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Tropospheric slant delays interpolating multiple mapping functions

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Representing the tropospheric slant delays in geodesy can get complicated due to the inhomogeneity and fast variations of the weather. Mapping functions are the most common used tool for this task, but due to the lack of information when calculating the parameters of the mapping functions, relevant errors could appear. The errors in the zenithal direction come from the limitations of the mapping functions, and in the azimuthal direction come from the asymmetries in the sight-field of the receiver. New representations, as the full skyviews representation made by University of Helsinki, have proven to lead to better results in the computation of GNSS products using orbit processing softwares, but these are expensive, both computationally and in size. In this study, we apply the mapping functions approach using the Least Travel Time ray-tracer with larger amounts of mapping functions per receiver, and a 1-hour update of all the parameters. We believe that a more precise use of the slant delays would lead to a better computaiton of GNSS products, along with a important data assimilation to the weather forecast from the residuals obtained in the Least Squares Adjustment used in the processing. The results show that the error induced when using mapping functions converges quickly to a minimum when we increase the amount of mapping functions used per receiver. The most efficient number of mapping functions is 10, being equidistant (one mapping functions every 36 degrees in azimuth).