

Water from Space: Towards a Revolution in Water Resources Management



AND



IN PATERNSHIP WITH :



Hydromatters
Prendre la mesure de l'eau. From space to society.

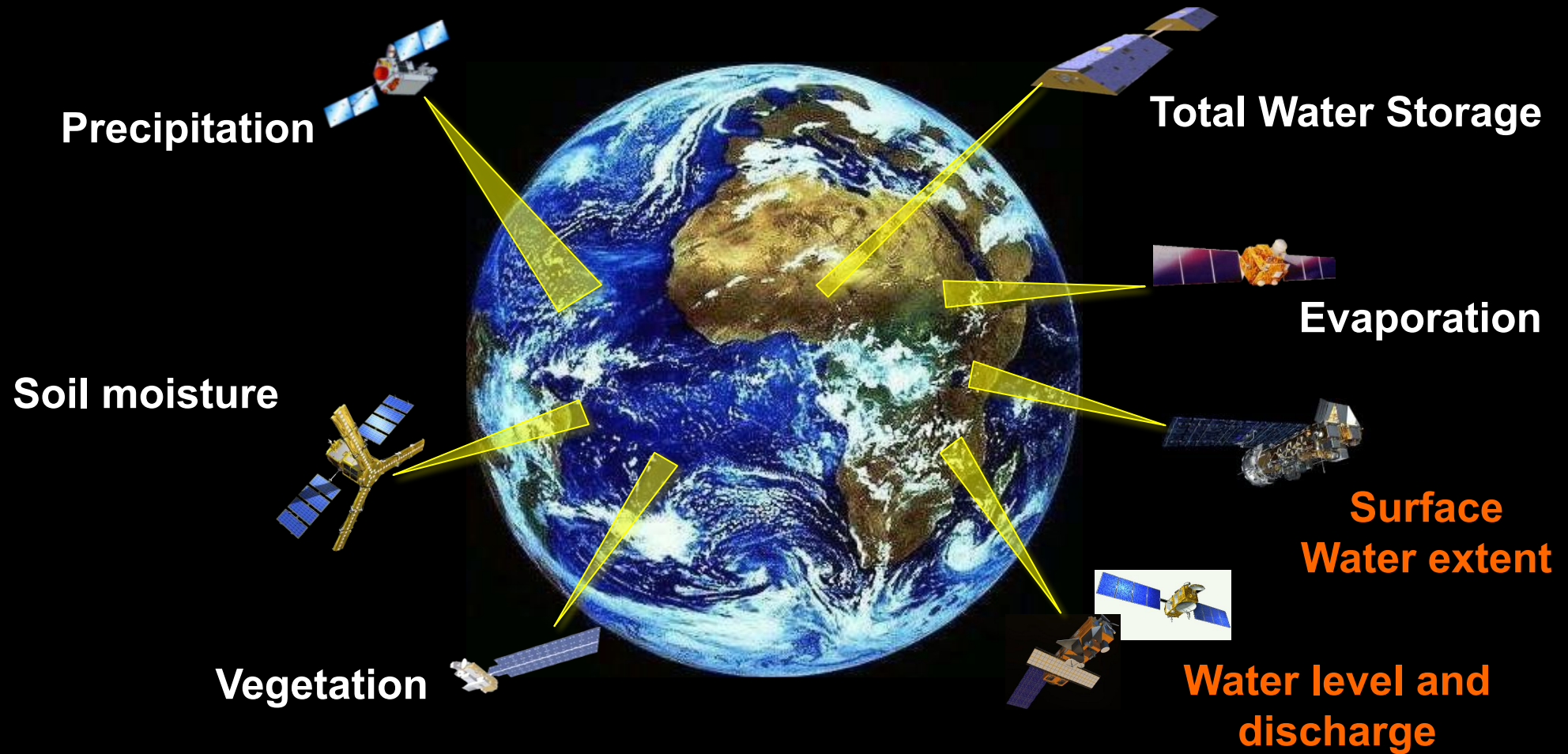


Daniel Moreira, Fabrice Papa, Alice Fassoni-Andrade, Ayan Fleischmann, Sly Wongchuig, Rodrigo Paiva, Adrien Paris, Frederic Frappart, Jefferson Santos Melo, Jean-Francois Crétaux, André Martinelli Santos, Pierre-André Garambois, Benjamin Kitambo and Stéphane Calmant

