Observing inland waters from space

Satellite altimetry is based on the measurement of the two-way travel time of a radar signal sent out by the satellite and reflected by a water surface. As the satellite orbit is known with high accuracy, the absolute level of the reflecting surface can be determined.

Even though satellite altimetry was originally intended for monitoring the sea level, the technology has become an important tool for observing inland water levels over the past years.

DGFI-TUM is working on the development of innovative methods for a consistent combination of all available altimetry measurements in order to reach optimal resolution and accuracy.

As altimeter signals over continents are usually contaminated by reflections from land in the vicinity of the water bodies, a special focus is put on effective preprocessing. This includes the classification of altimeter radar echoes (waveforms), the development and application of improved retracking methods, handling of the hooking effect, and outlier elimination. Depending on geographical position, local conditions and data quality DAHITI can thus provide water levels with an accuracy of few centimeters.

More information:

Schwatke, C., Dettmering, D., Bosch, W., and Seitz, F.: **DAHITI - an innovative approach for estimating water level time series over inland waters using multi-mission satellite altimetry**, *Hydrol. Earth Syst. Sci., 19, 4345-4364, 2015*

DAHITI

Database for Hydrological Time Series of Inland Waters

Credits: NASA (Worldmap), CNES (Jason-1), ESA (Envisat), Pixabay

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- DAHITI provides time series of water levels and uncertainties from multi-mission satellite altimetry.
- DAHITI includes lakes, reservoirs, rivers and wetlands.
- DAHITI highlights episodic, seasonal and long-term fluctuations.

http://dahiti.dgfi.tum.de

About DAHITI

The Database for Hydrological Time Series of Inland Waters (DAHITI) has been operated by DGFI-TUM since 2013. DAHITI provides time series of water levels of lakes, reservoirs, rivers, and wetlands derived from multi-mission satellite altimetry for hydrological applications.

Currently, DAHITI comprises water levels and their uncertainties of more than 400 globally distributed targets. The database is continuously being extended. Depending on the availability of satellite altimetry observations, DAHITI time series are provided with a temporal resolution between a few and 35 days and cover the period between 1992 and today. Most of the targets are updated in near real-time.

All data and information are freely available for registered users via the DAHITI website (http://dahiti.dgfi.tum.de).
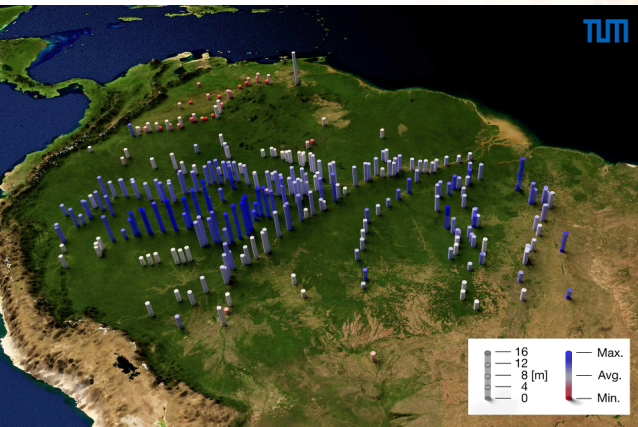
Water level with respect to a minimal stage for all DAHITI stations in the Amazon Basin

DAHITI is targeted at all users who require water level time series and uncertainties for various hydrological applications.

Especially in remote areas, satellite-based information has demonstrated its enormous potential for monitoring, analyzing and predicting water levels independent from in-situ observations.

Water Level Time Series

DAHITI provides absolute water levels with respect to mean sea level for various inland water bodies. Most of the water bodies are characterized by distinct seasonal fluctuations. For large rivers such as Amazon and Mekong these variations reach more than 10 m. Moreover, signatures of extreme rain events (e.g., Lake Victoria 1998), drought, climate change and human interference (e.g., Aral Sea, reservoirs) can be traced.
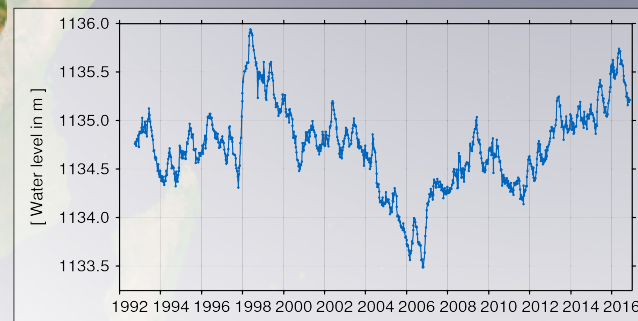
Aral Sea
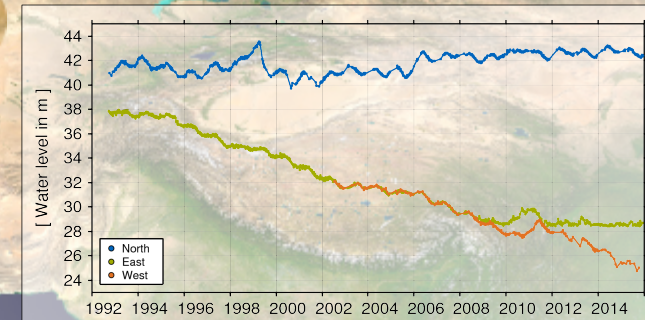
Uzbekistan - Asia
Longitude: 59.6°E
Latitude: 45.6°N
Period: 1992-09-27 – 2015-12-08
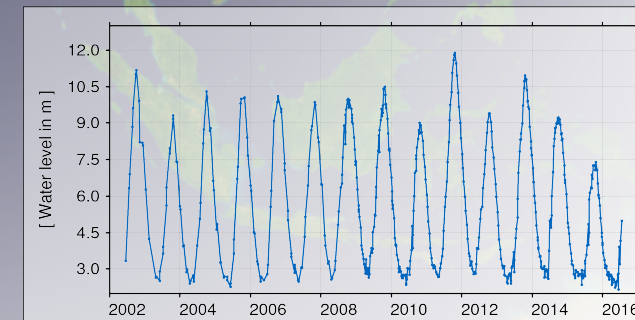*Data Points: 277-1073*

Lake Victoria

Tansania,Uganda,Kenia - Africa
Longitude: 33.0°E, Latitude: 1.0°S
Period: 1992-09-27 – 2016-11-15
Data Points: 867

Mekong River

Cambodia - Asia
Longitude: 104.0°E, Latitude: 12.9°N
Period: 2002-06-16 – 2016-07-15
Data Points: 446