

The **PISTACH** project for Hydrology: project, products and early results.



Prototype
Innovant de
Système de
Traitement pour l'
Altimétrie
Côtière et l'
Hydrologie



SERVICE
ALTIMÉTRIE
&
LOCALISATION
PRECISE

OSTST – Seattle – 22-24 June 2009
Coastal and Inland Altimetry Session



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Motivations

- Many **science/human/economic issues are crucial** in the coastal zones and over continental waters.
- Altimeter and radiometer instruments are **perturbed by emerged lands**:
 - Radiometer → 50 km off the coasts
 - Altimeter → ~10 km off the coasts
- However measurements are present and **contain useful information** between 50 km and the shoreline, over continental water bodies and over emerged land as well !

→ **enhance the data processing on coastal areas/continental waters**



Objectives

- **Conception** of an **EXPERIMENTAL altimetry level2 product** dedicated to the monitoring of **continental waters** (and coastal areas) using new standards
- **Realization** of a **prototype** for generating Level2 products during Jason-2 CalVal Phase
- **Operation** of the prototype, **production of data** during 1 year (sept 2008-2009)
- **Dissemination** to PI groups (OSTST PI community and others) for having approval for implemented methods

*NB: ESA is supporting the **COASTALT** project (coastal ocean only) applied on EnviSat and ERS datasets. Comparable objectives*



Devlpt. of new dedicated algorithms

- Tasks issuing a prototype module:
 - ✓ Corrections/data from global/local models (tides, bathy, surface pressure, MSS, MDT, DEM, LandCover ...)
 - ✓ Waveform retracking
 - ✓ Wet/dry tropospheric correction from ECMWF model
 - ✓ Wet tropospheric correction from radiometer
 - ✓ Significant waveheight, Sea State Bias, and iono correction
- **Output:** 2 products: **Hydro**, Coastal



"HYDRO" Products

First Generation:

- **EXPERIMENTAL** products!
- NetCDF, very similar to Jason-2 IGDRs format (same variable names + 80 additional PISTACH fields, 1 file per track)
 - very easy to handle for (S/I)GDRs users!
 - compatible with BRAT (Basic Radar Altimetry Toolbox)
- Rich but complex...

→ **PISTACH products** ~ Jason-2 IGDR enriched with 80 fields and a 20Hz sampling rate

- **V0.0 products:** october 2008: some bugs had to be fixed and coverage extended → **not released**
- **V1.0 products:** from cycle 12 track 4 (October 30th)
NEWS (June 2009): cycle 1 to 11 processed and released
- **"HYDRO" product:** whole continental domain (water + land) + 25 km over ocean. **20 Hz**

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"HYDRO" Products

➤ Data volume:

- max 10Mb per file
- ➔ ~ 2-3 Gb per cycle (uncompressed)

➤ Data access (free!):

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➤ A « Cal/Val » report will be realized for each cycle

➤ No PISTACH user manual for the moment:

- Jason-2 S-IGDR user manual (Aviso web site)
- variable description in the file headers

➤ **Feedback welcome** to help us improve the products !

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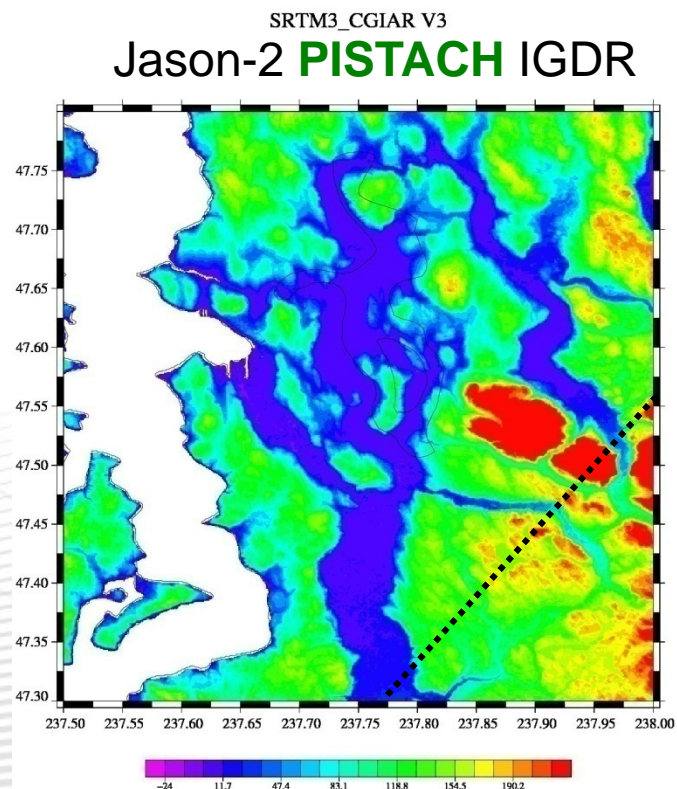
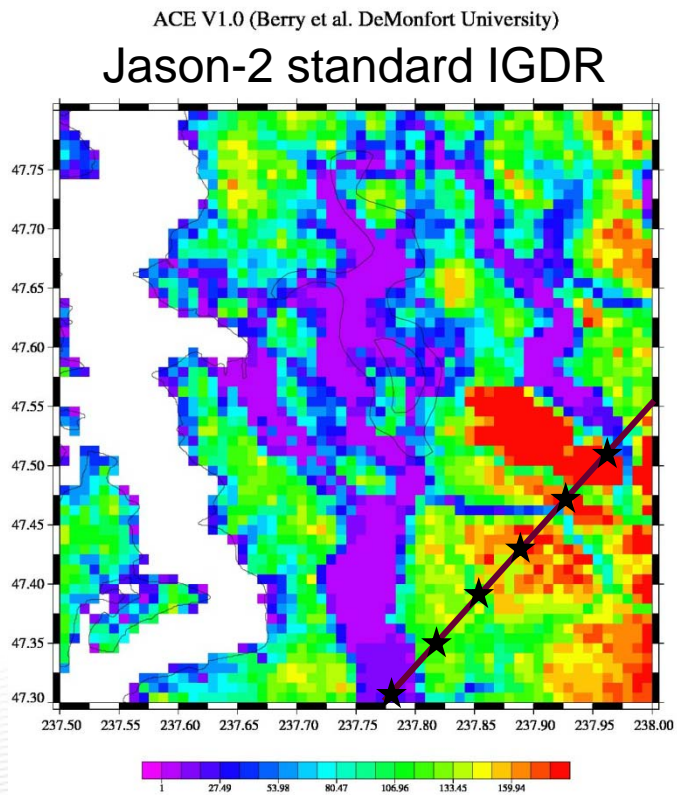
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Geophysical information

