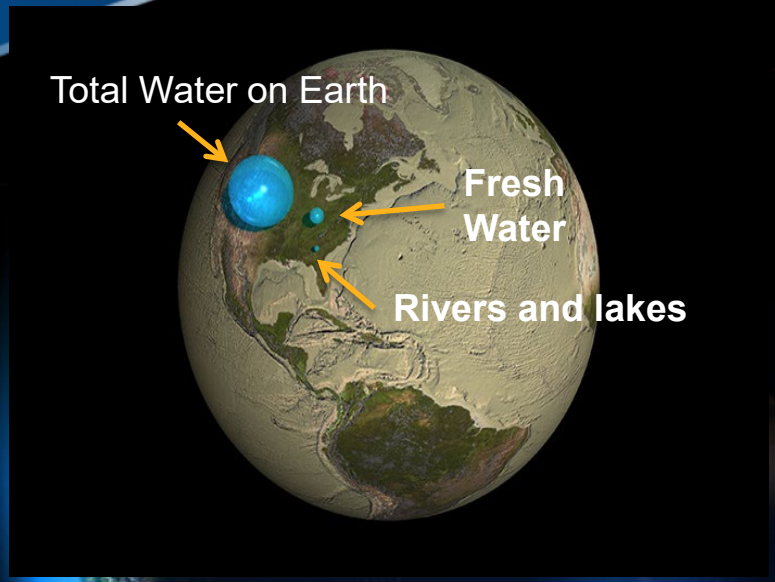


Program Status

Science Team Meeting 2017
June 26-28, 2017
Météo-France Conference Centre, Toulouse, France

Selma CHERCHALI

Land and Hydrology Program Manager
SWOT Program Manager
CNES – Science, Applications and Innovation Directorate

Program and Science Status

CNES Board of Administrators confirm CNES entry to phase C/D/E1, July 7th 2016

A SWOT Science Team put in place by January 2016 and runs for 5 years.

- 1 M€/yr : CNES support
- Thesis and Post- doc
- 20 FTE (Full Time Equivalent) for Ocean : 2.7M€
- 20 FTE (Full Time Equivalent) for hydrology : 2.7 M€
- Means in laboratories

~ 7M€ / year

Science Status

TOSCA Committee review in June : good progress but some recommendations :

- the clear link with the preparation of SWOT
- and where the research can make a maximum impact on the SWOT mission
- Publications : send them systematically to the program managers and Science leads with a clear reference (acknowledge) to the CNES support
- Communication : do not hesitate to contact CNES for a key result

The SWOT community is growing

- TOSCA workshop, Maison des Océans , Paris, March 21st and 22nd : Presentations of the work done from 2013 (Rosemary, Jean François, Benoit)
- A Mid-Term Review of the Scientific advances (Earth Observation), October 6th, Paris
- Workshop Lacs and Climate, June 1st end 2nd of June, Toulouse (J.F Crétaux and T. Pavelsky presentation)
- A strong participation of French scientists to the Applications User Workshop, April 5 and 6, Washington : Engaging the User Community for Advancing Societal Applications of the Surface Water Ocean Topography (SWOT) mission

Lacs and Climate Workshop
1st and 2nd of June 2017, Toulouse

- Coordination :J.F. Cretaux, T. Pavelsky
- Bring together international experts in order to tackle future challenges in lakes domain
- Strengthen the collaboration between the 3 communities: modelers, in situ and satellite observations providers
- Synthesis of the needs and requirements in term of modelling and assimilation and dedicated products
  - TOSCA , ROSES, NSERC, NRC programs future activities : new projects ?
  - Inputs for Lacs ECV (ESA CCI + program)
- Prepare the exploitation of the next generation of space missions
  - Major trends for developments with the new generation of space observations
- New ideas for a new generation of sensors concepts (example of SMOS next)

