





# POSTER ABSTRACT BOOK

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# Long-Term Coastal Response to Sea-Level Change, Sediment Budgets and Human Interference

**Hijma, Marc (1); Van der Spek, Ad (1,2); Cohen, Kim (1,2,3)**

1: Deltares, Delft/Utrecht, The Netherlands; 2: Utrecht University, Faculty of Geosciences, Utrecht, The Netherlands; 3: TNO Geological Survey of The Netherlands, Utrecht, The Netherlands

E-Mail: marc.hijma@deltares.nl

The way in which a coastal zone responds to a change in sea level depends on more than just the change itself and the resulting change in accommodation space. Another important aspect, that is frequently overlooked, is the amount of sediment that is available for transport and sedimentation within the coastal zone. Long-term evolution of the coastal zone depends on the balance between accommodation–space creation and sediment supply that can come from different sources and through different transport paths. In addition, the increasingly large impact of human activities on coastal-zone evolution has to be taken into account when trying to predict future coastal response to sea-level change. In this presentation, three periods of coastal evolution in The Netherlands are highlighted that are illustrative of the variable influence of changes in sea level, sediment availability and human impact on coastal evolution.

The first case covers the period 9000-7000 calendar years Before Present (yr BP) when relative sea level (RSL) rose from -24 to -8 m MSL. This period is marked by a sea-level jump between 8450-8250 yr BP, resulting in very high rates, 2 m/century, of RSL-rise. The transgression of the shallow North Sea area resulted in an abundant availability of sediment, but due to the high rates of RSL-rise the coastal zone showed overall retrogradation. Sediment-budgeting studies show that the rate of retrogradation was spatially variable due to regional differences in erodibility, sediment distribution and paleo-topography.

The second case falls in the period of 6000-2000 yr BP. Despite a RSL-rise of 4 m during this period, large parts of The Netherlands showed stabilization of the shoreline that was followed by more than 5 km of progradation. This can be explained by a changing balance in favour of sediment supply over the creation of accommodation space by RSL-rise due to decelerating rates of RSL-rise. The rate of sediment supply did not increase.

The third and final case covers the last 75 years. In the first part of this period, the Dutch shoreline was eroding due to RSL-rise and sediment deficits. In 1990, it was decided to counteract the erosion by starting a nourishment programme that it is still active today. More than 10 million m3 of sand is nourished each year in several different ways: e.g. on the beach, on the shoreface or using ‘sand motors’. This latter approach makes use of longshore currents to distribute nourished sediment along the coast. The nourishment programme has been very successful in stopping overall erosion of the shoreline.

The final part of the presentation synthesizes what we can learn from these cases, not only for predicting future coastal response, but also for taking effective, sediment-based measures to counteract coastal erosion due to RSL-rise.

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