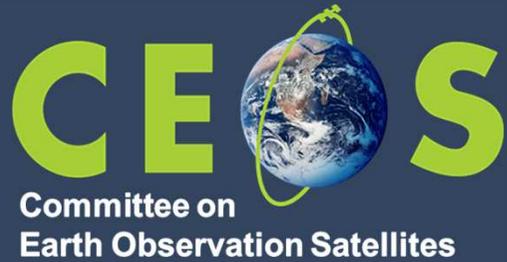




CNES Earth Observation Program

International cooperation, a key driver

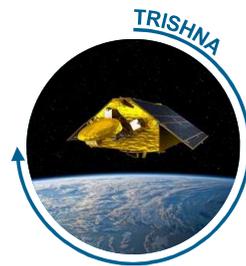
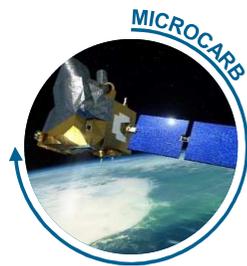


Dr. Selma Cherchali
Agenda Item 13.3
37th CEOS Plenary
15 - 16 November 2023
Chiang Rai, Thailand
Hosted by GISTDA

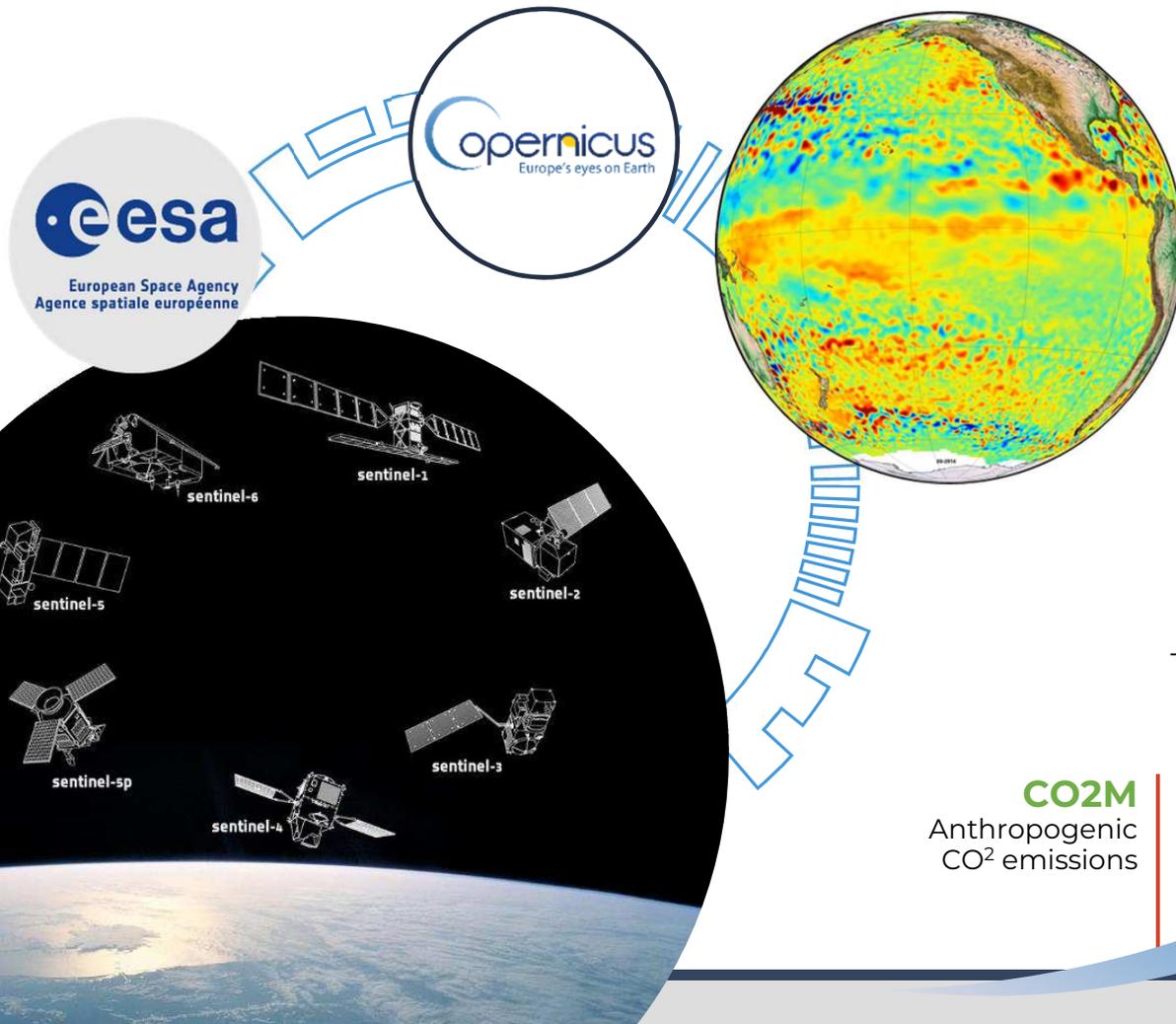
EO program : Commit to a more sustainable world



