The impact of Argo on short-range coupled prediction

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Abstract

The necessity of coupling atmosphere and ocean models is accepted on seasonal to decadal prediction timescales, but the importance at the shorter time-scales relevant to weather forecasting has not been extensively addressed. The recent development of short-range coupled prediction systems at the UK Met Office, which assimilate data into both ocean and atmosphere components of the coupled model, provide an opportunity to assess the potential for Argo to improve weather forecasts.

This new weakly coupled data assimilation system has been used to carry out an observing system experiment with an ocean resolution of 1/4 degrees with 75 vertical levels and an atmospheric resolution of approximately 60km with 85 vertical levels. In this system there is 4D-VAR data assimilation for atmospheric observations, 3D-VAR assimilation of ocean observations (including temperature and salinity profiles, SST, SLA and sea-ice concentration), and assimilation of land surface observations.

To assess the impact of Argo data on both the ocean and atmosphere, we have run two observing system experiments (OSEs): one assimilating all available atmosphere and ocean observations, the other withholding the Argo data from the ocean component. Both analyses have been run from December 2011 to December 2012. To investigate the impact of withholding Argo observations on the short-range weather forecasts, we have also run forecasts in particular periods of extreme weather.