Geophysical information/corrections from more accurate local/global models

Example: DEM near SEATTLE. ACE1: 1/120° and SRTM/CGIAR: 1/1200°



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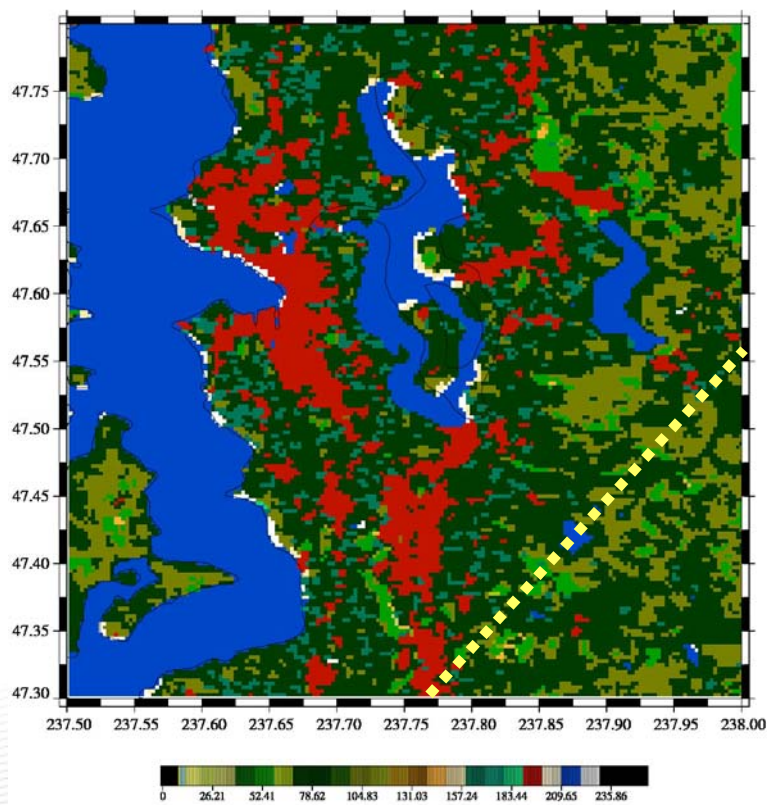
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Geophysical information

- New field example: land surface classification from GLOBCOVER

GLOBCOVER L4 LANDCOVER Version 2



→ Useful for automatic selection of water bodies

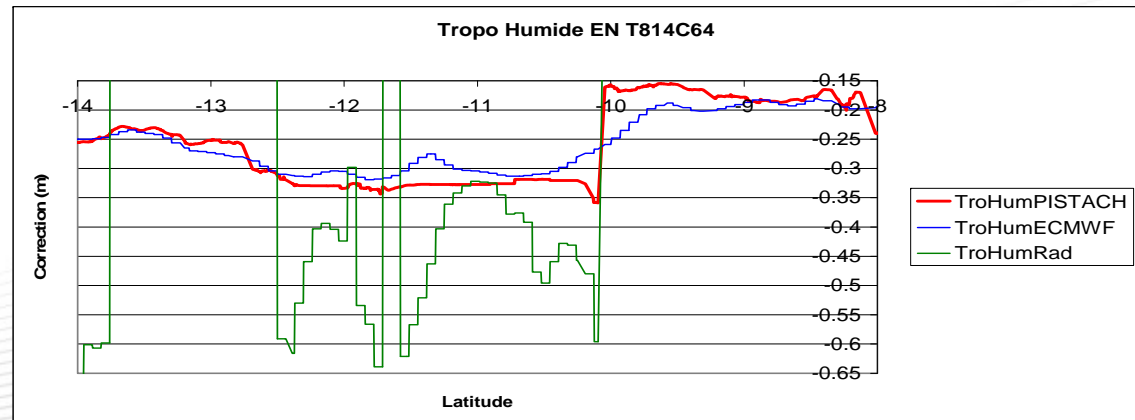
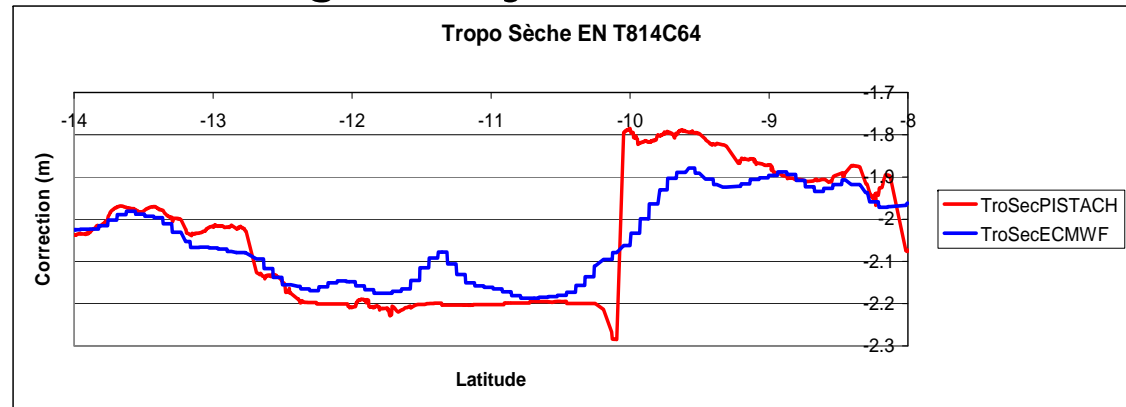
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Wet and Dry model tropo corrections