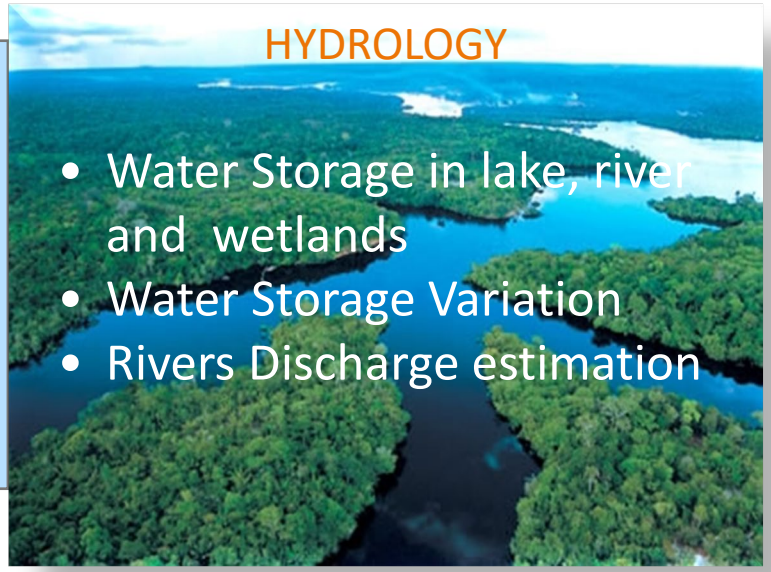
SWOT preparatory program
Objectives

- **Outreach :** Inform the stakeholders about the SWOT capabilities (website, workshop), develop communication strategies to target and support requirements of the user community etc…
- **Support research laboratories**
- **The improvement of the existing applications**
  - Sea transport shipping, fisheries, the seasonal meteorology (phenomenon El Nino), forecast of extreme events (cyclones, storms) and the monitoring of climatic parameters
- **New perspectives of applications for coastal areas**
  - In particular for coastal management and off shore resource exploitation mining, oil continental shelves
- **The creation of new environmental services**
  - in hydrology of inland waters (lakes, reservoirs, major rivers) and across the world, thus offering opportunities for water resources management, estuaries, the risk prevention of flood, the prevention of the propagation of epidemy
- **An open data policy**
  - This will strengthen the services with added values in the field of the oceanography and create new services in the field of water resources

SWOT preparatory program

New *applications with SWOT measurements*

DATA



Permettraient

POTENTIAL APPLICATIONS

1. **Transboundary rivers management** (international & interregional)
2. Better modelling of **floods**
3. **Water management** for urban, industrial and agricultural
4. **Hydroelectricity** production management
5. Prevention of the propagation of **epidemics**
6. Fluvial **navigation** support
7. Integrated management for **estuaries**

- Increase the relationship between Research laboratories and water actors: ongoing activities (AFD, Oieau, PFE, CLS, Legos, IRD, Tetis,…)
- Interface users' needs and project: development of dedicated products
- Water actors (PFE) : outreach activities, preparation of services integrating space data
- **Copernicus Water and Snow service** in the Copernicus Global Land Service : CLS/Legos (2016 and long term susttainability)
- **Need a capability for near real time processing of SWOT data (< 1- 2 days) and the definition of the required products.**

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SWOT preparatory program

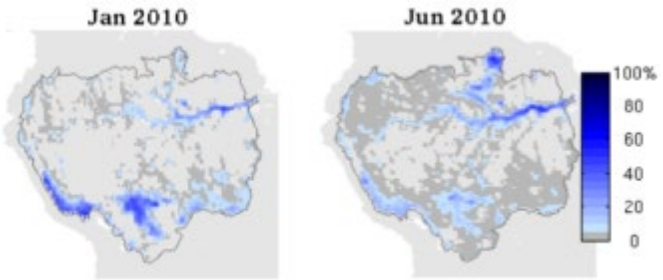
Science activities linked to the preparation of applications

