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Global storm surges during a past warm climate, the Last Interglacial

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We present here a novel application of state-of-the-art surge modeling on a past climate of special interest. The Last Interglacial (LIG; 125,000 years ago) was the latest instance of a climate (slightly) warmer than present: for this reason its study can inform on the response of several climate components to a climate state with partial resemblance to possible futures. Climate variables like temperature and precipitation have been extensively studied for the LIG. Here, we calculate for the first time the implications of the altered LIG atmospheric circulation (both in mean state and extremes) for storm surges along the global coastline. This presents particular interest since it is often claimed that a warmer climate may imply enhanced storminess in some ocean basins. We use sub-daily results from simulations of the LIG and of the pre-industrial periods with the climate model CESM1.2 (equipped with atmosphere module CAM5, with ca. 1 degree horizontal resolution) to force the Global Tide and Surge Model (GTSM) for 30-years at climate equilibrium conditions. We analyze patterns of storminess and of storm surges, and report on the anomalies in those metrics between the LIG and the pre-industrial climate. These results can help contextualize proxy-based reconstructions of storms of the LIG, as well as projections of storm surges in a future warmer climate. Finally, we also reconstruct tides of the LIG, aiming to provide useful constraints to paleo sea-level reconstructions.