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Model Data Fusion for Marine Biogeochemical Models

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Current and Planned Activities

- Method development and testing
- Focus on dual state and parameter correction
- Application of DA to toy problems
- Twin experiments
- Application of DA to 0-D and 1-D case studies

- Delivery of pragmatic DA in eddy-resolving OFAM BGC
- Exploration of DA using 4DVAR in ROMS
- Development of Bayesian Hierarchical Methods in coastal bgc models

Aspirations

- Functioning DA in operational BlueLink system dealing with spatially and temporally variable parameters (short-term forecasts, hindcasts)
- Functioning DA in 3-D coastal models at shelf scale (ribbon model) and bay/estuary scale (relocatable estuary models)
- Formal error/uncertainty propagation for scenarios as well as short-term forecasts
- DA / uncertainty analysis in global carbon cycle models?
- Coastal and ocean BGC OSSE.
- Set of test cases and toolboxes for testing and developing DA methods in BGC models.

Issues

- **Compute power.**
 - Can we use GPUs / parallel systems efficiently for 3-D as well as 0-D models? Eg Richard / Andrew's approach should parallelise very efficiently.
- **Observations**
 - Serious shortage of in situ observations. ARGO, gliders?, ...
 - Heavily reliant on ocean colour from satellites.
 - Do we understand error structures in satellite products.
 - Building optics / radiative transfer into models?

Capability

- Very small pool of practitioners
- Likely difficult to recruit BGC DA experts
- Train PhDs, postdocs?
- Attract mathematics graduates?