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Combining in-situ wind measurements from cruise ships with global numerical weather predictions using model output statistics

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Several tools used in marine traffic such as models designed for improving sailing efficiency and ship route optimization (e.g. weather routing) typically require numerical weather prediction (NWP) data such as wind speed and direction as their input along ship routes. However, the coarse temporal and spatial resolution of global forecasts and systematic errors in their output limit the value of NWP data in such applications, especially when predictions at longer forecast lead times are required. A potential, yet relatively unexplored, approach to alleviate this issue is to combine in-situ ships observations routinely made in several large vessels with NWP data using model output statistics (MOS).

With the aim to better facilitate the use of NWP data in ship routing and optimization algorithms, we use in-situ wind measurements obtained from a set of large cruise ships to regionally train a simple deterministic MOS-system, which is based on multiple linear regression. This system is then used to post-process 10-metre wind speed forecasts obtained from Global Forecast System along the ship routes at different maritime regions. The preliminary results show that improvements in the predicted 10-metre wind speed obtained with the developed system are in many cases rather limited. Linked with this, issues related to the use of ship measurement in MOS such as their non-local nature together with a need for proper data homogenization are addressed. Finally, potential avenues for improving the performance of the used MOS system with respect to uncorrected forecasts as well as probabilistic extensions to it are discussed.