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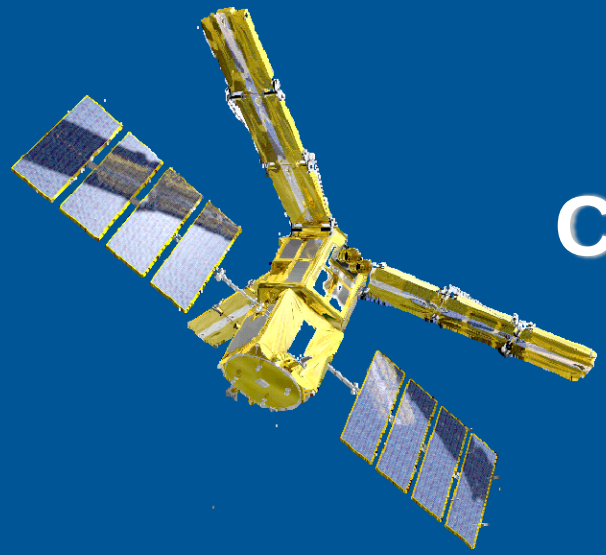
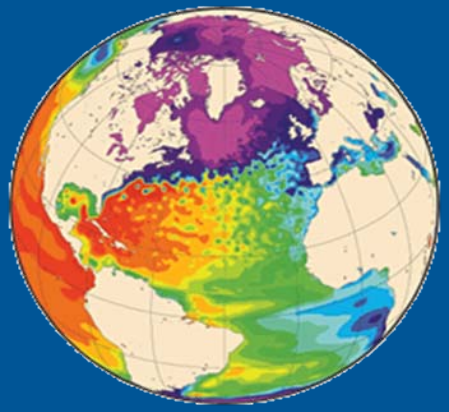
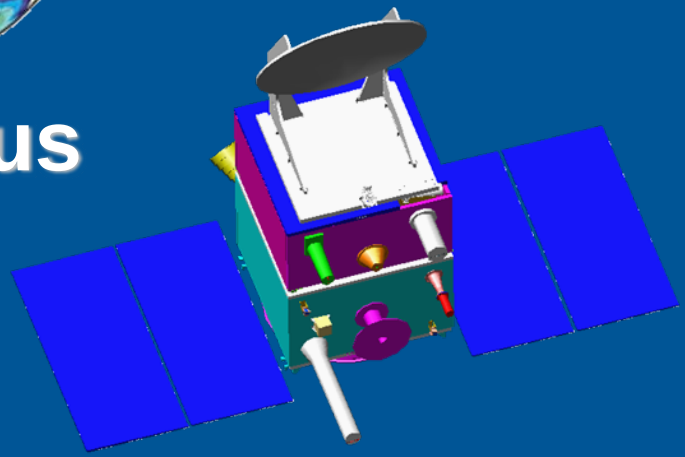