- ▶ **SCIENCES:** Better understand and monitor our changing Earth's Planet in the context of Global Change
- ▶ **TECHNOLOGY:** Innovation to build tomorrow's sustainable sectors
- ▶ **SOCIETAL:** Respond to Climate Change challenges
- ▶ **SERVICES:** Development of new services for populations at the regional and local scales
- ▶ **COOPERATION:** Participate to structuring international partnerships



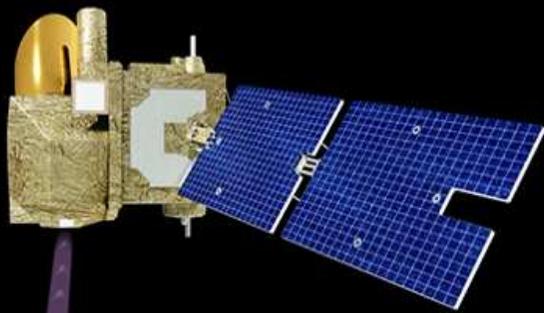
CNES contribution to Europe



- Science**
Future EO programme, Earth Explorer, SCOUT
- Copernicus and Weather Monitoring**
Enhanced continuity and expansion missions

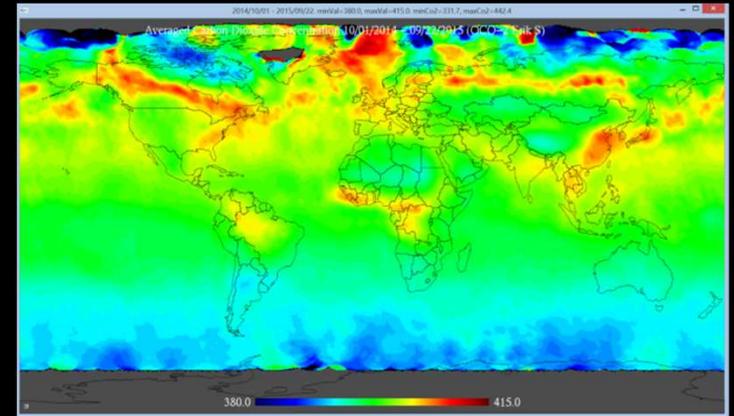
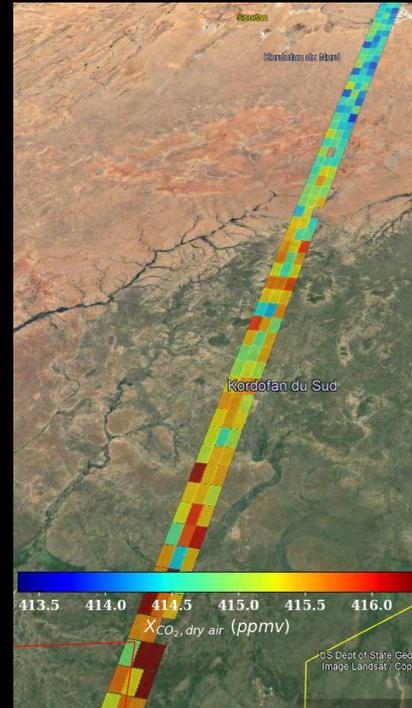
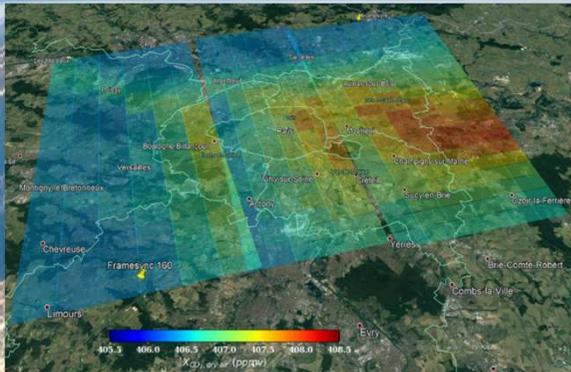
- CIMR**
Arctic ocean and sea ice
- CHIME**
Agriculture and biodiversity
- CRISTAL**
Thickness of sea ice and ice caps
- ROSE-L**
Monitoring terrestrial ecosystems, soil moisture and ice
- LSTM**
Surface temperature
- CO2M**
Anthropogenic CO₂ emissions