In the context of the research project:
SAMBA, SWOT for the Amazon Basin

Hydrology from Space

Satellites have changed the way we observe the water cycle and hydrology



Water quality

Water quantity

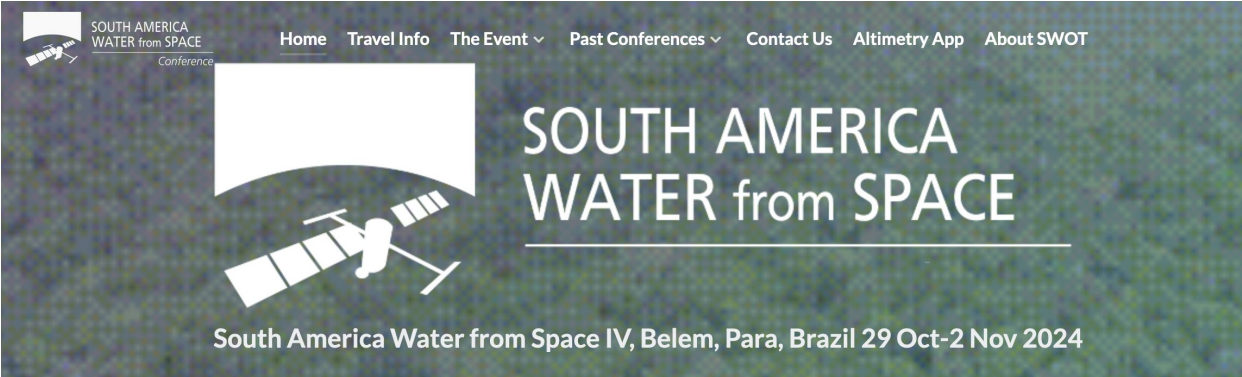
Variability and Changes

BUT BEFORE USE IT WE NEED TO VALIDATE

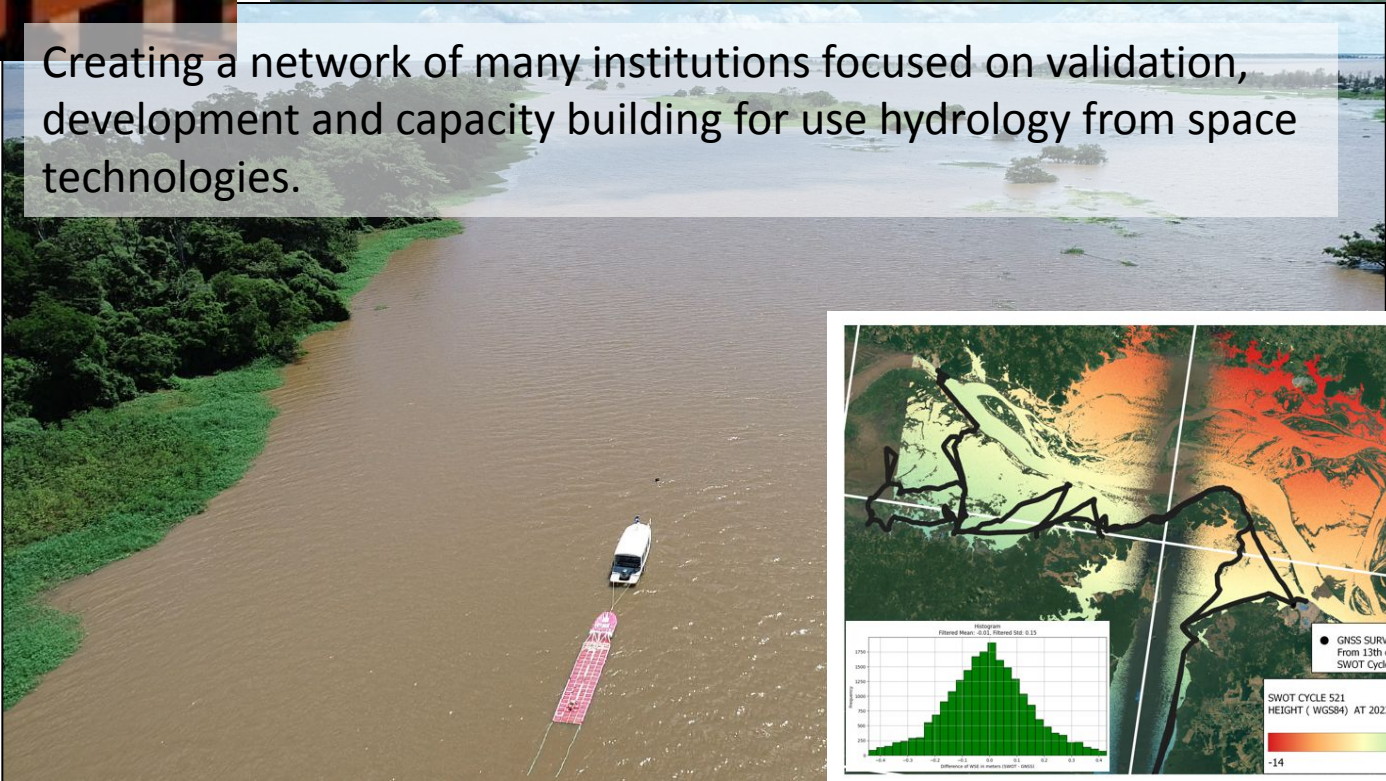
From the last two decades IRD and SGB deeply worked for validation , research , development and application of remote sensing technologies for hydrology monitoring.



www.hydrologyfromspace.org



Creating a network of many institutions focused on validation, development and capacity building for use hydrology from space technologies.



