The Performance of Present, Future, and Optimal Argo Infrastructure

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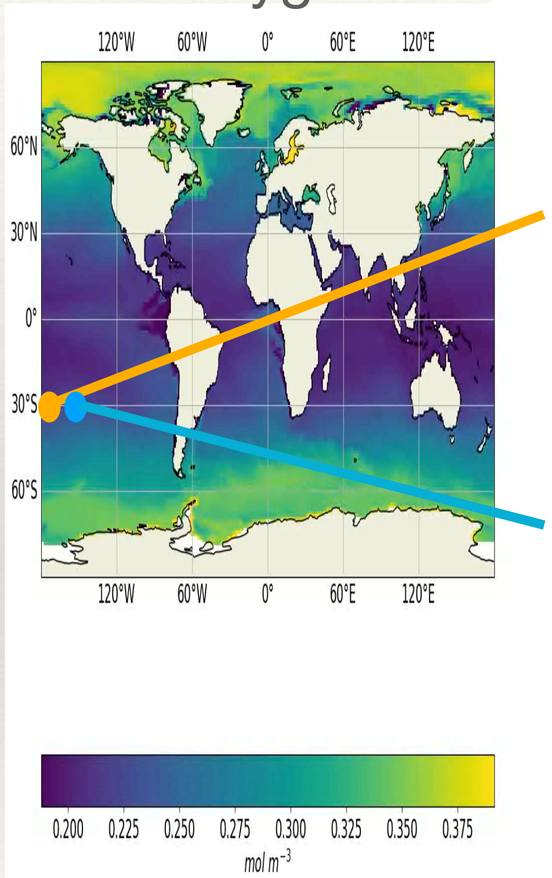
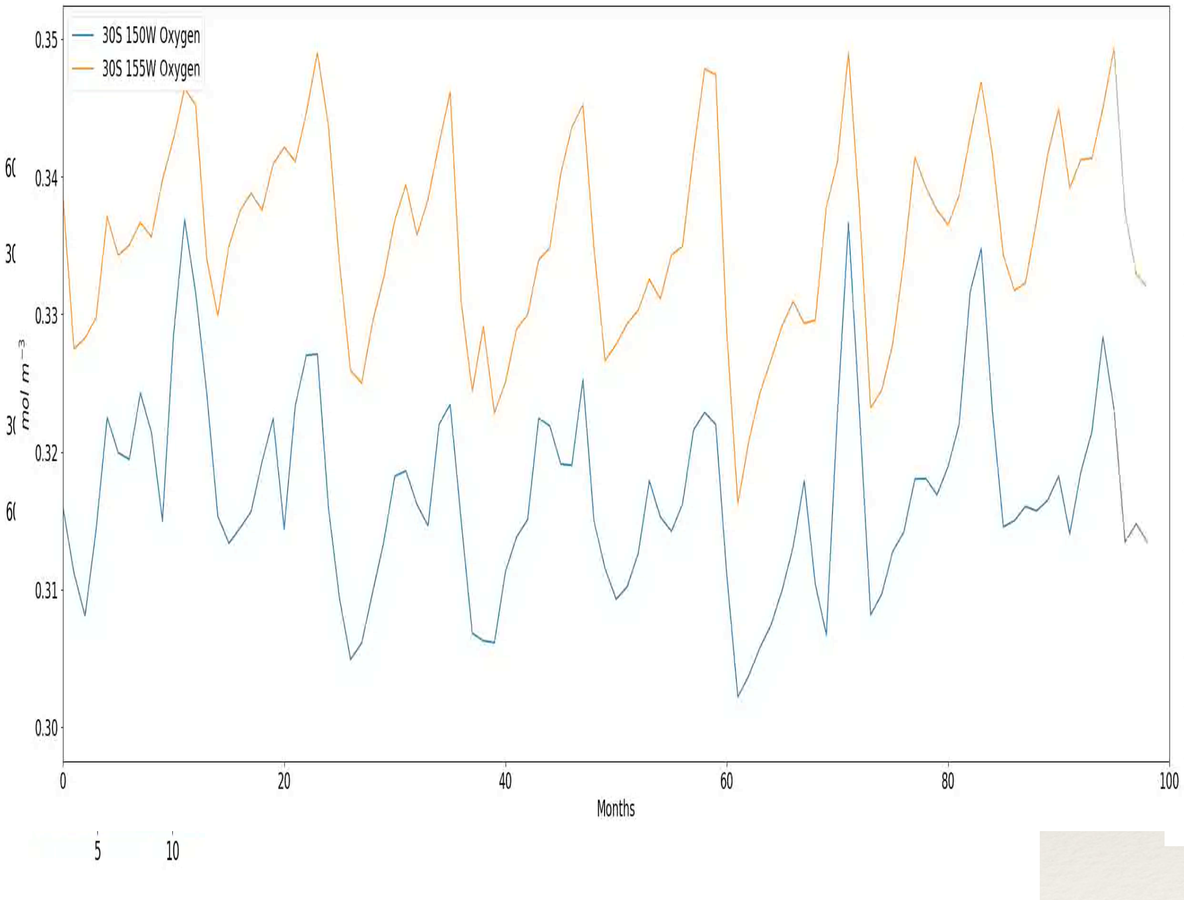
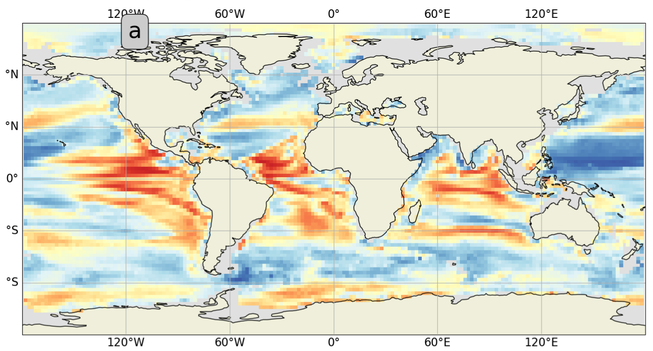
Oxygen

