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**Topic:** Recent ocean salinity science advances

**Title:** COMPARISONS OF SALINITY AND TEMPERATURE BUDGETS IN THE UPPER OCEAN

**Abstract:** Recent work has shown that the drivers of the upper ocean temperature variability depend on time and spatial scales, with surface fluxes being more important for larger spatial scales ( $>O(100\text{km})$ ) and short ( $<14$  days) timescales, while oceanic processes dominate at smaller spatial and longer time scales. Further, heat anomalies are damped by an air-sea feedback through turbulent sensible and latent heat fluxes. We aim to contrast the upper ocean heat budget with the upper ocean salinity budget. Because salinity anomalies do not exhibit damping by air-sea fluxes, we hypothesize that they persist longer than temperature anomalies and that their evolution is more dependent on advection and internal ocean mixing.

We use a high-resolution coupled climate model with reasonable salinity variability (Laurindo et al. 2024) to quantify the relative roles of surface fluxes and ocean processes in natural variability of salinity. For monthly averaged fields of salinity integrated from the surface to 50m, oceanic advection dominates the grid-scale salinity budget, moreso than in the heat budget. For long (interannual to decadal) timescales, the budget is more complex, and while advection is the main term, surface fluxes and ocean mixing also play key roles. Advection is most important for deeper integrations of the budget to below 100m. For short timescales (less than 14 days) combined with large spatial scales, surface fluxes dominate the salinity budget, similar to the heat budget.

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