- Integration of atmospheric parameters performed on a realistic atmosphere thickness (given by the altimeter)

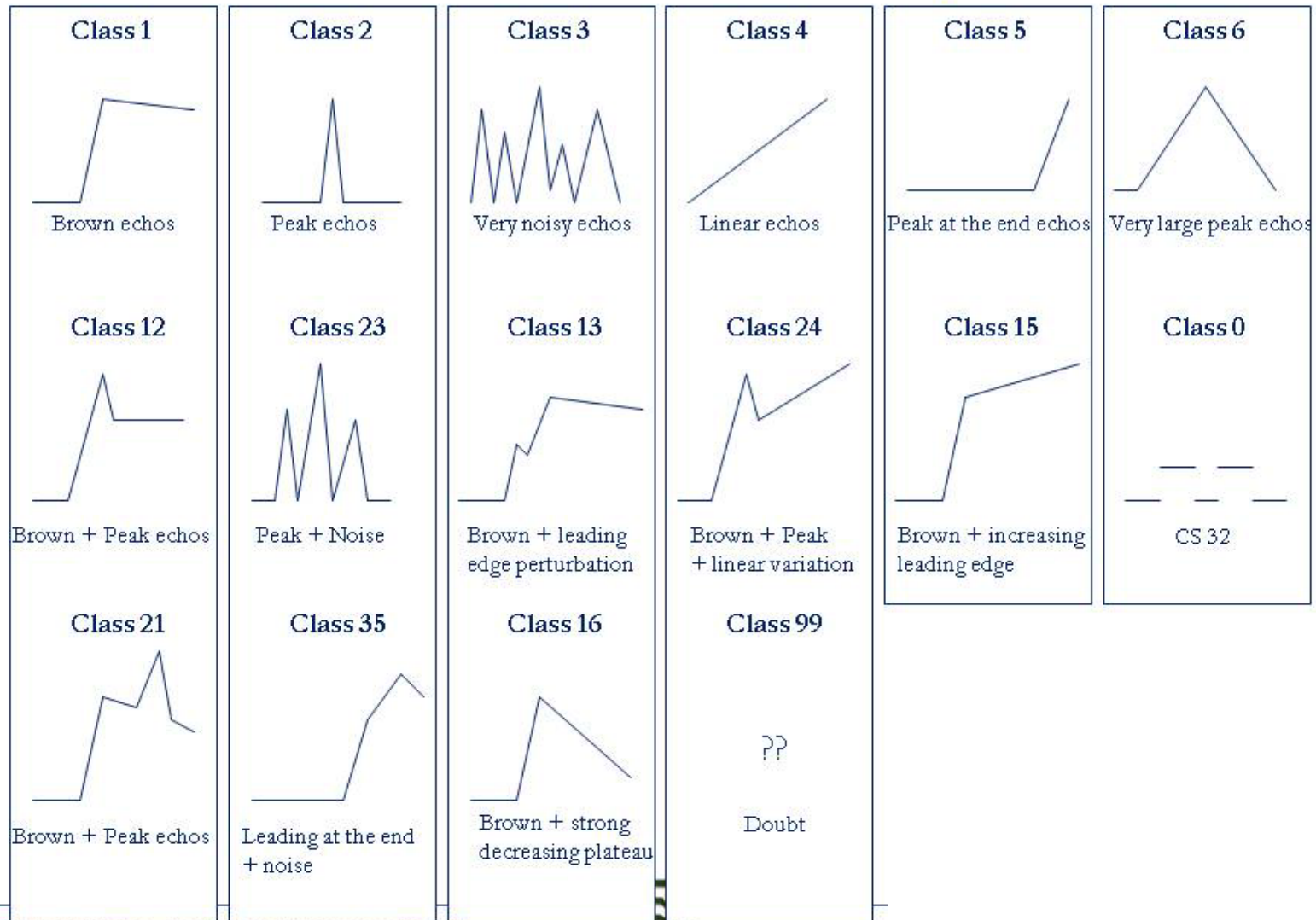


NB: not implemented in V1.0 (no access to ECMWF data...)