Global lakes & rivers survey from SWOT

SWOT measurements and products

Lakes

Height, extent & volume changes on lakes larger than 250 m x 250 m

- ⇒ This will allow calculating water storage changes
- ⇒ This will allow understanding the role of lake in water cycle

Rivers

Height, slope and width of rivers larger than 100

- ⇒ This will allow calculating discharges along pre-defined reaches of 10 km
- ⇒ This will allow understanding the role of rivers in water cycle and on sea level changes
- ⇒ This will allow understanding the interaction with floodplain and groundwater dynamics at basin scale

SWOT: a revolution!

In Situ Network



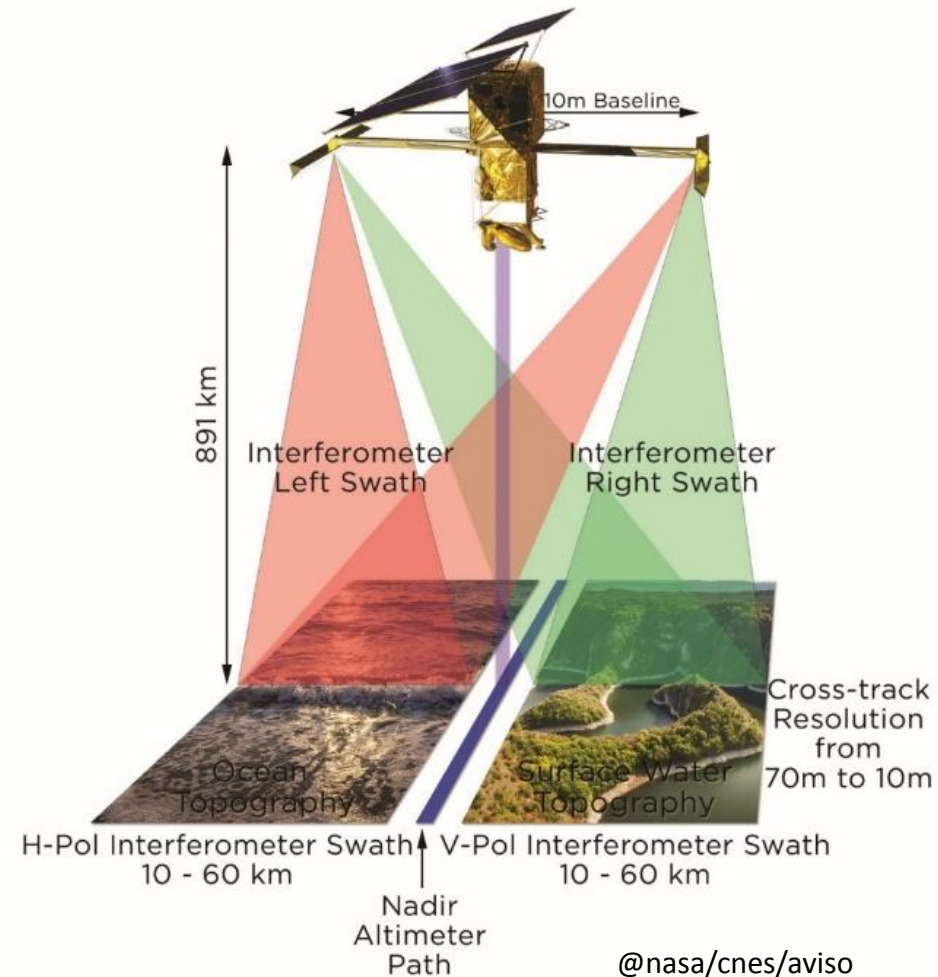
Classic altimetry Since 1990'S



SWOT Since 2022

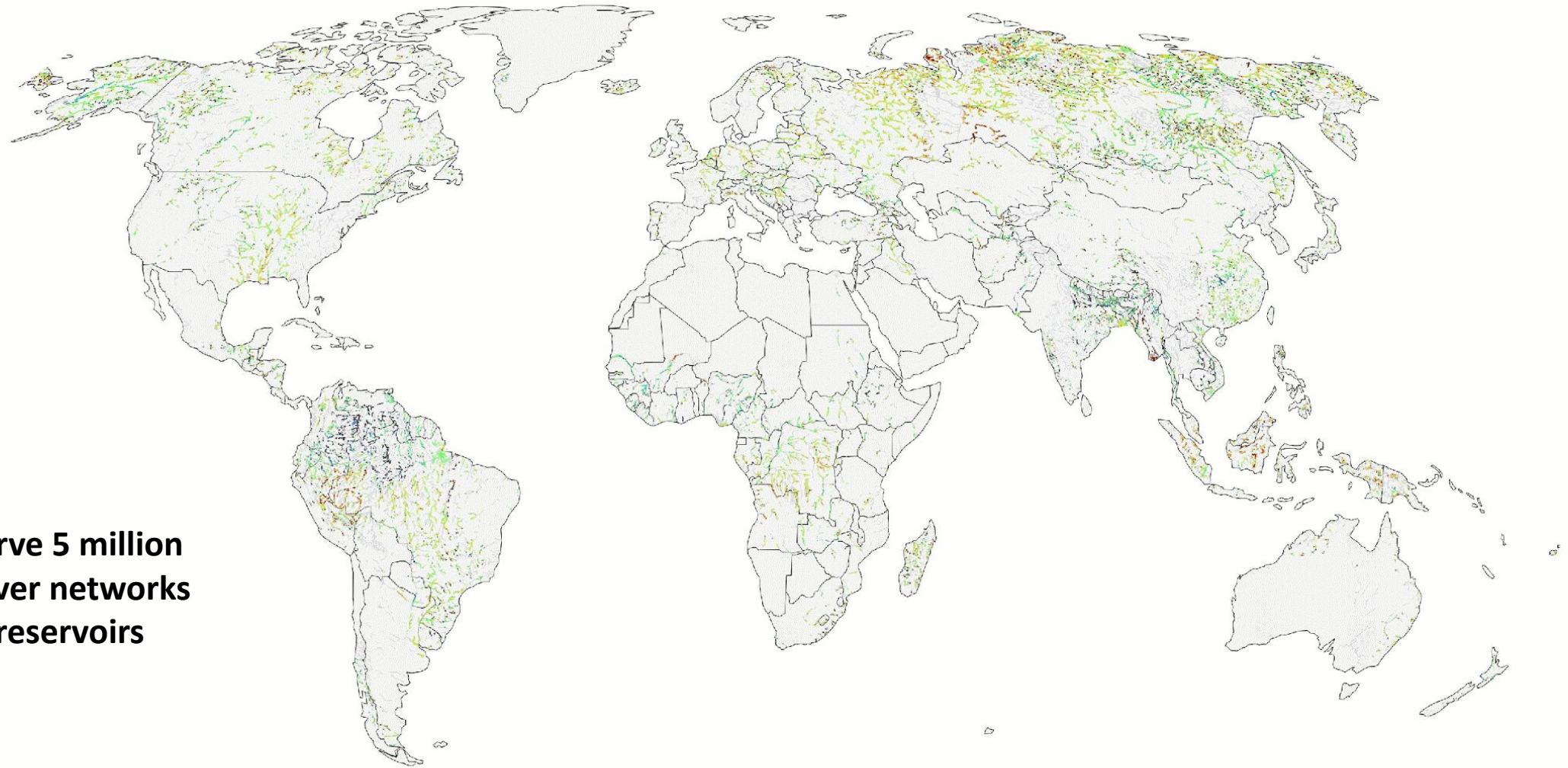


SWOT is an interferometer in Ka Band

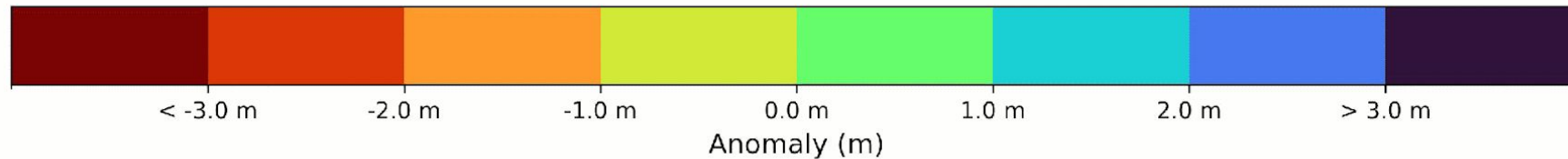


Measurements will be released every 21 days and every passes on shape of vector files, pixel cloud and rasters

