



Supplement of

Reconstructing ocean carbon storage with CMIP6 Earth system models and synthetic Argo observations

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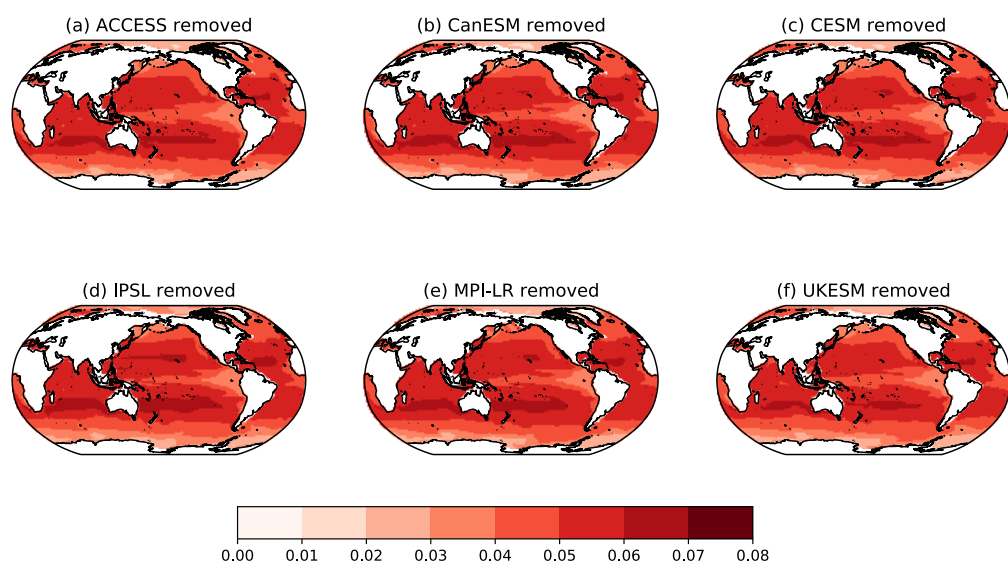


Figure S1: Optimal pCO₂ weights, in units mol C (ppm CO₂ m²)⁻¹, for solving integrated ocean DIC' between 0-100m using a subset of CMIP6 models. The subsets are created by removing the runs of each model: (a) ACCESS, (b) CanESM, (c) CESM, (d) IPSL, (e) MPI-LR, and (f) UKESM.

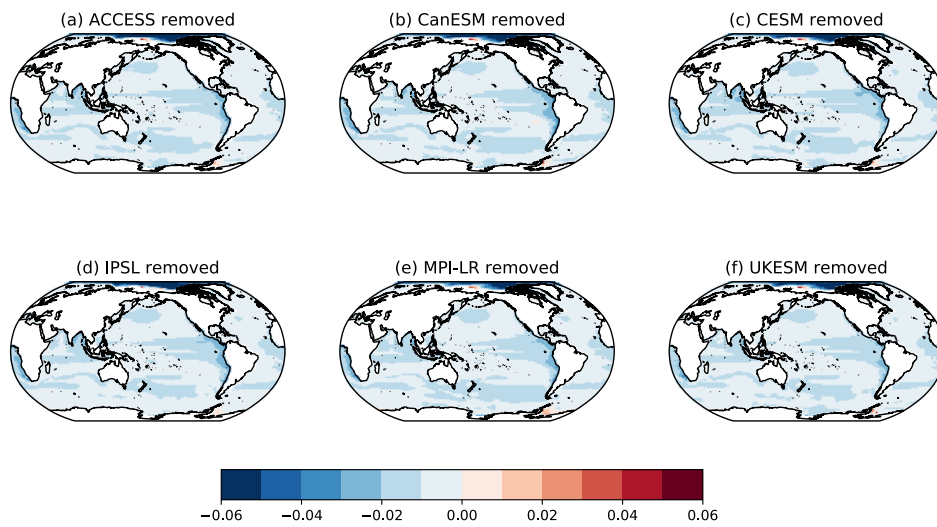


Figure S2: Optimal T' weights, in units $\text{mol C } (^\circ\text{C m}^2)^{-1}$, for solving integrated ocean DIC' between 0-100m using a subset of CMIP6 models. The subsets are created by removing the runs of each model: (a) ACCESS, (b) CanESM, (c) CESM, (d) IPSL, (e) MPI-LR, and (f) UKESM.

