



## ***An Updated Wave Climate Hindcast for the Persian Gulf***

*[ Mohammad . Dibajnia ]*

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### ***1- Introduction***

*Reliable coastal structure design, sediment transport predictions and future planning all depend on the use of accurate wave data. As part of the Phase II of the MONITOR SB&B project, a long-term 25-year (1984-2008) hindcast was developed for the southern coastline of Iran in the Persian Gulf and the Strait of Hormuz. Key aspects of this hindcast included:*

- An improved input wind field, the driving force for a wave model, was developed using synoptic station data located around the Persian Gulf and calibrated with wind measurements from the QuikSCAT satellite mission.*
- Comprehensive validation against multi-year satellite altimeter data, as well as against various wave buoy and Acoustic Doppler Current Profiler (ADCP) measurements.*
- Application of a state-of-the-art 3rd generation wave model, the WaveWatch III model of the U.S. National Oceanic and Atmospheric Administration (NOAA).*
- No wave data assimilation into the hindcast. Many hindcasts apply local “corrections” to the hindcast data through assimilation of measured wave data (particularly satellite data). This assimilation limits the ability to independently verify the results of the hindcast.*

### ***2 - The Wave Model and its Configuration***

*The WAVEWATCH III wave generation model, as developed by the U.S. National Oceanic and Atmospheric Administration (NOAA), was utilized for the wave simulations. WAVEWATCH III incorporates 3<sup>rd</sup> generation physics, solving for the spectral action density balance equation for wave number-direction spectra. Key features of the model include:*

*Simulation of wave growth and decay, nonlinear resonant interactions, dissipation and bottom friction.*

*Third order accurate wave propagation scheme.*

*Sub-grid representation of unresolved islands.*

*Depth- and current-induced refraction.*

*A variety of model output options.*

*One of the fundamental inputs to the WAVEWATCH III model was a regular grid defining water depths throughout the model domain. In order to get a better definition of waves along the Iranian coastline, a high resolution model was used. The Persian Gulf model grid extended from 23.70° N to 30.70° N and 47.60° E to 60.05° E with a grid resolution of 0.05°. A nested model with higher resolution was used for the area between Moghaam and Dayyer. The inner model boundary within the Persian Gulf model extended from 50.975° E to 54.025° E and 26.475° N to 28.825° N and had a grid resolution of 0.025°.*