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Evaluation of eddy-properties in operational oceanographic analysis systems

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Recent studies have shown that the presence of oceanic eddies affects the intensification of high-impact tropical cyclones. Many operational weather prediction systems (e.g. in Canada, UK and Europe) have now moved to using fully-coupled atmosphere-ocean prediction models. As a result, the accuracy with which ocean analysis systems are able to constrain the presence and properties of oceanic eddies may affect tropical cyclone forecast skill. While numerous eddy identification and tracking methods have been developed for oceanic eddies, specific methods and metrics tailored to verifying the skill of ocean analyses and forecasts in capturing these features are lacking. Here we apply an open-source eddy-tracking software and adapt it for the purpose of matching eddies between gridded observational analyses and two ocean analysis products of different resolution (1/4° and 1/12°). The ocean analysis products are the Global and Regional Ice Ocean Prediction Systems run operationally at Environment and Climate Change Canada. The systems share a common data assimilation approach with the main difference between them being the model resolution and the inclusion on tides in the regional system. A contingency table approach is taken to identify hits, misses and false alarms to provide statistics on the probability of detection and false alarm ratio. These statistics are investigated in terms of their sensitivity to eddy properties (radius, amplitude). The results clearly demonstrate the added value of higher resolution in accurately representing eddy features. The higher resolution analyses provide a higher probability of detection with a lower false alarm rate. Errors in eddy radii are also improved in the 1/12° analyses.

Which theme does your abstract refer to?

Development and assessment of data assimilation in forecasting applications (global and regional)

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