TASK 6.1: RIVER AND LAKE LEVEL DOWNSTREAM ADDED VALUE SERVICES

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Review of user needs and requirements:

- § 2.2: Users need from the enquiry realized for CNES/Jason-2 PISTACH Project
- §2.3: Synthesis and recommendations from the Second Space for Hydrology Workshop, Geneva (Switzerland) 12-14 November 2007
- §2.4: State of the art of the applications and services derived from space techniques for the management of water resources

Review of user needs and requirements:

§ 2.2: Users need from the enquiry realized for CNES/Jason-2 PISTACH Project (early 2008)

- PISTACH « hydrological » products were the first altimetry products dedicated to users in hydrology (released in 2008).
- Questionnaire sent to 90 people from 15 different countries. Main conclusions are:
  - usage mostly limited to non-operational activities (research)
  - uses for modelling from global to regional (climate and surface water cycle)
  - users have identified the potential of altimetry to complement in situ data or other satellite data sources
  - needs for quality indexes and repeatability of the measurements

Review of user needs and requirements:

§2.3: Synthesis and recommendations from the Second Space for Hydrology Workshop, Geneva (Switzerland) 12-14 November 2007

Action 1 : Develop a **"Space for Hydrology" web portal** dedicated to hydrologists to help them identify and access relevant satellite data, and to space scientists to understand hydrological concepts and requirements.

Action 2 : Develop **capacity building for hydrologists** in order to enable them to access, analyse and use hydrological variables derived from satellite missions

Action 3 : Support preliminary researches for the **development of an along-track interferometry mission** dedicated to continental water surfaces

Action 4 : initiate a common work between space scientists and hydrologists to **quantify the uncertainty of satellite products for hydrology**

Action 5 : Adapt, design, develop **standards for exchange** of hydrological data (to be done in close relation with WMO), and apply them for satellite products dedicated to hydrology

Action 6 : Facilitate all means of exchange of information on successful applications of satellite products for hydrological studies (research and management).

Action 7 : prepare a joint WMO-Space for Hydrology session at the next WMO Congress (2009 Brazil)

Review of user needs and requirements:

§2.4: State of the art of the applications and services derived from space techniques for the management of water resources

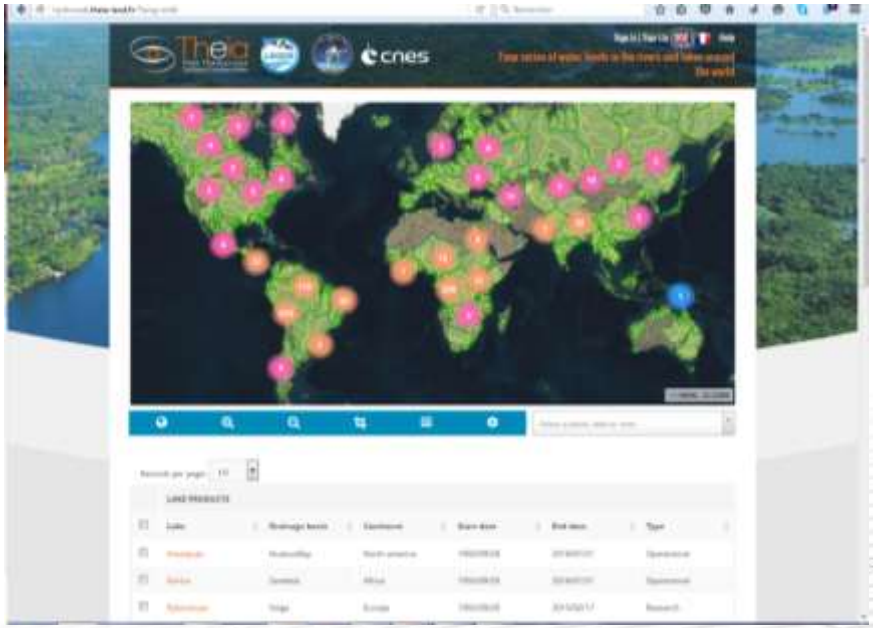
- Based on an enquiry realized in 2012 among french actors of the water resource management (more than 60 people) and funded by CNES
- Themes of the survey:
  - Actual practices in terms of data used → satellite mainly used for activities in foreign/remote countries.
  - needs and expectations → 2D visu of water variables + temporal evolution. Standardization of products, capacity building, optimization of resources and costs.
  - analysis of the most pertinent services:
    - Service already existing and satisfactory (ex: mapping of hydro network)
    - Existing service, not fully satisfactory (ex: mapping of snow cover and snow water equivalent)
    - Service unavailable but expected (ex: mapping of flood extend in forests)

Review of the state of the art technologies:

- **§ 3.1: CNES/LEGOS Hydroweb**
- §3.2: ESA River and Lake
- $ 3.3 USDA-FAS Global reservoir and Lake Monitor
- $ 3.4 DGFI-TUM DAHITI
- **$ 3.5 CNES/CLS PISTACH**

Review of the state of the art technologies:

- **§ 3.1: CNES/LEGOS Hydroweb**
- The new operational version of HydroWeb (operated by CLS on behalf of CNES) is accessible via the THEIA Plateform: http://hydroweb.theia-land.fr/



Several hundreds of water level time series from altimetry are accessible.

