



## Assessing the impact of present and future altimeter constellations in the Met Office global ocean forecasting system

Satellite altimeter measurements of Sea Level Anomaly are a crucial component of current operational ocean forecasting systems. The launch of the SWOT wide-swath altimeter mission is bringing a step change in our observing capacity with 2-dimensional mesoscale structures now able to be observed over the global ocean. Future altimeter constellations are likely to include multiple wide-swath altimeters. Here we present results from two studies using the Met Office's global ocean analysis and forecasting system, FOAM. The first was carried out to inform the design of future altimeter constellations. An assessment of the benefit of 2 wide-swath altimeters compared to 12 nadir altimeters was made using observing system simulation experiments. In the FOAM system, an altimeter constellation of 12 nadir altimeters produces greater reductions in the errors for SSH, surface currents, temperature and salinity fields compared to a constellation of 2 wide-swath altimeters. The impact is greatest in the dynamic Western Boundary Current regions where the nadir altimeters can reduce the SSH RMS error by half, while the wide-swath altimeter only reduces this by one-quarter. A comparison of the spatial scales resolved in daily SSH fields also highlights the superiority of the nadir constellation in our forecasting system. The second study shows preliminary results from assimilating real wide-swath altimeter data from SWOT into the global FOAM system. Results from an observing system experiment are presented which demonstrate the impact the additional data from SWOT has when assimilated in conjunction with the other standard observing networks.

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