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# Strategies for optimising operational decisions using ensemble marine forecasts

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Marine forecasts are essential to operational planning, with decisions able to be guided by a host of different weather products spanning a period of days, weeks and even months ahead. The correct selection and subsequent application of these different types of weather products has the potential to save many thousands of dollars per day in operational downtime, however this is only possible when the uncertainty information contained within the ensemble predictions are properly translated into actionable insight. In the current economic context, this is especially relevant to the offshore industry –whose use of forecasting technology is traditionally very conservative, and therefore whose planning is often more reactive –allowing large savings (e.g. mobilisation/demobilisation or vessel sequencing costs) if robust decisions are made as early as possible. Here, two methods for the interpretation of ensemble data, based on cost-loss and weather pattern analysis, respectively, are described and applied to ocean wave forecasting. The selection of methods is dependent on the lead time of interest, with cost-loss analysis optimised for supporting decisions days to weeks ahead, and weather pattern analysis optimised for supporting decisions weeks to months ahead. Based on the results of a research collaboration with Shell U.K. Ltd, the application of these techniques are illustrated from the point of view of a North Sea asset manager planning the deployment of equipment/personnel under conditions of calm weather, and the protection of equipment/personnel under conditions of severe weather. For such a user, it is shown that more efficient operational planning may be facilitated by properly-processed ensemble marine forecasts across all timescales, with their use enabling more informed decision-making, and helping reduce operational costs, by promoting increased confidence in longer-range forecasts than are typically used by the offshore oil & gas and marine renewable energy sector at present.

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