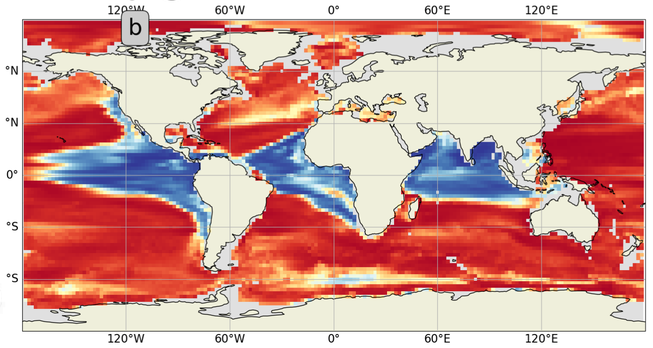




Oxygen / Chlorophyll



Oxygen / Temperature



SOCCOM

Unlocking the mysteries of the Southern Ocean

GO-BGC

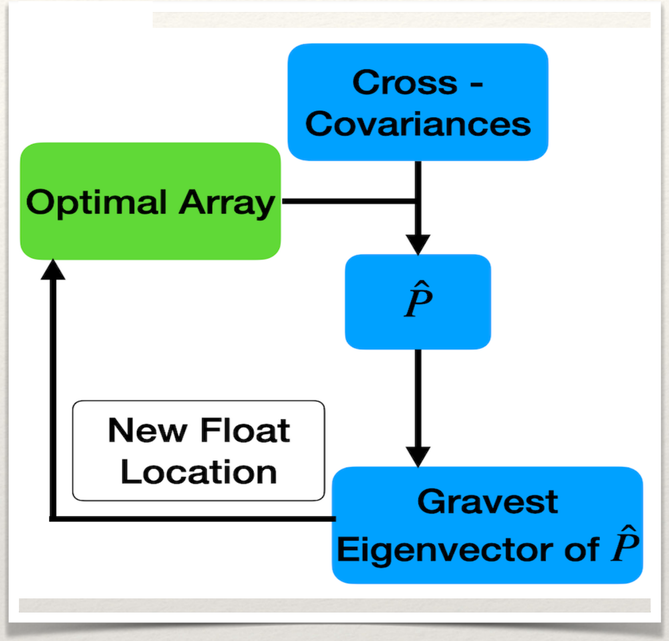
Global Ocean Biogeochemistry Array

Methods - Error Mapping

Covariance of the Expected Error | **Covariance of state** | **Covariance constrained by observation**

