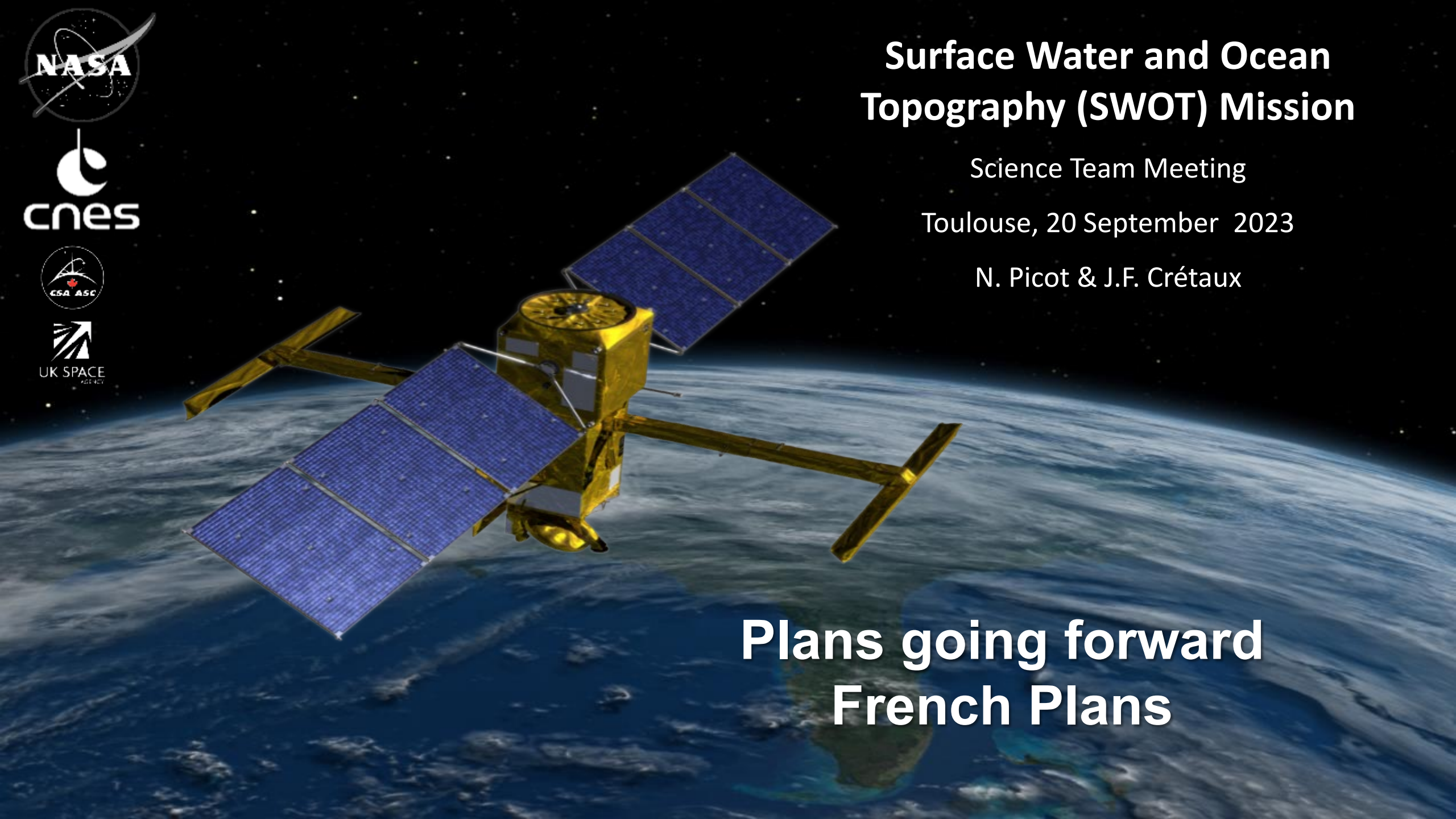


Surface Water and Ocean Topography (SWOT) Mission

Science Team Meeting

Toulouse, 20 September 2023

N. Picot & J.F. Crétaux

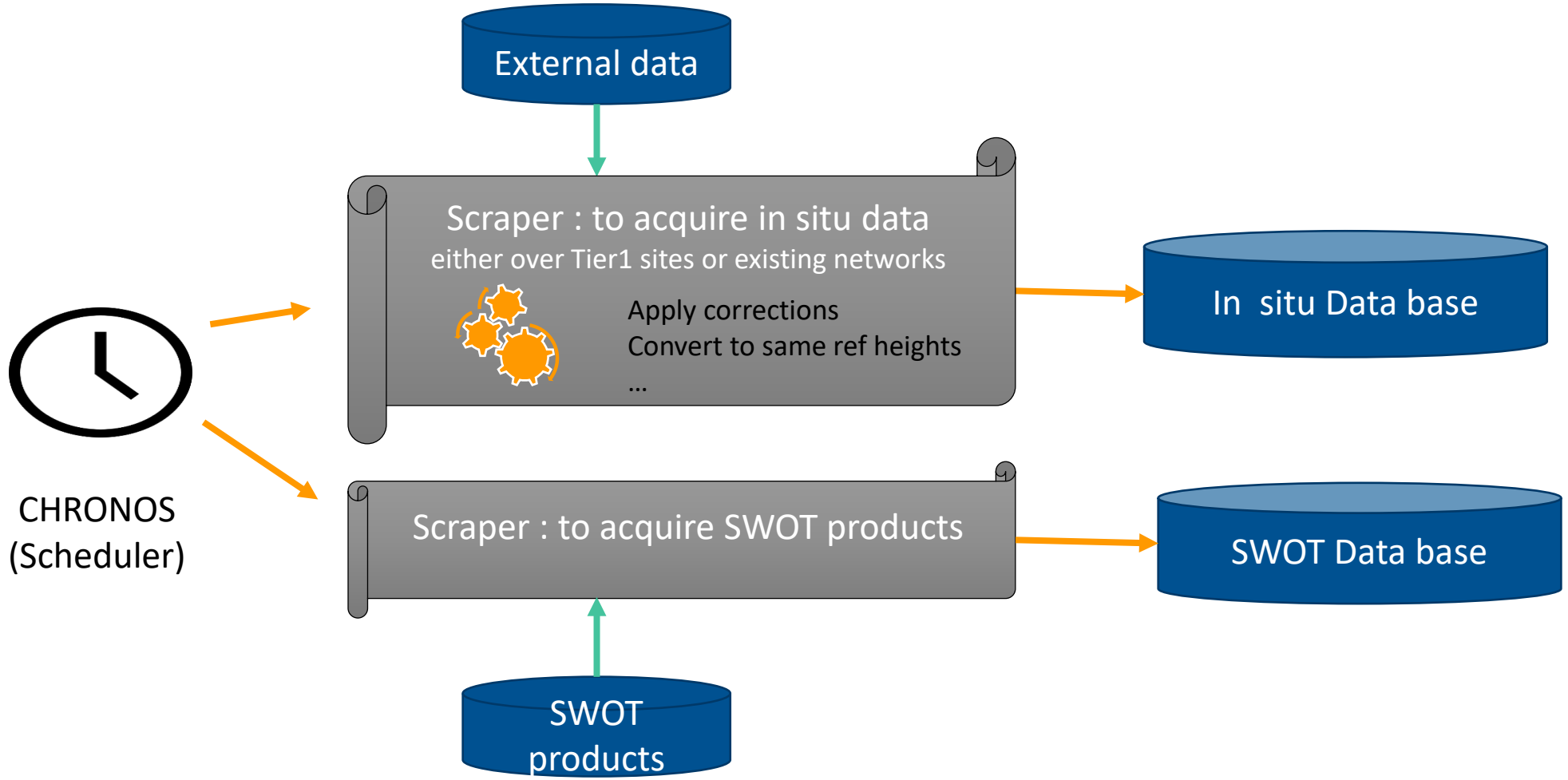
Plans going forward
French Plans

Plans going forward – French Plans

- Continue the development of our **CNES shared platform** (not open source)
- Continue developing the **comparison with other satellite data**
- **Collect more data** over **selected sites**
- **Process and validate in situ data**, develop error metrics (refer to Colin presentation, and St3TART project documents)
- Precise the procedures to compare in situ data with SWOT, share the tools among the community

Plans going forward – French Plans - CNES shared platform

- CNES Expertise Center is a frame work to ease the comparison and analysis of in situ data with SWOT products. Available on CNES HPC center



Plans going forward – French Plans - CNES shared platform

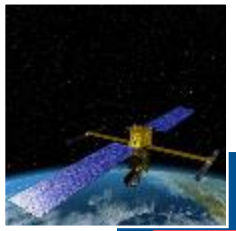
Lake Data Base brief overview (Rivers in backup slides)

Features (static)

- id (PLD lake id)
- geometry
- reach_id (PRD reach)

Features (static)

- id (station id)
- lake id (PLD)
- Geometry (position station)
- Source (ex NVE)
- Name (station)



SWOT LakeSP

Observations

- id (PLD lake id)
- Time
- Cycle number, pass number
- Geometry
- Parameters + uncertainty (wse, extent,…)
- Xtrack distance
- Etc …