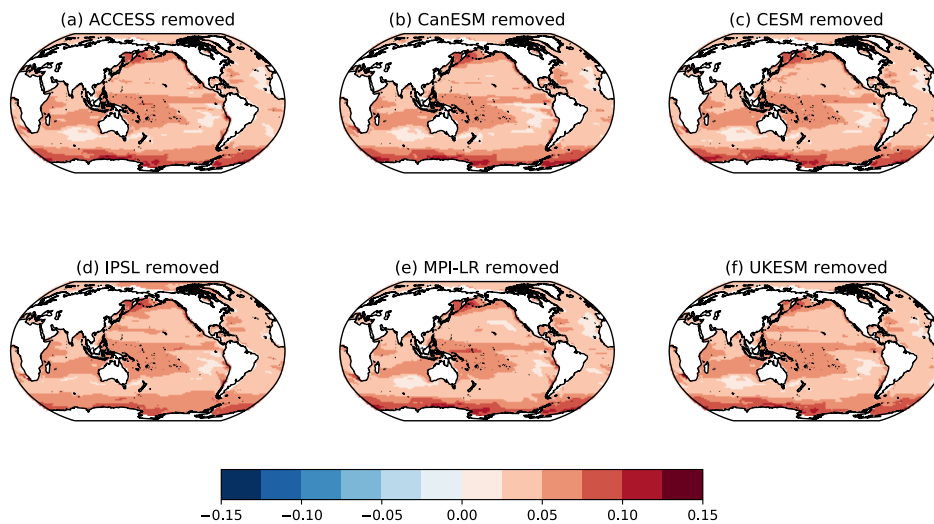


Figure S3: Optimal S' weights, in units $\text{mol C (psu m}^2\text{)}^{-1}$, for solving integrated ocean DIC' between 0-100m using a subset of CMIP6 models. The subsets are created by removing the runs of each model: (a) ACCESS, (b) CanESM, (c) CESM, (d) IPSL, (e) MPI-LR, and (f) UKESM.

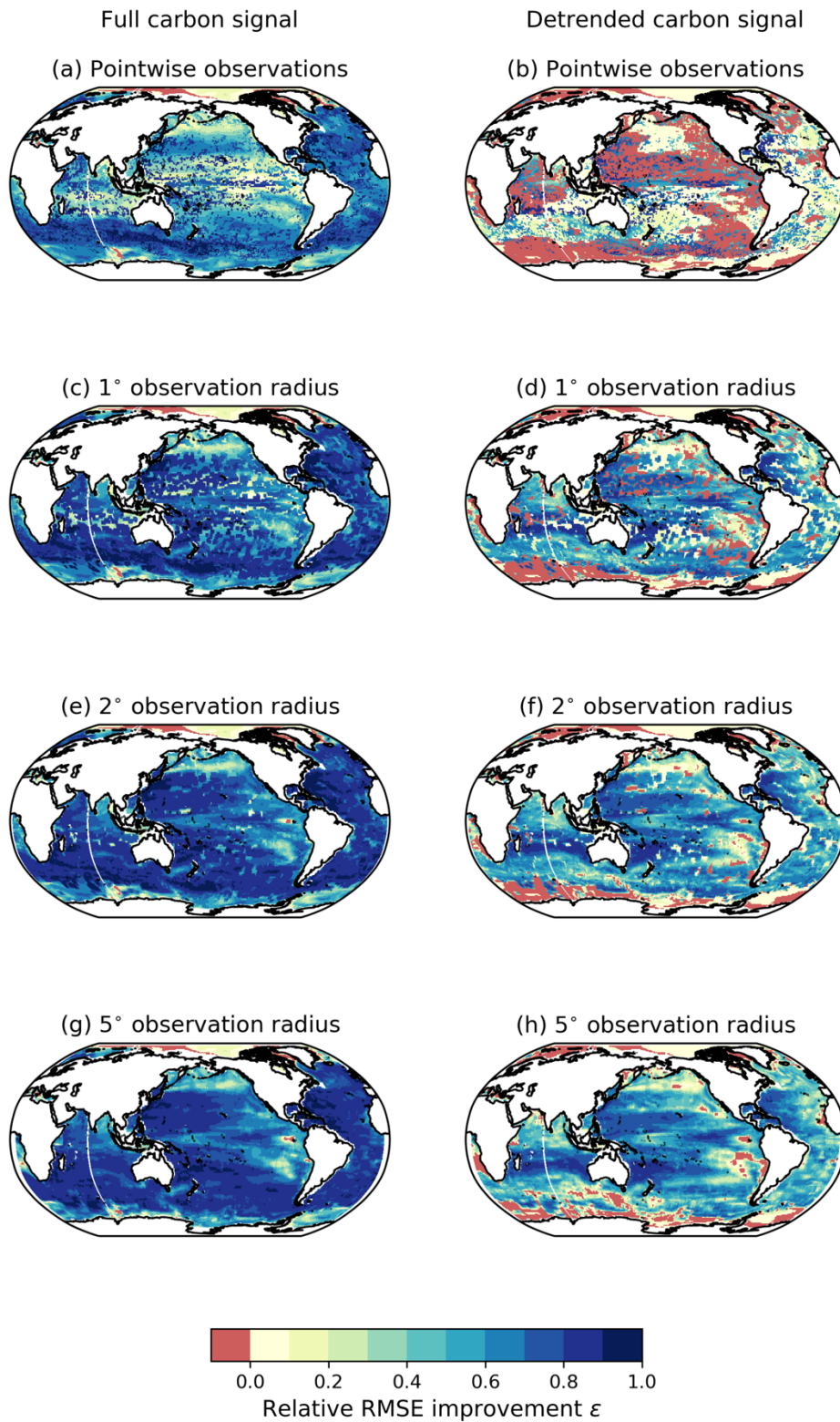


Figure S4: Relative RMSE reduction for NorESM 0-100m carbon changes (left column) and detrended 0-100m carbon changes (right column) using year 2015 Argo profile locations and different cutoff radii: (a,b) using only co-located temperature and salinity profiles, (c,d) using a cutoff radius of 1°, (e,f) using a cutoff radius of 2°, and (g,h) using a cutoff radius of 5°.

