Volume & Heat Budgets in the Coastal California Current – Revisited

THEMES = ADJOINT SENSITIVITY, REGIONAL STATE ESTIMATES, CALIFORNIA CURRENT, REMOTE FORCING, BUDGET CLOSURE

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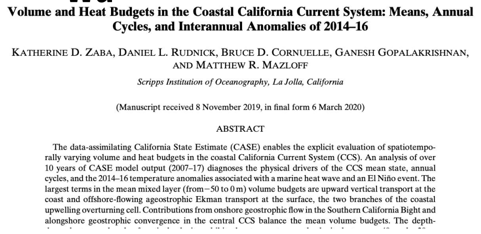
GOALS –

1) **Close the volume & heat budgets for Zaba et al. model region**, using the ECCO Central Estimate
2) Perform a sensitivity analysis to identify drivers of variability in the heat & volume budgets–**do our results agree with Zaba et al. findings?**
3) Literature identifies coastally-trapped waves as mechanism for persistent thermosteric anomaly along California coast–**does this anomaly appear in the Central Estimate?**


Volume and Heat Budgets in the Coastal California Current System: Means, Annual Cycles, and Interannual Anomalies of 2014–16

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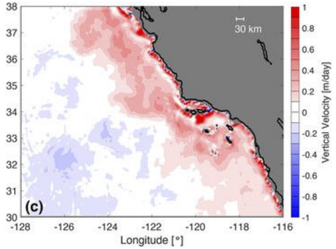
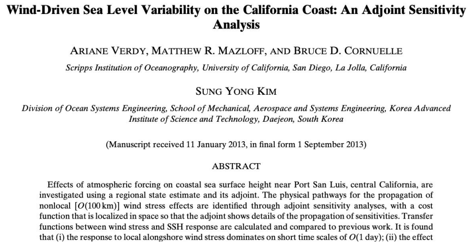
ABSTRACT

The data-assimilating California State Estimate (CASE) enables the explicit evaluation of spatiotemporally varying volume and heat budgets in the coastal California Current System (CCS). An analysis of over 10 years of CASE model output (2007–17) diagnoses the physical drivers of the CCS mean state, annual cycles, and the 2014–16 temperature anomalies associated with a marine heat wave and an El Niño event. The largest terms in the mean mixed layer (from −50 to 0 m) volume budgets are upward vertical transport at the coast and offshore-flowing ageostrophic Ekman transport at the surface, the two branches of the coastal upwelling overturning cell. Contributions from onshore geostrophic flow in the Southern California Bight and alongshore geostrophic convergence in the central CCS balance the mean volume budgets. The depth-

SKILLS & TOOLS USED –

- Accessing & visualizing ECCO Central Estimate output
- Closing volume & heat budgets
- Adjoint sensitivity analysis
- ECCO Modeling Utilities (EMU)
- ecco_v4_py




Wind-Driven Sea Level Variability on the California Coast: An Adjoint Sensitivity Analysis

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ABSTRACT

Effects of atmospheric forcing on coastal sea surface height near Port San Luis, central California, are investigated using a regional state estimate and its adjoint. The physical pathways for the propagation of nonlocal [O(100 km)] wind stress effects are identified through adjoint sensitivity analyses, with a cost function that is localized in space so that the adjoint shows details of the propagation of sensitivities. Transfer functions between wind stress and SSH response are calculated and compared to previous work. It is found that (i) the response to local alongshore wind stress dominates on short time scales of O(1 day); (ii) the effect