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

**Prototype**
**Innovant de**
**Système de**
**Traitement pour l’**
**Altimétrie**
**Côtière et l’**
**Hydrologie**

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Coastal and Inland Altimetry Session
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ftp://ftpsedr.cls.fr/pub/oceano/pistach/
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
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

ftp://ftpsedr.cls.fr/pub/oceano/pistach/
“HYDRO” Products

- **Data volume:**
  - max 10Mb per file
  - ~ 2-3 Gb per cycle (uncompressed)

- **Data access (free!):**
  
  ftp://ftpsedr.cls.fr/pub/oceano/pistach/

- 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!
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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Geophysical information

- New field example: land surface classification from GLOBCOVER

GLOBCOVER L4 LANDCOVER Version 2

→ Useful for automatic selection of water bodies
Wet and Dry model tropo corrections

- Integration of atmospherical 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

Class 1
- Brown echoes

Class 2
- Peak echoes

Class 3
- Very noisy echoes

Class 4
- Linear echoes

Class 5
- Peak at the end echoes

Class 6
- Very large peak echoes

Class 12
- Brown + Peak echoes

Class 23
- Peak + Noise

Class 13
- Brown + leading edge perturbation

Class 24
- Brown + Peak + linear variation

Class 15
- Brown + increasing leading edge

Class 21
- Brown + Peak echoes

Class 35
- Leading at the end + noise

Class 16
- Brown + strong decreasing plateau

Class 99
- ??

Class 0
- CS 32

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WF Classification: Lake Issykkul

Class 1
- Brown echo

Class 15
- Brown + increasing leading edge

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WF Classification: Amazon (Manaus)
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
Quality Assessment: Amazon (Solimoes)

- Cycle 8
  - H Max
  - H Mean
  - H Min

- Cycle 30
  - Surface Height
  - Latitude

- J2 Cycles
  - H anomaly (wrt historical in situ max)

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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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:
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