

Analysis of GPS water vapor variability during the 2011 La Niña event over the western Pacific Ocean

ABSTRACT

We analyzed the variability of global positioning system (GPS) water vapor during the 2011 La Niña events over the western Pacific Ocean. The precipitable water vapor (PWV) derived from the UMSK (Malaysia) GPS station was investigated and compared with four other selected GPS stations: NTUS (Singapore), PIMO (Philippines), BAKO (Indonesia) and TOW2 (Australia). Analysis of the correlation between PWV and the sea-surface temperature anomaly (SSTa) on a weekly basis for the three La Niña cases of January–February–March, August–September–October, and October–November–December was used as an indicator of the influence of the El Niño Southern Oscillation. A good relationship between GPS PWV and SSTa for the Niño 4 region, with correlation coefficients between -0.91 and -0.94, was observed for the August–September–October and October–November–December cases. During the 2011 La Niña events, the water vapor was seen to increase to about 8.39 mm for the October–November–December case, with decreases of about 4.20 mm for the remaining months, compared to the mean 2011 value. This implies that during these events, the precipitation in the western Pacific is increased, due to stronger easterly trade winds blowing along the eastern Pacific Ocean than along the western Pacific, and a mass of warm water moving westwards, thereby increasing the evaporation.