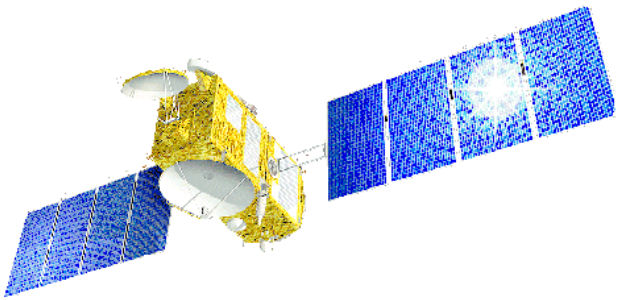


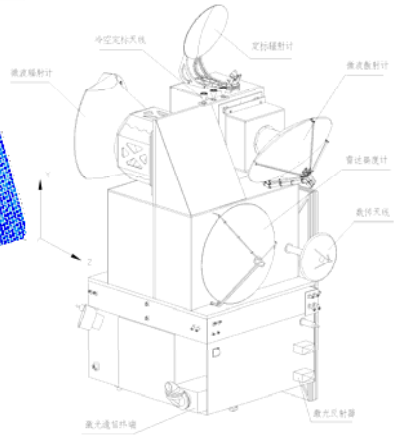


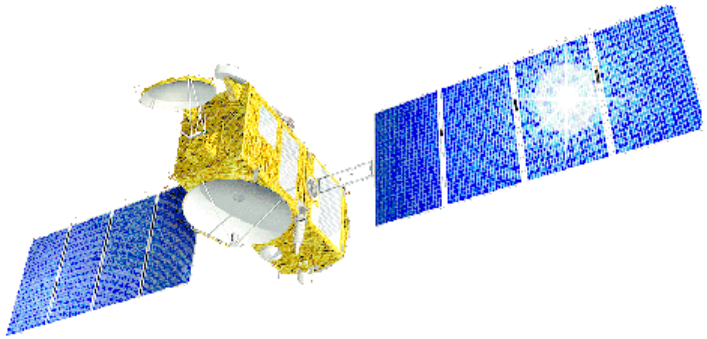
CNES program status

E. Thouvenot, CNES

November 2008







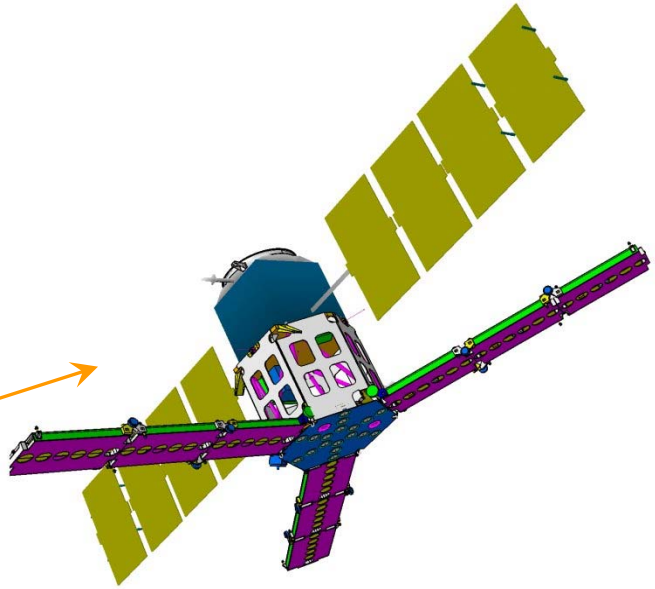
CNES Strategy in Oceanography

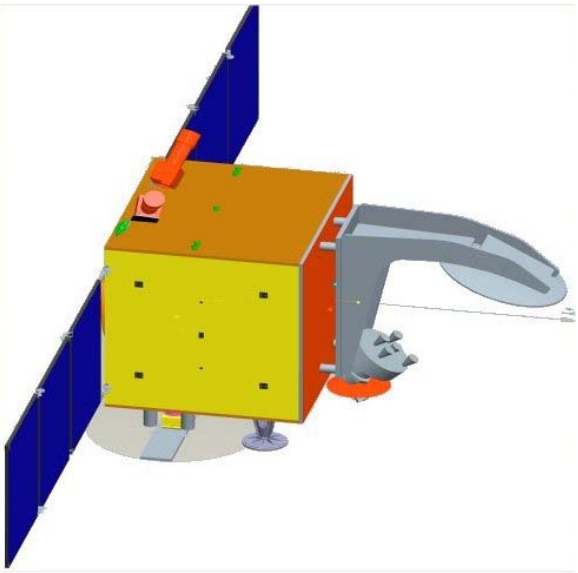
- **Contribute to operational outcome of altimetry :**
  TOPEX/POSEIDON => JASON1 => JASON2/OSTM =>JASON3
  ERS 1 & 2 => ENVISAT => SENTINEL3
  + CORIOLIS, MERCATOR/COO...

