



Analysis of weighted mean temperature of Algeria for GNSS water vapor sounding

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Atmospheric water vapour is important for the climate system and a key to understand the hydrological cycle. The hydrological cycle describes the transfer of water in solid, liquid and gaseous form through these phases as well as the physical movement of water within the ecosystem of the earth and between its atmospheres; oceans and continents. Nowadays the accuracy of water vapour estimates based on GNSS observations is comparable to radiosonde and radiometer data. On the other hand, the solution of GNSS precipitable water vapour can be quantified the radiosonde humidity errors and biases with the role of radiosonde observations in the climate studies. The weighted mean temperature in troposphere is a critical parameter in the conversion of wet zenith delay to perceptible water vapour in GNSS Meteorology. In the retrieval of integrated water vapour from GNSS zenith wet delay, effect of temperature is to be taken into account. However, effect of temperature and water vapour partial pressure are interrelated. Therefore, the vertical profiles of temperature are taken into account through a term called weighted mean temperature. In this study, we processed the radiosonde data which are provided by World Meteorological Observation network and surface temperature data at 5 stations in Algeria from 2006 to 2007 to determine weighted mean temperature equation. The coefficients a and b are of weighted mean temperature linear equation were determined by a least square regression method of the 4,944 data pairs after outlier data, which are over 3σ of differences between mean temperature in troposphere and surface temperature, were eliminated. Finally, we determined the Algerian weighted mean temperature model (AWMTM) that the relationship between mean temperature as function of surface temperature for the entire Algerian area, with the RMSE and the correlation coefficient of AWMTM are represented about 6.80 K and 0.75, respectively. The stations which are located in desert area, DAOR, DAUI and DAAT, show higher value on maximum temperature during summer season than other stations (DAAG, DAOF). We suggest the GPS meteorology is very useful technique for the sensing of water vapour in the region with insufficient water, such as Algeria. So that we expect that the AWMTM developed by this study will be directly used for the first experiment of Algerian GPS meteorology after Algerian CORS will be constructed.