



Impact of climate change on Gironde Estuary

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Within the THESEUS European project, a simplified mathematical model for storm surge levels in the Bay of Biscay was adjusted on 10 events at Le Verdon using wind and pressure fields from CLM/SGA, so that the water levels at Le Verdon have the same statistic quantiles as observed tide records for the period [1960-2000]. The analysis of future storm surge levels shows a decrease in their quantiles at Le Verdon, whereas there is an increase of the quantiles of total water levels. This increase is smaller than the sea level rise and gets even smaller as one enters farther upstream in the estuary.

A numerical model of the Gironde Estuary was then used to evaluate future water levels at 6 locations of the estuary from Le Verdon to Bordeaux and to assess the changes in the quantiles of water levels during the XXIst century using ONERC's pessimistic scenario for sea level rise (60 cm). The model was fed by several data sources : wind fields at Royan and Méribnac interpolated from the grid of the European Climatologic Model CLM/SGA, a tide signal at Le Verdon, the discharges of Garonne (at La Réole), the Dordogne (at Pessac) and Isle (at Libourne).

A series of flood maps for different return periods between 2 and 100 years and for four time periods ([1960-1999], [2010-2039], [2040-2069] and [2070-2099]) have been built for the region of Bordeaux. Quantiles of water levels in the floodplain have also been calculated. The impact of climate change on the evolution of flooded areas in the Gironde Estuary and on quantiles of water levels in the floodplain mainly depends on the sea level rise. Areas which are not currently flooded for low return periods will be inundated in 2100. The influence of river discharges and dike breaching should also be taken into account for more accurate results.