MICROCARB for precious observation of atmospheric CO₂

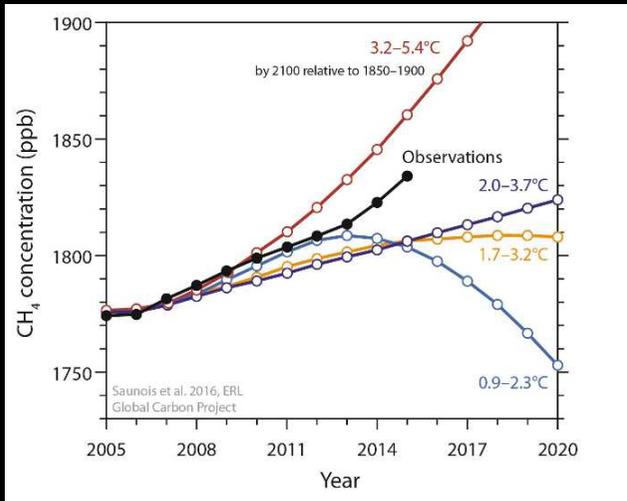


- A small (<80kg) & innovative instrument in Space in 2024/25
- A strong précision of 1 ppm (> 0.2%) on XCO₂

Simulation of CO₂ above Paris from Microcarb city mode product



CH₄: a more rapid response to mitigate



MERLIN : a Laser in space for XCH₄



2946 detections in 2019-2021

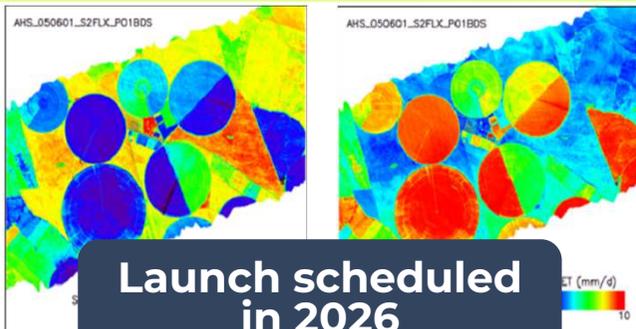
3 sectors: Oil and Gas, Coal, and Others