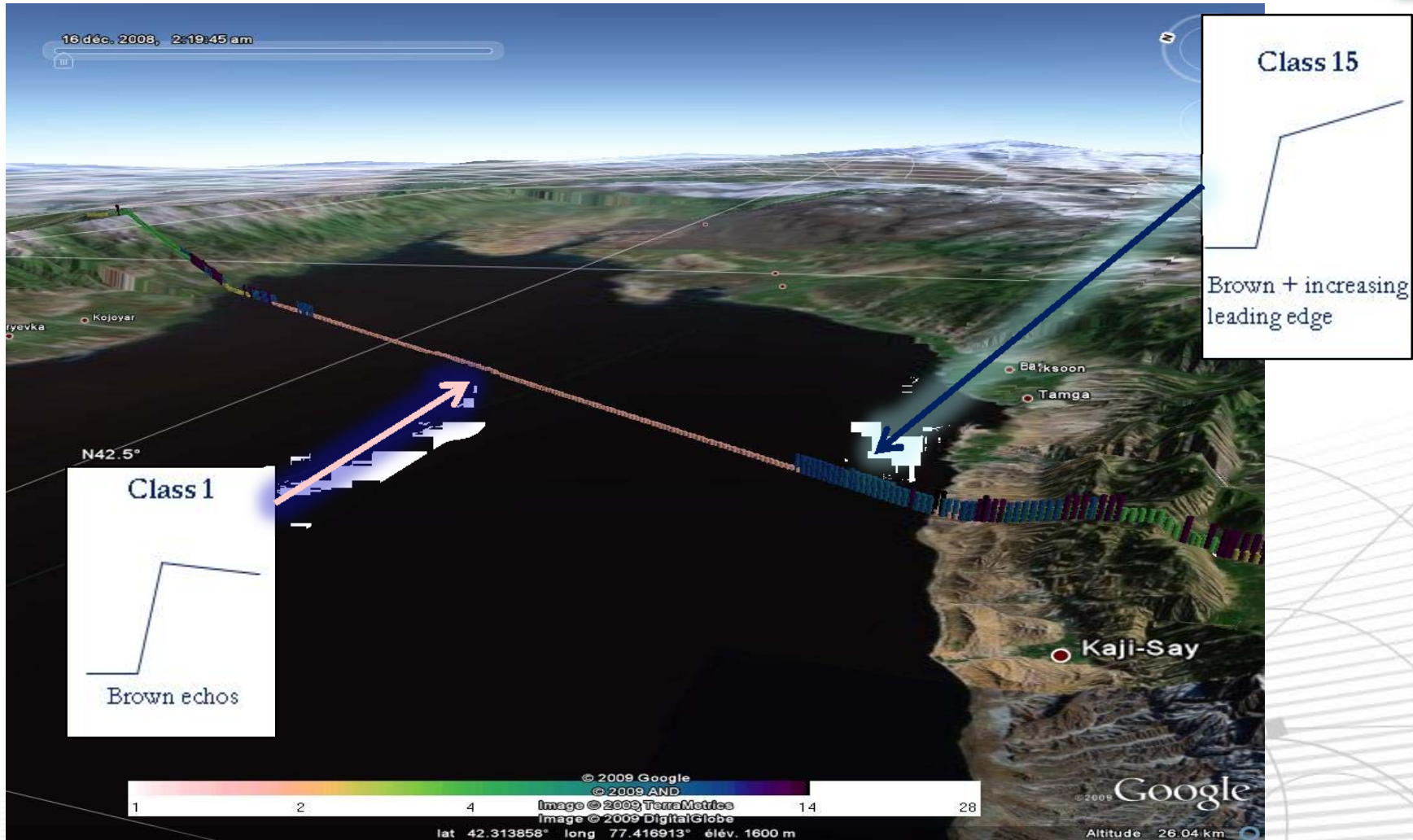
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Waveform Classification



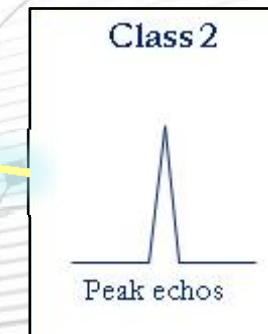
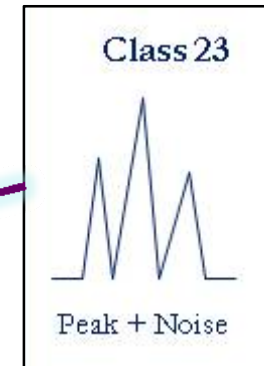
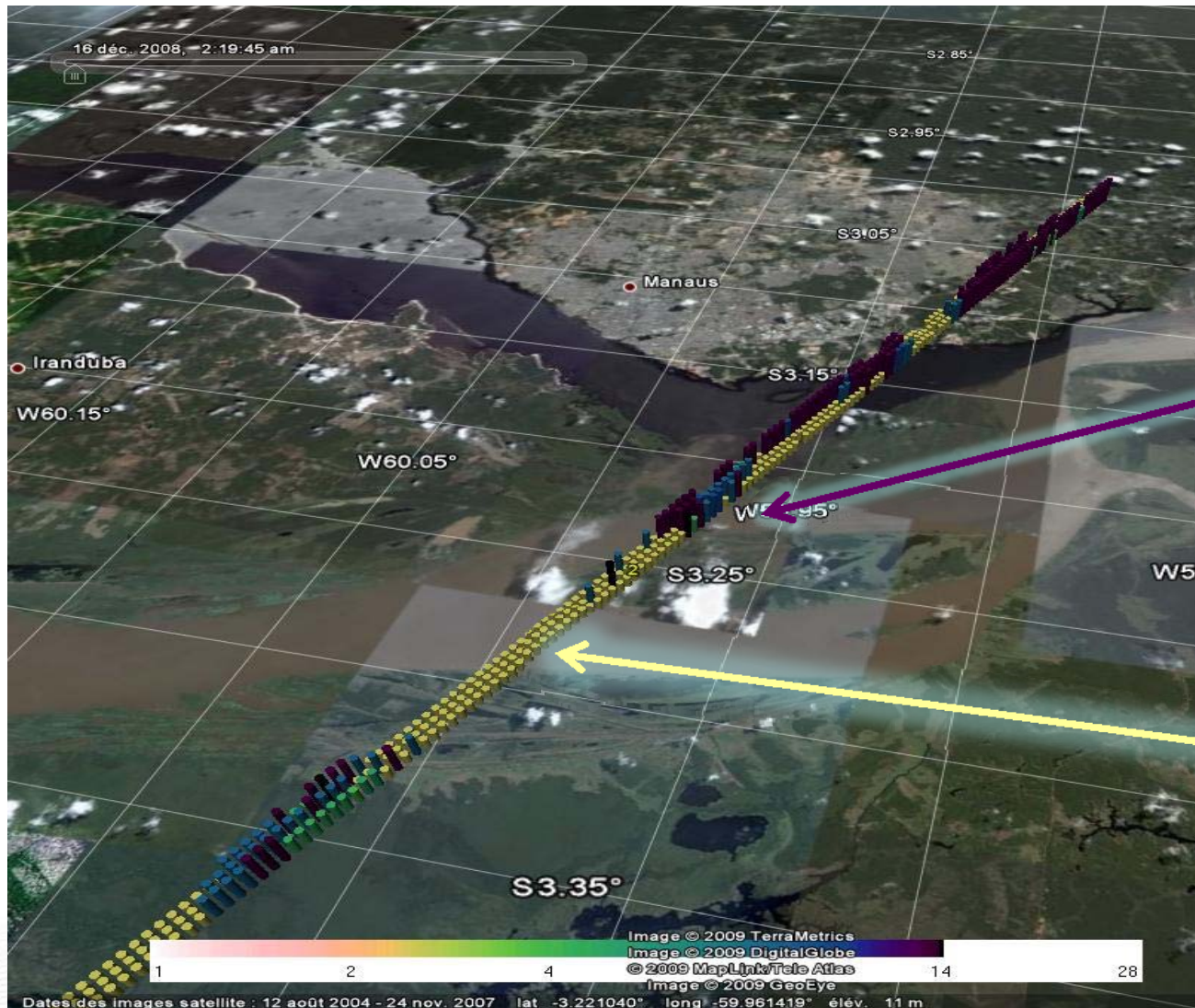
WF Classification: Lake Issykkul