SMOS/SMAP

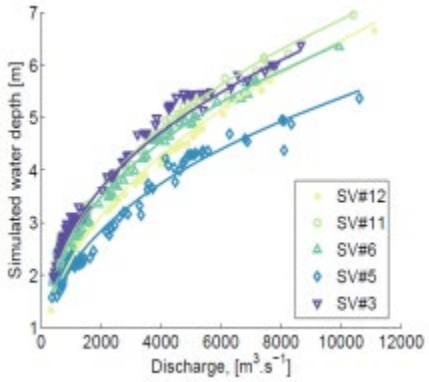
GPM

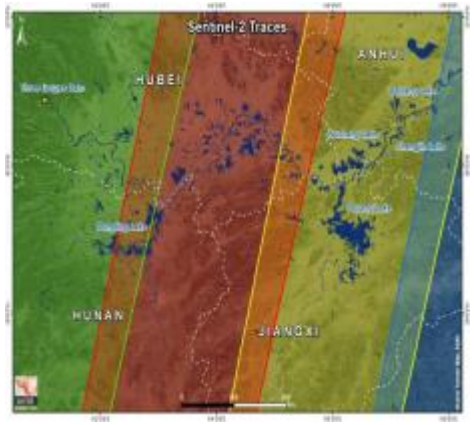
JS3/S3/S6…+ models MGB

S2/LDCM…



Monitoring of floods in tropical regions
Understanding the phenomenology and relations with flows in basins=> **Credit Cesbio / Legos**
Analysis of precipitations erros on discharge and delivery of errors models => **credits GET**

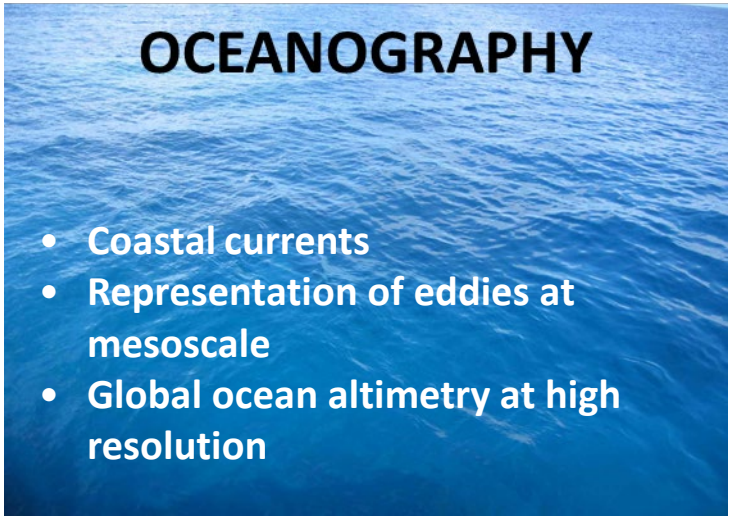




Preparation of water surfaces database, regional, global
=>SWOT simulation, DB discharge => **credits Legos/UFRGS**
⇒ Water cycle (ex Poyang => **credits Sertit**)

SWOT preparatory program

New *applications with SWOT measurements*



Permettraient

7. Climate and weather **forecast with better accuracy**
8. Marine operations : **ship routing management**
9. **Fishery management**
10. Oil And Gas **Offshore** support
11. **Coastal** management

- The plan is to build on the elements currently in place in the framework of conventional altimetry and extend it to the new users communities interested in the high resolution provided by SWOT
- A successful « integration » of SWOT data in Copernicus Marine Service global and regional ocean data assimilation systems will allow demonstrating its usefulness and impact for a wide range of ocean applications.
  - **Need a capability for near real time processing of SWOT data (< 1- 2 days) and the definition of the required products.**
  - This will require its integration with **multiple nadir altimeter data and models** (time resolution issues) -> improve SWOT data assimilation methods
  - On going activities for a new generation of DUACS products integration of the high spatial resolution (SWOT) and the temporal component via the other nadir missions