In-situ lake

Observations

- Id (station)
- Time
- Geometry (observation)
- Parameters + uncertainty (wse, height, extent, storage, …)
- Validity flag

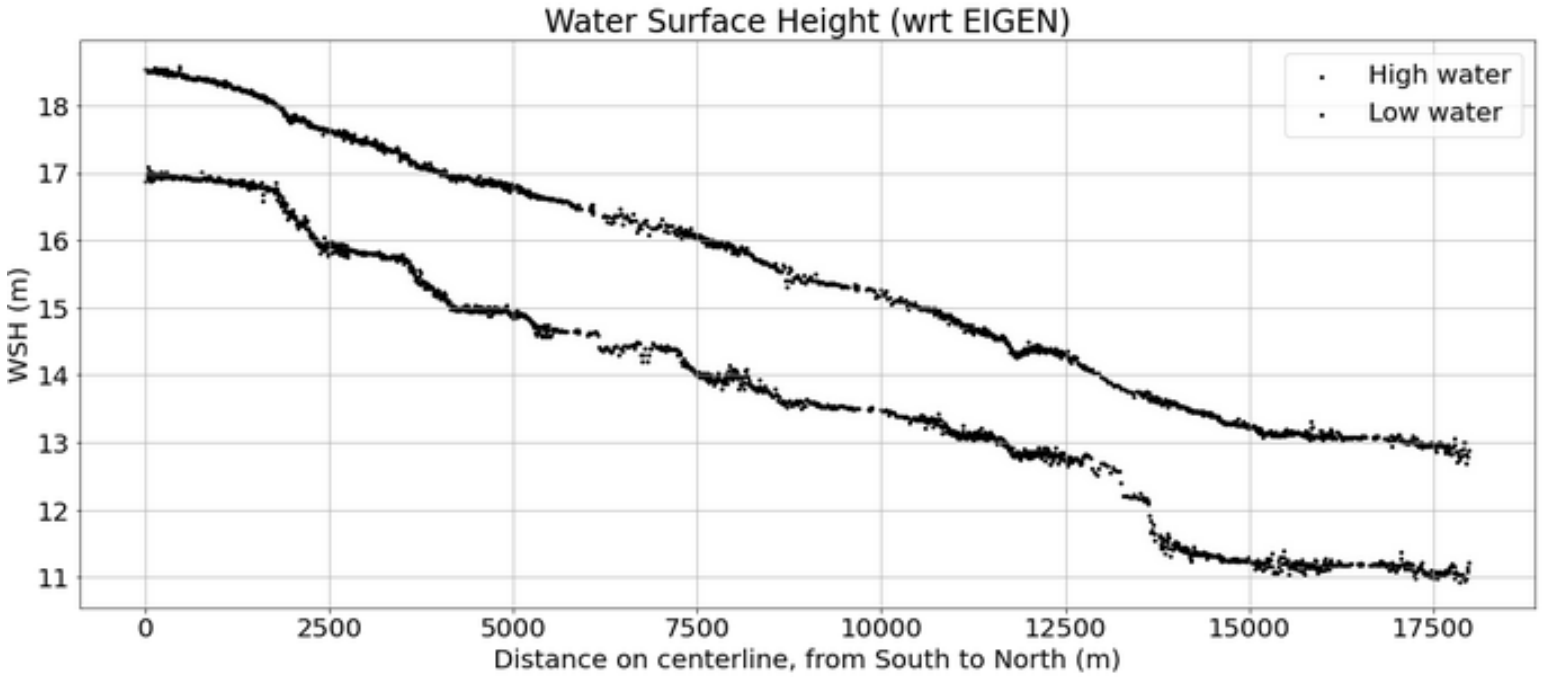
https://confluence.cnes.fr/display/SWOTCE/wiki+HR

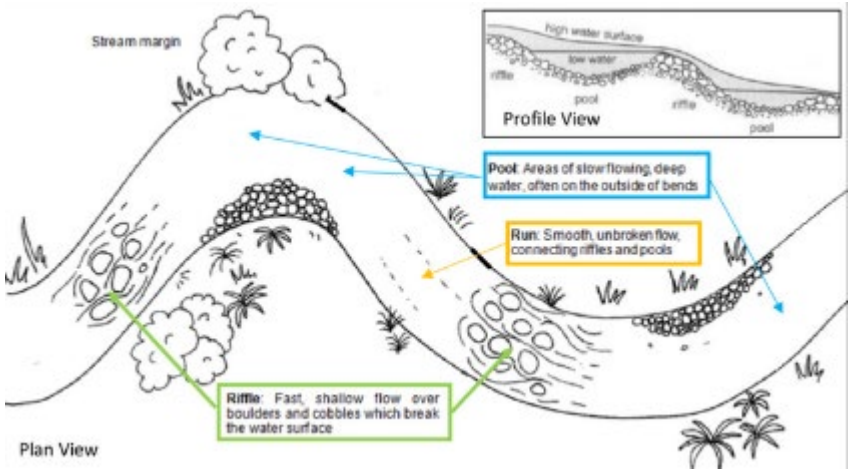
Plans going forward – French Plans - Comparison with other satellite data

