

DECADAL COASTLINE RESPONSE TO ACCELERATED SEA LEVEL RISE

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During most of the 20th century, the global mean sea level (GMSL) has been rising at around 1.8 mm/yr. However, since the early 90s, this rate has increased to beyond 3 mm/yr, and over 2006 - 2018 the rate of rise is 3.7 mm/yr [3.2 - 4.2 mm/yr] (Fox-Kemper et al., 2021). While it appears that the world's coastlines have remained more or less resilient against the slow sea level rise (SLR) over the 20th century (Stive, 2004), it is almost a certainty that they will respond to the much higher rates of GMSLR (upto ~ 12mm/yr by end of 21st century) projected for the future (Fox-Kemper et al., 2021).

In this study, we analyse available long-term beach and dune datasets to investigate detectable trends in coastline indicators, especially since the early 90s when GMSLR rates of over 3 mm/yr have been observed. Here, we subject data from several sites in the US, Europe, Australia and Japan to a detailed analysis, focusing on coastline indicators such as the shoreline, dune crest etc.

Preliminary analysis indicates, that the measured dune crest elevations along the non-nourished parts of the Holland coast have increased between 1-3m (depending on the location), while measured dune crest elevations at Duck, North Carolina, USA have decreased (Figure 1). Shoreline position, taken as the mean sea level countour, has moved slightly landward at Narrabeen, Australia for the most part (albeit still within its natural variability) while it has remained more or less stable along the non-nourished parts of the Holland coast (Figure 2). The complete analysis reveals whether a relationship between coastal indicators and GMSLR and coastal indicators does exist and explores what these insights mean in terms of predicting long term coastline response to GMSLR.

REFERENCES

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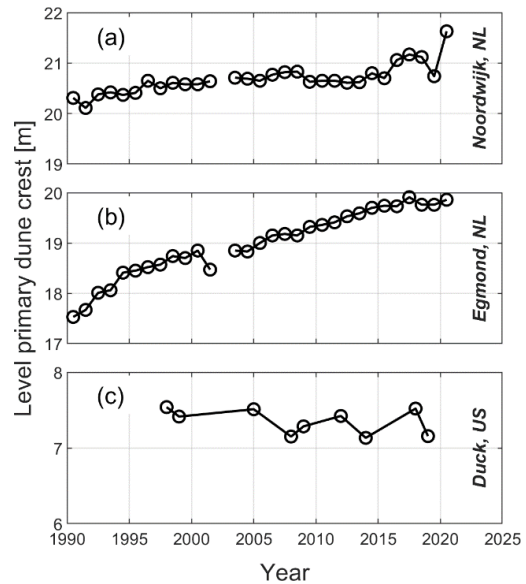


Figure 1 - Time evolution of the dune crest elevation between 1990 and 2022 at (a) Noordwijk, NL; (b) Egmond aan Zee, NL; (c) Duck, US

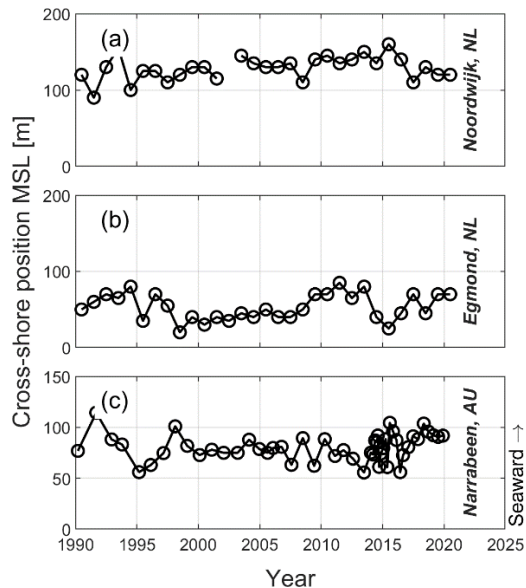


Figure 2 - Shoreline position between 1990 and 2019 at (a) Noordwijk, NL; (b) Egmond aan Zee, NL; (c) Narrabeen, AU.