

# SWOT for SOUTH AMERICA

PIs: F. Papa (IRD-LEGOS) and D. Moreira (SGB-Brazil)

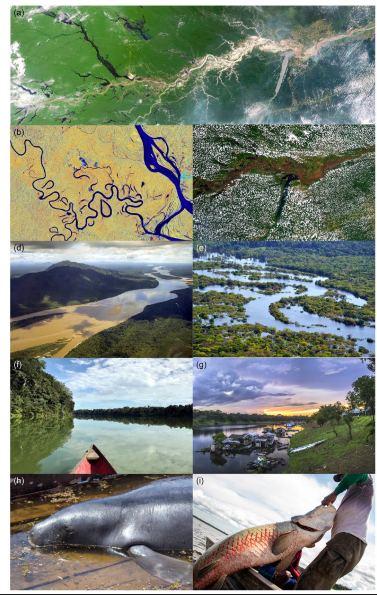


An integrated proposal on the Water Cycle and Hydrology in South America in the SWOT context. Organized around 5 WPs, each with a French and a South American PI.

- WP1: Hydrodynamics of the Amazon estuary PI: Fabien Durand (IRD) and Daniel Moreira (SGB)
- WP2: Water storage variability in S Amer. PI: F. Papa (IRD), F. Frappart (INRAE) and J. Tomasella (CEMADEN)
- WP3: Lake Storage in the Andean chain PI: J.-F. Crétaux (CNES) and Rodrigo Abarca (Concepcion-Chile)
- WP4: Amazonian floodplains hydrodynamics PI: M.-P. Bonnet (IRD) and Ayan Fleischmann (Mamiraua)
- WP5: SWOT Cal/Val in South America PI: Adrien Paris (HydroMatters) and Juan G. Leon (Cali U.-Colomb.)



## The Amazon : a natural laboratory of remote sensing for hydrology



A Review of the various achievements of more than *three decades* of scientific advances on the *hydrology* of the *Amazon Basin* from *Remote Sensing*