- Nadir altimeter data can be valuables to support the validation of SWOT data.
- We will make use of Hydroweb products (over 10 000 Virtual stations currently available), complemented by new processing methods :
  - River Slope derived from S6 data
  - Lake Processing prototype over at least 1000 lakes
  - New retracking techniques applied to SWOT nadir LRM data, to S6 and S3 nadir SAR data

Plans going forward – French Plans - Comparison with other satellite data

- **River Slope derived from S6 data**

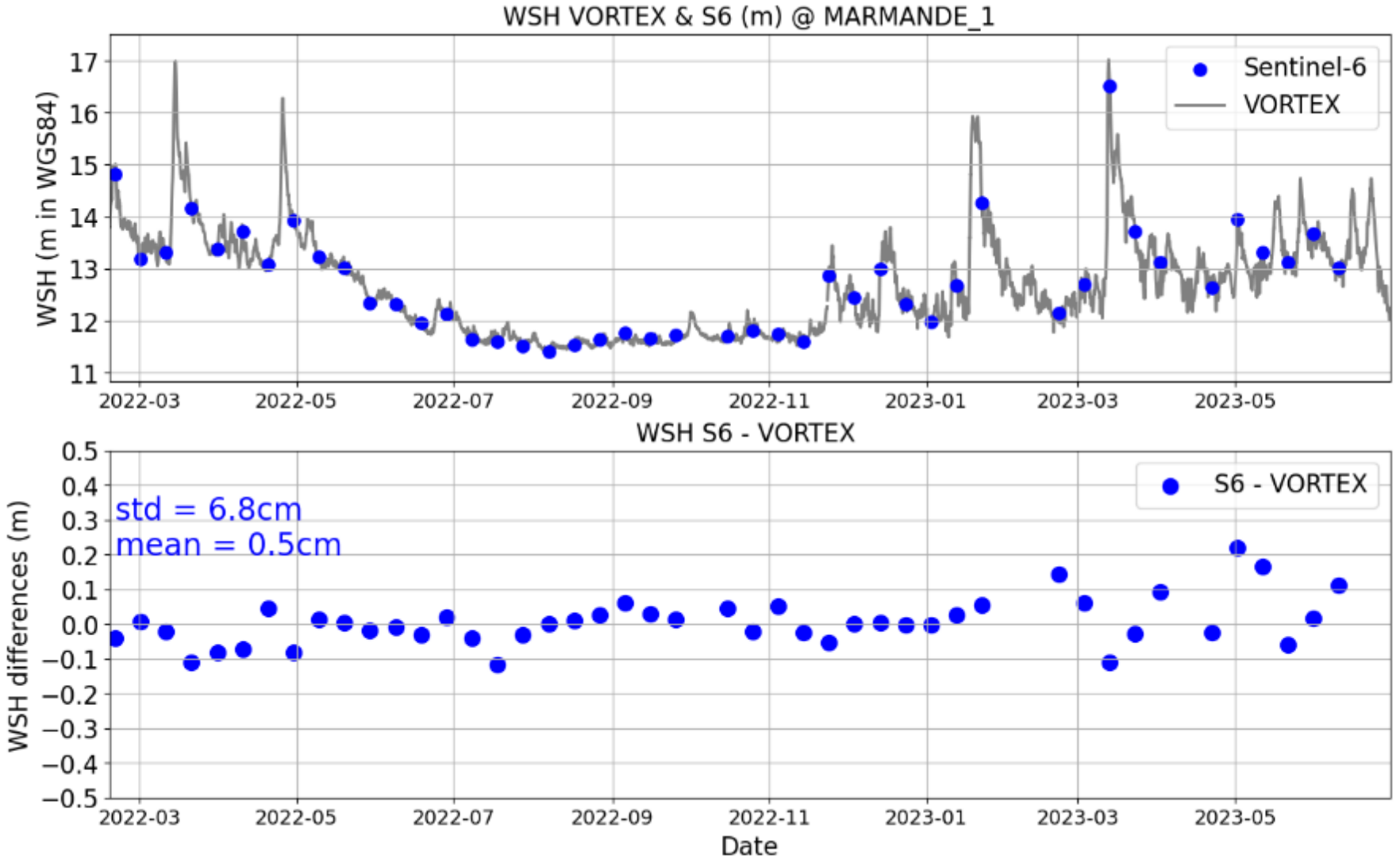




Sentinel-6 exhibits riffles and pools, that disappears when water elevation increase

