Supplement for "Global air-sea heat and freshwater fluxes constrained by ocean observations"

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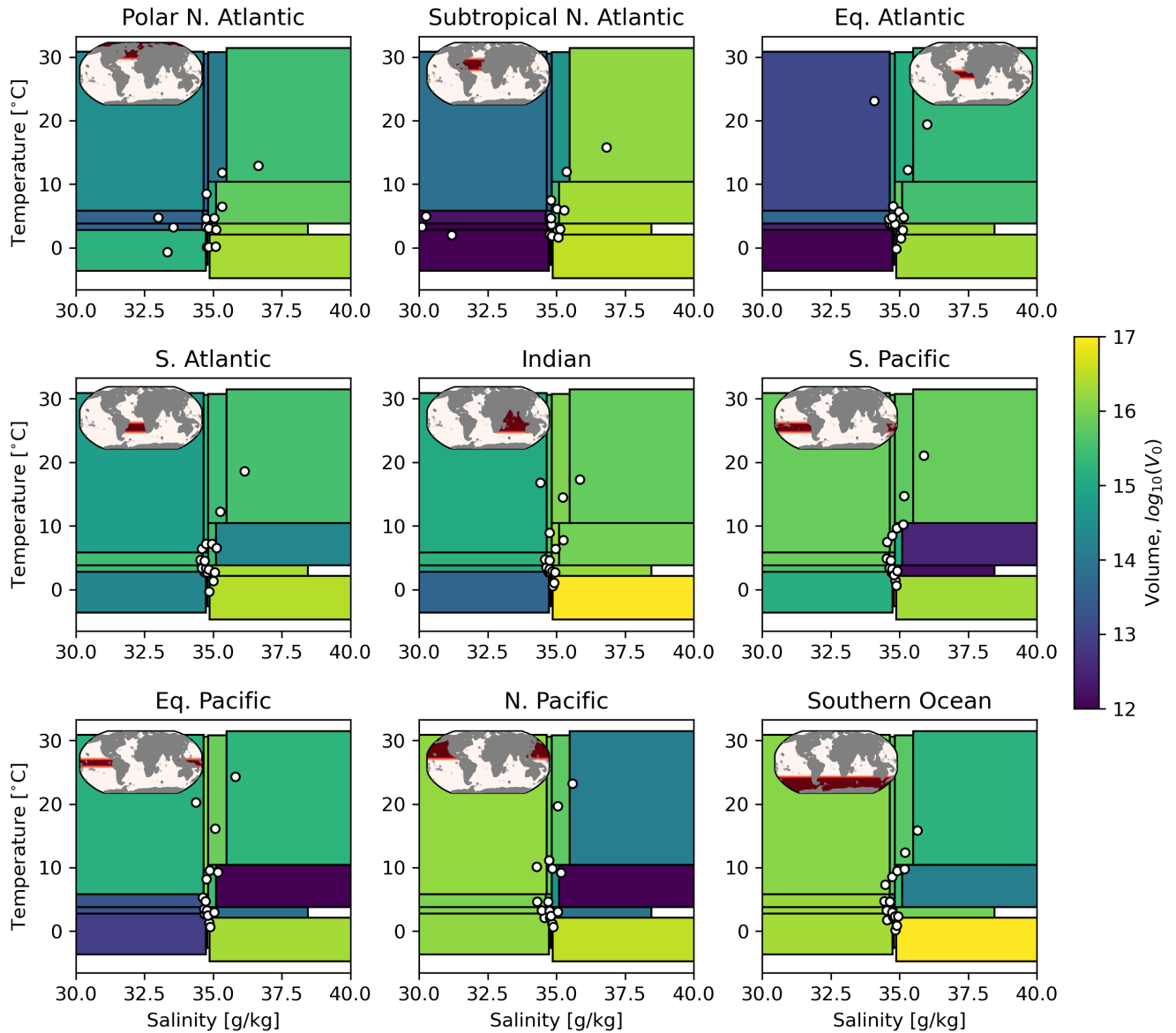
Figure S1. Demonstration of the coarsening achieved through Binary Space Partitioning of the IAP composite data set. Each coloured box represents a water mass in T-S space with time-mean T and S bounds as shown by the edges of the boxes. The colour of the box shows the volume held in each water mass. Inset maps show the geographic distribution of the basin that the T-S distribution describes. White dots represent the volume-averaged T and S in each water mass.
