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*Supplement of*

# Quantifying the near-term response of the ocean $CO_2$ sink to reduced atmospheric carbon concentrations

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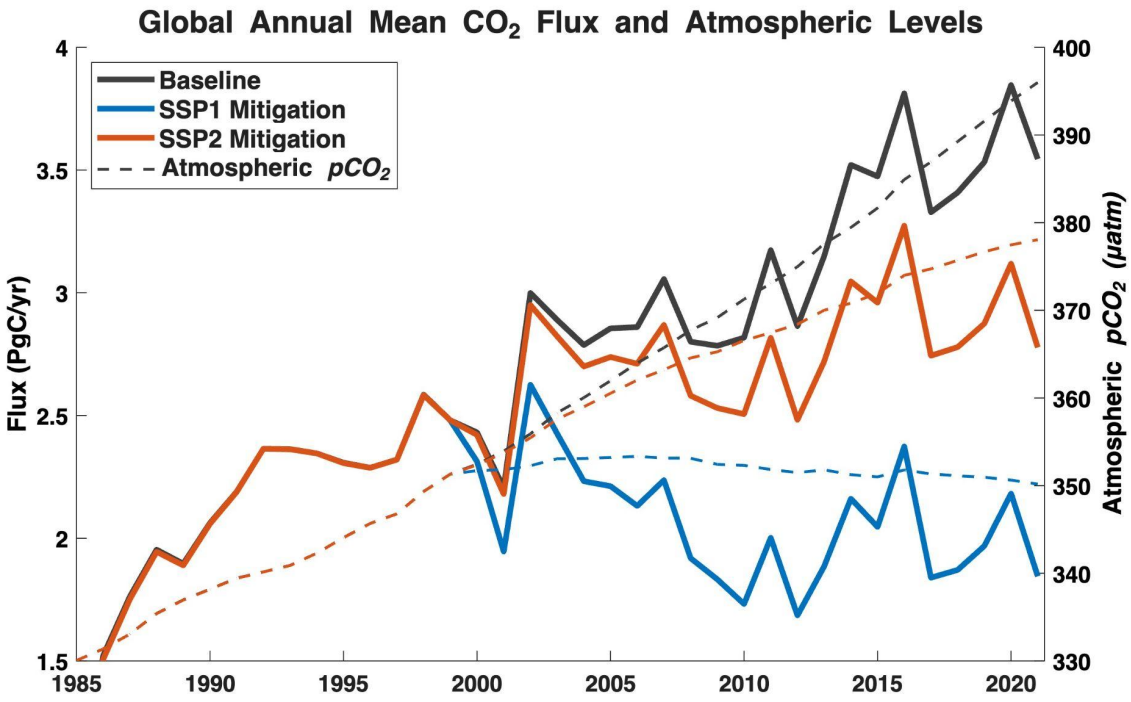



**Figure S1:** Annual-mean time series of air-sea $CO_2$ flux (solid lines) and atmospheric $pCO_2$ (dashed lines) for baseline and SSP mitigation simulations. Air-sea $CO_2$ flux is globally integrated, and atmospheric $pCO_2$ represents a global mean. Full time series presented here; SSP scenario forcing is applied in January 2000. Positive flux represents ocean uptake.

