

Remote Sensing of the Davao atmosphere using GNSS and radiosonde data for 2013-2015

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One GNSS receiver installed at Davao University was utilized to obtain estimates of the atmospheric water vapor content in Davao City for the years 2013-2015. The datasets from the local radiosonde station was used to verify the measured GNSS-derived precipitable water vapor (PWV) and a significantly strong correlation ($R=0.871$) was calculated. The parameter water vapor weighted mean temperature, T_m is a significant factor in deriving PWV values from GNSS satellite data. A local T_m model utilizing the datasets from the Davao City radiosonde station was derived and validated by comparison to the global and regional models. Time series plots were made out of the calculated GNSS PWV values for the years 2013, 2014 and 2015 to test for any annual, seasonal and monthly variations. Results from analysis of variance (ANOVA) with post-hoc tests showed that significant differences were measured in the PWV means for the three years tested. There were also significant differences in the PWV averages for the dry and wet season as well as between the cool dry, hot dry and wet seasons. The results for the monthly variations agree well with the wet and dry seasons with the month of February (2013-2015) getting the lowest average monthly value of GNSS PWV and the months of May (2013, 2015) and June (2014) the highest. The temporal behavior of GNSS PWV was also evaluated for moderate to torrential rain events. It was shown that while moderate rain follows small variations in PWV, heavy torrential rains usually follow a peak in the PWV value with a time lag ranging from 2 –8 hours.

Keywords: GNSS, Atmospheric Water vapor, rain events