River Water Level Anomaly - July 2023

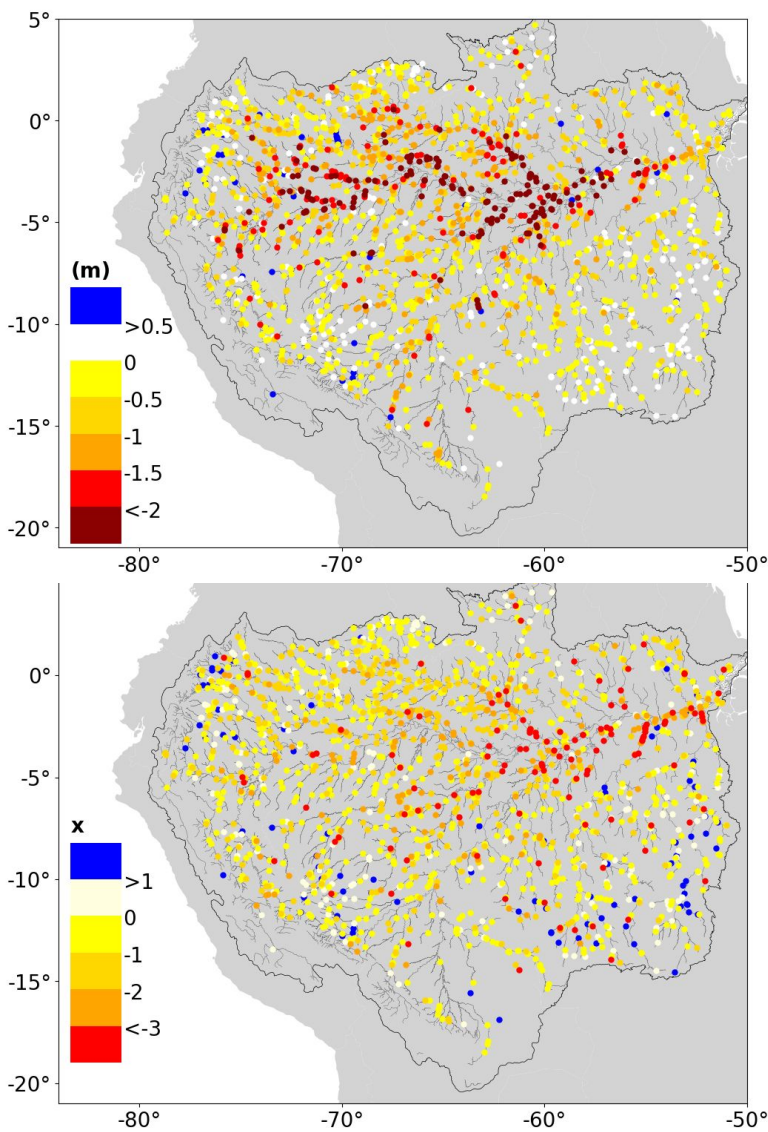


SWOT can observe 5 million kilometers of river networks and millions of reservoirs worldwide.



