

An approach to obtain a tropospheric mapping function based on ECMWF models

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The tropospheric propagation delay of Earth-satellite tracking data (from electromagnetic or optical signals) is generally corrected in two steps: 1) computing the zenithal wet and dry delays at the station, 2) applying a mapping function to pull them down at the elevation needed.

Considering that zenithal delays can be well computed from ground pressure, temperature and humidity data through hydrostatic theory, or can be integrated from ECMWF multiple layer models (for instance), or at least can be adjusted in orbit processing, we turned our attention more specifically to the validity of the mapping function.

Starting on one hand from a few maps of the ECMWF meteorological model of pressure, temperature and humidity available each 6h in 91 isobaric layers we reconstructed first the wet and dry tropospheric delays at each grid point for several azimuth and elevation angles. On the other hand we computed the same delays from a Marini-type mapping function based on the integrated zenithal delays computed themselves from the same ECMWF models.

An adequacy was searched between both approaches which led us to adjust all coefficients of the dry and wet mapping functions.

We propose here to describe our approach and to present preliminary results of the dry and wet mapping functions obtained.