

Abstract Submitted
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A simple model of the effect of ocean ventilation on ocean heat uptake BALU NADIGA, NATHAN URBAN, Los Alamos National Lab — Transport of water from the surface mixed layer into the ocean interior is achieved, in large part, by the process of ventilation—a process associated with outcropping isopycnals. Starting from such a configuration of outcropping isopycnals, we derive a simple model of the effect of ventilation on ocean uptake of anomalous radiative forcing. This model can be seen as an improvement of the popular anomaly-diffusing class of energy balance models (AD-EBM) that are routinely employed to analyze and emulate the warming response of both observed and simulated Earth system. We demonstrate that neither multi-layer, nor continuous-diffusion AD-EBM variants can properly represent both surface-warming and the vertical distribution of ocean heat uptake. The new model overcomes this deficiency. The simplicity of the models notwithstanding, the analysis presented and the necessity of the modification is indicative of the role played by processes related to the down-welling branch of global ocean circulation in shaping the vertical distribution of ocean heat uptake.

Balu Nadiga
Los Alamos National Lab

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