

Different scales of rip currents along the German North- and Baltic Sea coastline

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Northern Germany is bordered by the North Sea and the Baltic Sea. While the North Sea is dominated by tides ranging between 1.5 m – 3.5 m the Baltic Sea is a non tidal environment. In both seas wave dominated sandy coastlines with nearshore bar – trough systems are common. Different kinds of shore protection have been carried out along both coastlines. Some areas are densely populated and serve as vacation spots during summer. Rip currents of different size, stability, activity and origin are common along these coastlines. Depending on wind and wave conditions rip currents can develop due to coastal constructions like groins or harbour moles; however, mostly they appear independent from any kind of coastal construction.

By aerial photographs, sedimentological analyses and the application of artificial tracers (Luminophores) rip current characteristics and activities under different hydrological conditions were examined. Both, tides and waves are controlling rip currents. For an area in Baltic Sea (Kiel Bay, Mecklenburg Bay) it could be shown that rip currents are stable for decades. Some of them have a regular spacing of 1.4 km – 1.6 km which is reduced to 700 m – 800 m under storm conditions. Measurements with artificial tracers were carried out to determine the sediment exchange between beaches, the bar-trough system and the lower shoreface. It turned out that “natural” rip currents are active during mostly all weather conditions while rip currents affected by groins are active only during storms. In all cases sand is transported from the beach towards offshore.