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## Application of a global coastal regional frequency analysis

**Thomas Collings**<sup>1</sup>, Niall Quinn<sup>1</sup>, Ivan Haigh<sup>1,2</sup>, Joshua Green<sup>1,2</sup>, Izzy Probyn<sup>1</sup>, and Hamish Wilkinson<sup>1</sup>

<sup>1</sup>Fathom, Square Works, 17-18 Berkeley Square, Bristol, United Kingdom

<sup>2</sup>School of Ocean and Earth Science, University of Southampton, National Oceanography Centre, European Way, Southampton United Kingdom

Inundation from storm tides and ocean waves is one of the greatest threats coastal communities endure; a threat that is increasing with sea-level rise and changes in storminess. Stakeholders require high resolution hazard data to make informed decisions on how best to mitigate and adapt to coastal flooding. Using a synthesis of observational, hindcast and modelled data, we apply a regional frequency analysis (RFA) approach to characterise extreme water level exceedance probabilities across all global coastlines. This is the first time an RFA has been applied to coastal water levels on a global scale. Wave setup is included in regions which are considered exposed to onshore wave action. The RFA is shown to increase return levels in areas prone to tropical cyclones. Using Cyclone Yasi as a case-study, we detail the RFA methodology and demonstrate how it uses information from rare, extreme events to better characterise return period water levels in areas which haven't yet been impacted in the observational record, simply due to chance. The results are output at approximate 1km resolution along the entire global coastline (excluding Antarctica) and have been corrected for use with digital elevation models, for applications such as inundation modelling.