Wave fuzzy forecasting. An example from the Norwegian coastal area

This work explores the applicability of well-known fuzzy time series forecasting techniques for the prediction of wave parameters. These techniques have extensively been used with great success to the forecasting of stock prices, and they have been started to be used in ocean science the last ten years. In the present work, time series of significant wave height from NORA3 (Norwegian Reanalysis Archive 3 km) database have been thoroughly examined and used for the verification of the forecasting performance of the fuzzy models. The data cover a period of 44 years (1979-2022) at a one-hour intervals, and the example presented referred to a Norwegian coastal area. To examine the forecasting accuracy, two error measures are used as an evaluation criterion to compare the forecasting performance of the listing models. Before applying the fuzzy forecasting procedure, and in order to remove nonstationarity, moving-average is applied to the data. It has been found that all error measures attain their minimum at the same "optimal" point Mopt, which in turn gives the closer forecasts to the actual values. The forecasting procedure can be further combined with deterministic forecasts of the wave data, based on the regular realtime analysis, to update the fuzzy forecasts every, e.g., 6 or 12 hours.

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