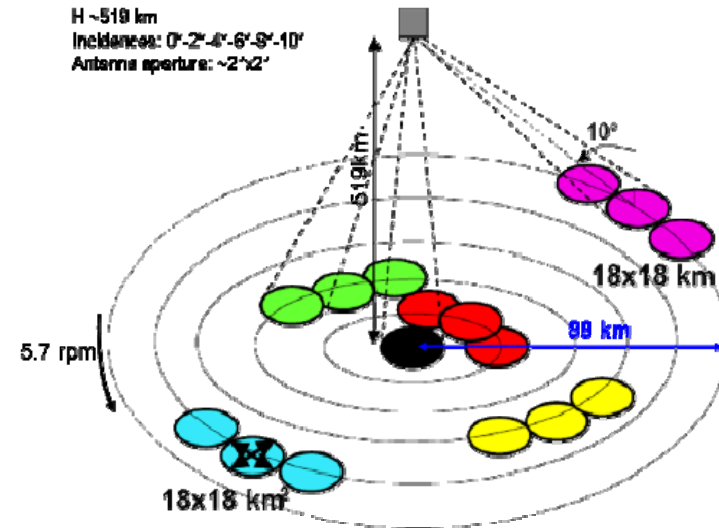
**Directional wave spectrum in the wavelength range 70-500 m**

Accuracy: 10% on wavelength, 15° on direction, 15% on spectral level around the peak

**SWH and wind speed from nadir**

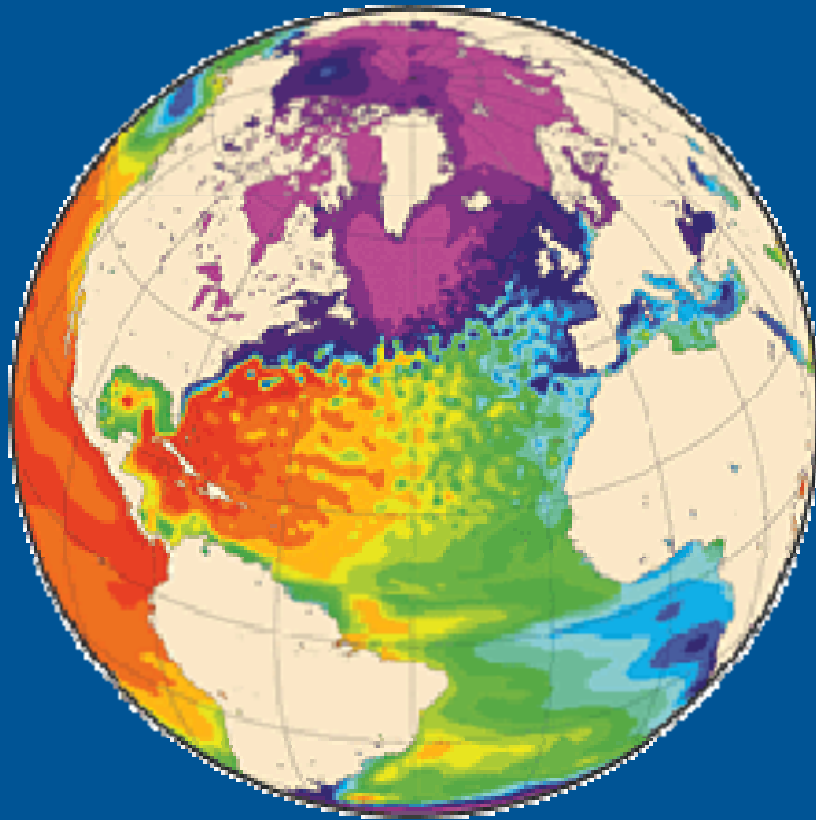
**Normalized radar cross-section from 0° to 10°**

Absolute accuracy of ±1 dB, relative accuracy between incidences ± 0.1 dB



## Airborne instrument in 2012 (KUROK)

- **CNES OSTST chairmanship changes:**
  - ◆ Rosemary Morrow will focus on SWOT
  - ◆ Pascal Bonnefond is taking over on OSTST
  
- **Eric Thouvenot left his position as Ocean program manager**
  - ◆ Replaced by Juliette Lambin in January 2011
  
- **In project science support (replacing Alix Lombard & myself):**
  - ◆ Amandine Guillot => Jasons, AltiKa
  - ◆ Claire Pottier => SWOT
  
- **Gilles Tavernier appointed CNES Jason-CS project manager**
  
- **New OSTST call in phase with NASA (call to be issued ASAP)**



**Thank you**