

On the assimilation of GNSS-PWV measurements in Heavy to Torrential Rain events in Davao City, Philippines

*Kristine Mae Rodriguez Carnicer^{1,3}, Rui Fernandes², Edgar Vallar¹, Maria Cecilia Galvez¹

1. Environment and RemoTe sensing ResearchH (EARTH) Laboratory, Physics Department, De La Salle University, Philippines, 2. Space and Earth Geodetic Analysis Laboratory (SEGAL), University of Biera Interior, Portugal, 3. Ateneo de Davao University, Philippines

Precipitable water vapor (PWV) measurements derived from the datasets of a single standalone GNSS receiver was conducted in Davao City, Philippines (7°4' N, 125°36' E) for the years 2013 to 2016. The primary goal of the study is to monitor the variability of the GNSS-PWV estimates during heavy to torrential rain events. Several papers have made case studies on precipitation and atmospheric water vapor and most studies have supported the existence of the positive correlation between PWV and rain. These studies implied that a better analysis of the distribution of water vapor is a key factor to better understand the initiation of precipitation and provide more accurate forecasts of such events. In the present study, time series plots were made to provide a better picture of the variability of PWV for each rain event. It can be observed that while moderate rain follows small variations in PWV, heavy to torrential rains usually follows a peak in PWV. A time lag of approximately 2-8 hours is observed between the two peaks. Intense to torrential rains would always be followed by a decrease of about 5-10 mm in PWV. In addition, a build-up of PWV is observed prior to intense to torrential rain. However, the maximum PWV value that precedes each rain event varies depending on the season and no cut-off value of PWV had been noted that predicts the occurrence of heavy to torrential rain events.

Keywords: GNSS-Precipitable Water Vapor , Rain events, Atmospheric water vapor