Bilateral programs and innovation



Ground **surface temperature** and daily **evapotranspiration**



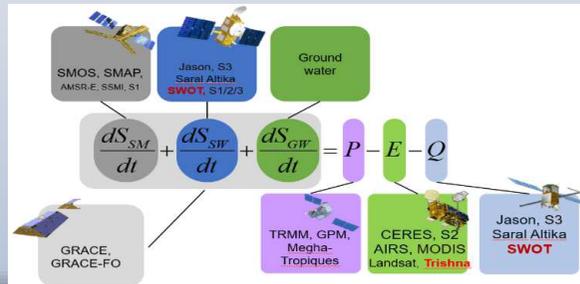
Launch scheduled in 2026

Bilateral programs devoted to WATER

Land, Coastal, Ocean Water

Satellite precursors
LSTM, S3-NG TOPO
Downstream Programs

hydroweb.next



First global survey of Earth's surface waters



Launched Dec 16, 2022

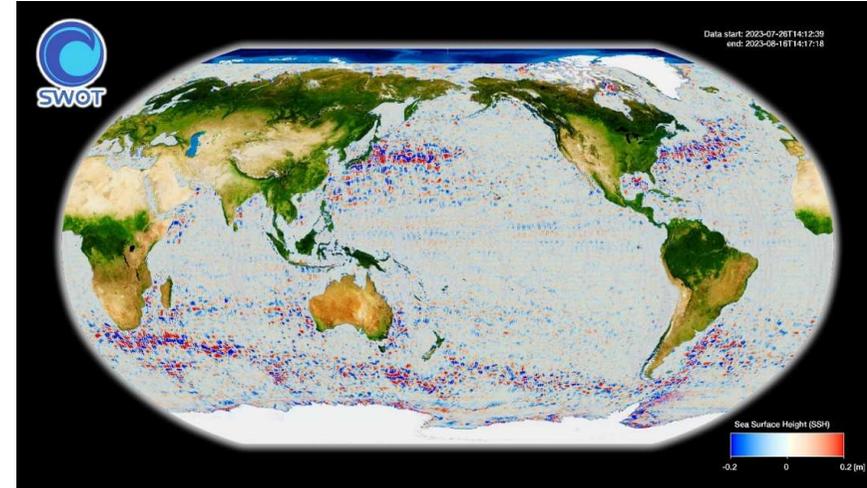
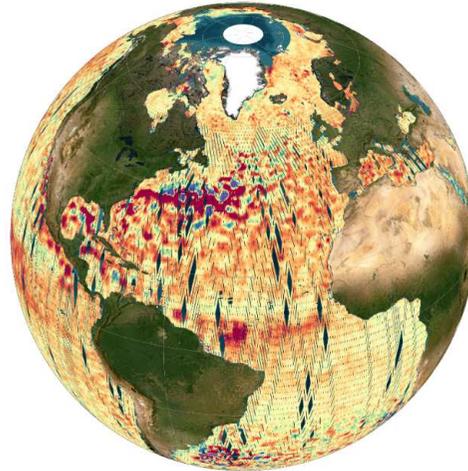
Success story: SWOT



- **CNES/NASA Joint Mission, successfully launched on December 16, 2022**
- **International Science Team meeting** in Toulouse in September 2023, 9 months after launch, gathering 250+ participants from 17 countries
- After a 6-month Cal/Val on a dedicated 1-day revisit orbit, **the SWOT satellite is now providing measurements on its Science Orbit** (21-day revisit)



Success story: SWOT



Start of Global Science Phase: July 2023

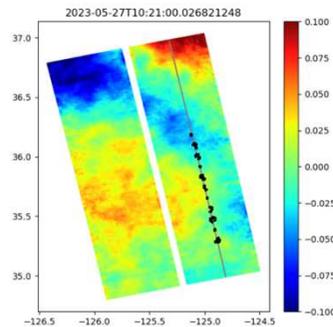
Integration and Testing, Launch, Commissioning & Calibration phases were all successfully completed on schedule...
...despite some substantial challenges (Covid, war in Ukraine, fires in Canada...)



Success story: SWOT



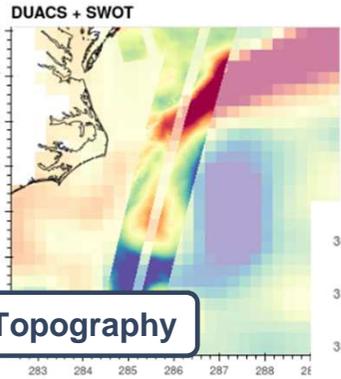
One-Day Repeat Phase for initial Cal/Val : A Unique Science Opportunity



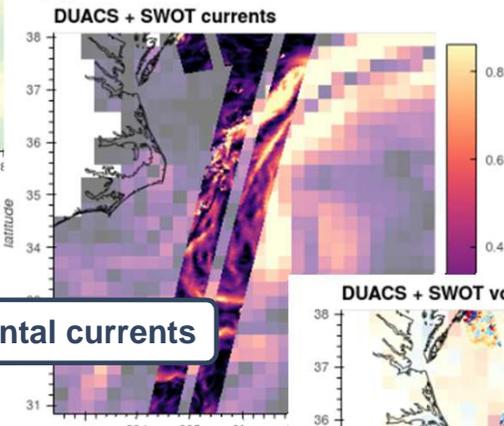
Success story: SWOT



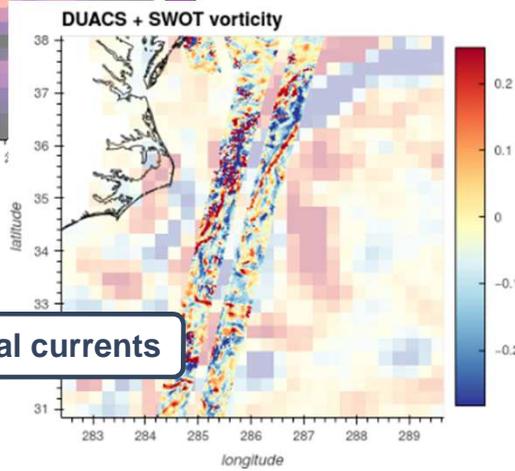
Impressive first science results
SWOT water dream is coming to light !