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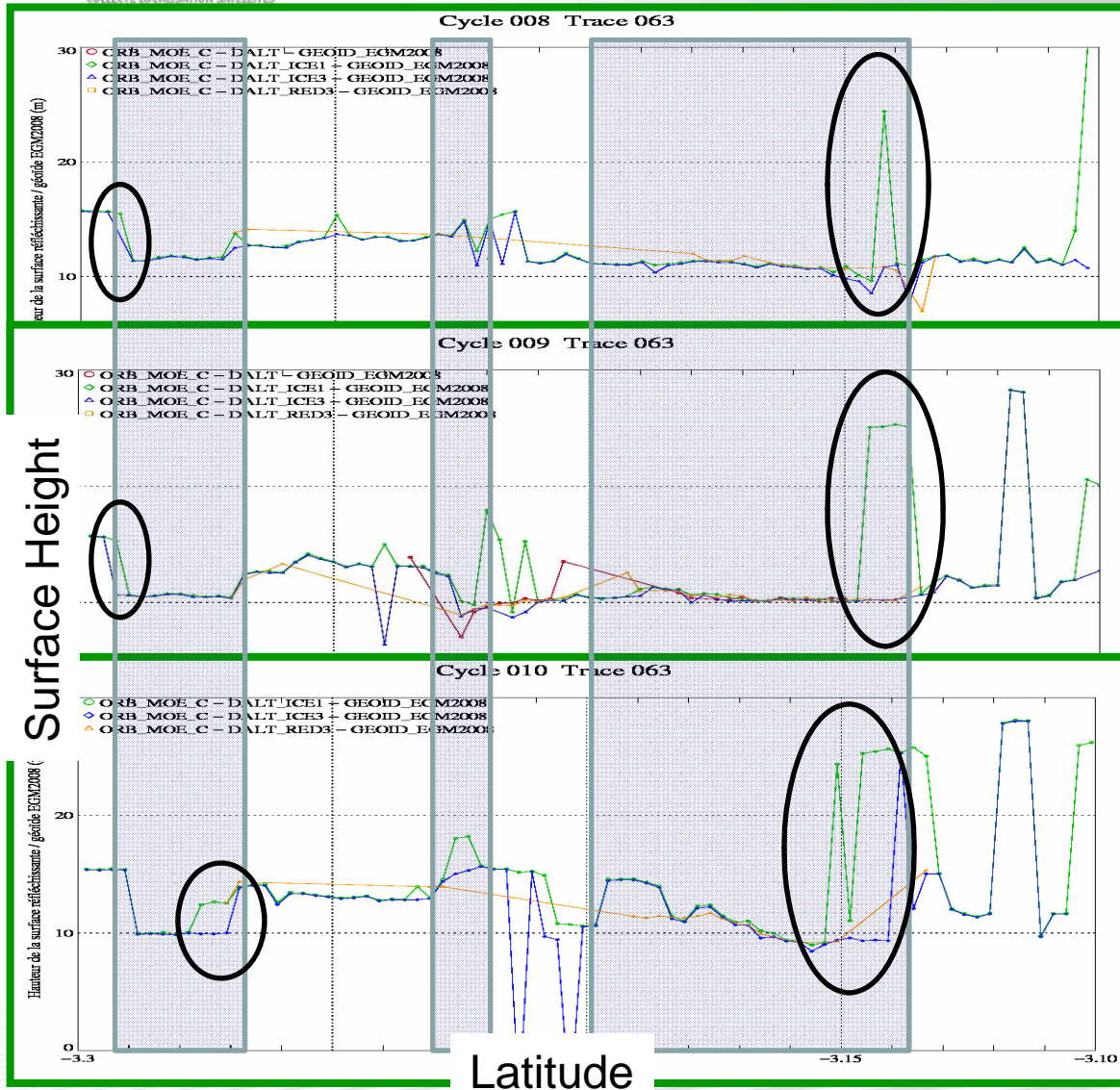
WF Classification: Amazon (Manaus)



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Retracking results: Amazon (Manaus)