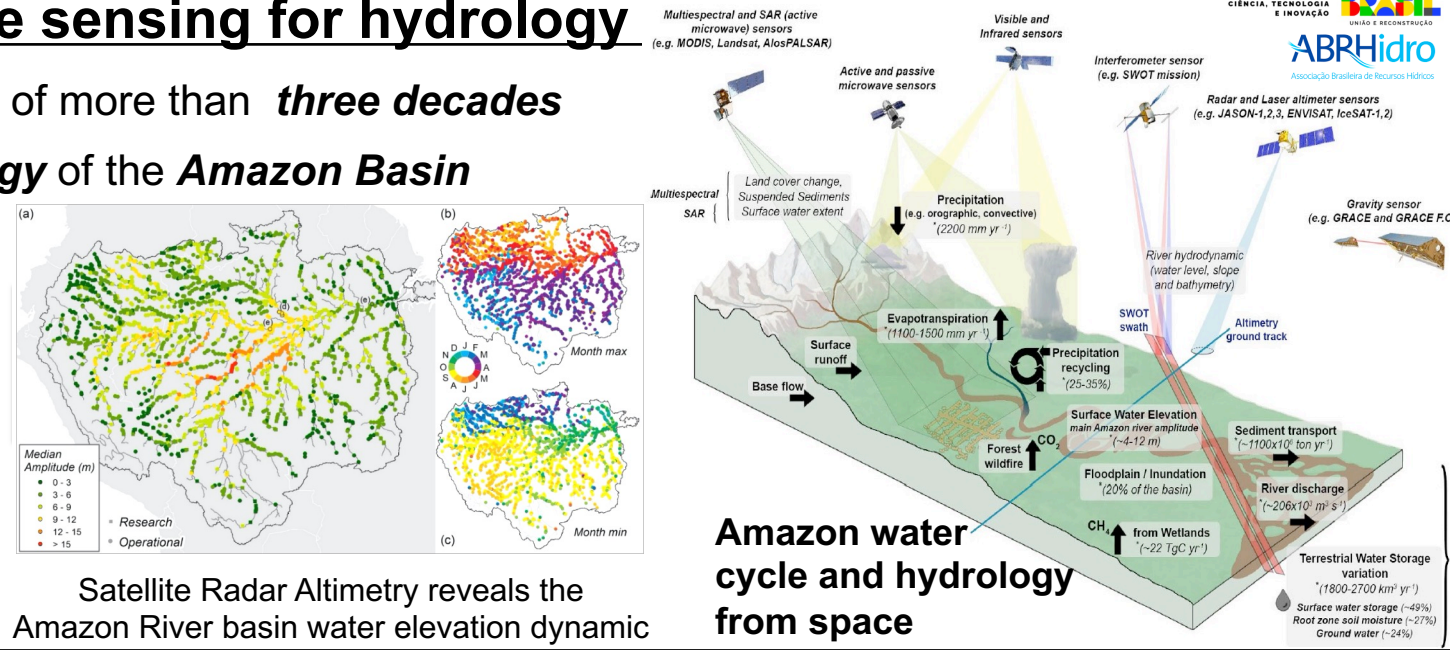
### Reviews of Geophysics

Commissioned Manuscript | Open Access | DOI: 10.1029/2020RG000728

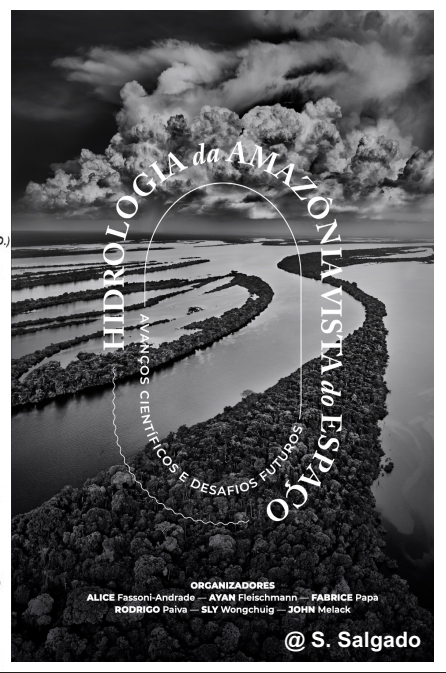
Amazon Hydrology From Space: Scientific Advances and Future Challenges

Alice César Fassoni-Andrade, Ayan Santos Fleischmann, Fabrice Papa, Rodrigo Cauduro Dias de Paiva, Sly Wongchui, John M. Melack, Adriana Aparecida Moreira, Adrien Paris, Frédéric Frappart, Filipe Aires, Gabriel Medeiros Abrahão, Jefferson Ferreira-Ferreira, Jhan Carlo Espinoza, Leonardo Lalpelt, Marcos Heil Costa, Raul Espinoza-Villar, Stéphane Calmant, Victor Pellet ... See fewer authors

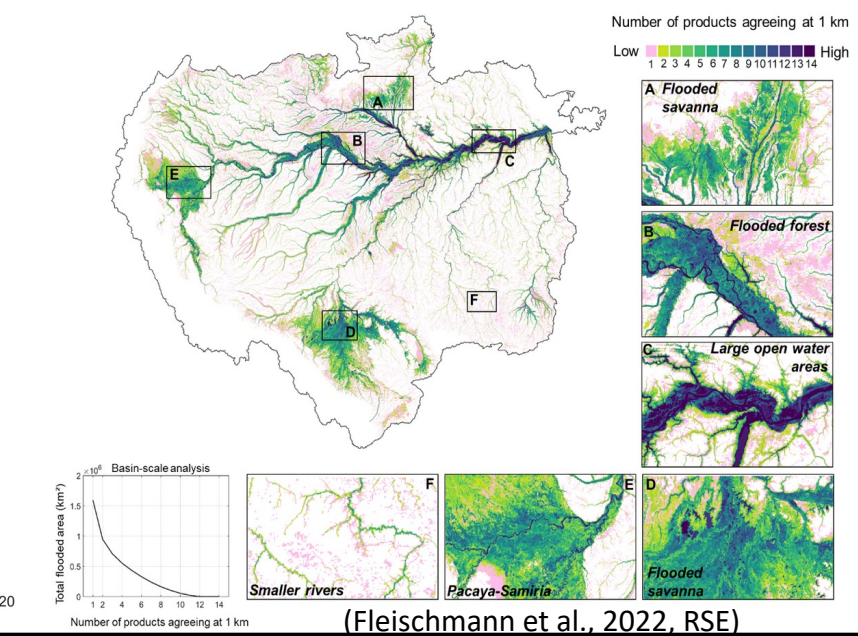
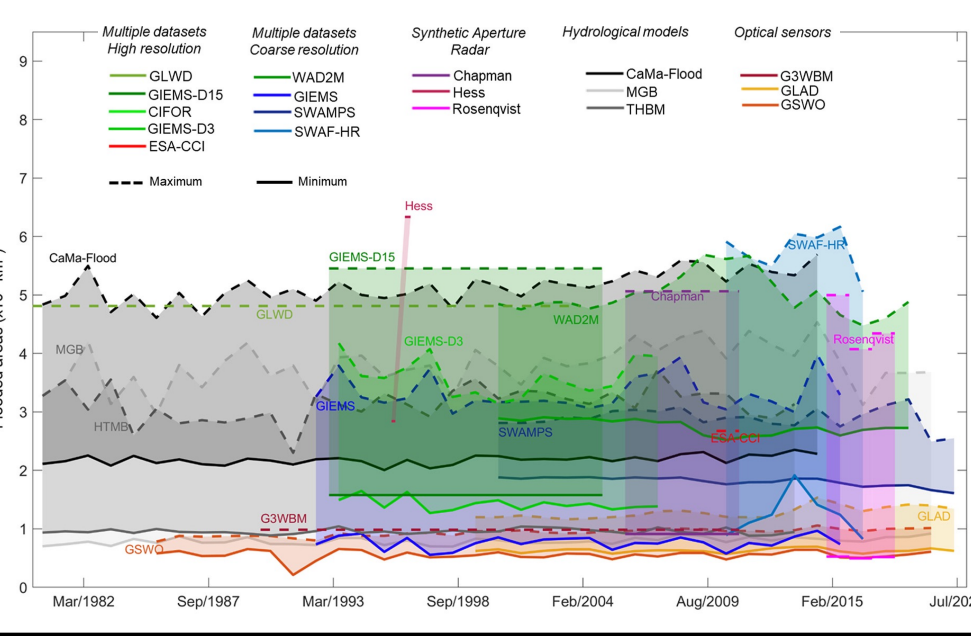
First published: 12 October 2021 | <https://doi.org/10.1029/2020RG000728>



