Database for Hydrological Time Series of Inland Waters (DAHITI)

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1. Introduction
In this poster, we present the "Database for Hydrological Time Series of Inland Waters" (DAHITI) and the potential for climate studies. Satellite altimetry was designed for ocean applications. However, since several years, satellite altimetry is also used over inland water to estimate water level time series of lakes, rivers and wetlands. The resulting water level time series can help to understand the water cycle of system Earth and makes altimetry to a very useful instrument for hydrological applications.

2. About DAHITI
DAHITI has been operated by the Deutsches Geodätisches Forschungsinstitut der Technischen Universität München (DGFI-TUM) since 2013. Currently, the database contains more than 750 water level time series of lakes, reservoirs, rivers and wetlands (see Figure 2). They are freely available via http://dahiti.dgfi.tum.de for registered users. In general, DAHITI is targeted at all users who require water level time series and uncertainties for various hydrological applications.

3. Data Holding
Currently, DAHITI provides 750 water level time series distributed over all continents, except Antarctica. The database comprises time series for Africa (168 time series), Asia (128), Australia (14), Europe (31), North America (87), and South America (322).

4. DAHITI Approach
The DAHITI approach of estimating water level time series is based on intensive data screening, an extended outlier rejection, and a Kalman Filtering step. More details can be found in Schwatke et al, 2015.

All available altimeter missions (e.g. Topex/Poseidon, Jason-1/-2/-3, Envisat, Saral, Sentinel-3A etc.) over the inland water body are combined in the DAHITI approach. This allows us to estimate consistent water level time series of lakes, rivers and wetlands for more than 25 years.

5. Data Access
The DAHITI time series can be downloaded as ASCII file or directly via API from the DAHITI website.

6. Selected Examples

6.1 Aral Sea
The Aral Sea is located in Central Asia (Kazakhstan, Uzbekistan). Over the last decades, the Aral Sea dried out and decomposed into several parts. Because of the different hydrological conditions, the water level changes vary in each of the basins. The major basin (east) lost about 10m of water height in the last 20 years and dried out completely whereas the water level in the western basin is still decreasing. However, the northern basin is regulated by a dam which leads to a nearly constant water level with seasonal variations for more than 25 years now.

6.2 Lake Urmia
Lake Urmia is located in the Northwestern part of Iran and has an extent of about 5,500 km² and max depth of about 16m. Because of absent precipitation and dam construction, the water level of Lake Urmia has been decreasing about 8m since 1995.

6.3 Lake Chiquita
Lake Chiquita is the second largest lake of South America. It is located in the Northern part of Argentina and has a depth between 12m and 19m. The lake has few inflows, but no outflows. The water level decreased strongly by about 5m between 2003 and 2013. Since 2013, the water level is increasing again. The reason for the strong water level variations are the unsteady precipitation and evaporation over the last decades and water withdrawal from the Dulce River for irrigation purposes.

7. Conclusion
- Satellite altimetry is an outstanding measurement technique to capture long-term events up to 25 years of inland water bodies
- Signatures of extreme rain events, drought, climate change and human interferences can be traced
- Water level time series of DAHITI can be also used for other hydrological applications such as investigating seasonal or short-term events of lakes and rivers.

References

2nd Mapping Water Bodies from Space Conference, Frascati, Italy, 27-28 March 2018