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Verification for subsurface oceanic structure in OFES outputs driven by different wind data sets (NCEP/NCAR and QSCAT)in the tropical Pacific Ocean

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1 Introduction
OFES is a numerical model that reproduces oceanic circulation and structure with high resolution by inputting sea surface flux (momentum heat and freshwater). Intercomparison between two types of OFESruns (NCEPrun and QSCATrun) driven by different wind datasets with no different surface heat flux revealed that the thermocline depth near 10°N is about 50m shallower in the NCEPrun than that in the QSCATrun. The integrated meridional geostrophic transports from the east boundary in the NCEPrun are about 10Sv larger than in the QSCATrun (Kutsuwada et al 2018).
In this study we examine oceanic structures and zonally-integrated meridional geostrophic transports in the southern hemisphere by making intercomparison between the two OFES runs together with comparison with the MOAA-GPV data set constructed by Argo float observations.
2 Data
OFES is high resolution semi-global ocean circulation model developed by JAMSTEC based on Modular Ocean Model ver.3 developed by NOAA. It can reproduce ocean circulation and structure with high resolution. As the external force driving the model we use two different types of wind data sets by numerical re-analysis (NCEP NCAR) and satellite measurement (QuikSCAT).
We averaged spatially for horizontal resolution from 0.1°x0.1°to 1°x1°. In the vertical direction we converted all simulated data such as temperature salinity and current with depth interval of 10m using Akima-method from sea surface(2.5m) to 6065m.
3 Method
Using dynamic height anomaly we calculate geostrophic current that is integrated vertically from sea surface to depth h (m). We use the depth of no motion of 2000m.The meridional Sverdrup transport corresponds vertically integrated flow from sea surface to depth of no motion (the maximum depth of wind driven circulation) and is given by the sum of the Ekman transport (calculated from Coriolis parameter and zonal wind-stress) and geostrophic transport.
In this study we verify the correspondence between geostrophic transports which are obtained from oceanic data and wind-driven transports calculated from sea surface wind data.
4 Result
The thermocline depth near 10S in the NCEPrun is about 50m shallower than that in the QSCATrun. The zonally-integrated meridional geostrophic transports from the east boundary in the NCEPrun is 10 Sv smaller than in the QSCATrun. Comparison of the two runs with the MOAA-GPV showed that the temperatures in the NCEPrun are lower than those in the MOAA-GPV at 50-400m depth while the QSCATruns is almost similar to the MOAA-GPV above 200m. In comparison for the integrated meridional geostrophic transports the values in the QSCATrun are smaller than those in the NCEPrun and similar to those in the MOAA-GPV. These results mean that in the southern hemisphere the QSCATrun reproduces real oceanic structures with higher reliability than the NCEPs one the same as that in the northern hemisphere.
Comparison in the meridional profile of zonally-averaged wind stress curl (WSC) showed that the NCEPs

WSC has larger values in a zone of 10°S corresponding to negative maximum than the QSCAT and also the same differences as that in a zone of 10°N corresponding to positive maximum. The geostrophic transports from the QSCATrun correspond the wind-driven flow calculated from QSCATs wind data closely at low latitude which suggests that the Sverdrup balance holds in these regions.