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CNES missions status

- SMOS (soil moisture and ocean salinity) (launched in Nov 2009 extent to 2017)
  - Excellent results
  - Extension of the mission required by the science community (2+ 2 years)
- Altika-SARAL (launched in February 2013)
  - Very good science results thanks to the improvements provided by Ka band radar instrument (better signal to noise ratio, greater along track resolution)
  - Anomaly encountered on a platform reaction wheel, leads to drift orbit
  - Extension od the mission required by the science community (2 years)
- Jason 2 (launched June 2008, 8 years in operation)
  - Mission Extension required by the science community (2+2 years)

TOSCA Science Committee recommended the extension of the 3 missions

Director Committee decision July 7th for the 3 missions

- Jason 3: (launched January 2016, reference orbit) all nominal
- CFOSAT (Cooperation between France and China)
  - new instrument concept dedicated to wave spectrum and direction measurement (SWIM) combined with a scatterometer (SCAT)
  - On track for a 2018 launch

The « revolution » in space missions for hydrology

Increase in accuracy (more adapted spectral bands)

example of soil moisture:
from AMSR-E (C-Band) *to* SMOS, SMAP (L-Band)

Increase in spatial resolution

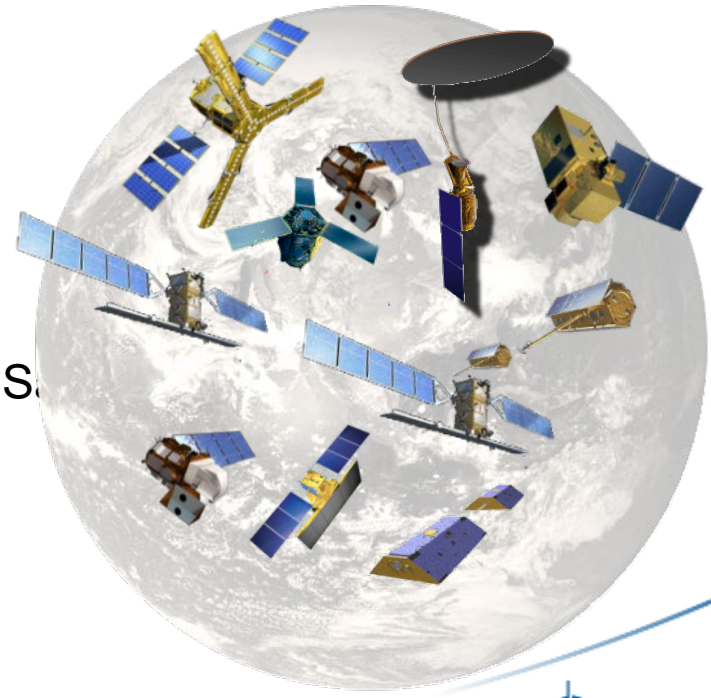
example of altimetry:
from Jason (kilometric), Altika, Sentinel3 *to* SWOT (100m)

