EMS Annual Meeting Abstracts
Vol. 18, EMS2021-237, 2021, updated on 05 Dec 2022
https://doi.org/10.5194/ems2021-237
EMS Annual Meeting 2021

Using probabilistic forecasts to effectively enhance operational marine industry decision-making

Ken Mylne, **Edward Steele**, Hannah Brown, Christopher Bunney, Philip Gill, Andrew Saulter, and Jessica Standen
Met Office, Exeter, United Kingdom of Great Britain – England, Scotland, Wales (ken.mylne@metoffice.gov.uk)

Ensemble Prediction Systems (EPSs) are now run routinely by many global weather centres but, despite the enormous potential these forecasts offer, their perceived complexity has long presented a barrier to effective adoption by many users; limiting the opportunity for early decision-making by industry. To facilitate the interpretation of a set of (potentially seemingly contradictory) forecasts, a sensible approach is to turn the prediction into a binary (yes/no) forecast by applying a user-relevant operational weather limit – with the decision to proceed with or postpone an operation based on whether a certain proportion of the members predict un-/favourable conditions. However, the question then remains as to how the appropriate probability threshold to achieve an optimum decision can be objectively defined. Here, we present two approaches for simplifying the interpretation of ensemble (probabilistic) ocean wave forecasts out to 15 days ahead, as pioneered – in operation – in Summer 2020 to support the recent weather sensitive installation of the first phase of a 36 km subsea pipeline in the North Sea. Categorical verification information was constructed from 1460 archive wave forecasts, issued for the two-year period 2017 to 2018, and used to characterise the past performance of the European Centre for Medium-Range Weather Forecasts (ECMWF) EPS in the form of Receiver Operating Characteristic and Relative Economic Value analysis. These data were then combined with a bespoke parameterization of the impact of adverse weather on the planned operation, allowing the relevant go/no-go ensemble probability threshold for the interpretation of future forecasts to be determined. Trials on an unseen nine-month period of data from the same site (Spring to Autumn 2019) confirm the approaches facilitate a simple technique for processing/interpreting the ensemble forecast, able to be readily tailored to the particular decision being made. The use of these methods achieves a considerably greater value (benefit) than equivalent deterministic (single) forecasts or traditional climate-based options at all lead times up to 15 days ahead, promising a more robust basis for effective planning than typically considered by the offshore industry. This is particularly important for tasks requiring early identification of long weather windows (e.g. offshore pipeline installation), but similarly relevant for maximising the exploitation of any ensemble forecast – by any sector – providing a practical approach for how such data are handled and used to promote safe, efficient and successful operations.