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A Baseline Assessment Of Seafloor Geomorphology And Benthic Habitat Distribution Along The Neom Coast (Northern Saudi Arabia, Red Sea)

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The Red Sea is an isolated active rift in the latest stages of continental rifting. The basin is close to the transition to the following stage of oceanic seafloor spreading. These peculiar characteristics make it one of the warmest, most saline, and most oligotrophic marine ecosystems currently on Earth, supporting high rate of endemism of marine life from shallow to deep waters. In this work, we present a baseline description of the mesophotic and deep-sea environment from the Saudi Arabian continental margin of the North Red Sea and the Gulf of Aqaba with emphasis on shelf-slope transitions and shelf-edge reefs. A high-resolution acoustics dataset with coverage of 34,000 km² has been collected in the NEOM gigaproject area, from 30 to 1770 m water depth. More than 60 benthic transects have been performed using submersibles and Remote Operated Vehicle (ROV) coupled with high-resolution underwater positioning systems. Over 650 samples of sediment, benthos, and rocks were collected to characterize the benthic environment. Data from CTD casts were used to characterize the water column. Our results reveal a complex mosaic of benthic habitats, related to depth range, substrate type, continental slope morphology, water masses, and sediment delivery into the basin. Habitat composition varied along the depth gradient from the shelf break to the deep basin, with a high level of diversity in the lower mesophotic zone. Our findings allow us for the first time to characterize the diversity of benthic habitats in the NEOM area from shallow to deep waters. Here, we also provide a fundamental contribution to a better understanding of the key role of geomorphology with respect to the largely unknown mesophotic and deep-sea habitats in the Red Sea. Finally, we propose a classification of benthic habitats valuable for management purposes, including the design of monitoring programs, for ecosystem-based management, and for documenting the effects of climate change on ecosystems in a region undergoing rapid economic development.