

Meridional transport in the South Pacific: Assessing ENSO and SAM related variability

The meridional transport through the Pacific projects strongly onto climate variability. This study investigates the relative roles of the tropics and of Southern Ocean westerly winds in driving transport changes within the mid-latitude south Pacific. Gridded Argo temperature and salinity profiles and atmospheric reanalysis surface winds are used to study the time variability of the meridional transport in the South Pacific Ocean over the 2004-2012 period. North of 32°S, the 0-2000 m geostrophic transport is oriented northward and the Ekman transport is oriented southward. The residual of the basin-wide geostrophic transport and Ekman transport is 10-14 Sv at 32°-5°S, consistent with observations of the volume transport in the main passages of the Indonesian Seas. The ± 2 Sv uncertainty in the Indonesian Throughflow transport results from heterogeneous float sampling density. At interannual time scales, the geostrophic transport north of 11°S shows a strong El Niño Southern Oscillation (ENSO) signature characterized by an increase during La Niña and a decrease during El Niño. The ENSO signature is less evident at 11°-27°S. South of 27°S, geostrophic transport shows a Southern Annular Mode (SAM) signal characterized by an increase during the positive phase of the SAM and a decrease during the negative phase of the SAM. The interannual variability of the geostrophic transport north of 11°S is twice the variability south of 27°S.