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Since many years satellite altimetry is becoming increasingly important for hydrology. The fact, that satellite altimetry, originally designed for open ocean applications, can also contribute reliable results over inland waters helps to understand the water cycle of the system earth and makes altimetry to a very useful instrument for hydrology. In this presentation, we introduce a new approach for estimating water level time series derived from multi-mission satellite altimetry data. The estimation is based on altimeter data from Topex, Jason-1, Jason-2, Geosat, IceSAT, GFO, Envisat, Cryosat-2, HY-2A, and Saral/Altika. Depending on the extent of the investigated water body we use 1Hz, high-frequent or retracked altimeter measurements. Classification methods such as Support Vector Machine (SVM) and Support Vector Regression (SVR) are used for the classification of altimeter waveforms and for rejecting outliers. For the estimation of the water levels we use a Kalman filter approach applied to the grid nodes of a hexagonal grid covering the water body of interest. After applying an error limit on the resulting water level heights of each grid node, an average water level per time interval is derived referring to one reference location.

The computed water level time series for about 180 globally distributed lakes, rivers, and wetlands are provided by the new database DAHITI (Database for Hydrological Time Series of Inland Waters) available via http://openadb.dgfi.badw.de. The time series have temporal resolutions of 30 days, 10 days or 1 day depending on the data coverage.
For validation of the time series, we compare our results with gauges and other altimeter data sets. Hereby we achieve very high correlations between absolute water level heights of time series from altimetry and gauges.
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