$$\hat{P} = P - KHP$$

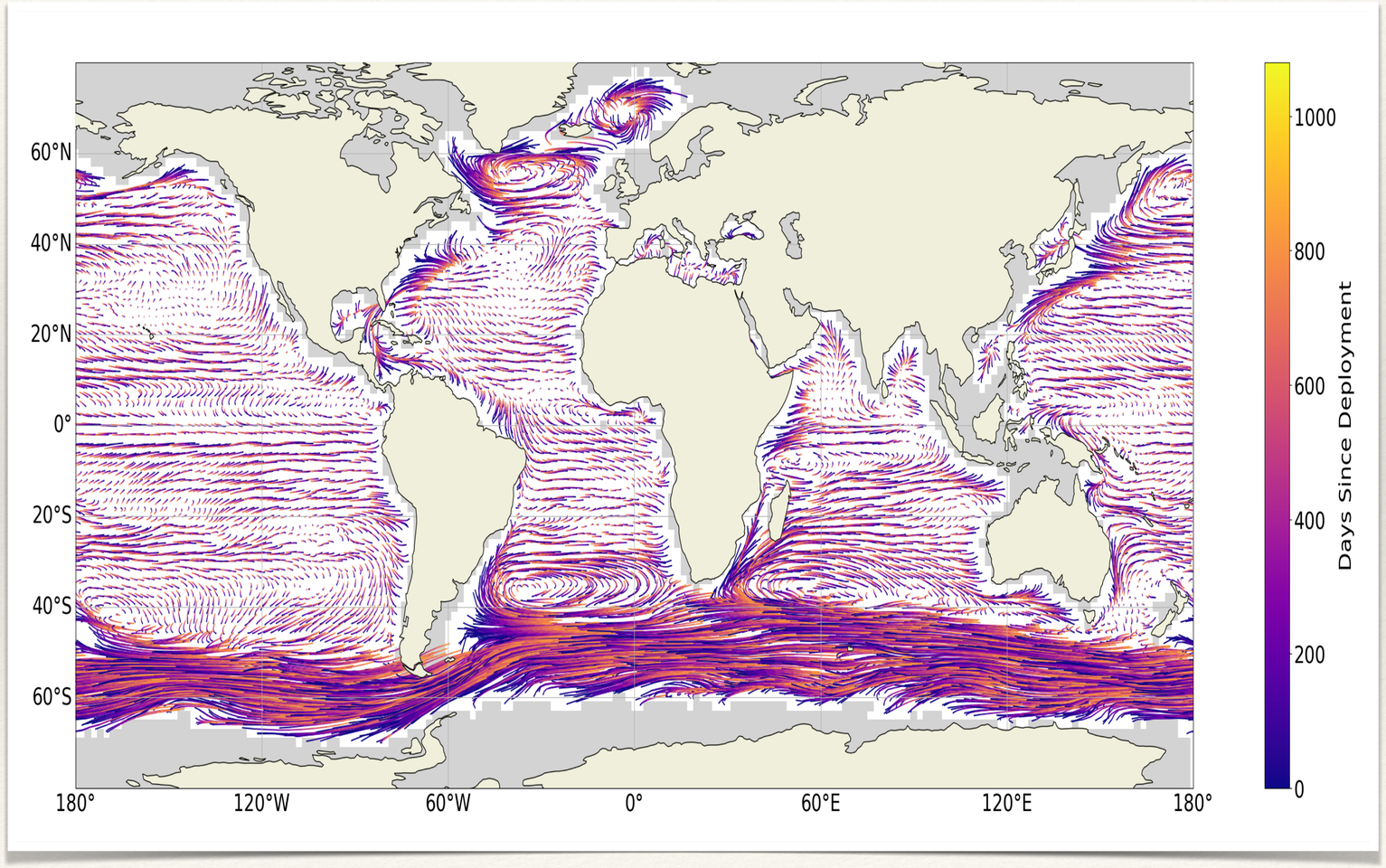
- CM4 BGC Modeled Variables
- 24 Depth Levels
- Gaspari and Cohn Localization
- Variance Normalized
- Eigenvalue Scale Seperation