**Ocean3 rtk: not suitable
(no ocean waveform !)**

**Red3 rtk: not suitable
(no ocean waveform !)**

**Ice1 rtk (id standard product):
suitable**

**Ice3 rtk: performs better than
Ice1 (more stable)**

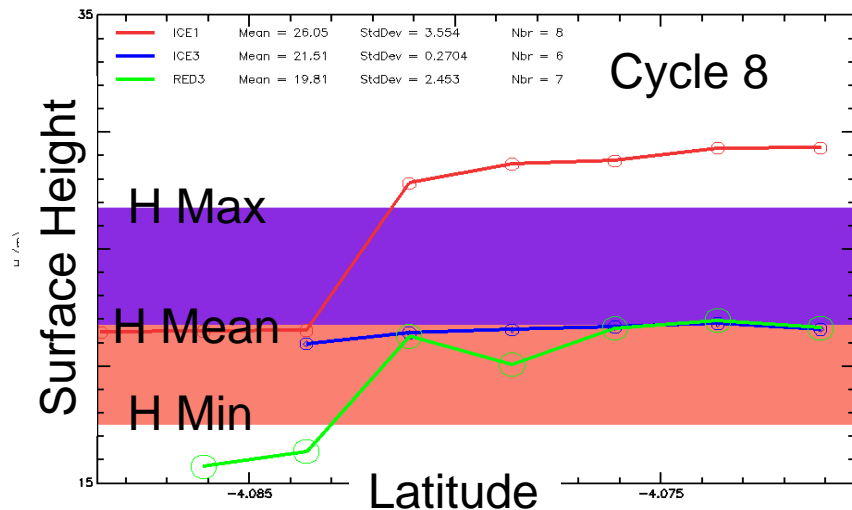
- Ice 3 is not polluted by early peaks in the WF
- Unreliable results on the thin arm of the Solimoes

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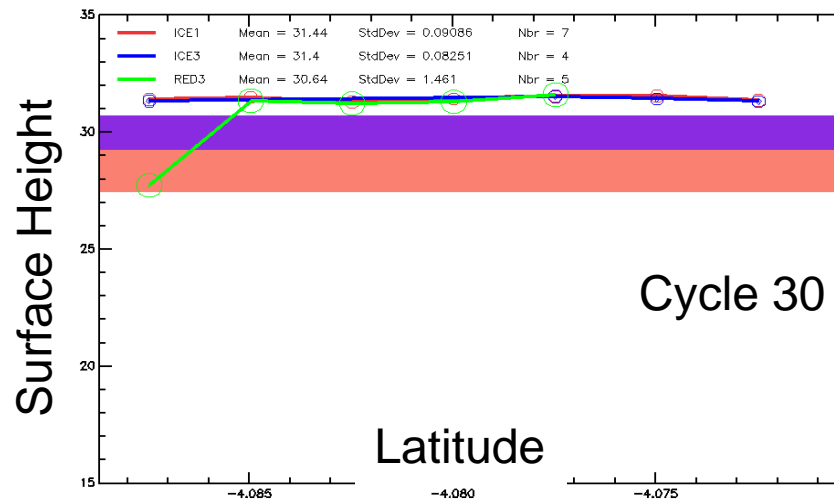


Quality Assessment: Amazon (Solimoes)

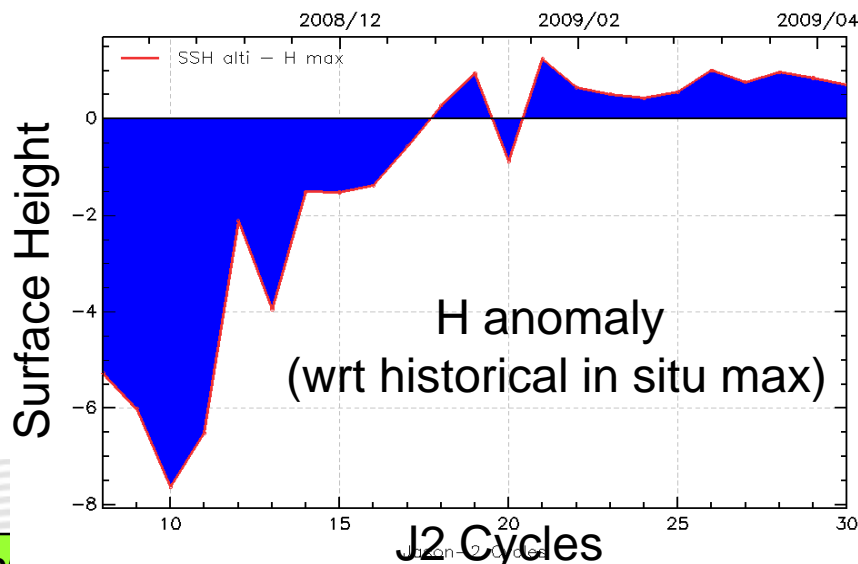
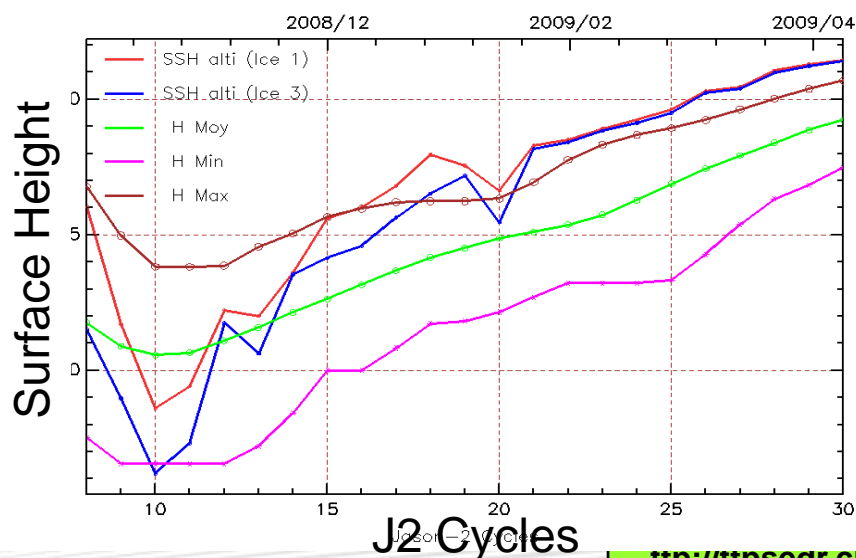
SIGDR Jason-2 - Cycle 008 / Pass 241 (River Solimoes)