Review of the state of the art technologies:

- **$ 3.5 CNES/CLS PISTACH (Jason-2)**

- → Jason-2 Level 2 products (IGDR) with multiple new state-of-the-art information dedicated to hydrological processes:
  - Retracking of the waveforms
  - Geophysical corrections
  - Environmental description data
  - NRT delivery on AVISO web site
  - Dedicated to users familiar with altimetry
  - Several hundreds of users worldwide
  - http://www.aviso.altimetry.fr/en/data/products/sea-surface-height-products/global/coastal-and-hydrological-products.html

Global Land Component of the COPERNICUS Land Service:

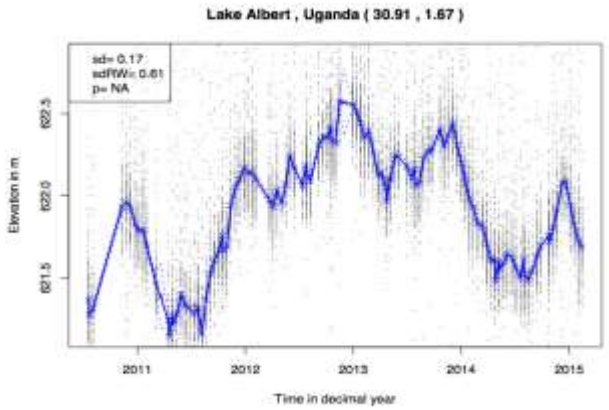
- ITT (managed by JRC-IES) in summer 2015 for the operation, evaluation and evolution of the **Global Land Component**

- Theme #2: **Cryosphere and Water**, awarded to the consortium led by CLS

- **Operational production (no R&D)** of several hydrological variables
  - snow area extent and snow water equivalent
  - Lake ice coverage and lake surface water temperature
  - Areas of water bodies
  - **Water level (lakes and rivers) → will rely on HydroWeb**
  - Lake surface reflectance, lake turbidity and trophic state

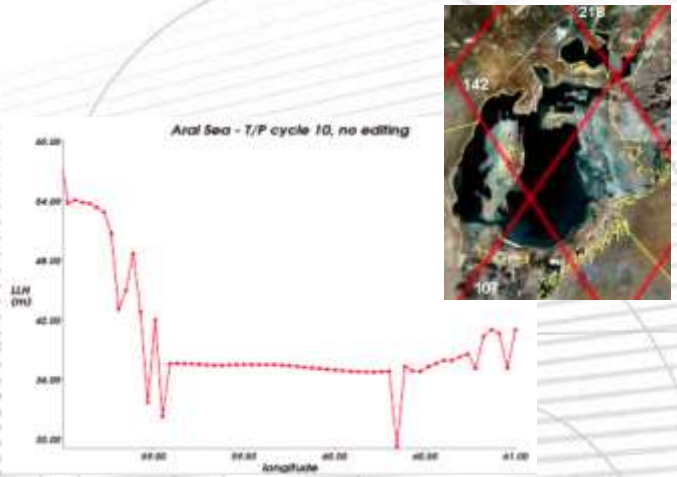
Time series river and lake levels

Product	River and lakes level for each specific water body
Type of information	Water level of each specific river and lake
Delivery format	Text file
Inputs needed to elaborate the product	CryoSat-2 – SIR_SAR_1B – 20 Hz Ku band SAR mode
Geographical coverage	Limited to the targeted water bodies
Time coverage	Monthly products
Geographic projection - Coordinate reference system	Single position - Latitude/Longitude coordinates