- **Continue research activities for future altimetry missions/instruments (AltiKa, WSOA, Water/SWOT,…)**

- **Contribute to space measurements of other ocean physical parameters :**
  - **salinity : SMOS, CNES contribution to ESA project**
  - **directional wave spectrum (SWIM/CFOSAT)**
  - **ocean colour (SSO or GEO)**

- **Prepare ocean applications of ORFEO (Cosmo SkyMed/ Pleiades) : mainly coastal applications**





CNES involvment in altimetry

experiment

operational

Complementing mission
mesoscale, ice

ERS-1 (ESA)
Altimeter algorithm

ERS-2 (ESA)

ENVISAT (ESA)
DORIS
Altimeter Processing
Archive & distrib.

HY-2 (CNSA)
DORIS

ALTIKA/SARAL
(CNES/ISRO)
Altimeter, radiometer,
DORIS, Lra
Process, archive & distrib.

Sentinel-3A (ESA)
DORIS

Reference mission
Ocean Large scale

TOPEX/POSEIDON (CNES/NASA)
Launcher
DORIS & POSEIDON
Mission Center

Jason-1 (CNES/NASA)
Satellite bus
DORIS & POSEIDON
Control & Mission Center

Jason-2 / OSTM
(CNES/NASA/EUMETSAT/NOAA)
Satellite bus
DORIS & POSEIDON
Control & Mission Center

Earth reference system

SPOT2 (CNES)
DORIS

SPOT3 (CNES)
DORIS

SPOT4 (CNES)
DORIS

SPOT5 (CNES)
DORIS

~~**CRYOSAT (ESA)**~~
~~DORIS~~

PLEIADES (CNES)
DORIS

CRYOSAT2 (ESA)
DORIS

1990
2000
2005
2010

SALP : Altimetry and precise positioning service

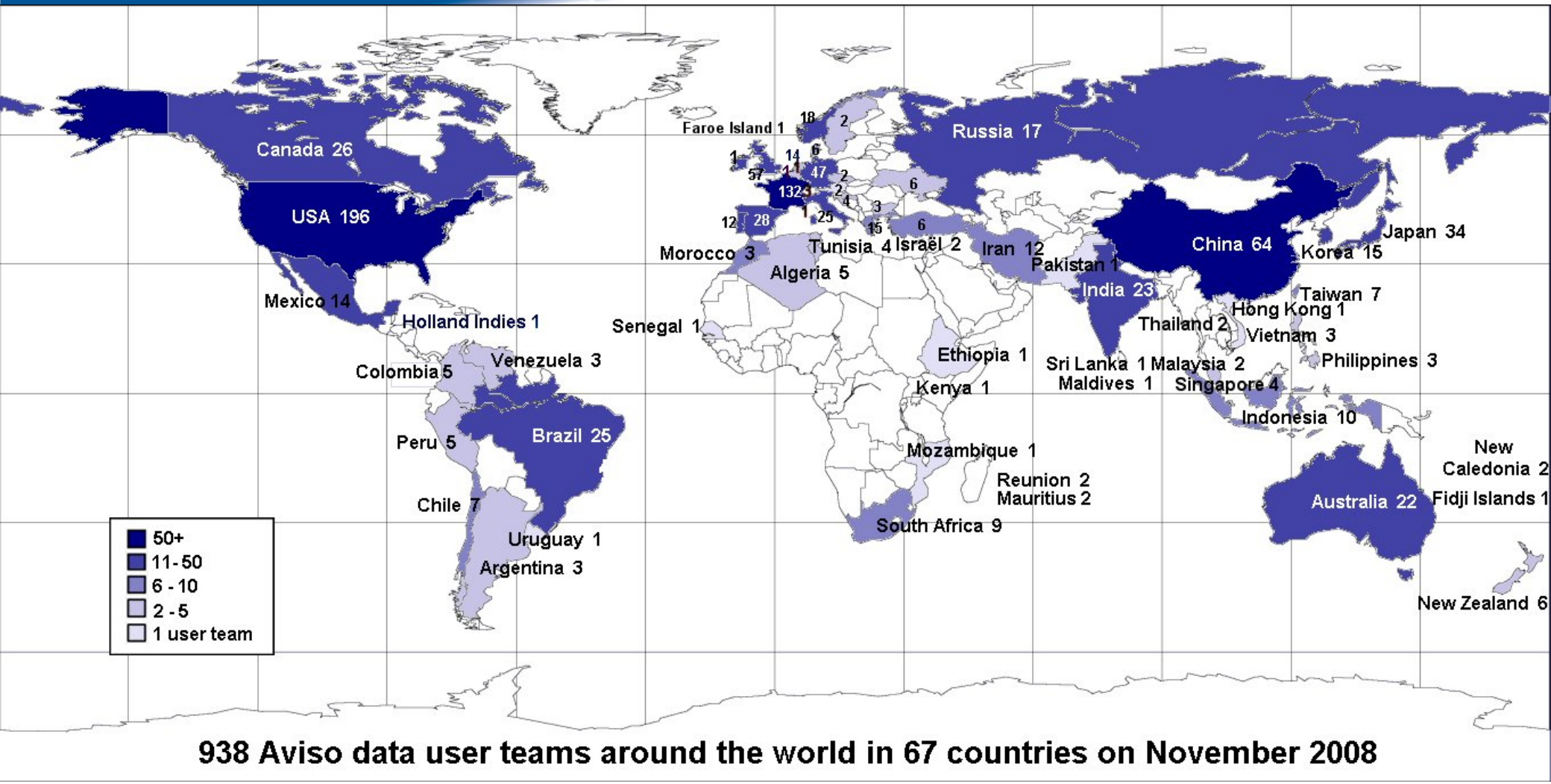
MERCATOR : assimilation, forecast
CNES / SHOM / METEOFRANCE / IFREMER / CNRS / IRD