Satellite Radar Altimetry reveals the Amazon River basin water elevation dynamic



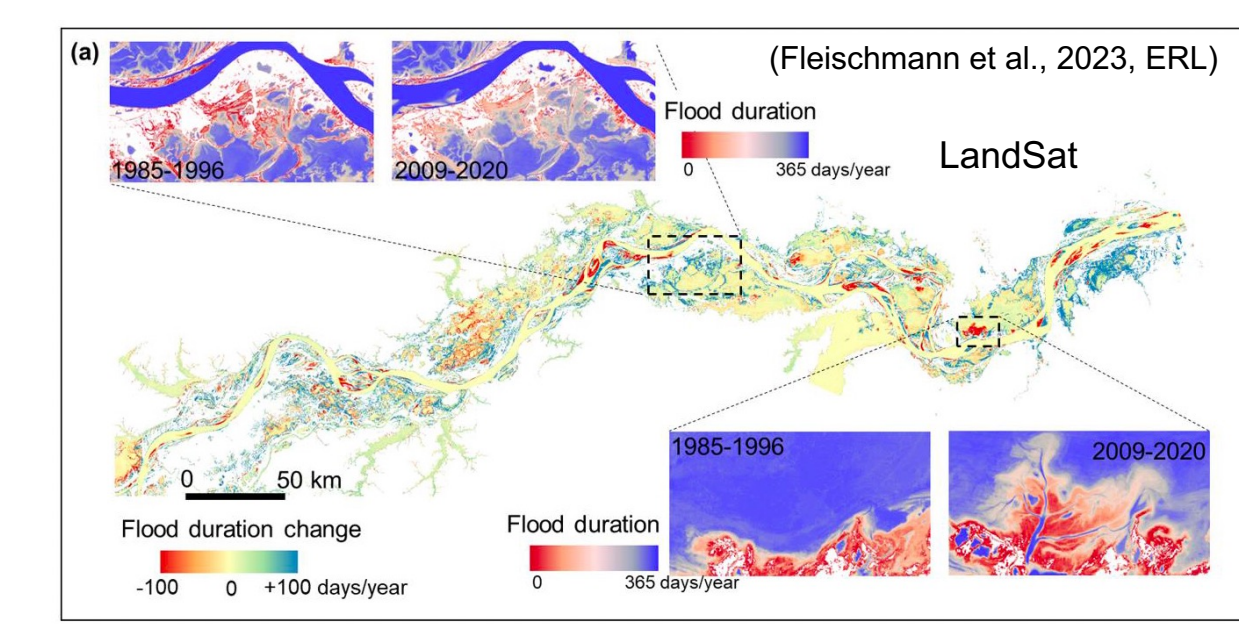
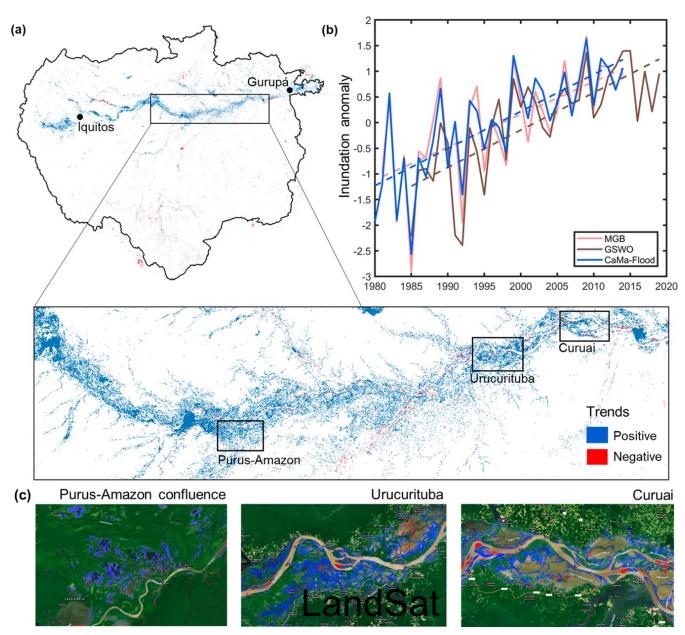
## How much inundation occurs in the Amazon? Comparison of more than 30 datasets at the Amazon basin scale and local scale



