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Assessment of correlation length and spatial resolution for GNSS-based Precipitable Water Vapor maps

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The present study is framed within the research cooperation between University of Genoa (UniGe) and Italian Space Agency (ASI) for the exploitation of the Global Navigation Satellite System (GNSS) data acquired through the “New National GNSS Fiducial Network”, implemented by ASI. The established collaborative research aims to operationally deploy the GNSS for Meteorology (G4M) procedure, developed by UniGe’s Geomatics Laboratory, to generate Precipitable Water Vapor (PWV) maps at Italian territorial extent. In this context, the focus of the contribution is on assessing the correlation length of Zenith Total Delay (ZTD), the key parameter to evaluate PWV, as a function of the distribution of GNSS stations belonging to the ASI’s National GNSS Fiducial Network. The evaluation of correlation length serves as a preliminary step toward the assessment of the geographical extent and achievable spatial resolution of the PWV maps derived from G4M procedure. Suitable areas for experimentation are subsequently identified, accounting for different weather conditions at national level. Therefore, the PWV maps derived in this study can serve as a preliminary assessment of nationwide meteorological conditions, highlighting potentially critical areas that warrant further investigation at a higher detail.