Status of altimetry missions/activities

- TOPEX/POSEIDON :
  - Stopped after more than 13 years of ocean observations
- Jason1: in extended mission, fully operational
- ENVISAT
  - excellent synergy with Jason1 (T/P and ERS complementarity further improved)
- DORIS
  - 6 DORIS receivers simultaneously in flight : earth reference system strengthened
- MERCATOR
  - inter Agency structure for the implementation of an oceanographic forecasting center in Europe in the mid term (GMES Marine Core Service); leader of MyOcean (EC-FP7 program)
- AltiKa/SARAL : in development phase. Launch possible from mid-2010.
- SALP/SSALTO/AVISO : multi-mission ground segment
- Sentinel3A : agreement with ESA to embark DORIS
- HY-2A : agreement with CNSA to embark DORIS

- Next Step : possible contribution to SWOT (TBD)

AVISO Data user teams



938 Aviso data user teams around the world in 67 countries on November 2008

Jason1

- Qualified in orbit
- Operational mission underway
- Products distributed routinely
- CNES operations funded through SALP
- Required lifetime : 3 years (achieved in december, 2004)
- Extended mission: 5 years (achieved in december, 2006)
- Extension agreement for 5 more years of operation signed between CNES & NASA on december, 2006

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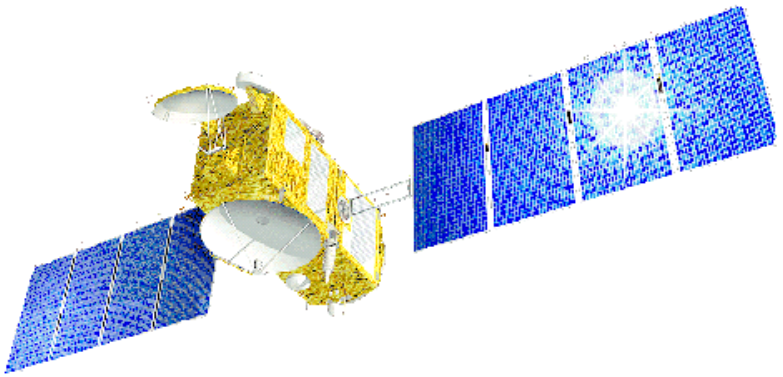
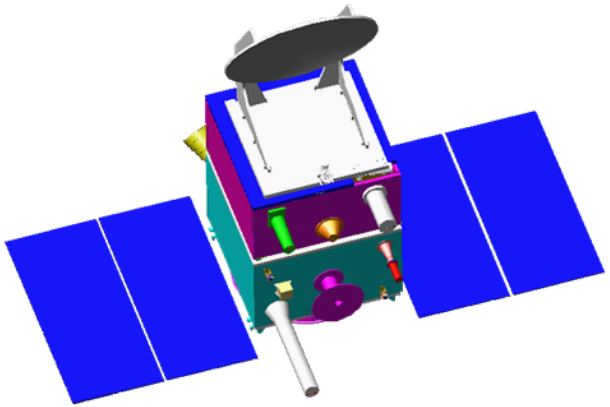


Jason2/OSTM

- **Cooperative Framework between NOAA/NASA/EUMETSAT/CNES**
  - **Core mission : continuation of Jason1**
  - **Technological passengers to enhance DORIS performance (CARMEN2/LPT, T2L2)**
- **Launched on june 20, 2008**
- **Close tandem mission with Jason-1**
- **Cal/Val in progress**

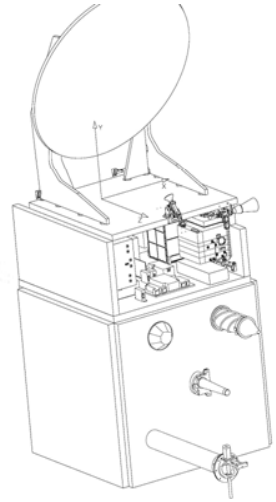
SARAL/AltiKa

- **Program approved on december, 2005**
  - **Altimetric Gap filler between ENVISAT & SENTINEL3**
  - **Research oriented mission :**
    - new, higher frequency, greater performance
    - potential new applications on ice, land, coastal areas
  - **…but with a consolidated architecture : conventional altimeter**

