Abstract: The western Makran coast displays evidence of surface uplift since at least the Late Pleistocene, but it remains uncertain whether this displacement is accommodated by creep on the subduction interface, or in a series of large earthquakes. Here, we address this problem by looking at the short-term (Holocene) history of continental vertical displacements recorded in the geomorphology and sedimentary succession of the Makran beaches. In the region of Chabahar (Southern Iran), we study two bay-beaches through the description, measurement and dating of 13 sedimentary sections with a combination of radiocarbon and Optically Stimulated Luminescence (OSL) dating. Our results show that lagoonal settings dominate the early Holocene of both studied beach sections. A flooding surface associated with the Holocene maximum transgression is followed by a prograding sequence of tidal and beach deposits. Coastal progradation is evidenced in Pozm Bay, where we observe a rapid buildup of the beach ridge succession (3.5 m/year lateral propagation over the last 1950 years). Dating of Beris Beach revealed high rates of uplift, comparable to the rates obtained from the nearby Late Pleistocene marine terraces. A 3150-year-old flooding surface within the sedimentary succession of Chabahar Bay was possibly caused by rapid subsidence during an earthquake. If true, this might indicate that the Western Makran does produce large earthquakes, similar to those that have occurred further east in the Pakistani Makran.

Keywords: Makran; coastal processes; coseismic subsidence; Holocene uplift; headland-bay beach; beach progradation; earthquake

1. Introduction

The Makran coast, in southeastern Iran, sits above oceanic lithosphere of the Arabian plate that is currently subducting northward under Eurasia. The coast has clearly experienced long-term uplift throughout the Late Pleistocene, as evidenced by the presence of emerged sequences of marine terraces, some of which outcrop at more than a hundred meters above present sea-level [1–3]. In eastern Makran (Pakistan), surface uplift of the coastal margin appears to be closely linked with large earthquakes, the last of which was a Mw 8.1 thrust event in 1945 [4,5]. However, in the western segment of the Makran (Iran), there is no obvious historical evidence for large earthquakes in the last 1000 years [6–9]. It is currently unclear whether the lack of seismicity reflects a different mechanical behavior at the subduction interface, or if infrequent large earthquakes occurred in the past and should be expected to happen again [10–12]. Here, we apply some concepts of coastal evolution to the Makran coast, coupled...
77. Ota, Y.; Yamaguchi, M. Holocene coastal uplift in the western Pacific Rim in the context of late Quaternary uplift. Quat. Int. 2004, 120, 105–117. [CrossRef]
80. Wesson, R.L.; Melnick, D.; Cisternas, M.; Moreno, M.; Ely, L.L. Vertical deformation through a complete seismic cycle at Isla Santa María, Chile. Nat. Geosci. 2015, 8, 547–553. [CrossRef]

© 2019 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).