SIGDR Jason-2 - Cycle 030 / Pass 241 (River Solimoes)

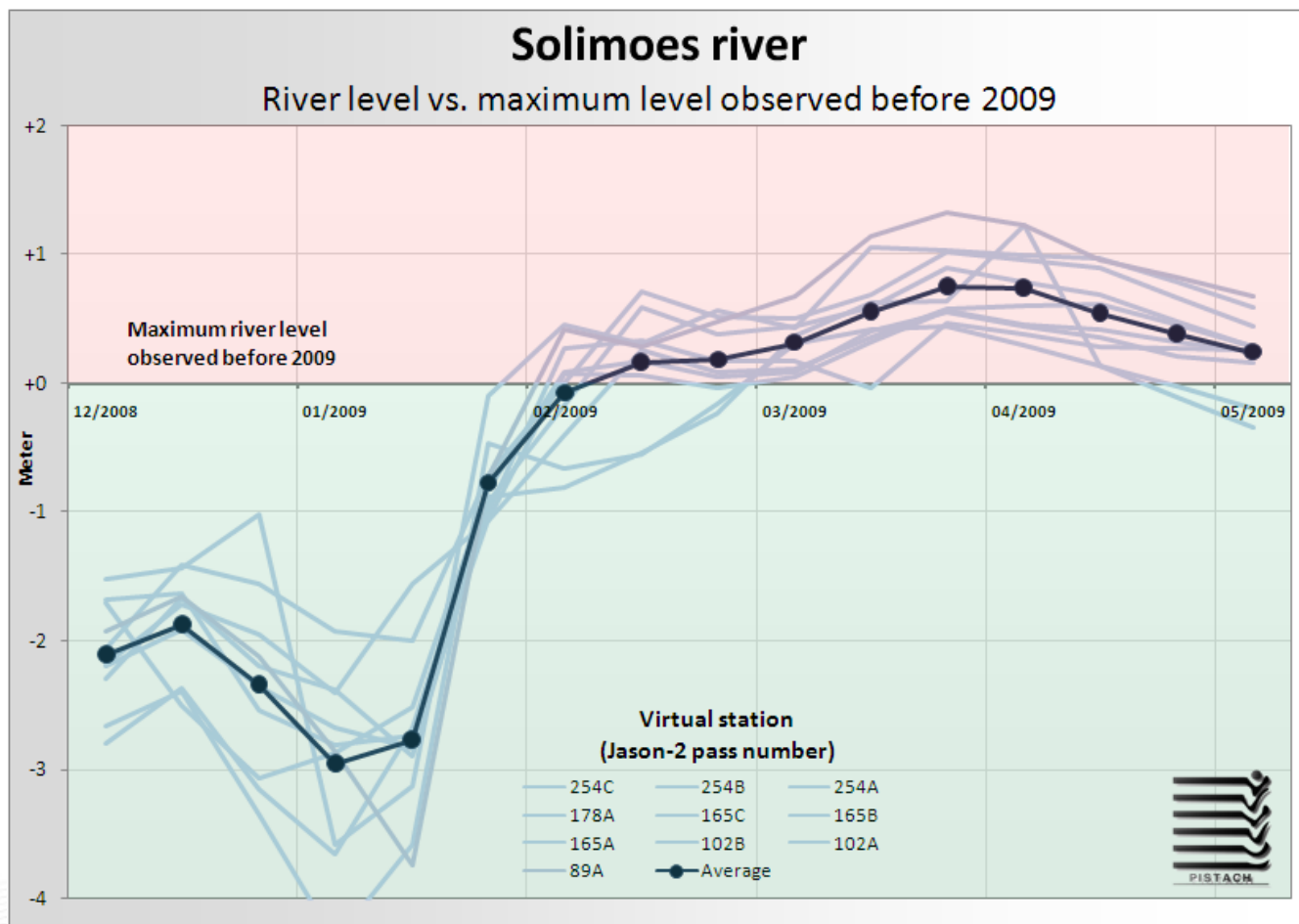


Station : TP-241C-Solimoes





Quality Assessment: Amazon (Solimoes)