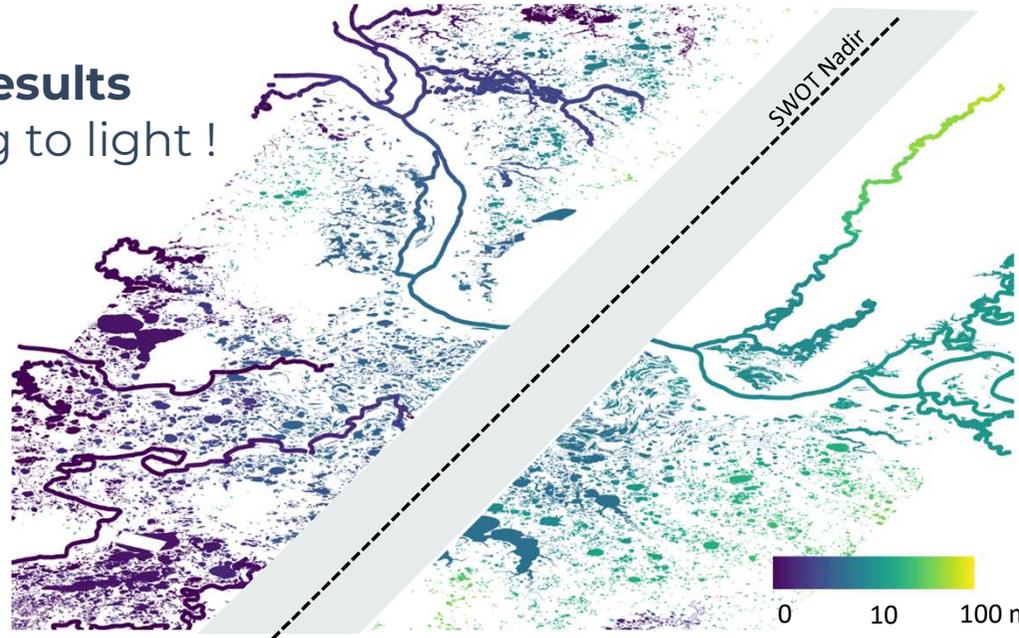
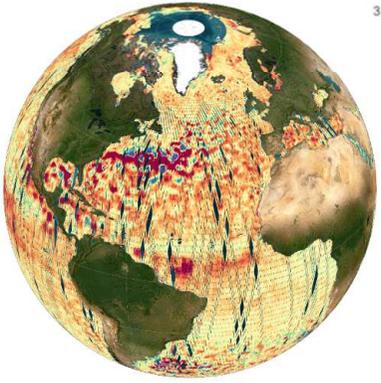
Topography



