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DETERMINING FUTURE SHORELINE POSITION OF A HIGHLY VARIABLE COASTLINE FOR COASTAL MANAGEMENT APPLICATIONS USING HIGH RESOLUTION COASTAL TYPOLOGY MAPPING

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Rising sea levels, increasing coastal erosion, and climate-driven changes in wave and storm dynamics present critical challenges for coastal communities. Effective coastal management relies on accurate predictions of future shoreline positions, yet broad-scale (>1 km) classifications often fail to capture the local-scale variability needed for site-specific planning. This study develops a high-resolution (0.1 km) coastal typology for the southwest coast of England, classifying 5 main coastal types and 24 sub-types across >2000 km of coastline.

Five study sites, representing all typologies, were analysed to determine historic shoreline change. Future shoreline positions were projected to 2100 using typology specific models. To account for uncertainty, probability density functions (pdfs) were assigned to key parameters, and Monte Carlo simulations generated probabilistic future shoreline positions, including exceedance probabilities (e.g., 95% confidence bounds).

Preliminary results highlight substantial spatial variability in shoreline retreat rates, with the defined coastal typologies reacting differently to future conditions, emphasising the necessity of typology specific modelling for effective adaptation strategies. This probabilistic approach provides improved estimates of future coastal change, aiding policymakers in identifying areas where infrastructure and communities face the highest risk. By integrating coastal typology identification with advanced modelling techniques, this study offers a novel methodology for refining coastal management strategies.