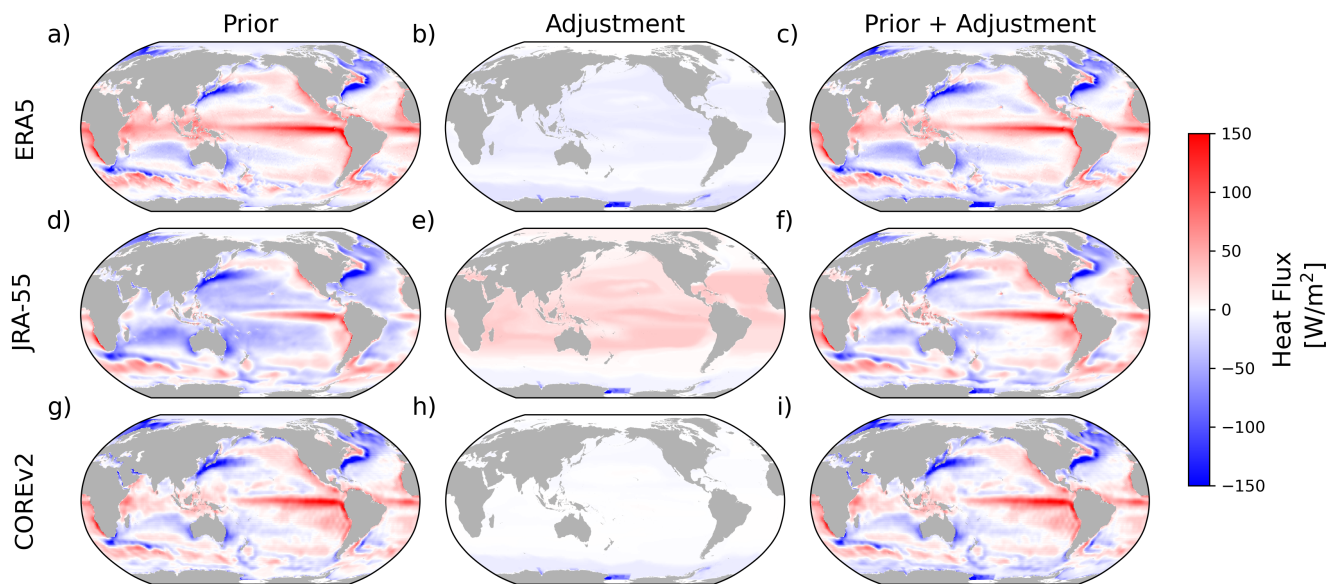
Figure S2. Time-mean surface heat fluxes and adjustments of reanalysis products when combined with IAP composite gridded data. a), d) and g) Time-mean prior surface air-sea heat fluxes in ERA5, JRA-55 and COREv2, respectively. b), e) and h) The inferred adjustment necessary to reconcile surface heat fluxes with the EN4-based ocean heat content tendency from OTM in ERA5, JRA-55 and COREv2, respectively. c), f) and i) the sum of the surface heat flux priors and the necessary adjustments in ERA5, JRA-55 and COREv2, respectively.
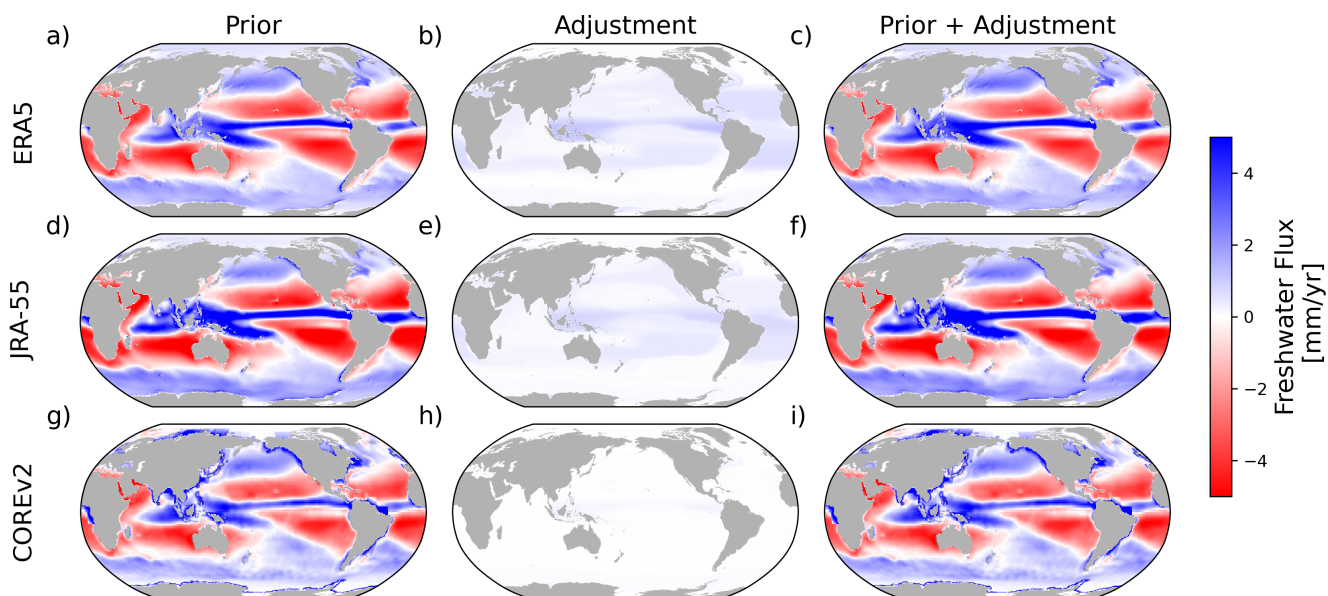
Figure S3. Time-mean surface freshwater fluxes and adjustments of reanalysis products when combined with IAP composite gridded data. a), d) and g) Time-mean prior surface air-sea freshwater fluxes in ERA5, JRA-55 and COREv2, respectively. b), e) and h) The inferred adjustment necessary to reconcile surface freshwater fluxes with the EN4-based ocean freshwater content tendency from OTM in ERA5, JRA-55 and COREv2, respectively. c), f) and i) the sum of the surface freshwater flux priors and the necessary adjustments in ERA5, JRA-55 and COREv2, respectively.