Horizontal currents



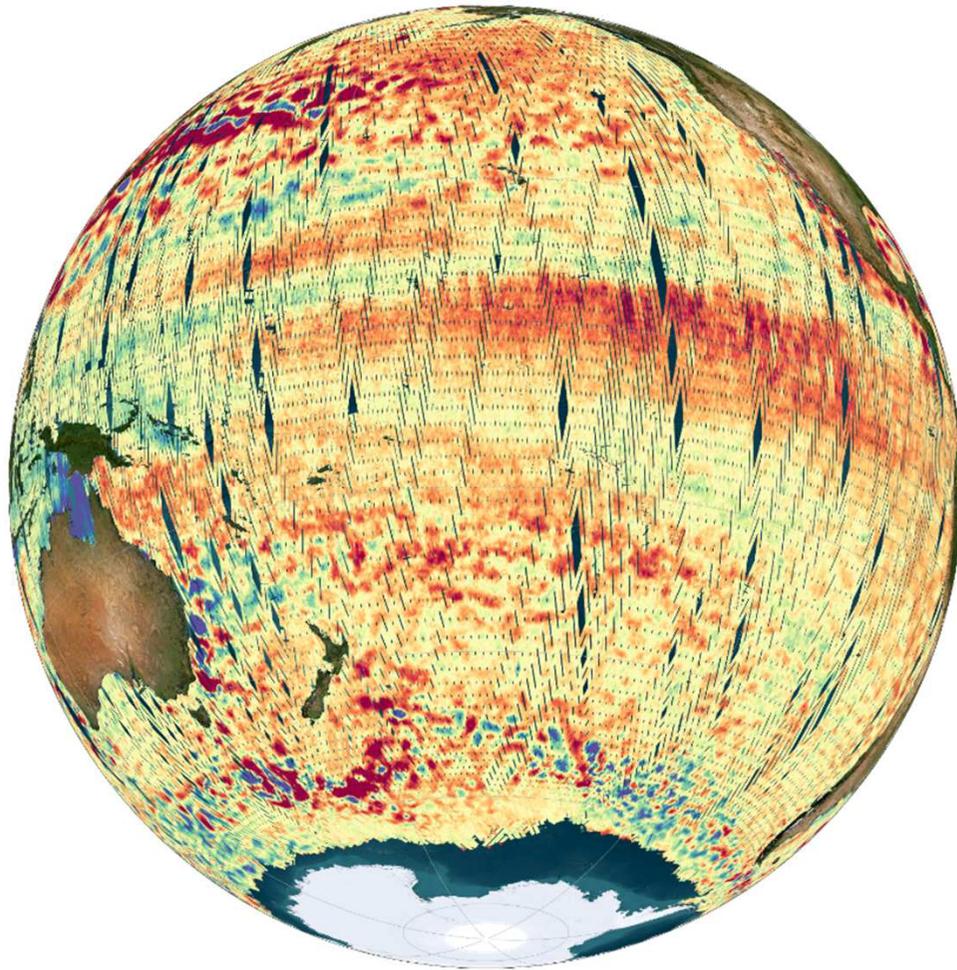
Vertical currents



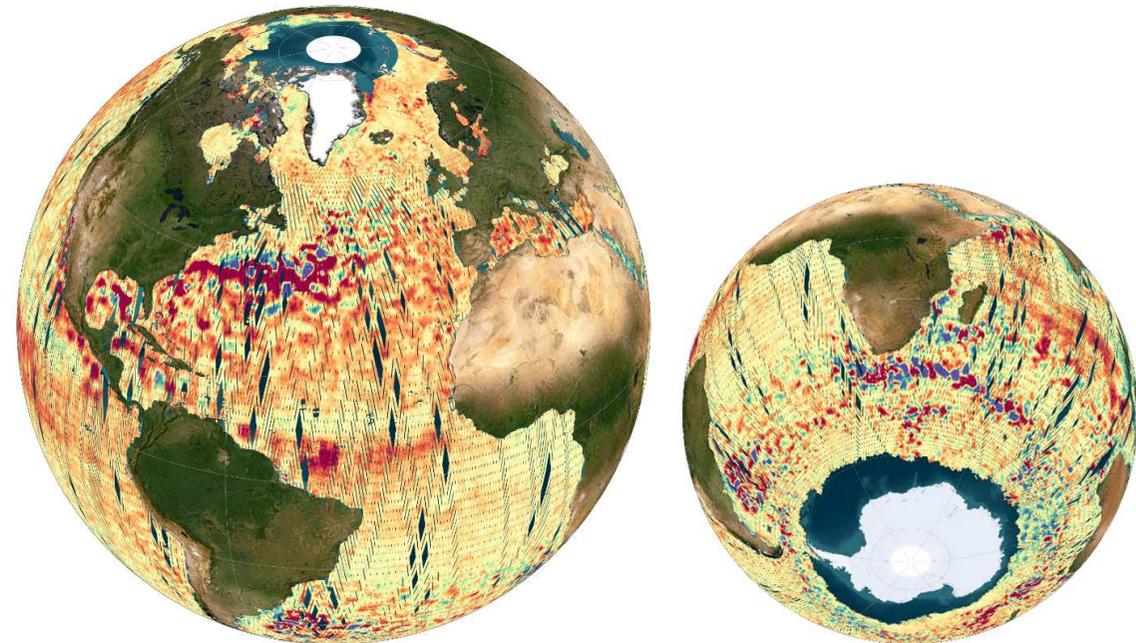
SWOT will provide valuable data and information that will **benefit society** in **three critical areas** :