- Good agreement for open water
- Less convincing for inundated savanna, interfluvial wetlands

All datasets available @

## How much inundation have changed over the Amazon? Satellite observations and models reveal a 26% inundation increase since 1980



- Changes in extent but also flood duration
- Large changes in the connectivity rivers/floodplains/lakes
- Strong implications for ecosystems, carbon cycle, life adaptation and local population

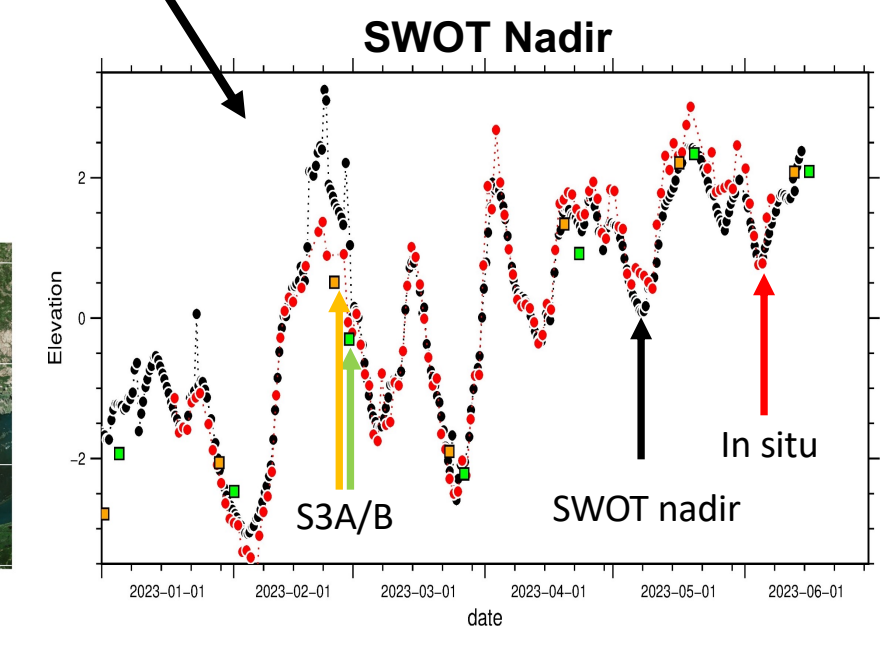
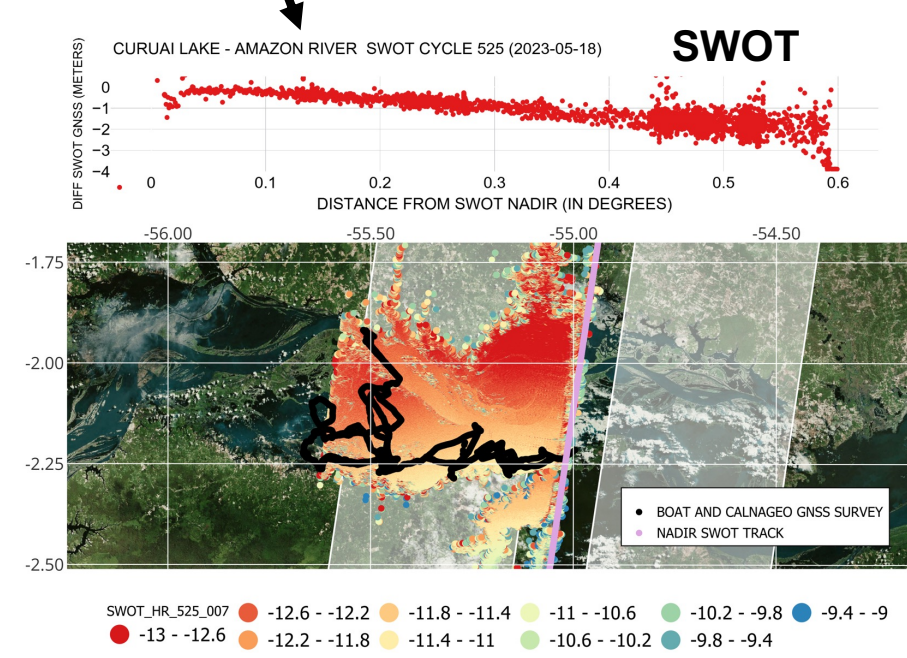
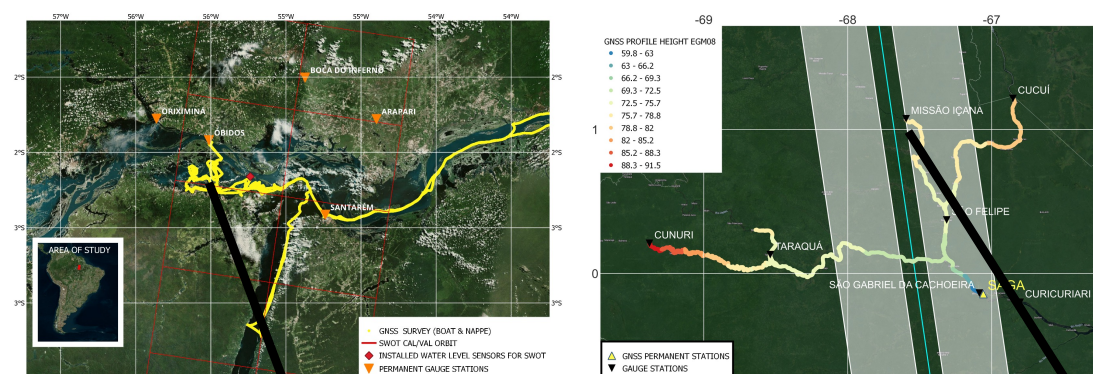
## SWOT Cal/Val for Hydrology in South America

