

Catalan ports will be more vulnerable to rising sea levels

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Storms generate heavy swell, putting ports at risk; this problem is compounded by rising sea level caused by climate change. A team of scientists analysed the impact of this phenomenon in Catalonia, concluding that the number of ports affected will double by the year 2100.

The overtopping of port breakwaters, caused by high swell during storms, is one of the problems most frequently faced by [ports](#). Added to this is the problem of rising sea level, one consequence of [climate change](#), which increases the depth of the water surrounding breakwaters, reducing their height.

A team of scientists from the Polytechnic University of Catalonia (UPC) analysed the impact of rising sea levels at 43 of Catalonia's 47 ports in three different future scenarios, taking into account different types of swell produced by several types of storm: frequent storms (once per year on average), large storms (once every five years) and exceptional storms (once every 50 years).

"The first scenario assumes a 47 cm rise in rise sea level in 2100 compared to the current situation; the second value for the same year is 88 cm (considered the worst-case scenario by the Intergovernmental Panel on Climate Change); finally, we considered an extreme scenario with a 180 cm rise in sea level. Although there is a low probability that this will come about (below 5 %), it cannot be ruled out, especially if there is an acceleration in the melting of the Greenland and Antarctic

ice," Sinc was told by Joan Pau Sierra, Maritime Engineering Laboratory researcher at UPC.

The findings, published in the journal *Regional Environmental Change*, show that as the sea level rises, overtopping flows at port breakwaters and the number of ports with "higher than acceptable overtopping levels" also increase, Sierra points out.

Increasingly vulnerable

In the worst scenario, twice as many ports or more would be affected. "Three to 8 would be affected by frequent storms, 5 to 11 by large storms and 10 to 20 by exceptionally large storms," says the researcher. In this extreme scenario, 28 (or 65 %) of the ports studied would see overtopping flows increase by more than one order of magnitude compared to current values.

For exceptional storms, a sea level rise of 180 cm would bring the number of ports with levels of overtopping discharge that can cause damage to the breakwater to seven; only two ports record this level of discharge with the current sea level.

For smaller rises in [sea level](#), overtopping and port vulnerability would still increase, but at a lesser scale. The scientist warns that it will be necessary to take measures to compensate for this.

More information: Joan Pau Sierra et al. Vulnerability of Catalan (NW Mediterranean) ports to wave overtopping due to different scenarios of sea level rise, *Regional Environmental Change* (2015). [DOI: 10.1007/s10113-015-0879-x](https://doi.org/10.1007/s10113-015-0879-x)

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