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Sea surges in Camargue (French Mediterranean coast): evolution and statistical analysis on the 20^{th} century.

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The vulnerability to short-term and long-term sea-level rise is particularly high in subsiding deltaic areas, especially in microtidal seas, when surges (the difference between the observed sea height and the astronomical tide at the same moment) are frequent. At the Grau-de-la-Dent tide-gauge in the Camargue (Rhône delta, France), where a record of daily sea-level measurements since 1905 is available, hourly tide values have been obtained through the digitisation of the original paper records for the period 1979-1995: the local harmonic constants and the surges for the whole 20^{th} century have been computed from these hourly observations. It appears that the annual maximum observed sea-level height increases by 0.4 mm/yr at a rate that is two times faster than the average observed relative sea level. The increasing trend of the annual maximum positive sea-surges (+1.9mm/yr), which is equal to the average relative sea-level's one, is thus responsible of this difference. The most important meteorological factor associated with local sea-surge occurrences is wind blowing from 100-120° sectors, which tends to push the water toward the coasts. Since 1961, the frequency and speed of such wind increase though with some oscillations, thus contributing to explain, at least partly, the increase in surges frequency and intensity. Long-term coastal erosion is another explanatory factor for the increase of extreme marine events in Camargue. The increase in sea-surge frequency and height during the last century is especially of concern in the deltaic area if the near-future global sea-level rise predicted by climatic models is also taken into account.