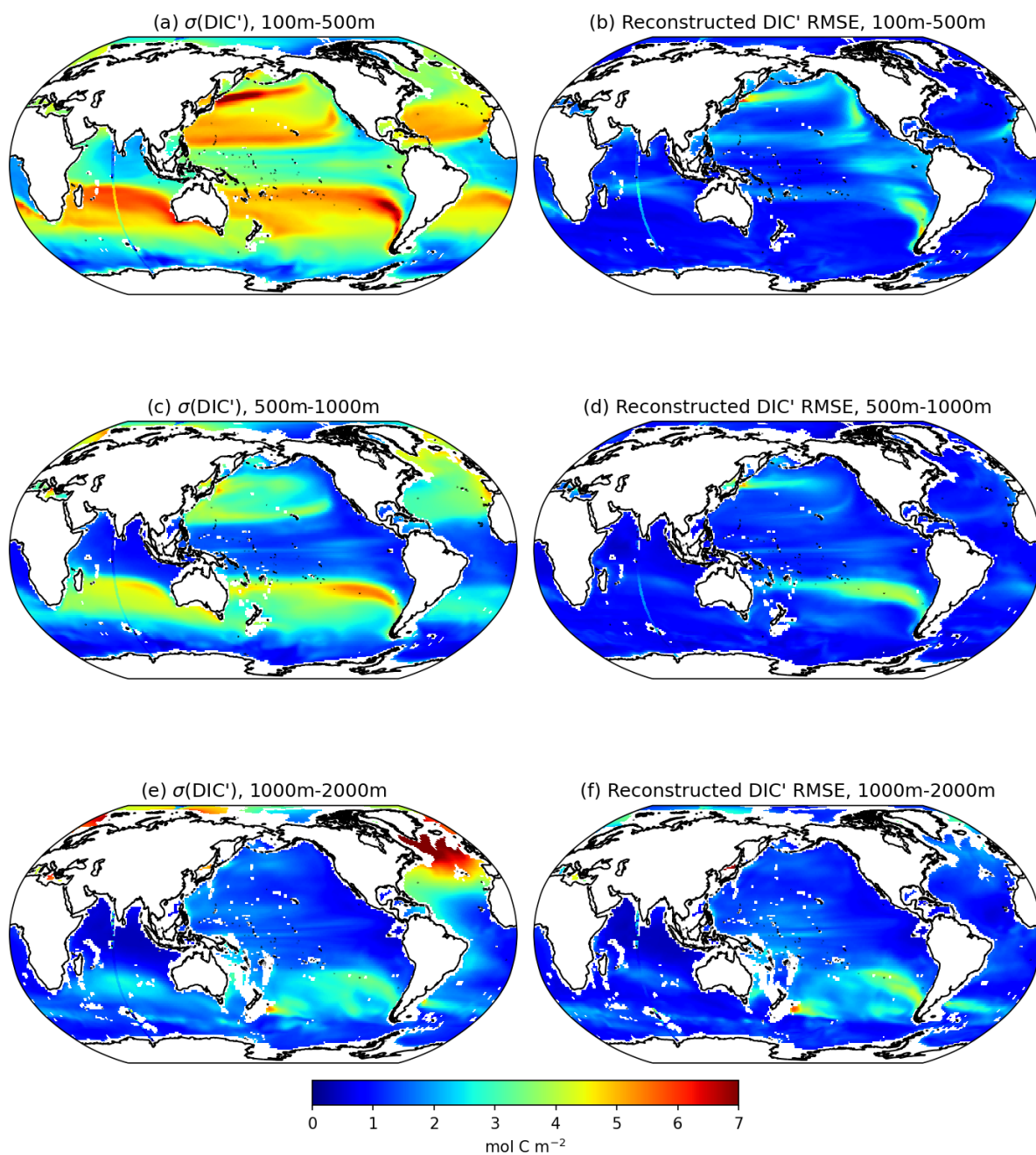


Figure S5: Average standard deviation in integrated interior DIC (left column) and RMSE for interior reconstructed DIC (right column) across the sensitivity ensemble. Standard deviations and RMSE are in units mol C m^{-2} . Depth levels are as follows: (a,b) 100m-500m, (c,d) 500m-1000m, and (e,f) 1000m-2000m.