

Validation of numerical model in Pacific Ocean with ARGO data



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ABSTRACT

We validated the ocean circulation model based on GFDL MOM3.1 using in-situ data including ARGO floats. Time-longitude diagram of the depth of the 20 isotherm (Z20) reasonably shows the interannual variability of the thermocline over the tropical Pacific. However, simulated Z20 is relatively low compared to that of observation. This result comes from the cold bias associated with the strong equatorial upwelling in the central and eastern Pacific.

Another validation is the variability of subsurface zonal current in the equatorial ocean. Disappearance of equatorial undercurrent during the 1982-1983 strong El Niño coincides with the observation evidences.

We also calculated the regional and seasonal T-S diagrams in North Pacific Ocean. Simulated water masses derived from T-S diagram are consistent with ARGO data especially in the mid and low latitudinal areas. However, some discrepancies have been found, those are permanent low salinity (high temperature) in the mid (high) latitude regions and low salinity at surface layer around equatorial region in summer season.

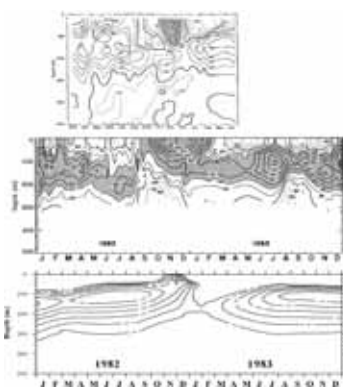
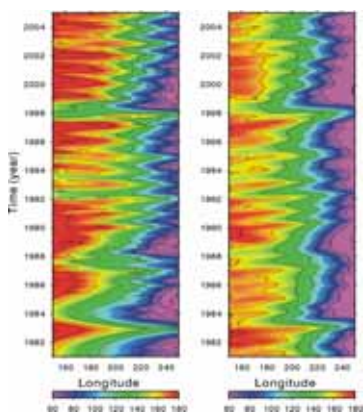
We will apply to various mixing schemes which were not considered in present study and higher grid resolution in order to solve the systematic model bias.

MODEL DESCRIPTION

GFDL MOM3.1

Zonal resolution : uniform 2° / Meridional resolution : 1° (eq.) – 4° (high lat.)
 Vertical level : 29 non-uniform level (thickness : 20 m (surface) – 750 m (bottom))
 Monthly mean surface boundary condition, HR wind stress, Scripps topography, Explicit free surface condition, horizontal eddy viscosity and diffusivity(10⁷cm²/s), PP vertical mixing, Integration for 100 years, Reproducing for 34 years

Z20 and EQUATORIAL UNDER CURRENT



Zonal velocity (cm/s) time series at 159°W in the observation from Firing *et al.* (1983) (top), model from Brady (1994) (middle), and MOM3 used in the present study (velocities more than 40 cm/s are shown in the bottom panel).

Hovmöller diagram of 20 °C isotherm depth averaged over the 5°S-5°N from observation (left) and model (right). We use buoy data from TAO/TRITON.

T-S DIAGRAM

T-S diagram in 10° by 10° grid in 2003 year. Red points are model results and blue points are ARGO data.



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