A view on satellite observation of the oceans

Programmatic context at CNES

Yann H. Kerr and Juliette Lambin
Observation: mission in operation


Calipso

Cryosat-2

Hy-2A

Iasi2/MetopB

Swarm

Iasi1/MetopA

Jason 2

Smos

Megha-Tropiques

Saral-Altika

Sentinel-2A

Sentinel-3A

Jason 3
Observation: missions in development

- CFOSAT
- IASI
- Metop SG A
- Swot
- Merlin
- Sentinel-3B
- Iasi 3/MetopC
- Strateole-2
- Venus
- Sentinel-2B
- CFOSAT
- Jason-CS/Sentinel-6
- Microcarb
- IASI-NG1/Metop SG A
Data centers, science, applications

4 data centers:

- Theia (land)
- Odatis (ocean)
- Form@ter (solid Earth)
- Aeris (atmosphère)

Science project funding

- ~10 M€ / year
- CNES projects science teams.
- Satellite Earth observation science

Applications

- From missions to applications (eg SMOS, SWOT)
- From societal needs (DIA/SA)
Program funding

CNES EO Budget

Different lines:

- Participation to ESA EO programs: Earthwatch, Earth Observation Enveloppe Program, Climate Change Initiative…
- CNES National programs (CFOSAT, IASI-NG)
- PIA funding (SWOT, Merlin, Microcarb)
- EUMETSAT funding (IASI-2, 3…)
CNES programs

Missions in operations

- Calipso (2006-) with NASA
- **SMOS (2009 - ) with ESA/CDTI**
- Megha-Tropiques (2011 - ) with ISRO
- Pléiades 1-A and 1-B (2011 - , 2012 - )
- Altïka on board SARAL (2013 - ) with ISRO
- Swarm (2013- ) (magnetic field) with ESA
- Jason 3 (2016- ) with Eumetsat, NOAA, NASA
- Venµs (2017- ) with ISA

Mission in development or just launched

- CFOSAT (October 2018) with CNSA
- IASI NG with Eumetsat on Metop SG
- Merlin (CD, 2021) with DLR
- SWOT (CD, 2021) with NASA
- Stratéole 2 (B/C/D, 2019)
- Microcarb (phase C/D, 2020) with UKSA
- Phases O/A
  - TRISHNA
  - MESCAL
  - ISA, Ulid, SMOS-HR, alti-Cryo, etc
  - OCAPI, VASCO, GRASP, HYPEX…
About SMOS

9 years old, still doing fine

Extension mission review OK both on CNES & ESA

New science results every day (almost!)

→ See presentations!!
L-Band radiometry missions

- **SMOS (ESA CNES)** (40 km / 3 days / L-band / global)
- **Aquarius (NASA)** (100 km / 8 days / L-Band / global)
- **SMAP (NASA)** (10-60 km / 3 days / L-band / global)

L-band radiometry offer measurement of sea surface salinity
Extremely rich measurement
Continuity/enhancement issue

TODAY!

SMOS-HR CMIR
...
Coming (very) soon: CFOSAT

CFOSAT: China France Oceanography SATellite

- Two payloads:
  - SWIM: wave scatterometer
  - SCAT: wind scatterometer

- Orbit
  - Altitude = 519 km
  - SSO (13 days repeat cycle)

- Mission: 3 years duration

Launched Oct 29th 2018

Call for proposals to set up an international science team on going (oceano@cnes.fr)
Phases 0, A studies:
- MESCAL (cloud/aerosol lidar) with NASA
- C3IEL with ISA
- Support to SKIM ESA/EE9 proposal
- WISA wide swath altimetry concept for operational mission
- Nanomagsat (magnetic field)
- ULID: demonstrator on nanosat
- SMOS-HR
- ...

Science prospective seminar:
- Will be held in Oct 2019
- Preparatory work: large scale science community consultation, dedicated working groups…
- Will provide Science (EO and space science) orientation for future CNES programs and activities

Space Climate Observatory
Summary

On CNES side

Present:
- SMOS in good health and no worries as to the mission extension
- CMIR (Sentinel Expansion) could provide a gap filling mission

Preparing the future
- ULID starts its phase A
- SMOS-HR in phase 0

Programmatic context
- Not much funds available in the short term
- Approached by CNSA which is interested in OS and SM missions
- Concept of a L band radiometry long term programme
- Necessity to think and work in the framework of the next « séminaire de Prospective du CNES »
- Lobbying necessary!!
Thank you!

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