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UNDERSTANDING GRAVEL BEACH AND BARRIER SYSTEMS: A NEW MORPHODYNAMIC APPROACH TO CLASSIFICATION

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Ubiquitous in mid to high latitude regions of the world, gravel beach (and barrier) systems have long been recognised as critically important natural coastal defences for many coastal communities globally. Gravel beaches exhibit a wide array of morphological forms and sedimentological assemblages, with sediments ranging over three orders of magnitude from sands to gravels to boulders. Research into gravel beaches presents multiple logistical challenges, and consequently, they are relatively under-represented in the literature compared to their sandy beach counterparts. A better understanding of the stability and future evolution of gravel coastlines in response to changes in sea-level, prevailing wave conditions, storm climates, and sediment supply is consequently a priority for coastal management authorities.

This research, aligned with the NERC-funded #gravelbeach project, uses a systematic analysis of satellite imagery, topographic data, novel surface digital grain sizing methods, hydrodynamic datasets, and statistics derived from wave runup equations to develop a new morphodynamically based classification of gravel beach typologies. Our findings identify a key subset of gravel beach types that are not previously acknowledged in the literature and provide insight into the antecedent factors controlling the formation of these different typologies. The results of our work offer a new framework for classifying gravel beach and barrier systems that better accounts for their high level of natural morphological and sedimentological variability.