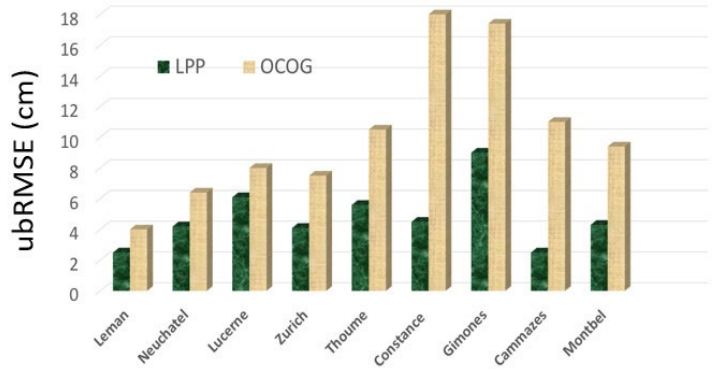
Plans going forward – French Plans - Comparison with other satellite data

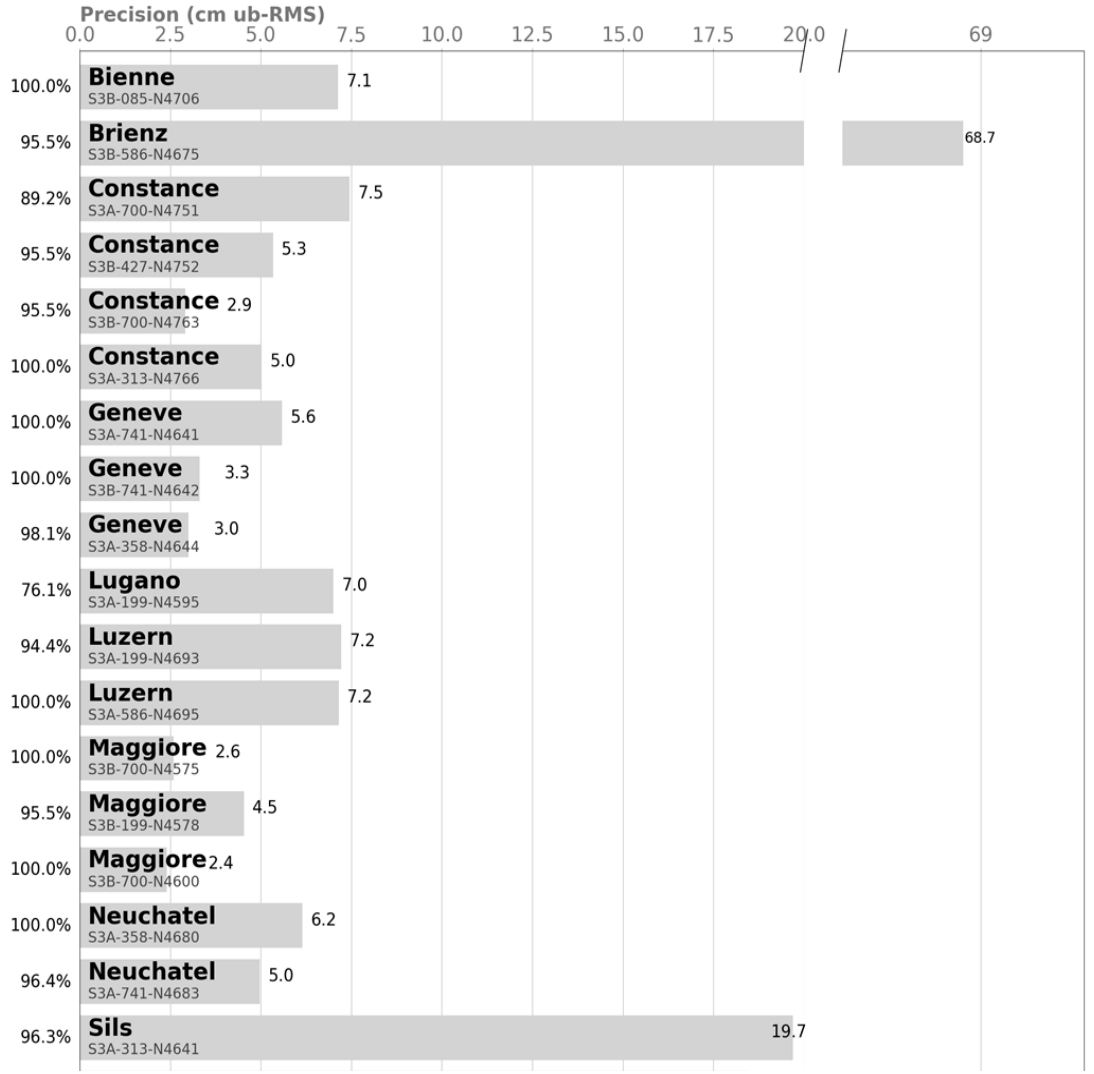
- **River Slope derived from S6 data**



Plans going forward – French Plans - Comparison with other satellite data

