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NEARSHORE WAVE BREAKING DETECTION USING SATELLITE RADAR ALTIMETRY

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Nearshore wave breaking is involved in the exchange of heat and gases between water and air, dissipates energy that could erode the shore, and can pose a hazard to coastal users and boats. Currently, it is difficult to measure the spatial distribution of coastal wave breaking, as it requires shore-based sensors (such as cameras or marine radar) or a network of wave buoys. Satellite sensors offer the potential to map coastal wave breaking on a global scale. Conventional radar altimeters (RA) can only measure reliably to ~3 km of the coastline. Improved instruments, launched since 2010, can measure within a few km of the shoreline with a resolution of about 350 m. Wave breaking can be seen in the variation of significant wave height (SWH) along propagation paths of wave systems; estimated from SWH (using a water level and depth wave breaking index); and in the backscatter and peakiness of the returned radar signal. These methods can be compared to wave breaking identified in data from an in-situ wave buoy. We show that it is possible to map wave breaking within a few km of the shoreline using satellite altimetry. Here Sentinel-6MF RA data are used to show patterns of wave breaking and reforming in the nearshore, in Mount's Bay near Penzance, Cornwall, UK.