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Changes in extreme sea levels along the North Atlantic coasts, over the last century

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Extreme sea levels are the joint contribution of mean sea level, tide and storm surges. The ClimEx project investigates changes in tide and storm surges over the last century, along the North Atlantic coasts. Concerning the tide, we investigated the long-term changes of the principal tidal component M_2, from 1846 to 2018 (Pineau-Guillou et al., 2021). The M_2 variations are consistent at all the stations in the North-East Atlantic. The changes started long before the 20th century and are not linear. Regarding the possible causes of the observed changes, the similarity between the North Atlantic Oscillation and M_2 variations in the North-East Atlantic suggests a possible influence of the large-scale atmospheric circulation on the tide. A possible underlying mechanism is discussed. Concerning the storm surges, we found a clear shift in the storm surge season at Brest (France), between 1950 and 2000 (Reinert et al., 2021). Extreme storm surge events occurred three weeks earlier (mid-December instead of beginning of January) in the winter 2000 than in the 1950s. Analysis of additional stations in Europe reveals a large-scale process (Roustan et al., 2022). Temporal shifts are positive (later events) in northern Europe, and negative (earlier events) in southern Europe. Such a tendency is similar to the one already reported for European river floods between 1960 and 2010 (Blöschl et al., 2017).

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