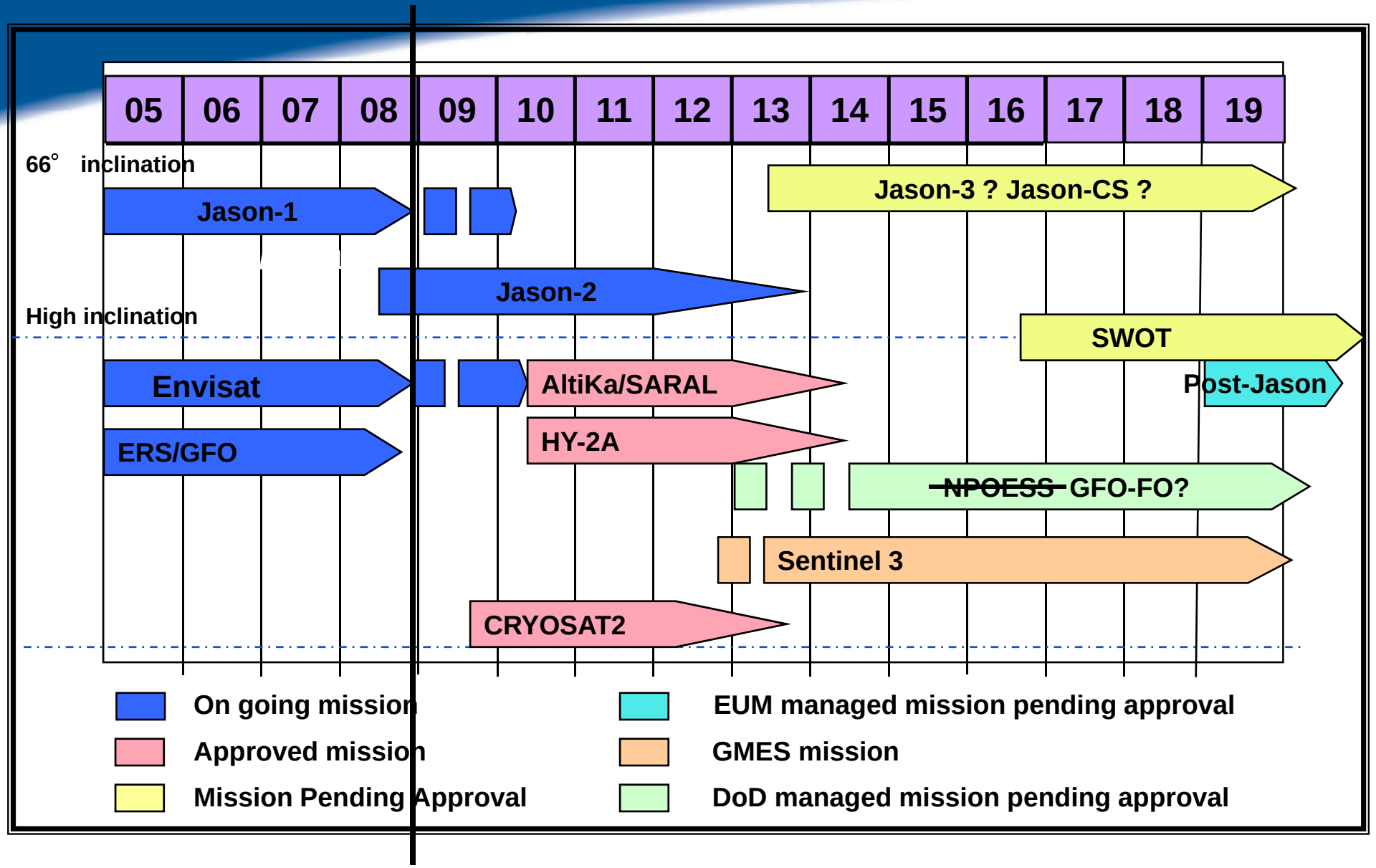


- **Cooperative framework : CNES/ISRO**
  - **Confirmation of CNES&ISRO cooperation on this new baseline obtained on December 2006 : SARAL mission (Satellite with ARgos & ALtika)**
  - **CNES/ISRO MOUs signed in february, 2007**
  - **Tentative launch date : mid- to end-2010**

- ***Data policy : ~ the same as JASON missions (through CNES/ISRO RAs)***
  - ***Next India/France scientific workshop on 3-5 december in Ahmedabad***
  - ***International Research Announcement planned in 2009***