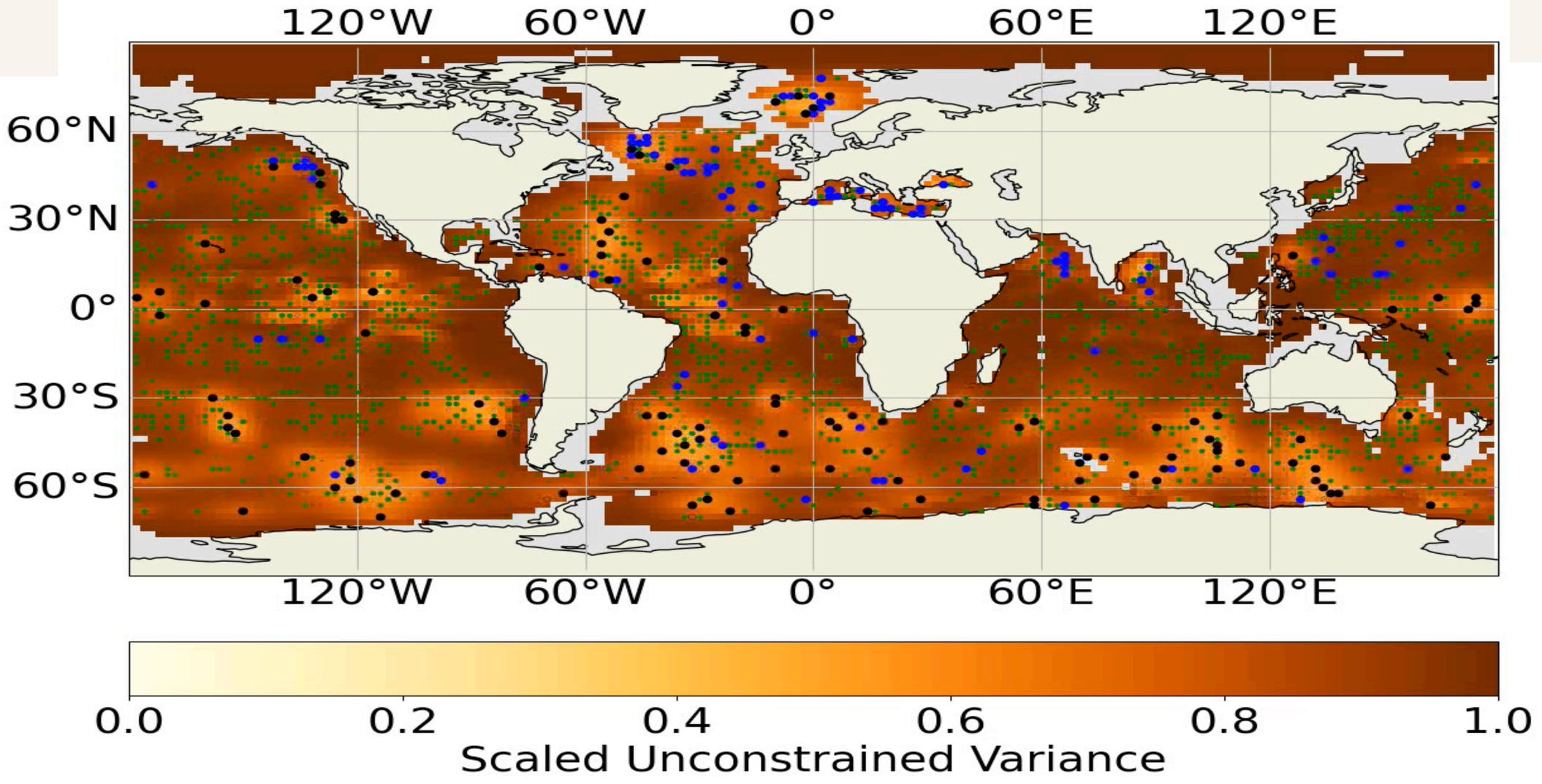
$$E_{map} = \frac{tr(\hat{P})}{tr(P)}$$

Methods - Float Location Prediction

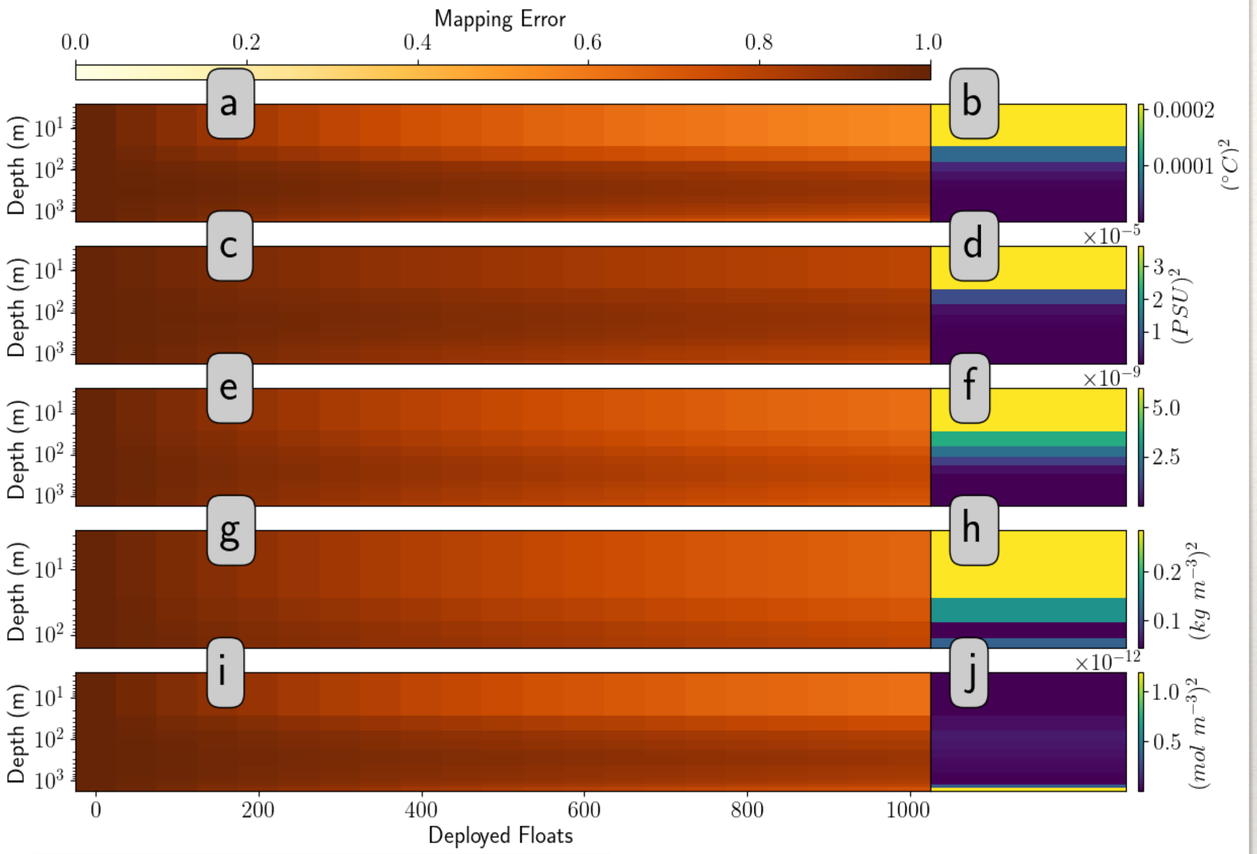
- Transition Matrix built from past Argo Trajectories
- Transition Matrix can estimate future array distributions
- Submitted to Tech