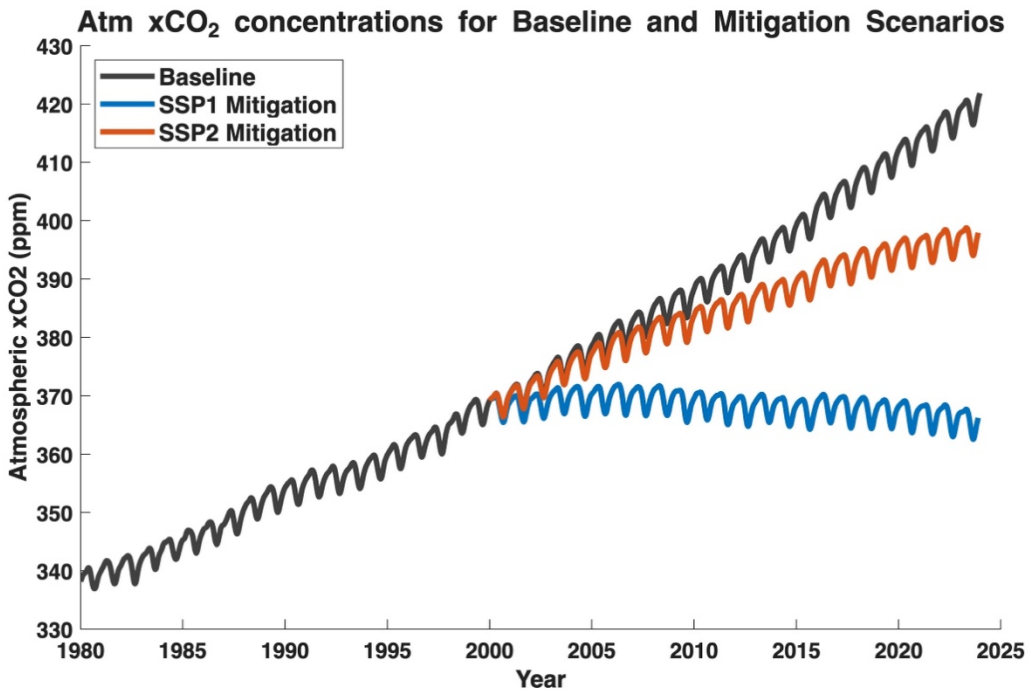



**Figure S2:** Monthly-mean time series of atmospheric $xCO_2$ for Baseline (black) and SSP mitigation simulations (SSP1: blue, SSP2: red). Atmospheric $xCO_2$ concentrations represents an area-weighted global mean. Full time series presented here with SSP scenario forcing reductions applied in January 2000.

