



## **Wave Climate and Trends in the Red Sea: Results from a 30-Year Wave Hindcast**

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The deceptively simple structure of the Red Sea offers very interesting wind and wave conditions, not easily, if ever, found elsewhere. The mountain ranges bordering the Red Sea influence the local dominant wind regimes and transform the Red Sea into a virtual wind channel, where along-axis winds are the dominant feature. Larger and smaller valleys cut across the bordering mountain ridges, creating winds that are relevant to local wind regimes. A unique situation in the Red Sea is the convergence of two wave systems forced by opposite winds over an extended period of time meeting at the center of the Red Sea. This study presents wave climate, variability and their trends in the Red Sea based on a 30-yr wave hindcast. A high-resolution regional atmospheric reanalysis generated using WRF model, initialized with ERA-Interim global reanalysis is employed to drive WAVEWATCH III model from 1985 through 2014. The wind and wave hindcasts were validated against buoys, scatterometers and altimeters, and their quality was found to be good. We explore the contribution of individual wave system that modulates to the variability of wave in the Red Sea and investigate the possible long-term trends in each system. A characterization of the wave conditions based on wave spectra brings out a detailed description of the different wave regimes, their associated meteorological conditions and their variation in time and geographical space.