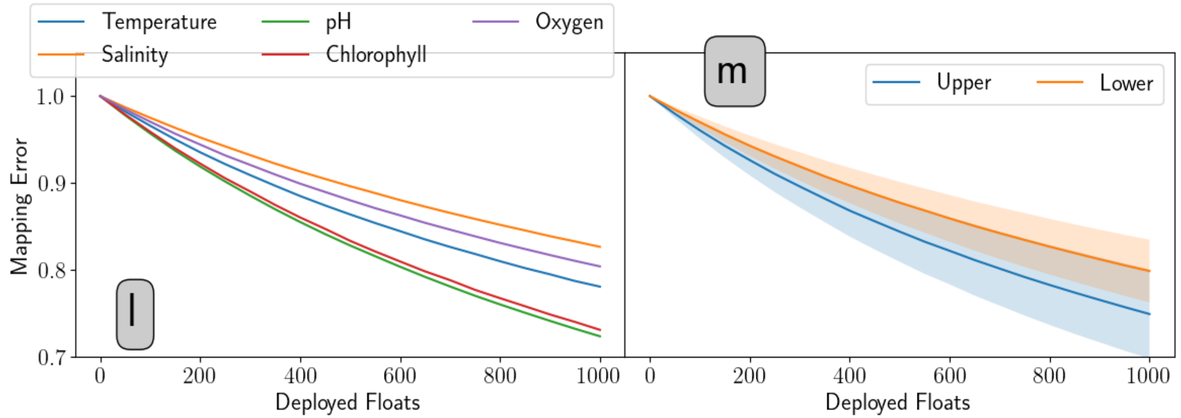


Results: Mapping Error of Future Argo Floats

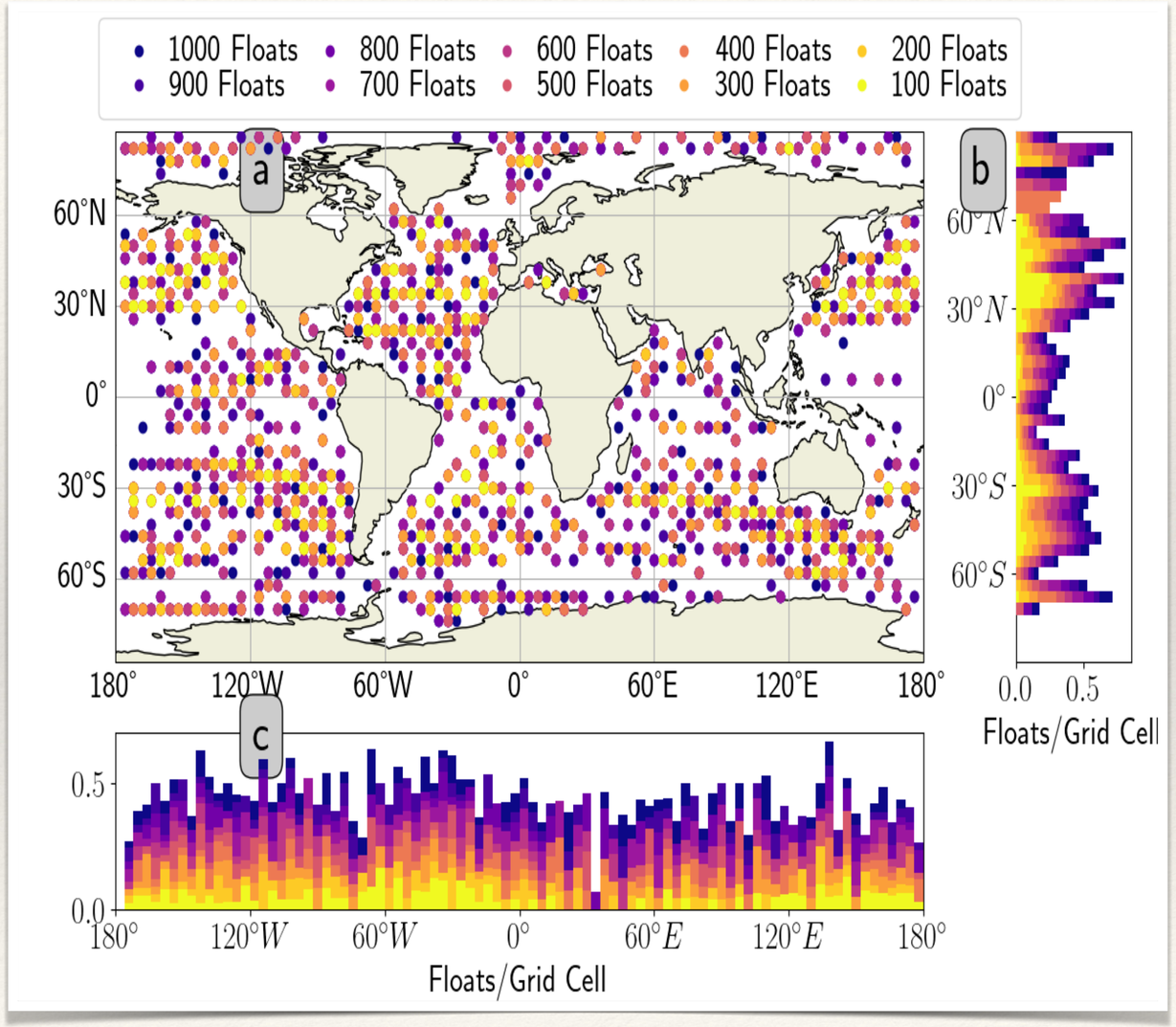


Results: Monte Carlo Distributions





Results: Optimal Array Distribution



Conclusion

- Constrained variance estimated for current Argo array and future Argo arrays
- Monte-Carlo distributions show that pH is the easiest and oxygen is the hardest BGC variable to constrain
- Optimal arrays have large distributions in subtropical gyres and reduced density in western tropical pacific