

The Effects of Rapid Caspian Sea-Level Fluctuations on the Miankaleh Barrier Coasts

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Abstract

The goal of this study was to study the geomorphologic response- type models of the coastline of Miankaleh Barrier to the rapid fluctuations of the Caspian Sea. In this regard, Landsat satellite imageries (the sensor: 4, 5, 7 and 8 series), historical maps, topography maps and multiple field works have been used. Based on quantitative documentation of historical changes in shoreline position in response to natural and human variables, eight geomorphic response-types were identified for classifying barrier coasts: (1) lateral movement, (2) advance, (3) dynamic equilibrium, (4) retreat, (5) in-place narrowing, (6) landward rollover, (7) breakup, and (8) rotational instability. Long-term (decades to centuries) monitoring of shoreline position over a spatial scale of 10 to 100 km provides a scientific basis for documenting process-response relationships that shape regional coastal morphodynamics. The results show that there are the six morphological-type models in the Miankaleh barrier region based on the eight geomorphologic-type models of McBride et al, 1995; such as lateral movement, advance, retreat, in-place narrowing, breakup and rotational instability. The results indicate that the advance and retreat morphological-type models are formed in the region during the rise and fall sea levels, respectively. In-place narrowing and breakup morphological-type models appear simultaneously with the rise in sea level, and the rotational instability model also appears when the sea level is reduced in the region. The lateral movement type model has also been developed during the sea level rise and fall periods. Also, the results show that the sea level during the period of 1214-1396 has experienced six Progradation-Retrogradation stages. The assessment of the satellite imageries and statistical data on sea level fluctuations indicate that the sea level has fallen back to 1374 and has dropped by about 1.5 meters. The rate of recession and the reduction of the level of surface between 1374 until 1396 were estimated at 6.8 cm per year. Despite the fact that on a large scale, the increase in the relative sea level water along the shore of the Miankaleh barrier is one of the most important factors controlling the occurrence of various geomorphic reactions; however, the sediment supply also has a significant impact on reactions shoreline.

Keywords: Geomorphological Changes, Sea Level Fluctuations, Progradation, Retrogradation, Caspian Sea, Miankaleh Barrier.