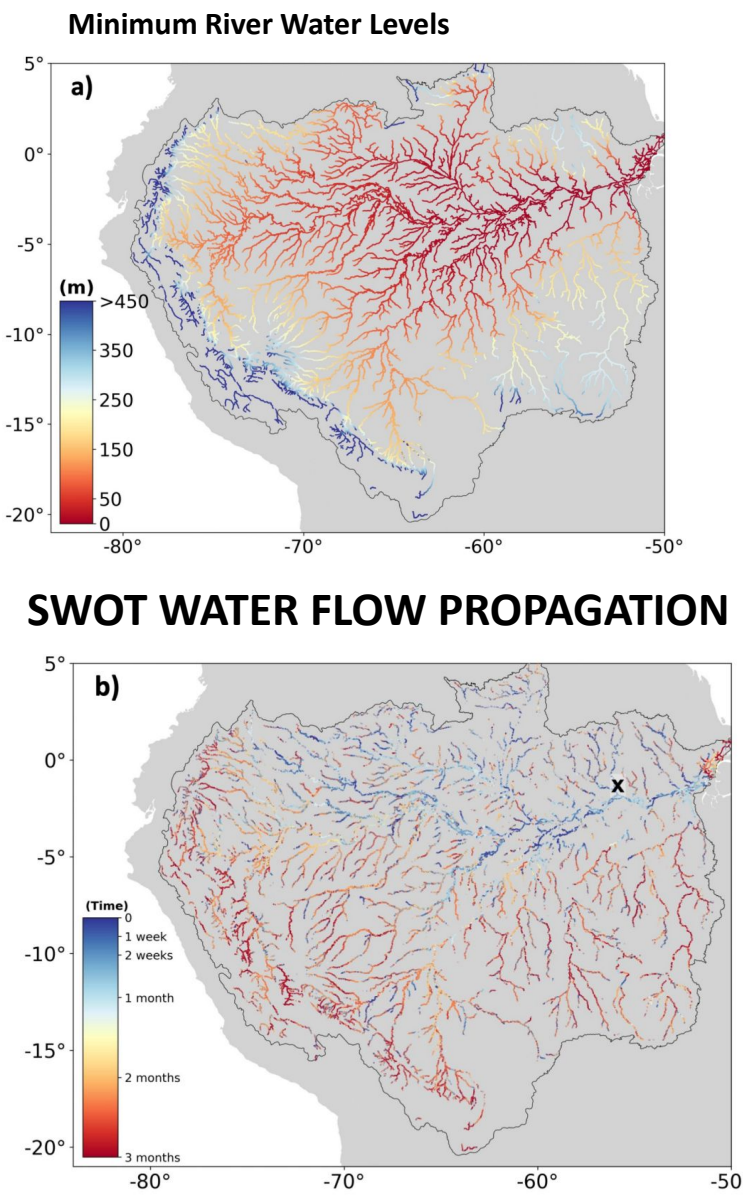
AMAZON 2023 DROUGHT FROM THE VIEW OF SATELLITE ALTIMETRY AND SWOT

WATER LEVELS ANOMALY

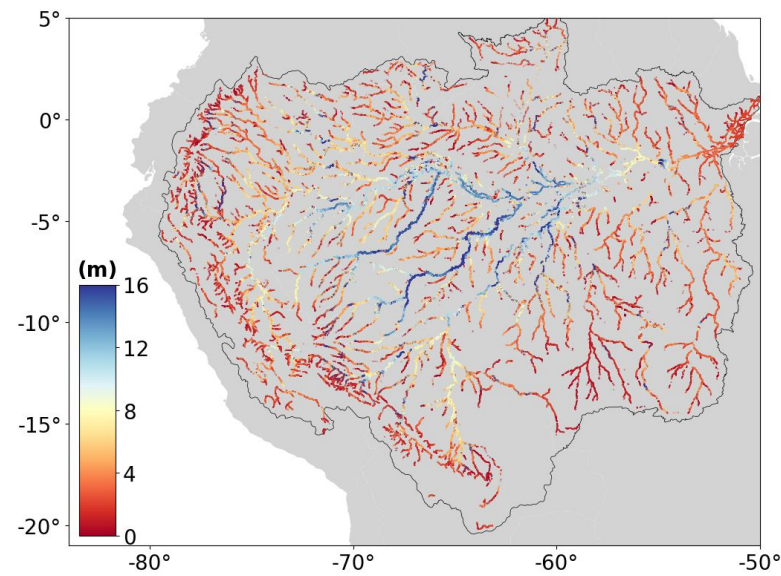


HOW STRONG AS THIS DROUGHT?
X - Represents X times of Drought Magnitude from Normal Standard Deviation of all droughts observed by Satellite Altimetry