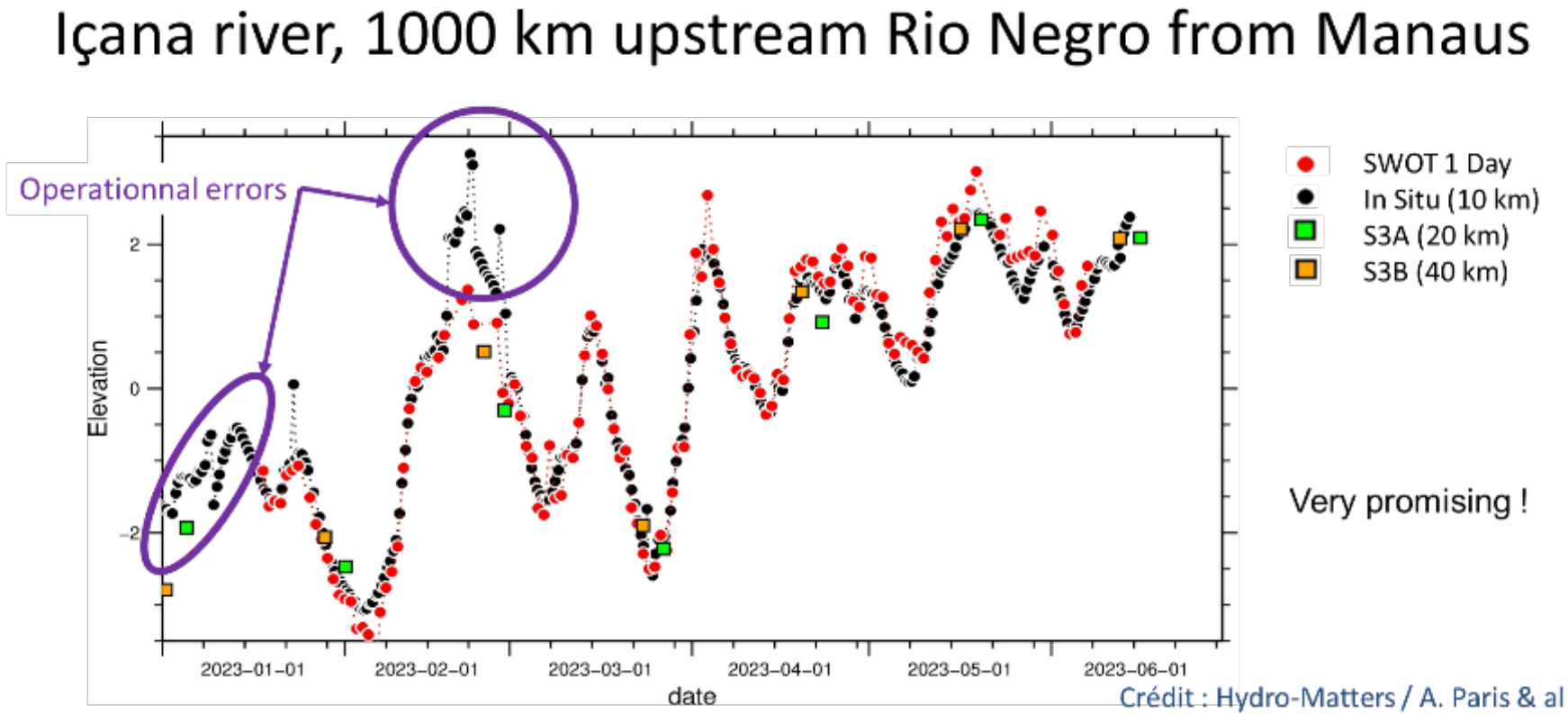
- **Lake Processing prototype over at least 1000 lakes**





Plans going forward – French Plans - Comparison with other satellite data

- **New retracking techniques applied to SWOT nadir LRM data, to S6 and S3 nadir SAR data**



