



Modelling the oceanic heat and freshwater content using a volume constraint

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The global heat and freshwater content in the last decade has been modelled with a ocean general circulation model with data assimilation. The model exchanges heat and freshwater with the atmosphere. Steric expansion is included. Thus the model conserves mass in favour of volume conservation. Volume anomalies are provided by satellite altimetry. Their timeseries can reasonably well be modelled with minor adjustments in the surface fluxes in the framework of 4DVAR assimilation. Heat and freshwater budgets are presented and compared to measurements where available. In addition variations in ocean mass derived from the heat and freshwater budgets are compared to estimates of gravity anomalies provided by the GRACE mission.