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Assessment of single-frequency observations in GNSS Tropospheric Tomography

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Water vapor is one of the most variable components in the Earth's atmosphere, which has a significant role in the formation of clouds, rain and snow, air pollution and acid rain. Therefore, increasing the accuracy of estimated water vapor can lead to more accurate predictions of severe weather, upcoming storms, and reducing natural hazards. In recent years, GNSS has turned out to be a valuable tool for remotely sensing the atmosphere. GNSS tomography is one of the most valuable tools to reconstruct the Spatio-temporal structure of the troposphere. However, locating dual-frequency receivers with a sufficient spatial resolution for GNSS tomography of a few tens of kilometers is not economically feasible. Therefore, in this research, the feasibility of using single-frequency receivers in GNSS tomography as a possible alternative approach has been investigated. The accuracy of the reconstructed model of water-vapor distribution using low-cost receivers is verified using radiosonde measurements in the area of the EPOSA (Echtzeit Positionierung Austria) GNSS network, which is mostly located in the east part of Austria for the period DoYs 233-246 in 2019.