Plans going forward – French Plans - Comparison with other satellite data

- **Make Use of Icesat-2 data over lakes and rivers**

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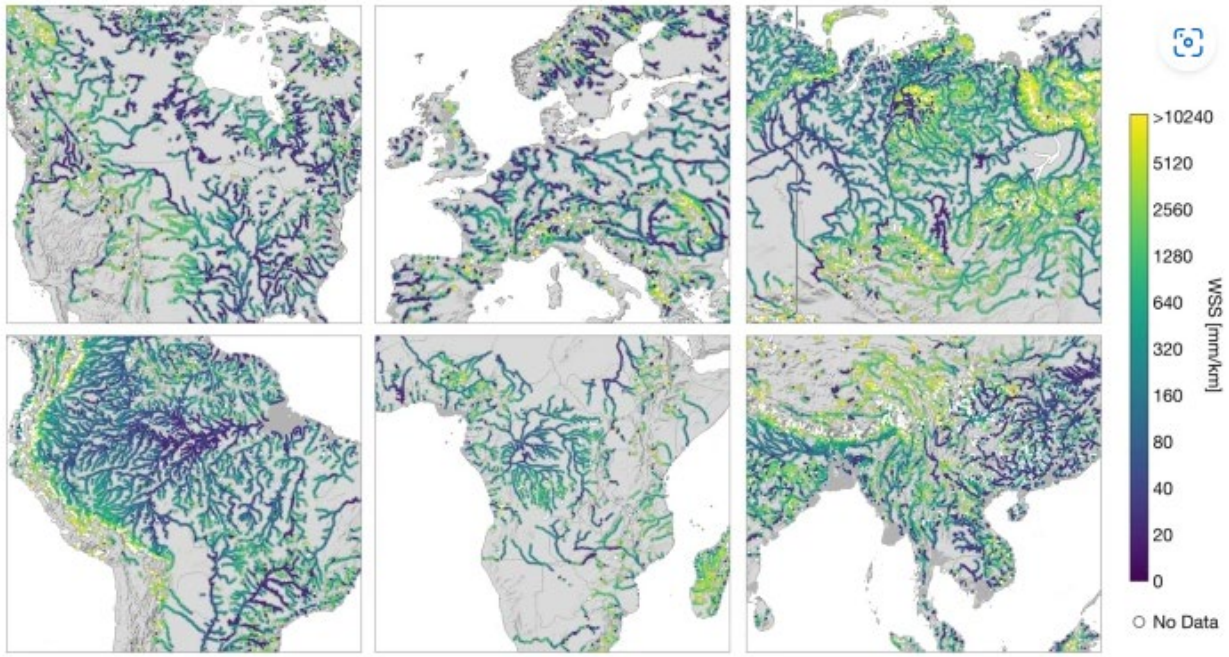
ICESat-2 river surface slope (IRIS): A global reach-scale water surface slope dataset

Daniel Scherer, Christian Schwatke, Denise Dettmering & Florian Seitz

Scientific Data **10**, Article number: 359 (2023) | Cite this article

1029 Accesses | **4** Altmetric | Metrics

Fig. 3



Detailed views of the averaged combined WSS for North America, Europe, and Siberia (upper f.l.t.r.), South America, Central Africa, and East Asia (lower f.l.t.r.).

Plans going forward – French Plans – Collect more data

- A strong CNES project effort was done during the 1 Day / Fast Sampling orbit phase. We do not have the ressources to maintain the same level of field data acquisition

- Our **French Tier 1 sites with automatic or regular data** will be maintained, as well as the team to process and analyze the data :
  - Garonne River
  - Rhine River
  - LOCSS / OECS citizen science network

- The in situ network over those sites might be / will be adapted in front of SWOT results

- Some additional Drone flights might be performed to complement the river slope measurements available so far

Plans going forward – French Plans – Collect more data

- We encourage other contributions, trough the TOSCA – Roses calls or other opportunities. **Tropical rivers** (Maroni, Brazil rivers, India, …) are obviously of interest but we need to find **other funding solutions** and to spend more time on the data acquired so far on those sites

- In the frame of S3-NG preparatory activities 2 new sites will be equipped in Europe.
  - One in Germany on the Danube with 8 Micro Stations
  - The second one over Po and Tanaro rivers with 7 Micro Stations

Allemagne :

- **Deggendorf sur le Danube** → 8 Stations

Italie :

