EGU22-3403
https://doi.org/10.5194/egusphere-egu22-3403
EGU General Assembly 2022

Multifunctionality of coastal wetlands in a hazard context

Svenja Karstens[1,2], Joshua Kiesel[3], Lennart Petersen[1], Kilian Etter[3], Athanasios Vafeidis[3], and Felix Gross[1,2]
[1]Christian-Albrechts-Universität zu Kiel, Center for Ocean and Society, Neufeldtstraße 10 24118 Kiel, Germany (svenja.karstens@ifg.uni-kiel.de)
[2]Christian-Albrechts-Universität zu Kiel, Marine Geophysics and Hydroacoustics, Institute of Geosciences, Olshausenstr. 40, 24118 Kiel, Germany
[3]Christian-Albrechts-Universität zu Kiel, Department of Geography, Ludewig-Meyn-Str. 14 24118 Kiel, Germany

The ability to trap and accumulate sediment and thereby to change the bathymetry makes coastal wetlands bioengineers of their own environment. While wind and wave attenuation directly contribute to hazard mitigation, the influence on bathymetry and thus shoreline change acts on longer time scales. In addition, sediment trapping impacts not only hazard mitigation but also blue carbon storage or the nutrient removal potential. The wetland in Stein at the Kiel Bay (German Baltic Sea) is a primary example of a site that offers 'nature based coastal protection', while at the same time the site is exposed to increasing anthropogenic pressures. Space for natural development at the study site is limited as the wetland is squeezed by a dyke in the hinterland, a marina and construction sites in the east, a popular tourist beach in the west and waterway dredging in the north. We aim to achieve a deeper understanding of short-term vs long-term processes of sediment trapping and vegetation propagation at this site.

We are combining remote sensing methods with vegetation mapping in field and on-site measurements (e.g. water level, oxygen saturation and waves). Vegetation mapping exposed a striking biodiversity with inter alia *Tripolium pannonicum, Atriplex littoralis, Lathyrus japonicus, Bolboschoenus maritimus* or *Honckenya peploides* besides the dominating *Phragmites australis*. Habitat variety is further enhanced by a manifold topography with small-scale basins, micro-cliffs and micro-depressions. Aerial images from 2007 to 2019 are analyzed to get insights into past development of vegetation patches and shoreline evolution. Preliminary results reveal that the wetland edge is relatively stable, while beach lake size varies significantly. However, this data lacks the spatiotemporal resolution to identify whether changes occurred gradually or after extreme events such as storm surges or winter ice. In contrast, our weekly to monthly UAV flights offer sufficient spatial and temporal resolution to monitor changes in microtopography. We anticipate that our results will help to better understand ecosystem dynamics as a response of gradual and abrupt disturbances, which may foster confidence in more sustainable coastal adaptation strategies.