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Tidal analysis and predictions at Red Sea

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Tidal variations in the Red Sea are spatially more dynamic and have more influence on the physical and biological processes. The scientific study on tidal analysis in the Red Sea is lacking. The lacuna is due to different factors such as uneven distribution of tide gauges over the Red Sea coast and lack of data resources. Hence, a comprehensive study of the dynamics of tides is lacking in this region. A comprehensive field data obtained from the general commission of survey (GCS), Saudi Arabia at different locations on the eastern coast of the Red Sea was processed and analyzed using different data analyzing techniques during the period 2012-2013. A tide model was developed to simulate the water level in the Red Sea. The modeling study was carried out with different steps of validation and statistical analysis. The correlation analysis shows a reasonable match in the simulated and measured water levels along the selected locations of the eastern coast of the Red Sea. Harmonic analysis techniques such as IOS and admiralty methods were used for deriving major and minor tidal constituents and studied the spatial variations of significant tidal constituents along the eastern coast of the Red Sea. Among the major diurnal and semidiurnal constituents, semidiurnal constituents well represent the astronomical tidal characteristics along the eastern coast of the Red Sea and the same verified with field conditions using form factor. The tide model can be used for near shore tide forecast in this region.

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