- Freshwater on land
- Sea level rise at coast
- Ocean's role in climate change

Success story: SWOT

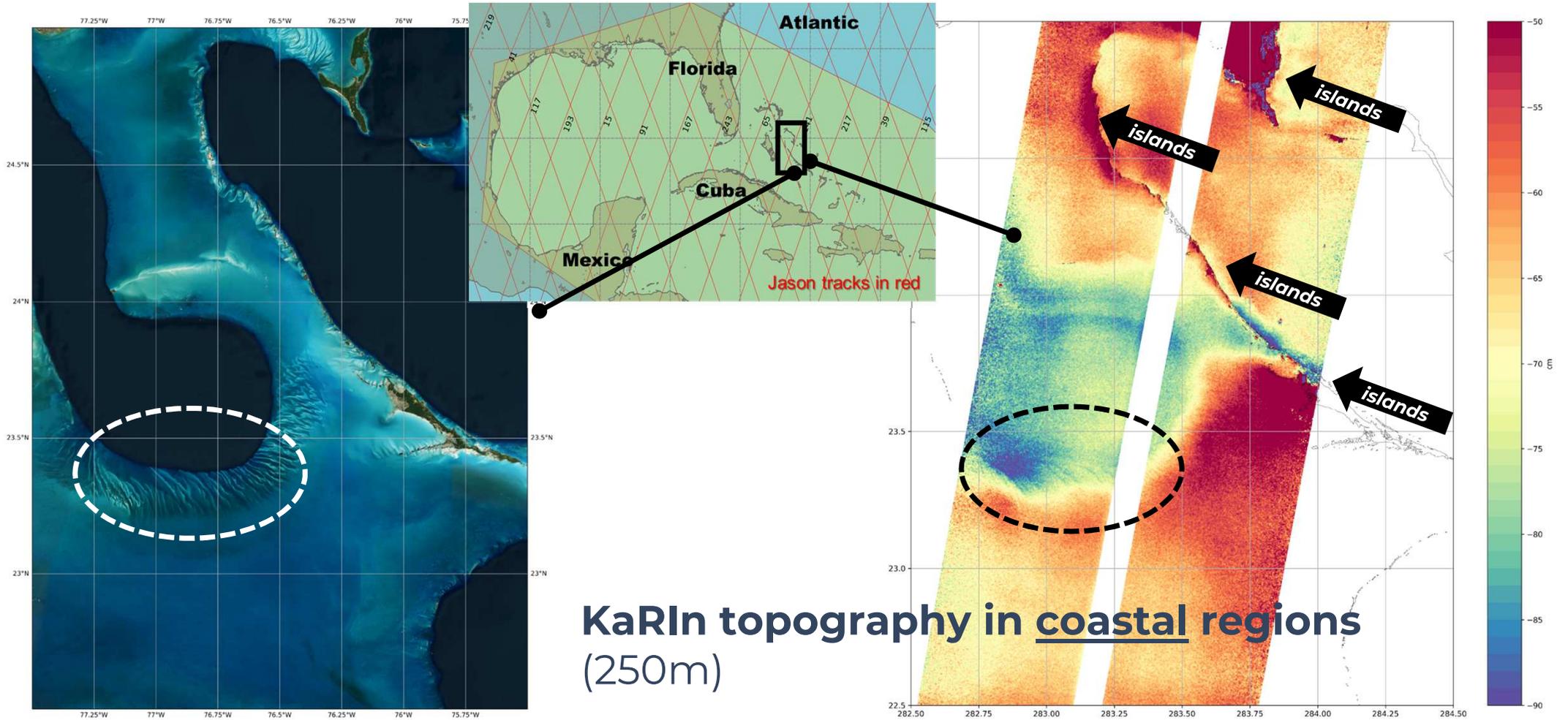


SWOT coverage is better than the combination of 7 radar altimeters, precision improved by a factor 10, 2D resolution up to 250-m



SWOT Level-3 product (no interpolation whatsoever)

