**Time Water Levels on Rivers and Lakes Using Jason-2 Altimetry Data**

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**Summary**

In the recent years, we have developed the HYDROWEB data base ([http://www.legos.obs-mip.fr/soa/hydrologie/hydroweb/](http://www.legos.obs-mip.fr/soa/hydrologie/hydroweb)) which provides of time water level time series on rivers, lakes and floodplains based on altimetry data from several satellites (Topex/Poseidon, ERS, Jason-1, GOFO and Envisat). All valid data of a single satellite-river crossing are further averaged to provide a mean river water level at the time of the satellite crossing. At present time altimetry data from Jason-2 satellite are used to compute time series over major rivers. We present validation tests that have been done (Amazon, Congo Rivers) using in situ data when available and/or altimetry data from other missions. We also give results of comparisons of SGRD and GDR altimetry data from Jason-2.

Moreover, additional remote sensing data, like satellite imagery, allow calculating surface variations of lakes. A lake data centre is under development at the LEGOS in co-operation with State Hydrological Institute of the Russian Academy of Science. A prototype of this lake data centre, based on a selection of 20 lakes, already provides the level-surface-volume variations calculated through combination of various satellite images (MODIS, Alos, Landsat, Cheers) and radar altimetry (Topex / Poseidon, Jason-1 & 2, GOFO, Envisat, ERS2). The final objective is to propose a data centre fully operating in 2009 based on remote sensing technique and controlled by in situ infrastructure for the Global Terrestrial Network for Lakes (GTNL) under the supervision of WMO and GCOS. ([contact: marie-claude.gennero@cnes.fr](mailto:marie-claude.gennero@cnes.fr))

**First validation Jason-2 (GDR) with Envisat time series**

In the figure opposite we show the time series of water level in several places in the lake Kariba (Zambezi) Basin in Western Africa - see fig. 2, compared to the time series of in situ gauge located less than 50 km. The results show a standard deviation ranging from 20 to 30 cm depending on the mission and the distance to the station (Figures 1a and 1b).

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**Informations related to the time series produced**

- SGRD (Satellite Gravimetric Reduced Data) and GDR (Interim Geophysical Data Records) and GDR (Geophysical Data Records) from Jason-2, containing water level and velocity data.
- adorealtimetry and Geopotential (model NEOF/ECAMAP) retracked Level (m) from altimetry
- dry tropospheric
- ionospheric (radiometer) and gim model since cy65
- pole tide
- solid earth tide
- gridded level
- wet tropospheric
- atmospheric correction
- lake level and tide
- pole tide
- solid earth tide
- lake level

**New improvements in HydroWeb**

- Near real time water levels from satellite altimetry
- Laser altimetry
- Radarsat-1 & -2
- Landsat 5 + Radar altimetry
- Landsat 7 + Radar altimetry
- SRTM + Radar altimetry
- SRTM + Laser altimetry

**Next phases of implementation**

For some lakes the relation $dh/dS$ (hydrometry) is not linear which explains for Lake Mar de Chiquita the different shape of load and surface velocity graphs.

**List**

- Data download (example of Lake Titicaca)
- List of new information (decision) to HydroWeb
- Database
- graphic files, web pages
- new databases
- Digital elevation map (DEM) of lakes
- Shoreline maps
- Rotation of images
- Automatic production of graphics, web pages and tiles.

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- In Fig. 1a & 1b: Time series obtained by altimetry from several satellite missions from 1992 until now, compared with in situ data.

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- In Fig. 3: Results obtained with Envisat GDR altimetry data compared with the in situ data.

**First validation Jason-2 (GDR) with Envisat time series**

- In Fig. 4a & 4b: Preliminary results obtained with Jason-2 GDR altimetry data compared with the in situ data.