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TITLE: Lessons from the First Generation of Marine Ecological Forecast Products

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ABSTRACT:

Recent years have seen a rapid expansion in the ability of earth system models to describe and predict the physical state of the ocean. Skilful forecasts ranging from seasonal (3 months) to decadal (5-10 years) time scales are now a reality. With the advance of these forecasts of ocean physics, the first generation of marine ecological forecasts has started to emerge. Such forecasts are potentially of great value in the management of living marine resources and for all of those who are dependent on the ocean for both nutrition and their livelihood; however, this is still a field in its infancy. We review the state of the art in this emerging field and identify the lessons that can be learnt and carried forward from these pioneering efforts. The majority of this first wave of products are forecasts of spatial distributions, possibly reflecting the inherent suitability of this response variable to the task of forecasting. Promising developments are also seen in forecasting fish-stock recruitment where, despite well-recognised challenges in understanding and predicting this response, new process knowledge and model approaches that could form a basis for forecasting are becoming available. Forecasts of phenology and coral-bleaching events are also being applied to monitoring and industry decisions. Moving marine ecological forecasting forward will require striking a balance between what is feasible and what is useful. We propose here a set of criteria to quickly identify 'low-hanging fruit' that can potentially be predicted; however, ensuring the usefulness of forecast products also requires close collaboration with actively engaged end-users. Realising the full potential of marine ecological forecasting will require bridging the gaps between marine ecology and climatology on the one-hand, and between science and end-users on the other. Nevertheless, the successes seen thus far and the potential to develop further products suggest that the field of marine ecological forecasting can be expected to flourish in the coming years.

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