

## **The ECCO Consortium: Distinguishing decadal sea level change due to heating and freshwater input from redistribution by ocean circulation**

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The geographic variations of sea level trend are studied in relation to their global mean by analyzing regional differences of the effects of external forcing and ocean circulation. The ECCO-GODAE ocean synthesis of satellite and in situ measurements is employed to study the observed changes from 1993 to 2004. Regional sea level change is shown to be largely due to changes in heat and freshwater content of the ocean. Vertically integrated regional mass changes, i.e., barotropic sea level trends, are negligible. The effects of external diabatic forcing and those of ocean circulation are distinguished from each other by using a simulated passive tracer to quantify the relative change in heat and freshwater distribution caused by these respective processes. Regional sea level change can mostly be attributed to depth-dependent water mass redistribution by changing ocean circulation. Direct diabatic changes due to external heat and freshwater forcings are found to be secondary except for a warming in the warm pool region of the Equatorial Pacific Ocean. The nature of these changes and their implications will be described.