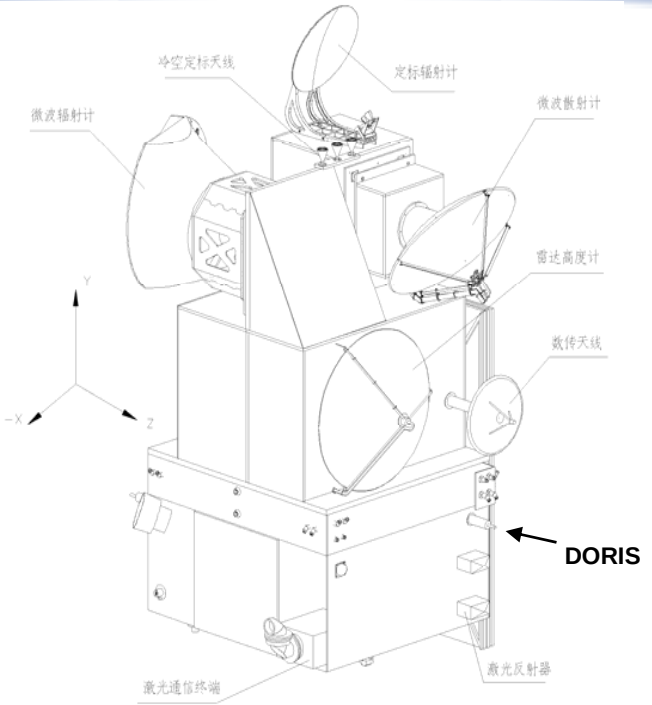
Status of altimetry programs



Next Steps

HY-2A : CNES/CNSA discussions underway

- Payload : Dual frequency altimeter, nadir 3-frequency radiometer, 5-frequency scanning radiometer, scanning scatterometer, +DORIS/GPS/LRA
- Orbit : SSO 6am-6pm, 14 days (after 1-year geodetic mission)
- Launch : june 2010

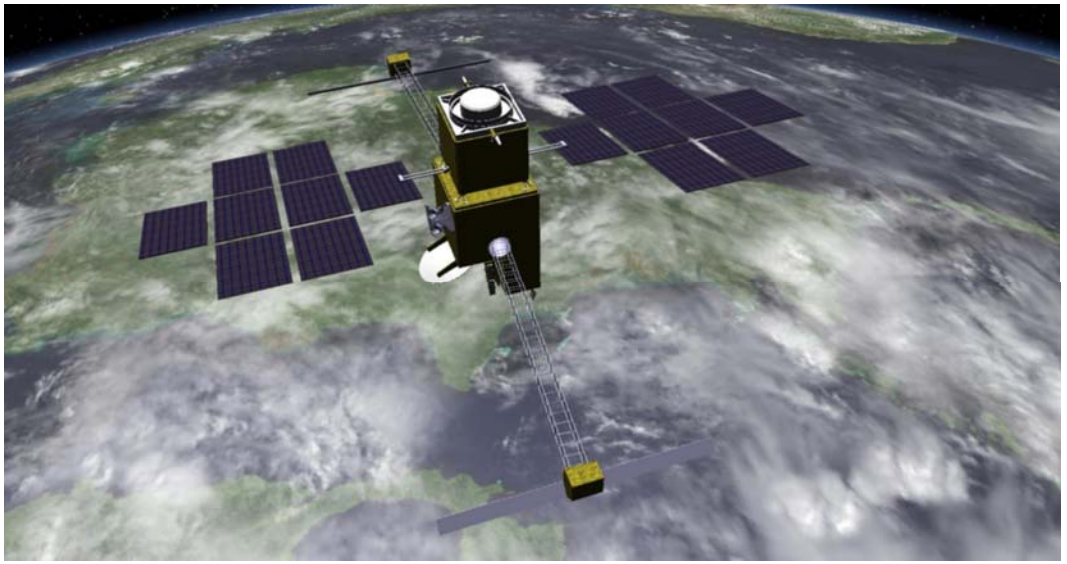


JASON3 : (Cnes position)

- Operational mission : not supposed to be funded by R&D agencies
- NOAA/EUMETSAT cooperation with EC, CNES & NASA (TBC) contributions
- CNES in-kind contribution : Proteus platform and project team equivalent to JASON/OSTM (i.e. about one third of European part of the program)
- Launch : mid-2013 ?

and contributions to ESA/EC missions : Cryosat2, Sentinel3

Surface Water & Ocean Topography (SWOT)



- Mission combining research needs associated to hydrology and oceanography :
  - mapping of water level for rivers, lakes, and oceans (including coasts)
- Principle : Wide-swath interferometric, Ka-band altimeter
- Recommended by the US Decadal Survey
- Submitted in the frame of the Cnes Scientific Prospective Seminar (march, 2009)
- Cooperation scheme : TBD (NASA/CNES/…)
- Phase 0 in 2007, pre-phase A & phase A in 2008/2009
- Launch possible in ~2016

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In Memoriam

To Yves Ménard