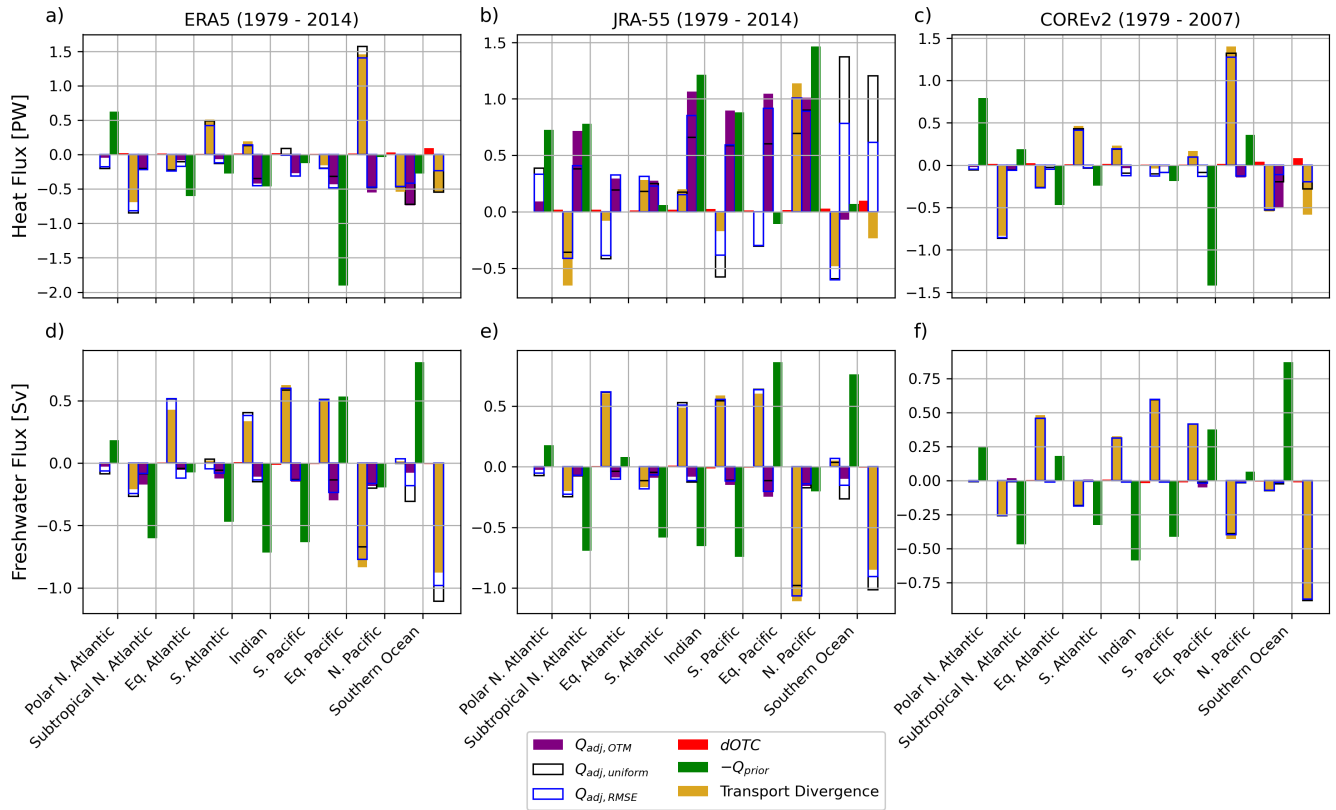
Figure S4. Time-mean basin-scale heat and freshwater budgets for reanalysis products combined with IAP composite observations. a) - c) Basin-scale heat budget terms for ERA5, JRA-55 and COREv2, respectively. d) - f) Basin-scale freshwater budget terms for ERA5, JRA-55 and COREv2, respectively. The geographic boundaries of basins is shown in the inset maps in figure S1.