→ Historical large floods on the Solimoes basin

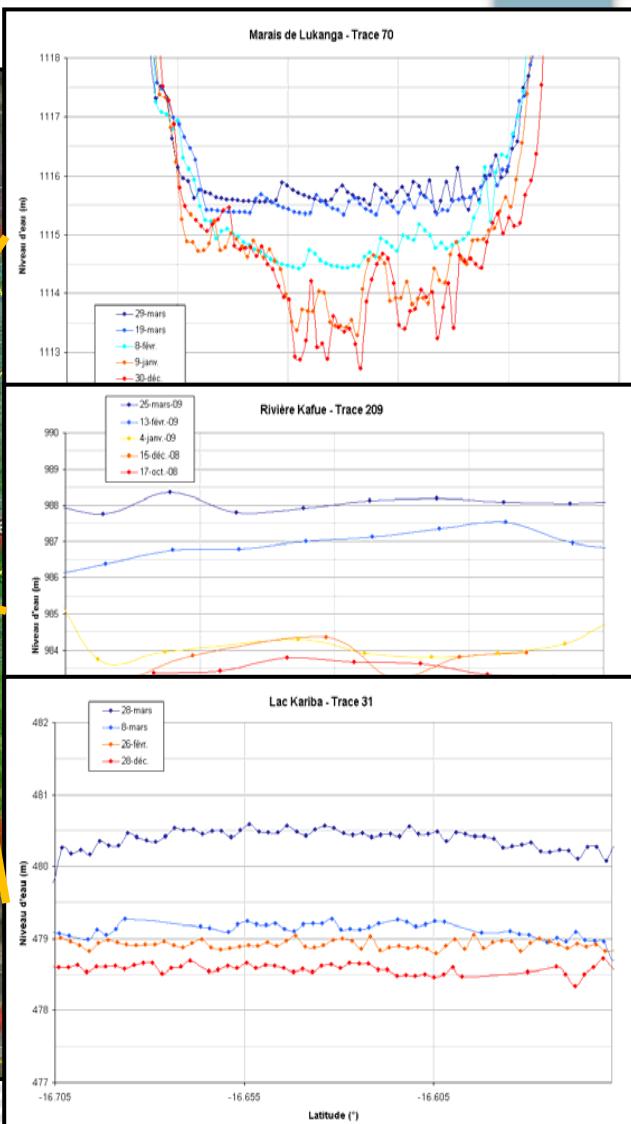
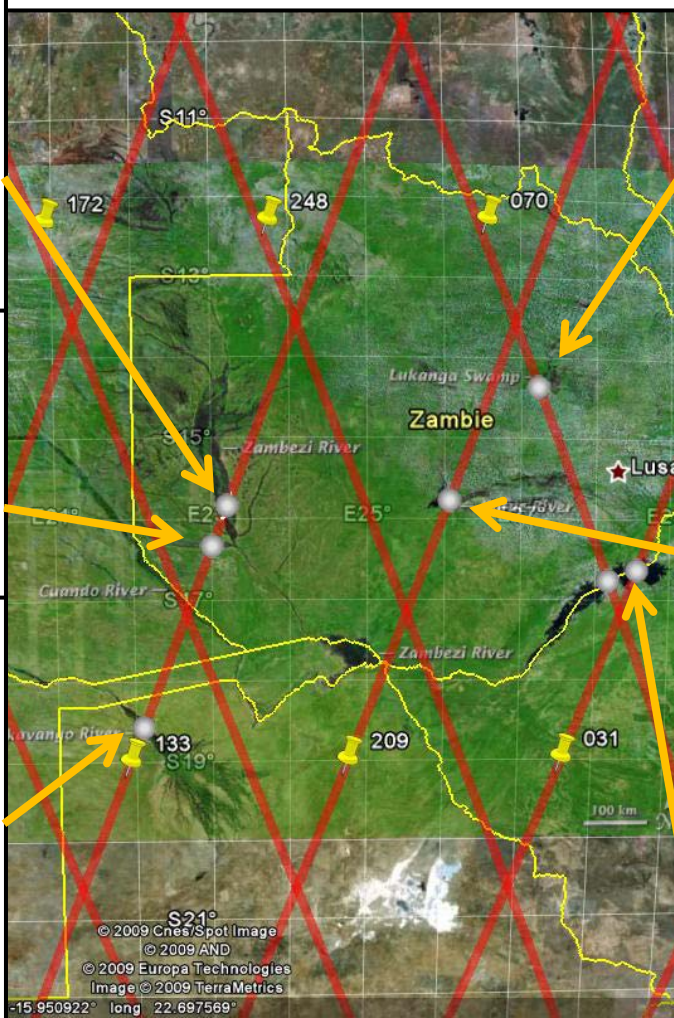
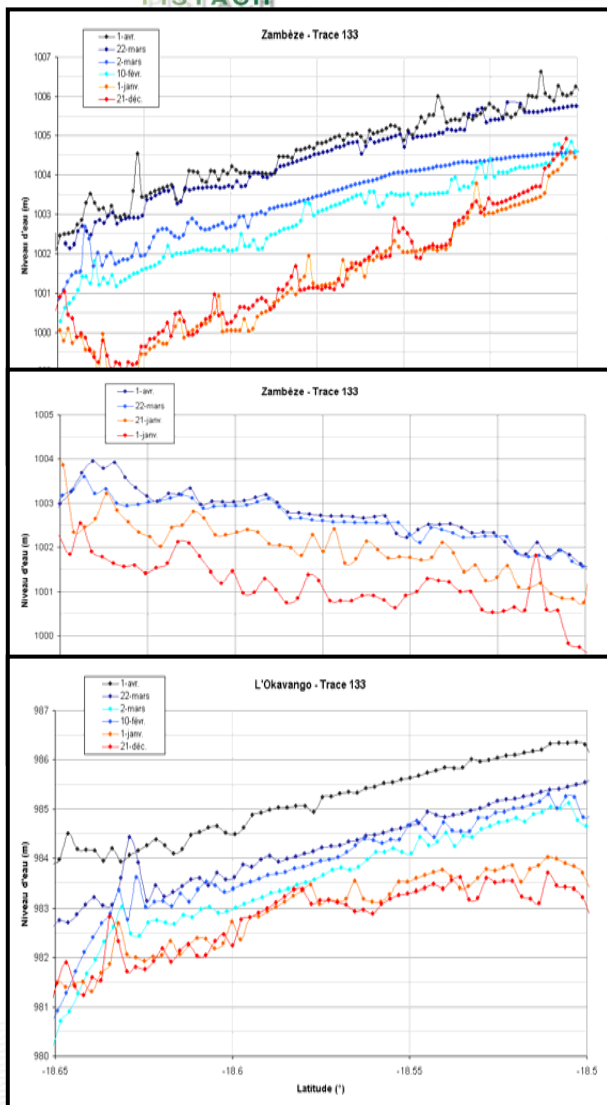
(see Calmant talk and posters)

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2009 floods on the Zambezi Basin



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Conclusion

- The **PISTACH products** include **several** new **state of the art** corrections and geophysical information: retracking, wet tropo, geoid, DEM, surface classification ...20Hz sampling
- V1.0 products are freely available since **cycle 1, in NRT**.
- **Validation & Evaluation** during next months. They will provide us feedback for improving future versions.
- A **light** version of the products is under study, in order to reach more easily non-expert users
- **Possible evolution of the prototype:** inclusion of Jason-1, T/P, AltiKa ?
- **Feedback, comments, questions:**
 - Claire.Dufau@cls.fr (Coastal Product)
 - Franck.Mercier@cls.fr (Hydro Product)

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Feedback welcome !

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