Along track levels

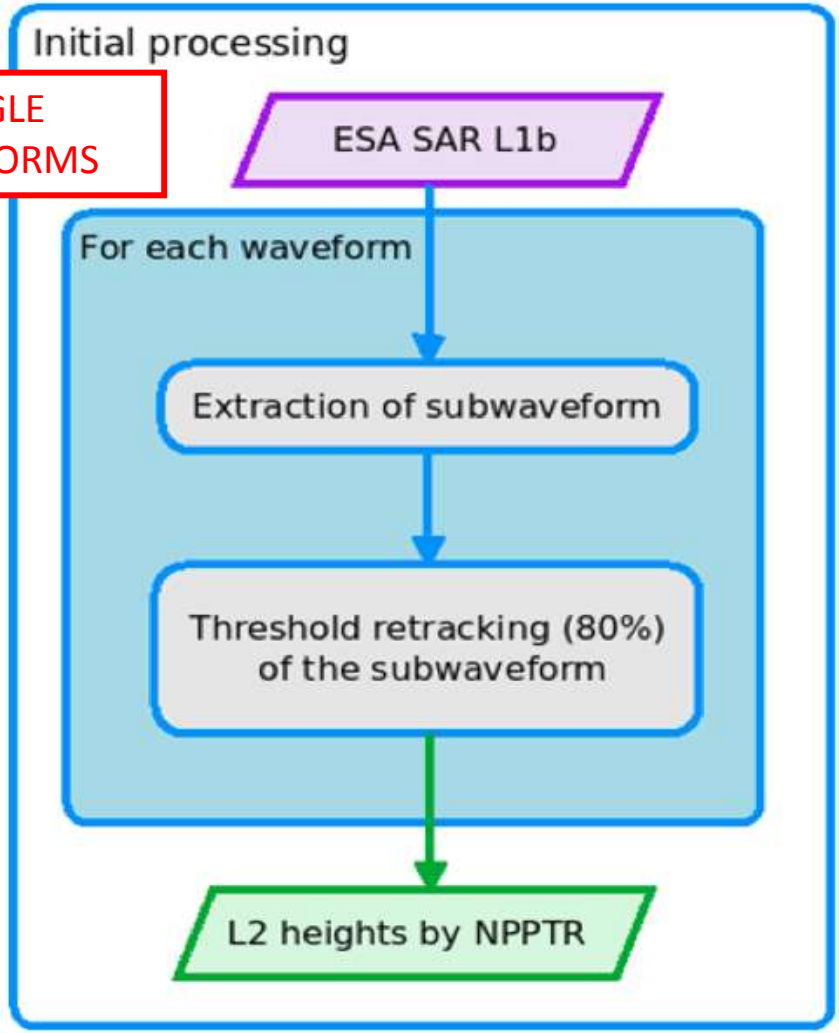
Product	River and lakes level along track
Type of information	Water level of river and lake along satellite track
Delivery format	Network Common Data Format – Climate and Forecast metadata conventions (NetCDF CF 1.6)
Inputs needed to elaborate the product	CryoSat-2 – SIR_SAR_1B – 20 Hz Ku band SAR mode
Geographical coverage	Global coverage, -88N – 88N
Time coverage	Daily products
Geographic projection - Coordinate reference system	Along-track product - Latitude/Longitude coordinates

