Geophysical Research Abstracts
Vol. 19, EGU2017-4101, 2017
EGU General Assembly 2017

Sediment contribution from coastal-cliff erosion into the Nile's littoral cell and its significance to cliff-retreat mitigation efforts

Oded Katz (1), Amit Mushkin (1), Onn Crouvi (1), Samuel Alter (1), Ran Shemesh (1,2)

(1) Geological Survey of Israel, Jerusalem, Israel, (2) Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel

In 2013 the government of Israel initiated a national mitigation program aimed to prevent further collapse and retreat of the country's coastal cliffs, which occur along the northern termination of the Niles's littoral cell (NLC) in the eastern Mediterranean. The goals of this large-scale program are to protect infrastructure and property proximal to the cliff and to conduct long-term maintenance and monitoring of this highly dynamic and sensitive land-sea interface that spans ∼40 km of Israel's coast line. Here, we examine the possible impact of proposed cliff retreat mitigation efforts on long-shore sediment transport (LST) and coastal dynamics in the region. We used airborne LiDAR spanning a 9-year period between 2006 and 2015 to quantify the annual contribution of sediment eroded from a ∼20-km-long segment of Israel's coastal cliffs into the NLC. Our measurements reveal 282±85*10^3 m^3 of sediment eroded from the cliff and delivered into the NLC during the studied period. Considering our study area comprises ∼50% of Israel's sea cliffs we infer an average contribution rate of ∼30,000-60,000 m^3/yr of cliff-derived sediment into the NLC prior to the planned broad-scale implementation of cliff-retreat mitigation measures.

Previous studies report an average net LST flux of ∼80,000 - 90,000 m^3 that reaches the northern termination of the NLC at Haifa Bay annually. Thus, our results suggest that Israel's actively eroding coastal cliffs are primary contributors (40-80%) to the LST budget along the northern termination of the NLC. It therefore appears that successful implementation of the coastal-cliff protection program along Israel's coastline will result in a significant sand deficit, which may drive LST in this part of the NLC out of its 'background' state. In the likely case that the energy/currents driving LST do not change, a possible outcome of this sediment deficit could be increased beach erosion along Israel's coast line to make up for the lost volumes of cliff-eroded sediments.