

## **From marshland to tidal flats – Deciphering major landscape changes and storm surge impacts around the medieval settlement of Rungholt (Wadden Sea of North Frisia, Germany) using Direct Push sensing techniques and LDA**

*Hanna Hadler, Andreas Vött, Dennis Wilken, Timo Willershäuser, Ruth Blankenfeldt, Claus von Carnap-Bornheim, Kurt Emde, Peter Fischer, Ulf Ickerodt, Stefanie Klooß, Lea Obrocki & Wolfgang Rabbel*

Since medieval times, the present-day Wadden Sea of North Frisia (Schleswig-Holstein, Germany) - National Park and UNESCO World Heritage - underwent massive geomorphological changes, as it was subject to both extensive land reclamation measures and hydrological extreme events. Beginning approximately in the 12th cent. AD, Frisian settlers widely embanked, drained, and cultivated the coastal marsh- and fenlands, causing a permanent lowering of the embanked areas. Within the course of a major medieval storm surge in AD 1362 (1. Grote Mandrenke), wide areas of cultivated medieval marshland were drowned and permanently turned them into tidal flats. By geophysical, geomorphological, and archaeological investigations, an interdisciplinary DFG project now aims at a detailed reconstruction of the coastal landscape development in the interplay of natural marsh formation, medieval land reclamation and storm surge-related land losses. Using a combined approach of Direct Push (DP) sensing, vibracoring and a set of sedimentary, geochemical and microfaunal palaeoenvironmental parameters, we deciphered long-term as well as event-related geomorphological changes in the area of Hallig Südfall, commonly associated with the medieval trading centre Rungholt. Multivariate linear discriminant analysis (LDA) was successfully applied to a DP test dataset to efficiently identify stratigraphic units (e. g. fossil marsh or tidal flat deposits) and map their lateral distribution. Based on radiocarbon dating of organic material, we were able to provide geochronostratigraphic evidence that Rungholt's medieval marsh landscape was destroyed and replaced by Wadden Sea tidal flats by the 1362 AD storm surge.

*Kontakt:*

*Hanna Hadler: Johannes Gutenberg-Universität Mainz, E-Mail: [hadler@uni-mainz.de](mailto:hadler@uni-mainz.de)*