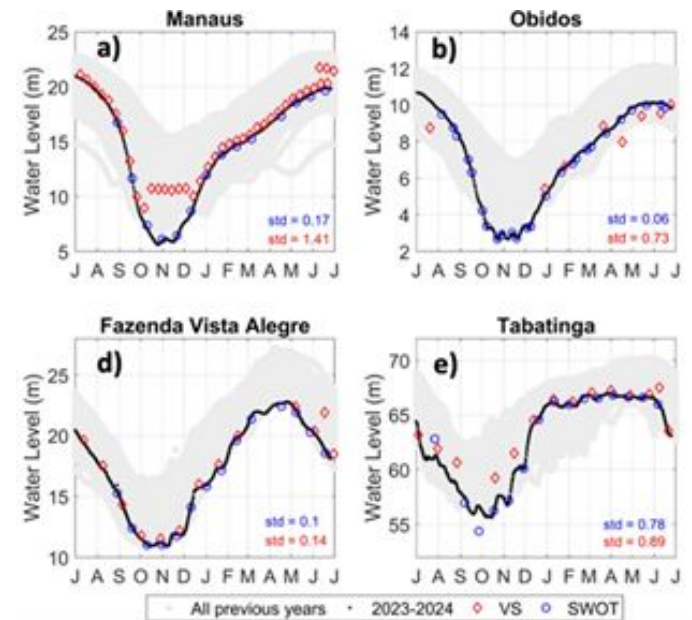
SWOT



Water Level Amplitude

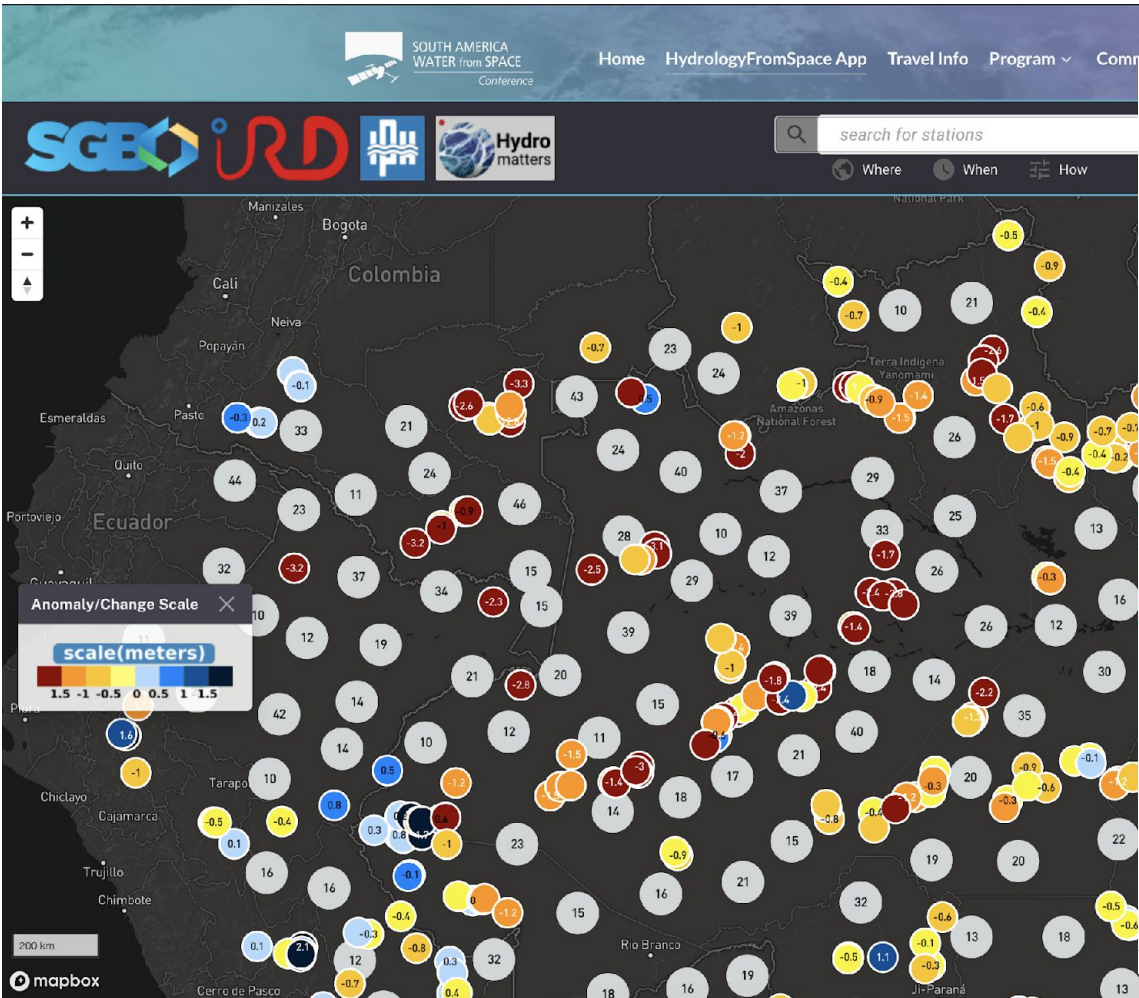


How gauges, SWOT and satellite altimetry observe the water level from 2023 drought?



Through all these fruitful partnerships leads by IRD and SGB, we are