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Interannual geocenter motion with relation to El Nino Southern Oscillation

The position of geocenter is constantly changing in accordance with the variation of the Earth's mass distribution. At present, the satellite laser ranging (SLR) is the best technique to monitor the geocenter motion. SLR observation shows the seasonal geocenter motion of about 4 mm, which is mainly caused by atmospheric and hydrologic mass redistribution. SLR observation also shows the linear geocenter motion of about 1 mm/yr in the 2000s, which can be explained by recent mass losses in polar ice-sheets. In addition to these changes, the interannual geocenter motion up to about 4 mm is also detected in SLR observation, but its cause still remains unclear. According to recent satellite geodetic observations, the temporal variation of the earth's geophysical fluid has close relation with the occurrence of El-Nino Southern Oscillation (ENSO) at the interannual time scale. For example, satellite gravimetry by GRACE detected the interannual gravity variation by ENSO precipitation anomaly in tropical regions. Also, satellite altimetry showed the high correlation between the interannual sea level variations and the occurrence of ENSO. Given these facts, it can be speculated that the interannual variability in geoceter motion can be explained by the surface mass redistribution associated with the occurrence of ENSO. In this study, we investigated the relationship between interannual geocenter motion and the occurrence of ENSO by utilizing the satellite geodetic data and the earth's geophysical fluid models.