Abstract:
In recent years, water level variations of inland water bodies such as lakes, reservoirs, and rivers measured by satellite altimetry got well established. Most inland water level time series are only assembled from measurements of one pass of one single satellite mission. Only a few multi-mission approaches combine different missions and passes over lakes and reservoirs in order to increase the accuracy and temporal resolution of the time series. This is possible because the lake surface can be considered to be constant everywhere at a given time. However, it is not possible so far to combine different altimeter missions and passes over rivers. We developed a new methodology to combine altimetry data from different missions in a statistical robust way along the river. The methodology is based on kriging which is an interpolation method originating from geostatistics. We expanded the concept to spatio-temporal kriging along the river. The interpolation is a weighted average of available measurements based on empirical correlations not only in the spatial domain but in the temporal domain as well. The higher the correlation, the more weight a measurement obtains in the average. With this approach we are able to combine data not only along the river at a given time or a given location but also data at another location at
another time. We developed a statistical model to describe the dependencies between different measurement locations; a prerequisite for the kriging algorithm. We employed the kriging method on altimeter measurements of the Mekong River in South-east Asia. Data of the Envisat, Envisat EM, Jason-2, and SARAL/AltIka mission were incorporated. With this we are able to achieve a higher temporal resolution time series at any given location. The resulting estimated time series are compared to in-situ data from gauging stations along the river and show a high agreement with these.


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