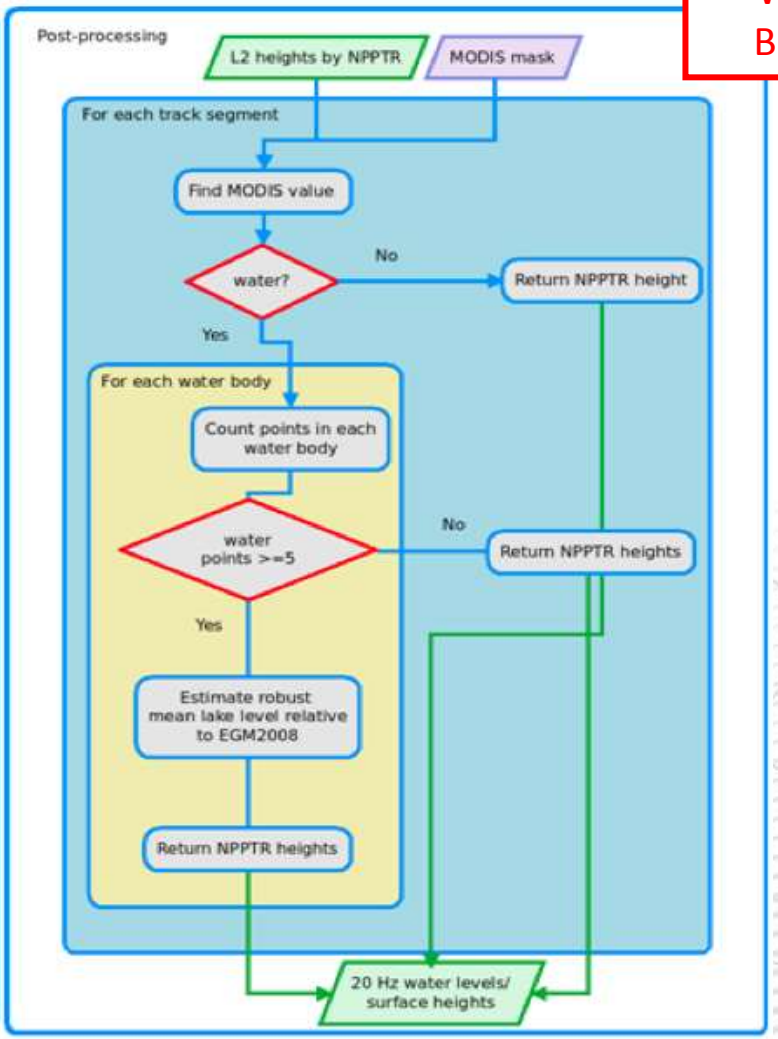


RIVER AND LAKE LEVEL PROCESSING CHAIN

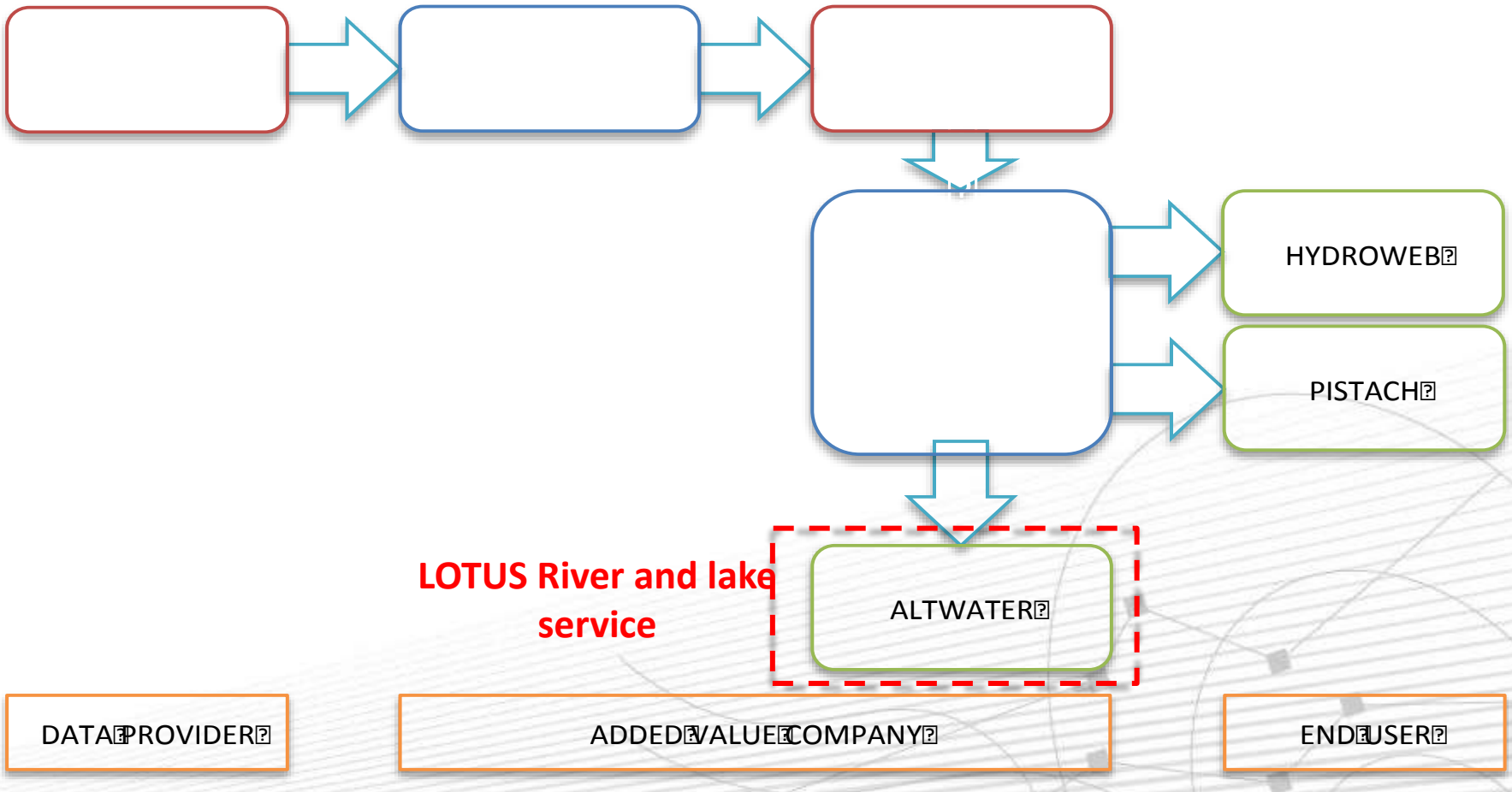
SINGLE WAVEFORMS

WATER BODIES





RIVER AND LAKE LEVEL PROCESSING CHAIN



Global coverage

River and Lake levels time series