



Detecting Low-Frequency Mass Exchange between Ocean Basins

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It has been known for some time that there is a seasonal exchange of water mass between the Pacific and Atlantic Oceans that is driven by wind forcing. This appears as a leading mode in the barotropic component in most global ocean models. Using 6+ years of data from GRACE and steric-corrected altimetry for the Atlantic, Pacific, and Indian Ocean basins we will show that there are also large, interannual variations as well. We find negatively correlated variations at the Chandler period over the entire Atlantic and Pacific basins, indicating significant exchange at this period. Similar variations are also observed in ocean models, although a model driven by ECMWF winds agrees better with the observations. Both the model and the observations (GRACE and steric-corrected altimetry) show an additional multi-year shift in mass from the Atlantic into the Pacific in late 2006, although the model under-predicts the size by nearly 50% compared to the observations. Correlations with the Southern Ocean winds stress (from QuickScatt) are examined. We find that the seasonal and Chandler period mass exchanges are highly correlated with the zonally averaged wind-stress in the South Pacific. However, there are no longer period fluctuations in wind stress, which suggests a different forcing mechanism.