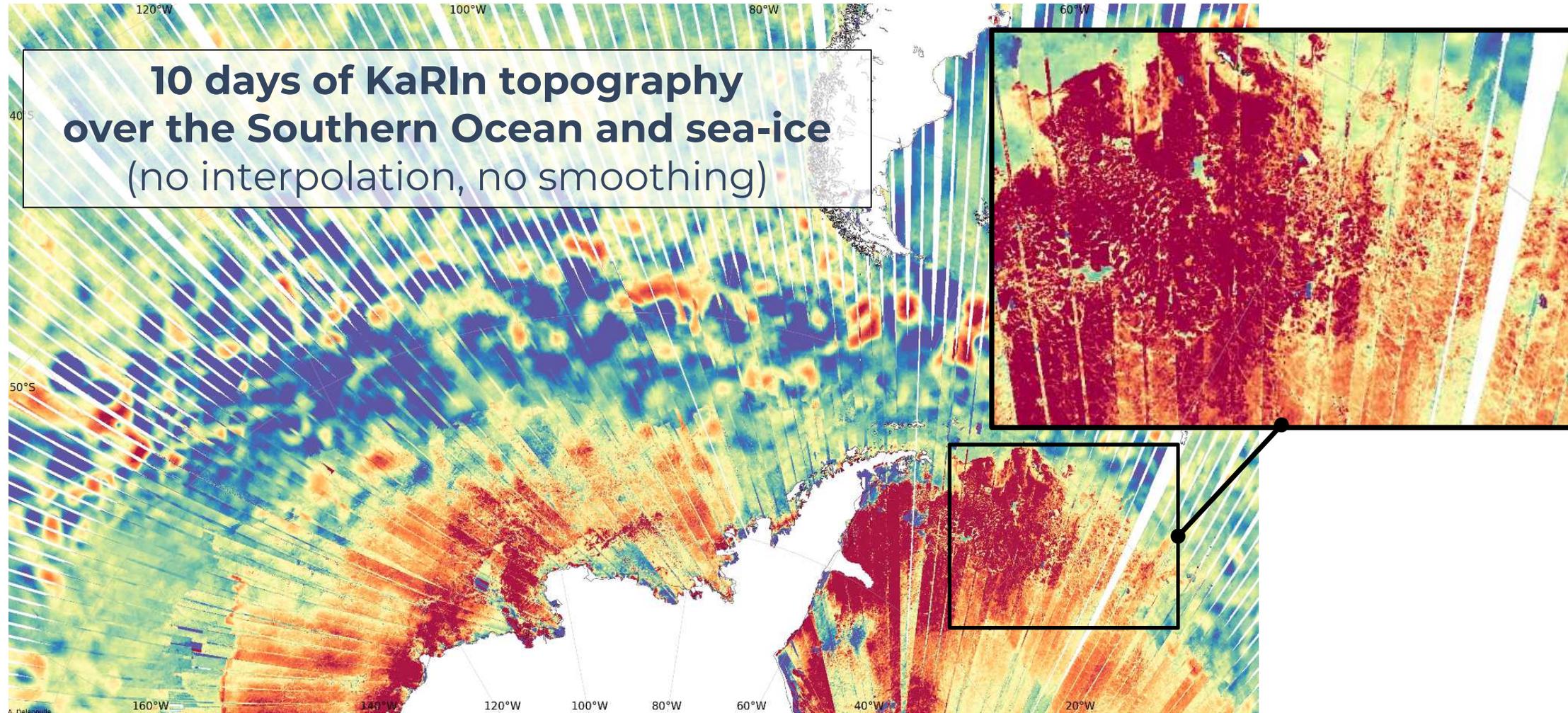
Success story: SWOT



Success story: SWOT



**10 days of KaRIn topography
over the Southern Ocean and sea-ice**
(no interpolation, no smoothing)

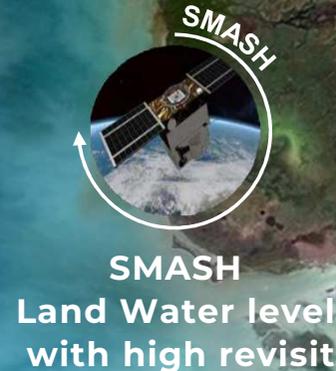


Future missions



Four Missions & services are dedicated to the Climate and the Environment

= Top priorities from the French research community (from Scientific Prospective Seminar 2019)



CNES has adopted a global perspective in making cooperation a key element of its strategy since its inception.

CNES partnerships with all the Ecosystem are founded on a relationship of trust, built at the highest levels over many years

