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Assimilating synthetic Biogeochemical-Argo data into a global ocean model to inform observing system design

Argo has revolutionised our understanding of ocean physics, and Biogeochemical-Argo (BGC-Argo) is now extending the concept to biogeochemistry. There are currently around 300 operational floats measuring one or more biogeochemical variable, and over the coming years an array of BGC-Argo floats will be established to provide regular profiles of oxygen, nitrate, pH, chlorophyll, suspended particles and downwelling irradiance. In preparation for this, and to inform decision-making around future deployments, a set of observing system simulation experiments (OSSEs) has been performed as part of the AtlantOS project. To perform the OSSEs, the MEDUSA biogeochemical model has been coupled with the global FOAM reanalysis system, and the capability developed to assimilate 3D profiles of oxygen, nitrate, pH and chlorophyll, as well as surface chlorophyll from ocean colour. The OSSEs test the impact on the system of assimilating simulated BGC-Argo observations for two potential scenarios: having BGC sensors on the full current Argo array (˜4000 floats), and having BGC sensors on ¼ of the current Argo array (˜1000 floats). BGC-Argo was found to provide complementary information to the existing ocean colour satellite constellation, while improving the representation of other variables throughout the water column, and air-sea CO2 flux. Assimilating ˜1000 floats, which is the current target array size, provided clear benefits. Results suggest that increasing the array size further would bring further benefit, though similar or greater improvements could potentially be achieved through development of the data assimilation scheme.

Which theme does your abstract refer to?

Assimilation of novel observations (i.e. under-utilized observations and upcoming missions)

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