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Evaluating Met Office uncoupled and coupled forecasts during the Iceland Greenland Seas Project field campaign in 2018

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During a cold-air outbreak (CAO) a cold polar airmass flows from the frozen land or ice surface, over the marginal ice zone (MIZ), then out over the comparatively warm open ocean. This constitutes a dramatic change in surface temperature, roughness and moisture availability, typically causing rapid change in the atmospheric boundary layer. Consequently, CAOs are associated with a range of severe mesoscale weather phenomena and accurate forecasting is crucial. Over the Nordic Seas CAOs also play a vital role in global ocean circulation, causing densification and sinking of ocean waters that form the headwaters of the Atlantic meridional overturning circulation.

To tackle the lack of observations during wintertime CAOs and improve scientific understanding in this important region, the Iceland Greenland Seas Project (IGP) undertook an extensive field campaign during February and March 2018. Aiming to characterise the atmospheric forcing and the ocean response, particularly in and around the MIZ, the IGP made coordinated ocean-atmosphere measurements, involving a research vessel, a research aircraft, a meteorological buoy, moorings, sea gliders and floats.

The work presented here employs these novel observational data to evaluate output from the UK Met Office global operational forecasting system and from a pre-operational coupled ocean-ice-atmosphere system. The Met Office aim to transition to a coupled operational forecast in the coming years, thus verification of model versions in development is essential. Results show that this coupled model's sea ice is generally more accurate than a persistent field. However, it can also suffer from cold-biased sea surface temperatures around the MIZ, which influences the modelled near-surface meteorology. Both these effects demonstrate the crucial importance of accurate sea ice simulation in coupled model forecasting in the high latitudes. Hence, an ice edge metric is then used to quantify the accuracy of the coupled model MIZ edge at two ocean grid resolutions.