- **Alexandrie sur le Po et le Tanaro** → 7 stations

Plans going forward – French Plans – Process and validate in situ data

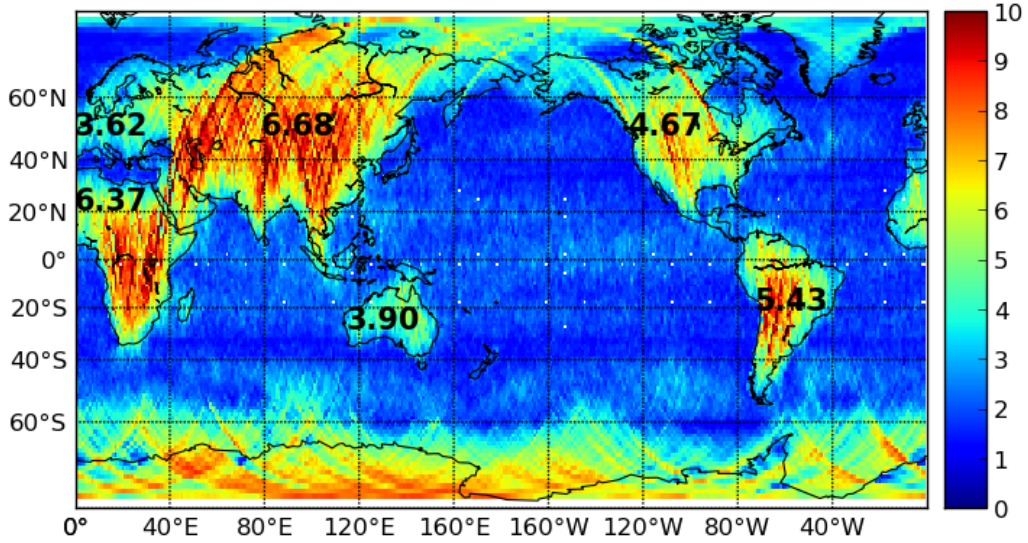
- Refer to Colin slides and to St3TART documents

Plans going forward – French Plans – Precise the procedures

- Refer (again) to Colin slides and to St3TART documents
- Early results over Tier 1 sites demonstrate that it is not that easy
  - Procedures might depend / will be adapted on sites characteristic (a lake is obviously different from a river / canal)
  - Perform some comparisons at Pixel Cloud level
  - Validate the performances over Lakes and contribute to the analysis over Rivers lead by NASA

Plans going forward – French Plans – Precise the procedures

- A specific focus will be done on the **validation of XCAL L2 & L3 quality** over large lakes.
- This work will be conducted by LEGOS team with support from CLS.
- It relies on the availability of Lake Mean Surface to analyze the cross track residual signals linked to XCAL accuracy.
- Lake Mean Surface have been computed by LEGOS over 20 large lakes, other teams are working with IceSat2 to increase the number of Lake Mean Surfaces. SWOT data might also be of interest (assuming there is no systematic / permanent XCAL error)
- Large lakes are also **important surfaces to validate the random noise and sigma0 evolutions** as a function of cross track distance / incidence angle

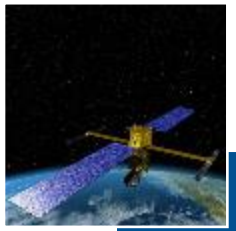


BACKUP

Format BD : tables rivières (tronçons)

Features (static)

- Id (PRD reach id)
- Geometry
- Lake id (PLD lake id)



SWOT RIverSP

Observations

- Id (PRD reach id)
- Time
- Cycle number, pass number
- Geometry
- Paramètres + incertitudes (wse, slope, discharge)
- Xtrack distance

Features (static)

- Id (station)
- Reach id
- Geometry
- Source (ex NVE, microstation)
- name

In-situ reach

Observations

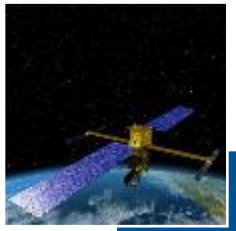
- id (station)
- time
- Paramètres + incertitudes (wse,slope,width,discharge, area…)
- Validity flag

https://confluence.cnes.fr/display/SWOTCE/wiki+HR

Format BD : tables rivières nodes

Features (static)

- Id (PRD node id)
- Geometry (node position)



SWOT RIverSP

Observations

- Id (PRD node id)
- Time
- Cycle number, pass number
- Geometry
- Paramètres + incertitudes (wse, width, area)
- Xtrack distance

Features (static)

- Id (station)
- node id
- Geometry (position station)
- Source (ex NVE, microstation)
- Name
- Distance (au nœud le long de la centerline)

In-situ node

Observations

- Id (station)
- Time
- Paramètres + incertitudes (wse,slope,width,discharge, area…)
- Validity flag

https://confluence.cnes.fr/display/SWOTCE/wiki+HR