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On the determination of weighted mean temperature in Indonesia

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The mean temperature weighted with water vapor pressure (Tm) is an important parameter to obtain precipitable water vapor (PWV) from the Global Navigation Satellite Systems (GNSS) observations. This study investigates the possible impacts of equatorial troposphere on Tm estimates and its relation with surface temperature Ts. We calculated Tm in Indonesia from a Numerical Weather Model at nine InaCORS sites. We used 3-hourly ERA5 pressure, temperature, and humidity profiles for the year 2019. We found that Tm and surface temperature Ts in Indonesia have low correlation, less than 0.4. Seasonal and site-specific Tm-Ts relationships have slightly higher correlation, although the values can vary significantly. The highest correlation of around 0.7 is found at site CPUT in Kalimantan. We calculated Tm at nine additional stations in Kalimantan and found that stations located farther from the coast tend to have higher correlation, independent of the seasons. This suggests that Tm is also influenced by the vicinity to the coast. Based on our findings, the use of a general Tm-Ts relationship in Indonesia may not be appropriate. Further studies are necessary to develop an improved Tm over Indonesian region.