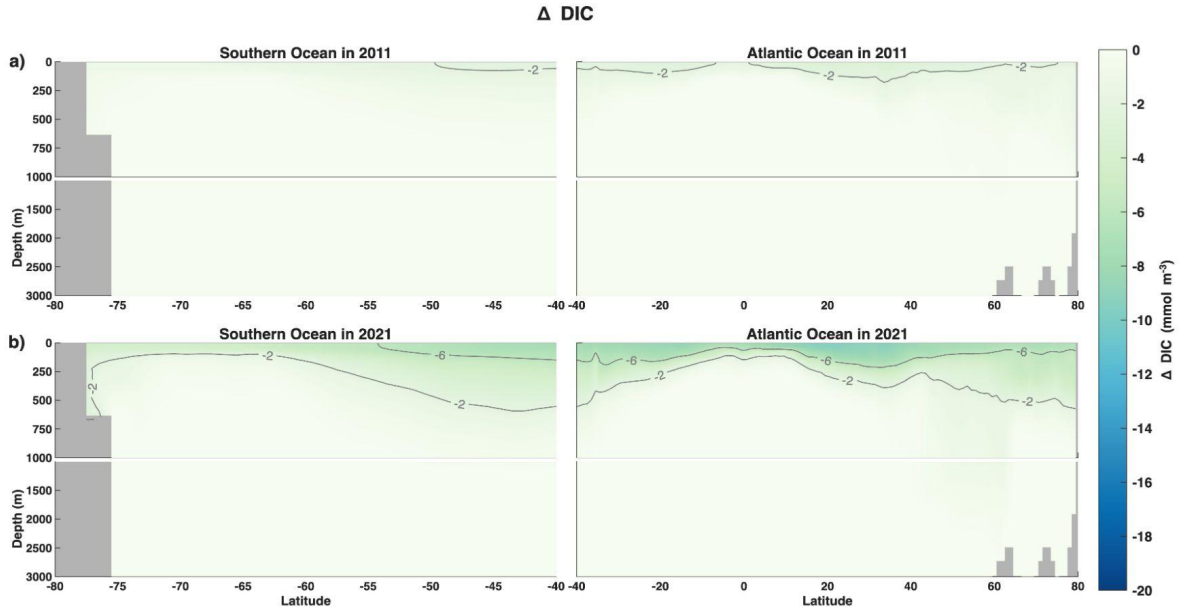



**Figure S3:** Southern Ocean and Atlantic basin-averaged zonal mean ΔDIC concentration (mmol $m^{-3}$) for SSP2 Mitigation minus Baseline. **a)** top panel shows changes in 2011 (11 years post mitigation), **b)** bottom panel shows 2021, (the last year of the simulation). Negative values (cooler colors) indicate more carbon accumulation in Baseline as compared to mitigation scenarios.

