

Surface
Water
Ocean
Topography



SWOT



Climate and Water Issues

Fresh water is present in very limited quantities on our planet.

It is therefore important to understand and **characterize the water cycle** at the global and regional level and to address the challenge of climate change by helping to **sustainable water resources management**.

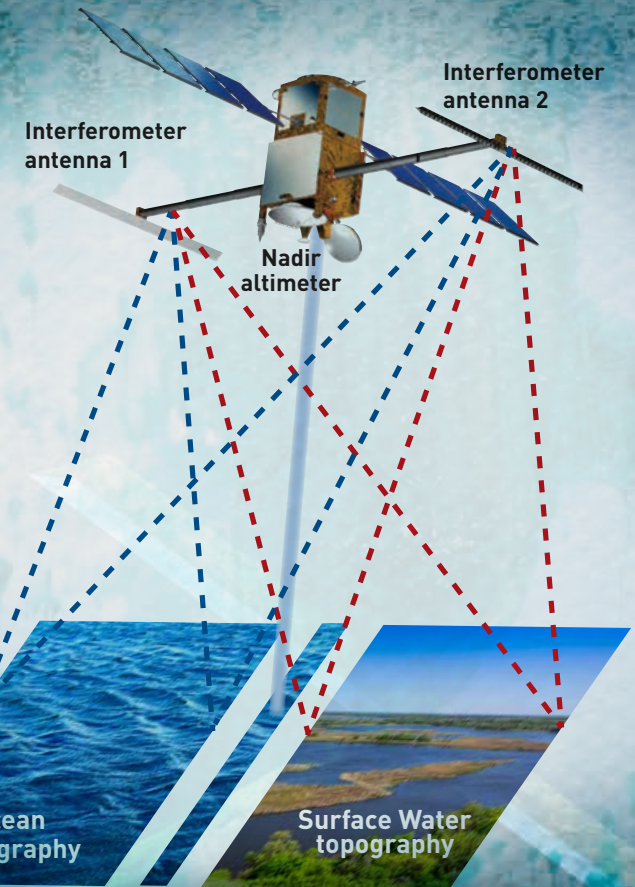
It is also essential to develop the means for the monitoring of inland water surfaces and the study of small-scale oceanographic structures to complement existing altimetry satellites.



Context

Less than **0.1%** of all water on earth is available for human consumption via rivers, streams, reservoirs and lakes.

There are over **300 million lakes** that are larger than 0,001 square km. Around only ten lakes have an area between 10,000 km² and 100,000 km². Now these are the small lakes that contribute most to the overall change in the volume of lakes.



SWOT Response

SWOT will provide **2D maps** of water elevations with a vertical accuracy of 24mm over ocean and 10 cm over continental surfaces (averaging over 1 km² of surface areas), of **1.7 cm/km** on estimated water slopes and 25% on masks water.

Oceanography

SWOT will characterize the mesoscale and sub-mesoscale circulation at spatial resolution of about 15 km and more.

Hydrology

SWOT will provide a comprehensive inventory of all inland water bodies whose surface is at least 250 m × 250 m (lakes, wetlands, reservoirs) and rivers with a minimum width of 100 m.

SWOT will measure variations in water storage and river flow discharge at monthly, seasonal and annual scale.

SWOT

France / USA Cooperation

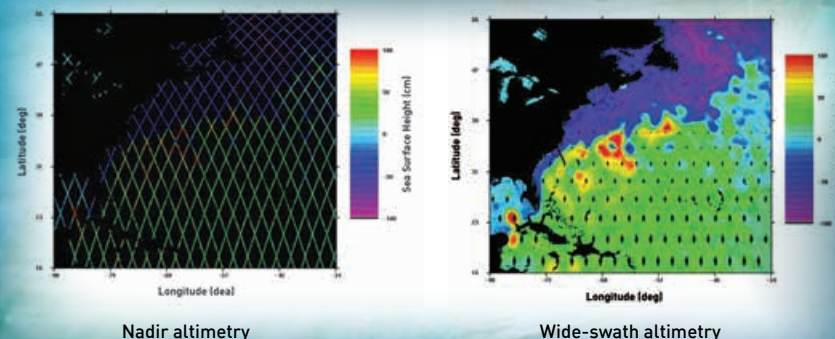
The SWOT Mission is a major partnership between NASA and CNES with contribution of the Canadian and English Space Agencies (CSA and UKSA).

NASA and CNES are taking advantage of more than twenty years of cooperation in the field of altimetry (Topex/Poseidon, Jason-1/2/3).



Ambitious and innovative mission

- SWOT brings innovation in technology, science and application domains.
- The SWOT mission is a major breaking concept in space altimetry with Karin
- instrument that presents a significant technical challenge.
- This mission will be a world premiere!



Mission lifetime: **3.5 years**
 Altitude: **890 km**
 Inclination: **78°**
 Repetitive cycle : **21 days**

Innovative concept

The main instrument **KaRIn** (wide swath Ka-band interferometric altimeter) will provide a two-dimensional image of the surface (two 60-km swaths on either side of the vertical of the satellite).

The measurement is based on the phase difference of the signal received by the two antennas.

The other instruments of the payload are:

- Nadir altimeter (inheritance of classical altimetry)
- Microwave radiometer
- GPS / DORIS / LRA for determining precise orbit.



Calendar

- **2014:** The "phase B" was decided on CNES and NASA sides.
- **2015-2016:** Important reviews are scheduled for the RFU (Radio Frequency Unit), KaRIn and for the satellite whose implementation was entrusted to Thales Alenia Space.
- **2016:** The project should move in "phase C/D" on CNES and NASA sides.
- **2020:** The launch is expected in the fall.

Unprecedented funding



SWOT

On French side, SWOT has received funding from the PIA (**Future Investments Programme**) thanks to its significant number of potential applications.

Downstream preparatory program

To support the development of applications, a strong support is foreseen around the following points:

- Inform and promote the use of SWOT products to end-users,
- Improve existing solutions,
- Bring innovation in Research & Development,
- Develop new applications especially in coastal areas,
- Create new environmental services in the water domain,
- Have a free and open data policy.



Potential applications

- Management of water sharing issues (international, interregional),
- Improved flood modeling,
- Management of fresh water for urban, industrial and agricultural consumption,
- Management of hydropower,
- Prevention of the spread of epidemics,
- Help to river navigation,
- Integrated management of estuaries,
- More accurate weather and climate forecasting,
- Help to navigation and sea rescue operations,
- Help to fishermen,
- Assistance to oil platforms.



Contacts

Websites: avis.altimetry.fr/swot & swot.jpl.nasa.gov

French Program Manager: **Selma Cherchali (CNES)**

French PIs : **Rosemary Morrow (LEGOS/CNES)**, **Jean-François Crétaux (LEGOS/CNES)**

French SWOT Downstream Preparatory Program: L-swot-aval@cnes.fr