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The impact of ice sheet dynamics uncertainties on sea level allowances at tide gauge locations

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Sea-level is projected to rise in the coming centuries as a result of a changing climate. One of the major uncertainties is the projected contribution of the ice sheets, Greenland and Antarctica, to sea-level change. Here, we study the impact of different types of uncertainty distributions on so-called sea-level allowances. Allowances specify how much a coastal structure will need to be raised in order to keep the same risk of flooding when the mean sea-level rises. Allowances combine information on projected sea-level change with statistics of sea-level extremes at a certain location. Our results show that allowances increase significantly for uncertainty distributions that are more skewed, due to the probability of much higher contributions from the ice sheets. In a more skewed distribution, the allowances are larger than the 95th percentile of the projected sea-level change, in contrast to distributions that have a Gaussian distribution, where the allowance is less than the 95th percentile sea-level change. The allowances are largest in regions where a relatively small observed variability in the extremes is paired with relatively large projected sea-level rise, typically around the equator.