able to provide important information to society, which we are already using in our warning systems to monitor the Amazon drought.

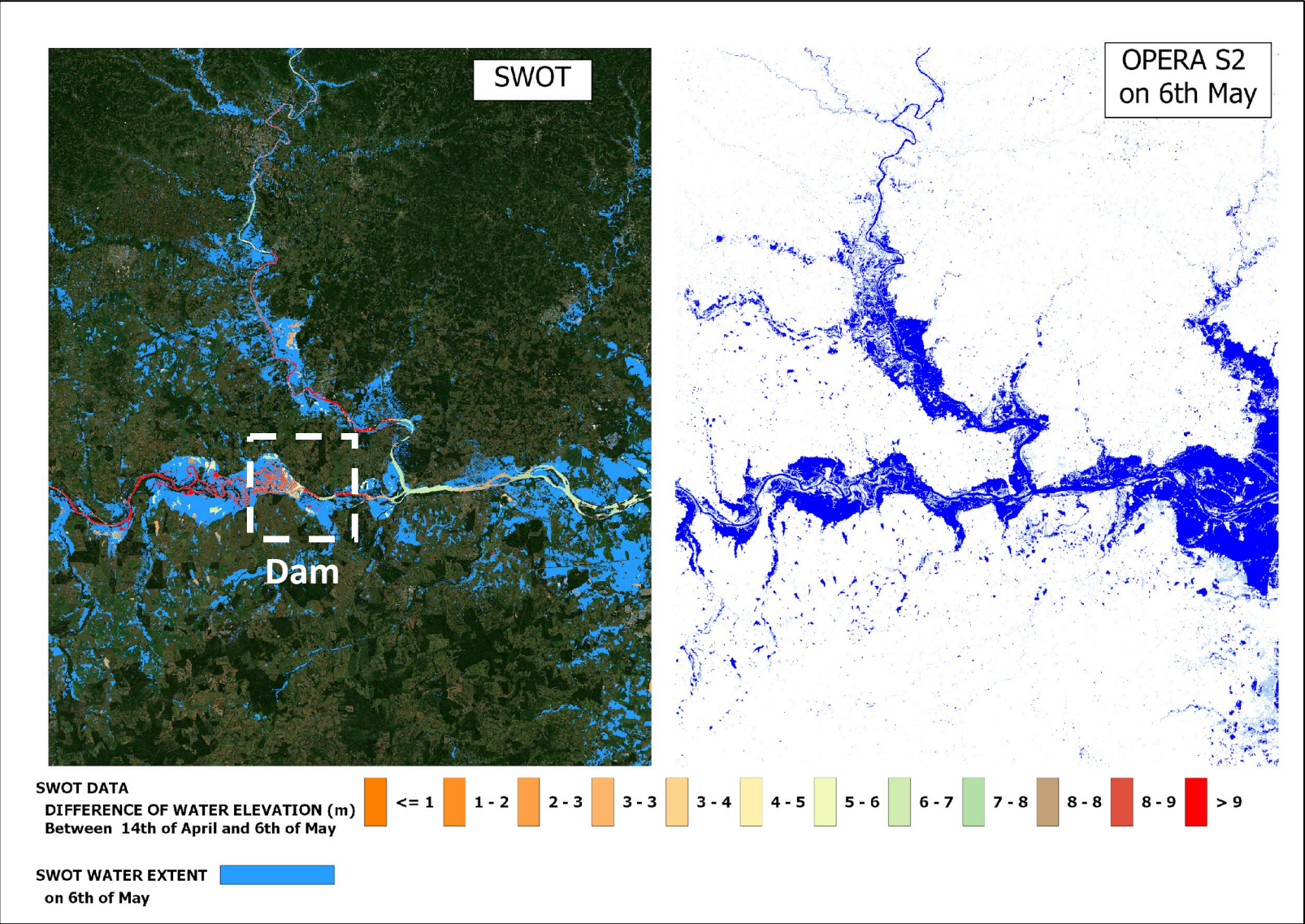
hydrologyfromspace.org : an augmented regional Hydroweb.next App for altimetry in the Amazon