Brazil, with CPRM, Pantanal/Paraguay river, Sao Francisco...  
Chile and Argentina: Andean lakes  
Colombia  
French Guyana: Maroni, Oyapock

>45- Field Campaigns, >40.000 km of river surveyed (GNSS, ADCP, Carpet)  
> 80 gauges leveled



### 1-day fast sampling phase (10-26 May Amazon/Tapajos/Curuai ; 2-23 June Rio Negro)



## South America Water from Space Conference

South America Water from III in Foz d'Iguazu, Brazil,

<https://hydrologyfromspace.org/>

SOUTH AMERICA WATER from SPACE III Conference

Foz d'Iguazu, Brazil, 21-25 November 2022

Online meeting April 19 2022

- 150 participants from 11 countries, many students
- Opening ceremony: OTCA General Secretary, Fr embassy, Br officials
- 4 mini-courses (altimetry, water resources, SWOT simulator/data, field measurements)
- Large online and social media activities

Some reference:

- Fleischmann A. S., F. Papa, S. K. Hamilton, A. Fassoni-Andrade, et al. (2023), Increased floodplain inundation in the Amazon since 1980, *Environ. Res. Lett.*, 18 (3), 034024, doi:10.1088/1748-9326/acb9a7
- Fleischmann A.S., F. Papa, A. Fassoni-Andrade et al. (2022), How much inundation occurs in the Amazon River Basin? *Remote Sens. of Environ.*, 278, 113099, <https://doi.org/10.1016/j.rse.2022.113099>
- Fassoni-Andrade A., A. Fleischmann, F. Papa, R. Paiva, S. Wongchui et al. (2021), Amazon hydrology from space: scientific advances and future challenges, *Reviews of Geophysics*, 59, <https://doi.org/10.1029/2020RG000728>
- Papa, F. and F. Frappart (2021), SWS in Rivers and Wetlands derived from Satellite Observations: a review of current advances and future opportunities for hydro. sc., *Remote Sensing*, <https://doi.org/10.3390/rs13204162>
- Fleischmann, A.S., L. Lalpelt, F. Papa, A. Ruhoff, R. C. D. Paiva et al. (2022), Patterns and drivers of evapotranspiration in South American wetlands, *Nature Communications*, accepted