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Sea surface height variability in the southeastern South American continental shelf between 27 °S and 40 °S

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Recent improvements in satellite altimetry data correction terms are encouraging studies of the remote sensed Sea Surface Height (SSH) progressively closer to the coast and over shallow continental shelves. In this paper we describe and discuss the SSH trend and variability at seasonal and interannual time scales in the South American continental shelf influenced by the Río de la Plata estuary and the Patos Lagoon fresh waters. Results show that, at those scales, altimetry data compare very well to in-situ observations. The spatio-temporal coverage of the gridded altimetry SSH data allows to identify several variability patterns in the region and the associated physical processes. On seasonal time scales, the combination of the solar radiation and wind forcing cycles accounts for up to 98% of the variability. Seasonal wind's variability is responsible for a difference of up to 20 cm between the southern (Argentinean) Río de la Plata estuary coast and the Uruguayan and southern Brazilian coasts. On interannual time scales, positive/negative SSH anomalies are highly correlated with El Niño/La Niña events. Finally, a significant positive trend of up to 5 mm yr-1 is found in all the study area, excepting the region around the Patos Lagoon (Brazil) and part of the Río de la Plata. Besides the local relevance of the results, this study indicates that satellite altimetry data are accurate enough to unveil SSH spatio-temporal patterns close to the coast and over continental shelves in the mentioned time scales.