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# UNCERTAINTIES OF TIDE GAUGES & THE ESTIMATION OF REGIONAL SEA LEVEL RISE

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Climate change and recent Sea Level Rise (SLR) is in the focus of public interest. On a global scale 1.6 ± 0.5 mm/yr is a state of the art value for the SLR in the last century (e.g. Church and White, 2006; Peltier, 2001; Wöppelmann, 2009). A regional impact is by many uncertainties difficult to determine. Uncertainties are enough and to spare in tide gauge observations, both epistemic and aleatoric.

Epistemic uncertainties are errors in the model concept or statistical uncertainties, e.g.: Tectonic and anthropogenic activities induce vertical movements of the earth surface, simple the vertical self-movements of the gauges or a change of the reference system can cause prominent errors (Sudau and Weiss, 2010). Instrumental errors cause epistemic uncertainties. In general, these errors can be reduced, if a functional quality management is implemented. Aleatoric uncertainties can be of both, spatial and time related nature. Insufficient hydrologic spatial representation of a single point tide gauge observation, as well as inter-annual and decanal variability of the coastal system, yield physical inherent uncertainties.

Figure 1 depicts some PDF of the mean tide level estimated from an example tide gauge. Always a historic reference period (1938 – 1967, grey) and an actual reference period (1978 - 2007, orange) is depicted. The dashed lines represent unsmoothed data and indicate a broad variability. The solid lines are smoothed by an one year moving average. The alteration of the structures between both PDF's, indicates that the regional SLR is far from linear, but shows a significant gain in extreme years. Filled areas show the mean sea level (18.6 yr running average) of the two reference periods. This figure shows only the aleatoric uncertainties, if one may call the epistemic ones, it is indicated how uncertainties and their statistical treatment effect an estimation of a regional SLR.

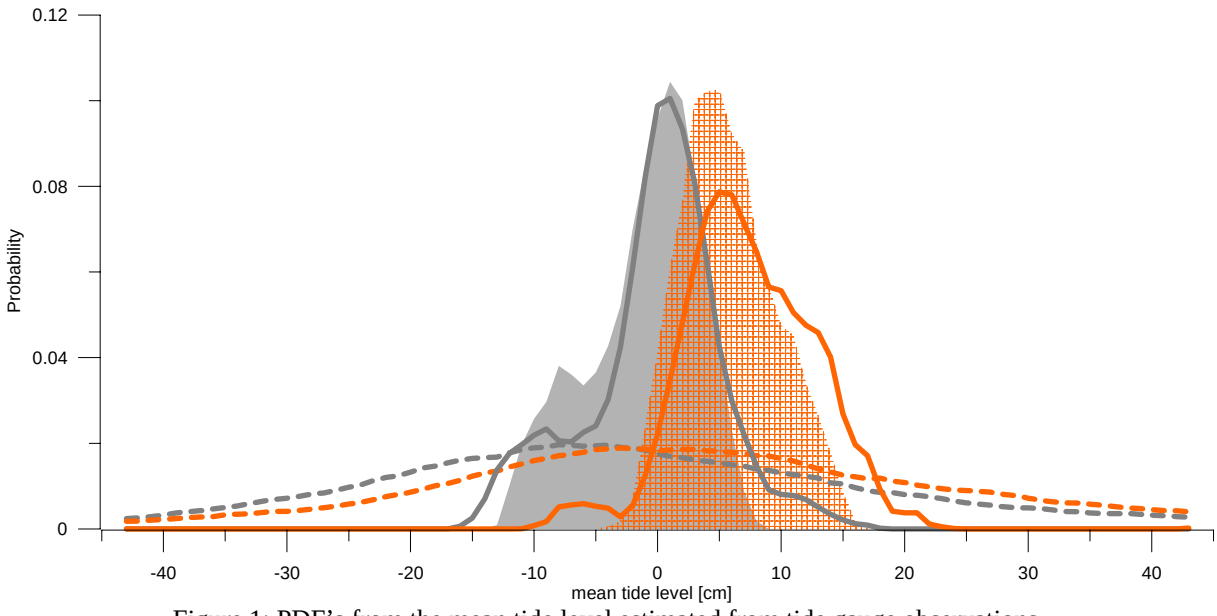


Figure 1: PDF's from the mean tide level estimated from tide gauge observations.

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