



## **Understanding the heat and salinity changes in the ocean interior over the last decades: an analysis of the CMIP models in density space**

Yona Silvy (1), Eric Guilyardi (1), Jean-Baptiste Sallée (1), Paul Durack (2), and Peter Gleckler (2)

(1) CNRS, LOCEAN, UPMC case 100, Paris, France ([eric.guilyardi@locean-ipsl.upmc.fr](mailto:eric.guilyardi@locean-ipsl.upmc.fr)), (2) PCMDI, USA

Multi-decadal ocean temperature and salinity change, a key element of climate variability and change, is not well constrained by available observation. In this study, we use global climate models (from the CMIP5 and CMIP3 model suites) and observational analyses to investigate the global and regional distribution of temperature and salinity changes in the neutral density space. Unlike the more classical fixed-depth heat content diagnostics, isopycnal analysis provides a lagrangian view of ocean property changes that can be directly related to surface fluxes and upper ocean water mass transformation, while essentially ignoring isopycnal heave. The comparison of pre-industrial, historical (1860-2005) and historical with natural forcings only simulations allows us to precisely describe where the heat and salt is stored as a result of anthropogenic forcing. The global and regional distribution of isopycnals in the models can also be evaluated against recent (ARGO) observations with better spatio-temporal coverage. It is shown that a large fraction of changes from sub-tropics to mid-latitudes is due to the poleward migration of isopycnals.