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GLOBAL WAVE PREDICTION, USING THE WAM MODEL AND NMC WINDS[1]

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ABSTRACT

We employ the Cycle 3 version of the WAM (Wave Model) model (hereafter referred to as WAM3) and use forcing by the NMC (National Meteorological Center) winds to calculate global ocean wave spectra during the period from November 1991 to May 1992. The calculations have been conducted for wave hindcasts and forecasts using the analysis winds and forecast winds, respectively. The results of the WAM3 waves and the NMC winds have been compared with the NDBC (National Data Buoy Center) buoy data and with results from other models. The comparisons indicate that the WAM waves in general predict a good estimate of the significant wave height, but often underpredict the extreme waves when compared with the buoy data. Nevertheless, its accuracy and quantitative measures are shown to be slightly better than those from the other global models. The CPU time for a 24-hour prediction run on the NMC Cray YMP computer is about 150 seconds.

INTRODUCTION

Accurate understanding and prediction of wind waves is of considerable interest to marine forecasters, oceanographers, meteorologists, ocean engineers and coastal engineers. During the last five decades, the state-of-the-art in wind wave modeling and prediction has improved significantly from the empirical approaches of Sverdrup and Munk (1947) and Bretschneider (1958) (for example see the Shore Protection Manual 1984), to spectral approaches including directionality using the radiative transport equation (e.g. SWAMP Group 1985). At present, the most advanced directional spectral model is the so-called third generation wave model of which the WAM model is an example (WAMDI Group 1988). Although these computationally complex directionally spectral models have achieved significant improvements in wind wave prediction, many uncertainties still remain. Wind waves result from air-sea interaction as well as several other physical processes; specifically, wave propagation, refraction, and source functions. The source functions include atmospheric generation, wave-wave interaction, wave-current interaction, and wave dissipation. Some of these physical processes can be described with adequate precision, but others like atmospheric generation and wave dissipation are still incompletely understood and remain a challenge for both research and development. Despite this incomplete

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