



Evolution of Aral sea level from satellite altimetry and its implications for water balance

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The Aral sea which once was one of the biggest lakes in the world, has started to shrink in the 1960s due to water withdrawal for land irrigation. Sea level decrease has led to the separation of Aral Sea onto two basins - Small Aral in the north, and Big Aral in the South. For several decades there were no continuous observations of sea level, and few data that exist are fragmentary or unavailable. We present observations of Big Aral sea level from TOPEX/Poseidon, Jason and Envisat altimetry with high temporal resolution over the last decade (1993-2004). As the sea volume is one of the key parameters for the studies of water balance, we use the altimetry derived time series of sea level in order to reconstruct, using a dedicated digital bathymetry model (DBM), associated changes in the sea surface and volume. We then introduce variations of the sea volume as the new precise constraint for the water budget of the Big and the Small Aral Seas. This is an important step forward towards estimating detailed seasonal and interannual changes of the water budget. We assess various existing data on components of the water budget of the Aral sea and discuss quality of the existing data and their applicability for establishing detailed water balance. In particular, large uncertainties in estimation of evaporation and underground water supply are addressed as well as impact of dam between both Aral basins.