Increase in temporal resolution

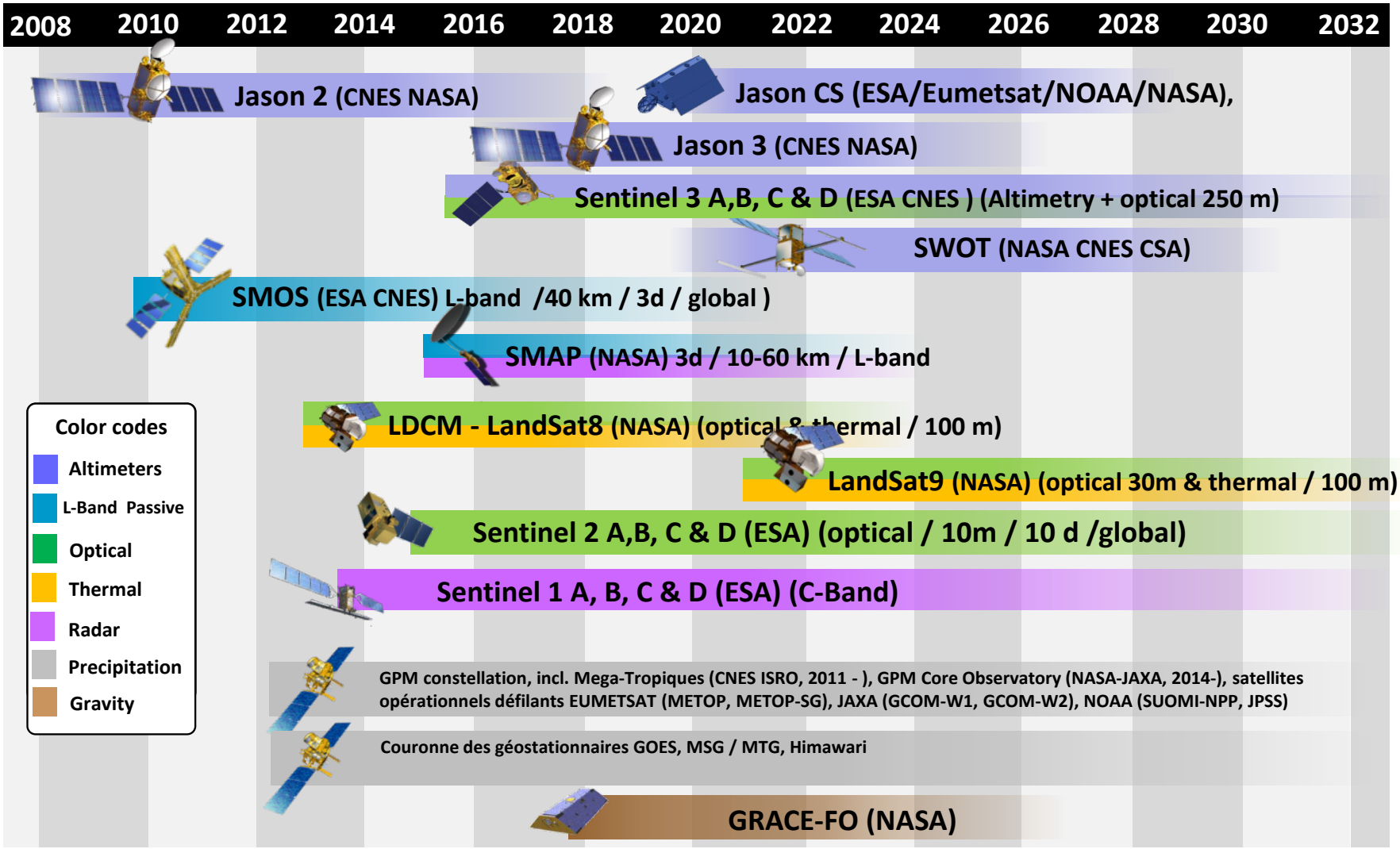
example of visible:
from SPOT5-6 (local) *to* Sentinel 2 (5 days)

