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Application of Optimal Interpolation Scheme in the Indian Waters

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The present day state-of-the art wind-wave modeling is constrained by the knowledge of the momentum transfer from wind to sea surface, the dissipation due to wave breaking and the numerical limitations of the process of the nonlinear wave-wave interaction. After the development of the successful third generation wave models such as WAM (The WAMDIG group, 1988) and WaveWATCH III (Tolman, 1996), there is little knowledge addition in terms of the energy input and dissipation processes in the wind-wave growth. There are different models proposed by various authors for the wind-wave momentum transfer and none of them play a major role in the further improvement in the wind-wave prediction. The research towards solving the nonlinear quadruplet wave-wave interaction could not significantly solve the wave modeling in terms of the accuracy and the time required for the forecasting. The understanding of wave breaking process is rather limited because of its random occurrence and the knowledge so far, is limited from the controlled wave breaking studies. With the above constraints, the wave modelers focus their attention in the data assimilation to improve the wave prediction in the last decade. However, the application of wave data assimilation scheme in the regional seas are few in compared to the atmospheric and ocean circulation models. In this study, an optimal interpolation scheme (Komen et al., 1994) is efficiently implemented in the Indian waters. WAM is setup over the Indian waters with Bay of Bengal and Arabian Sea. The modeling region is bounded by the longitudes 30oE and 99oE and latitudes 30oS and 30oN. The domain is gridded with a resolution of half degree with an option for nesting down to finer grids in the region of particular interest. The driving wind field is obtained from QUICKSCAT and NCMRWF in a grid resolution of 0.25o along longitudes and latitudes. The improvements in the wave prediction in the regional waters are found to be significant of the order of 10% to 40% in the reduction of root mean square error in the significant wave height.