A comparison between dredged areas and undisturbed seafloor revealed significant differences in mud content, the number of individuals and species of macrozoobenthic organisms (Fig. 3). This indicates that the benthic communities in the dredging areas are in a persistent successional stage. Mud-loving species (e.g., Notomastus latericeus and Kurtiella bidentata) profited from the changed habitats, however sand-prefering organisms (e.g., Pisione remota and Aonides remota) disappeared because of the slow backfill rates. We conclude that a complete backfill of the deep dredging pits is likely to take centuries. Additionally, the sediment compositions have changed (Fig. 4).

Fig. 1: The study site “platteland Dredging Area” is located 7 km offshore Sylt. Since 1984, unconsolidated proglacial sand deposits were extracted here for the purpose of beach nourishment of the islands exposed western shoreline.

Fig. 2: Results of the hydroacoustic survey from January 2003 left: post-processed bathymetric map of the study site measured with multibeam echosounder; class “1” = sites where sediment extraction terminated at least 10 years prior to the surveying (2009–2010); class “2” = sites where sediment extraction ended at least 10 years prior to the surveying. The occurrence of stones and sand was recorded with sidescan sonar. (a), (b): Position and sediment composition of the grid samples. (c), (d): Appearance of stones.

Fig. 3: Seafloor features detected within the subtidal sand mosaics.

Fig. 4: Habitat maps created with a combination of hydroacoustic data and ground truth information. (a), (b): Position and sediment composition of the grid samples. (c), (d): Appearance of stones.

Fig. 5: Macrozoobenthos abundance, biomass, species density and the mud content of sampling stations across the sediment extraction area. Site class 0 = control sites unaffected by sediment dredging; class 1 = sites dredged within the last 10 years; class 2 = sites 10 years after dredging.