Increase in accessibility of data

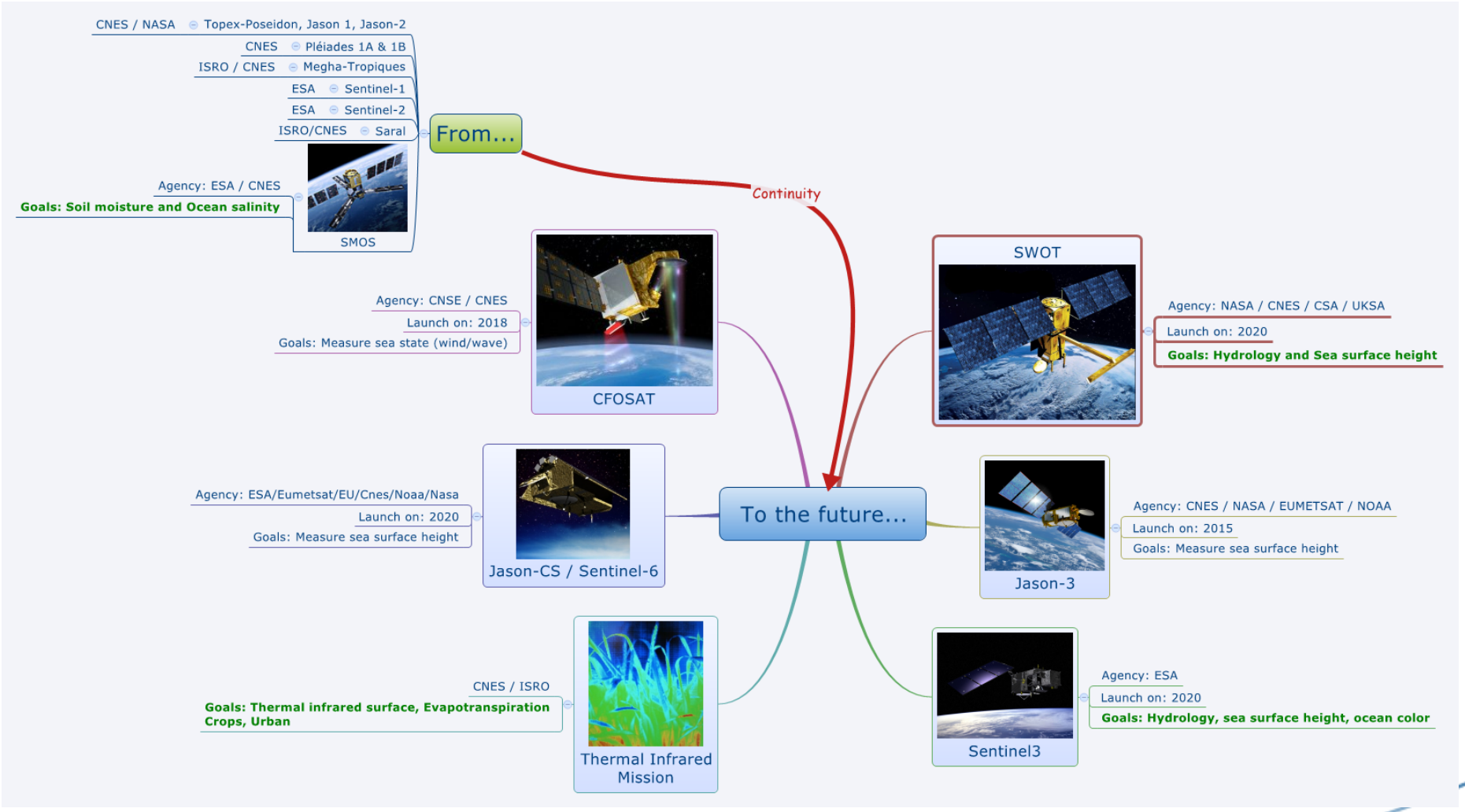
Vast majority (S1, S2,3, SMOS, SMAP, LandS
are freelly accessible



The Roadmap for hydrology missions



CNES involvement in the missions dedicated to Water Cycle



The future of Hydrology*…a strategy for integrated observations*

The hydrological sciences community is making it's mutation, as the atmospheric and ocean sciences did before, by moving to **global multi-model and multi-sensors integrated modeling and assimilation systems.**

But this comes with **specific challenges** that need to be addressed like the complexity of the observed systems (spatial heterogeneity and temporal dynamics), and the impact of anthropogenic activities.

CNES is supporting this dynamic by contributing to innovative missions including the **SWOT** and the **SMOS** missions , hydrology and oceanography dedicated missions

And also is supporting science activities **in Jason Series, GPM MeghaTropiques, Sentinel 1, 2 and 3**, **Venus, Biomass** ….

Some news in CNES organisation

Juliette Lambin : Head of Earth Observation

Philippe Escudier has left to another position

- Ocean Program Manager …waiting for a nomination

SWOT Program Manager ..still the same ☺