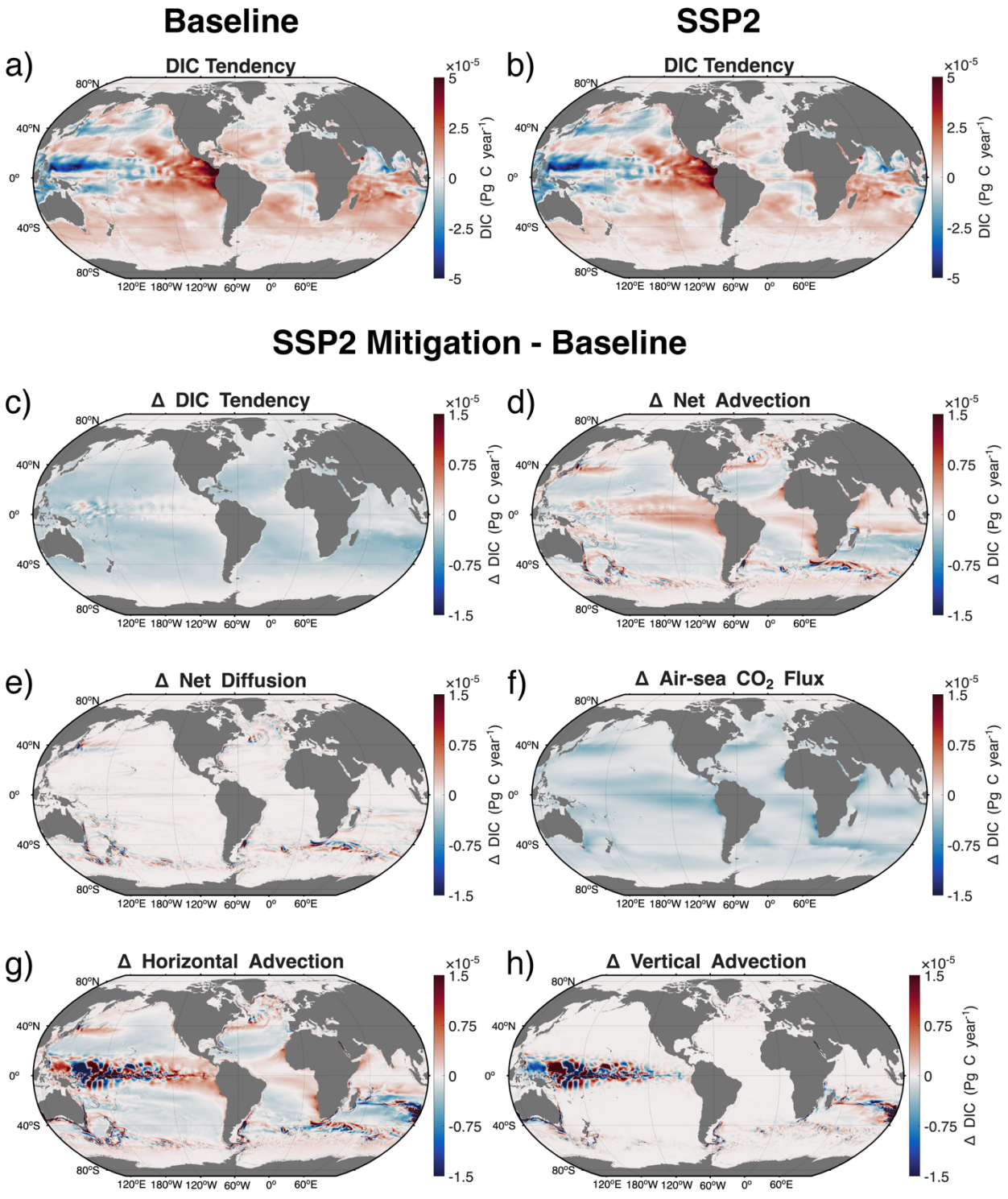



**Figure S4:** DIC budget. Time-mean (2016–2021) vertically integrated DIC tendency for **(a)** Baseline and **(b)** SSP2 Mitigation. Differences in ECCO-Darwin DIC budget terms (SSP2 Mitigation − Baseline) for surface-to-500 m vertically integrated 2016–2021 mean DIC tendency: **c)** tendency, **d)** net advection, **e)** net diffusion, and **f)** air-sea $CO_2$ flux. Net advection is further decomposed into **g)** horizontal and **h)** vertical components.

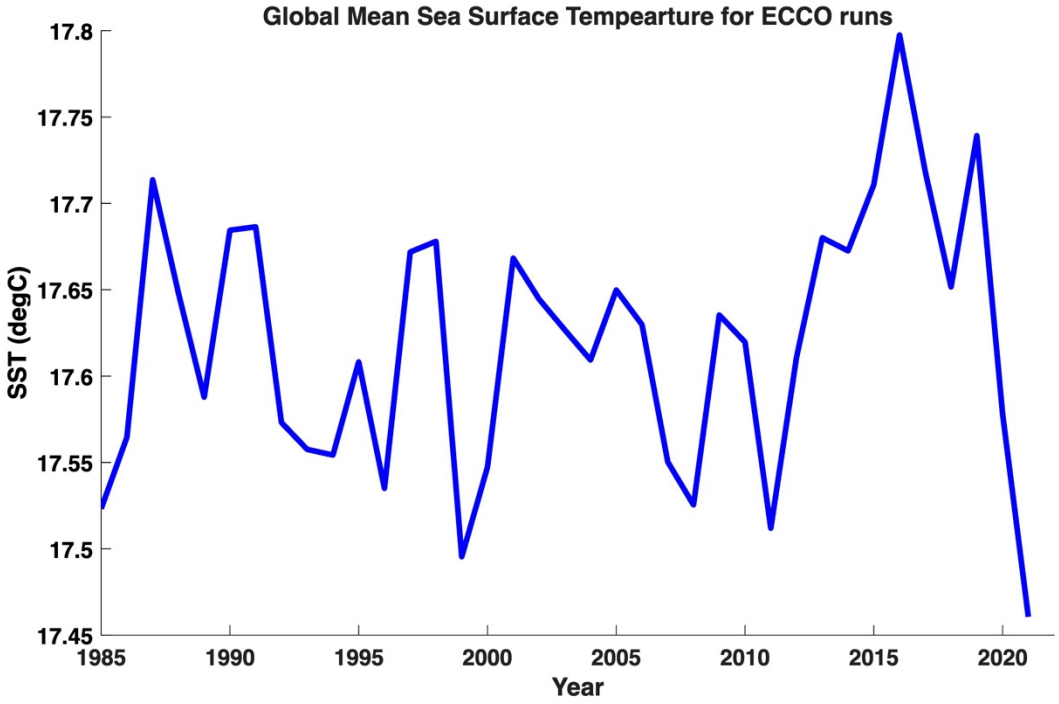



**Figure S5:** Global annual-mean time series of sea surface temperature which is unchanged between baseline and SSP mitigation simulations.