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SWOT WAS ABLE TO SHOW THE AREAS IMPACTED BY THE FLOOD IN SOUTH OF BRAZIL



SWOT OBSERVED
DAM OVERFLOW DURING THE FLOOD

14th of April 2024 (CYCLE 13)



6th of May 2024 (CYCLE 14)

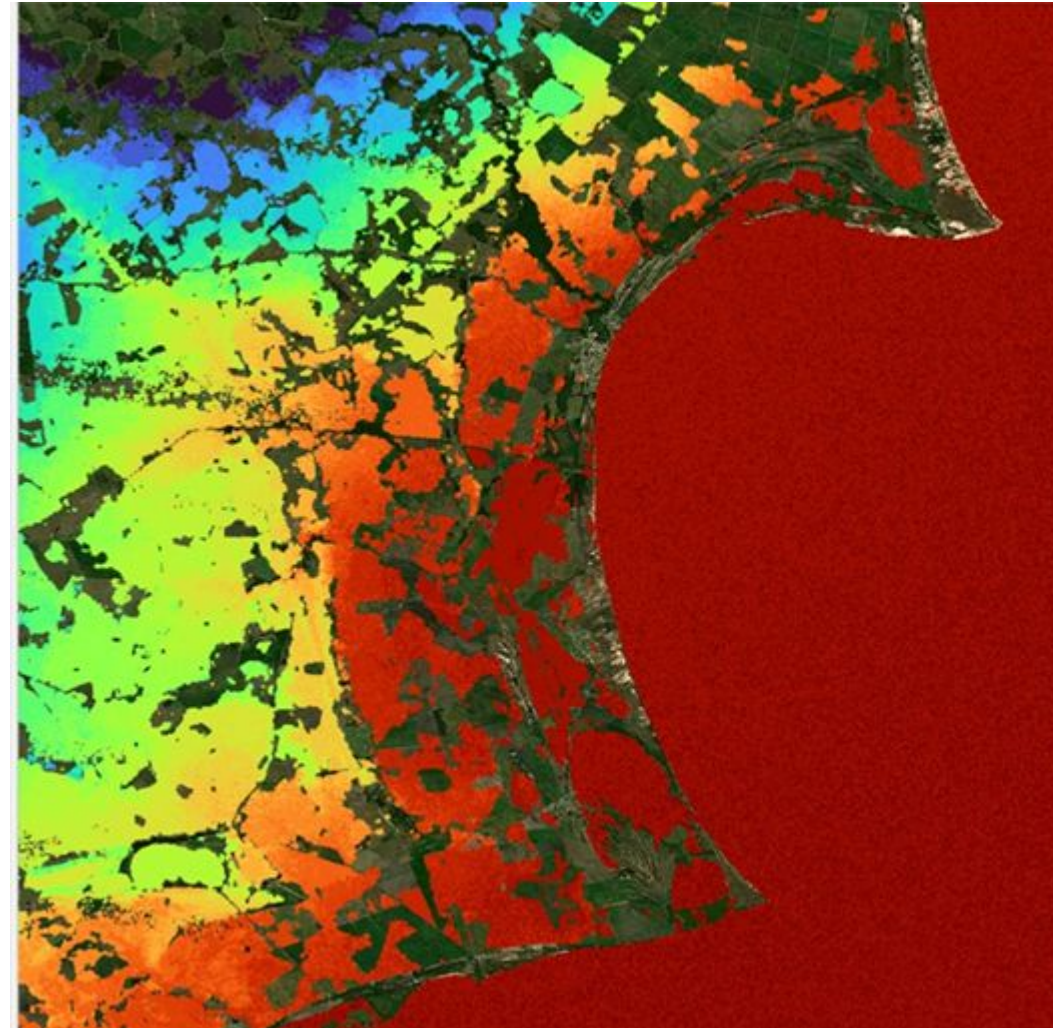


CONCLUSIONS

- Satellite altimetry, especially with SWOT, provides unique information on the extent and intensity of drought and flood impacts, essentially complementing in situ monitoring networks that are spatially limited.
- SWOT can provide water storage estimates for rivers and reservoirs at a global scale, supporting improved water management .

Perspectives for Agricultural Applications

- SWOT data can be processed and applied to land studies.
- The SWOT σ^0 signal is highly sensitive to surface soil moisture — both over bare soils and agricultural fields with vegetation.
- During the last Science Team Meeting, SWOT demonstrated the ability to detect irrigation events over agricultural areas.





COP 30

Difundindo Geociências para um Futuro Climático Seguro

OBRIGADO

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MINISTÉRIO DE
MINAS E ENERGIA

