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Modeling Atmospheric Loading using BLQ files

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In this work, we investigate the use of BLQ files in order to incorporate atmospheric loading corrections in the processing of GPS observations. How to model these signals is still a matter of debate among the scientific community. The common option is to remove the loading effect from the final daily solution. However, van Dam and Tregoning (2005) shown that it is possible to reduce the variance of heights when the corrections are applied at the observation level. But, in many GPS software packages is still not possible to apply corrections at observation level.

However, academic GPS software packages are capable of reading ocean loading corrections made available using the so-called BLQ format. For each station, its specific BLQ file contains values of the amplitude and phase-lag for 11 period tides: 4 semi-diurnal, 4 diurnal and 3 of long-period. At each GPS epoch, these values are converted into Vertical, East and North displacements and subtracted from the observations.

Our approach implies to compute daily BLQ files for each analyzed station, instead of a unique, no time dependent, BLQ file (enough for ocean load modeling). In order to create the BLQ files, we estimate atmospheric loading corrections using dedicated software (CARGA), which are later merged with the ocean tide loading values. Thus, each day the ocean tide loading values are adjusted to incorporate the atmospheric loading

We tested this methodology using a global network of GPS stations where larger noise in the position solutions was expected due to the atmospheric loading. We show that the inclusion of the atmospheric loading at processing level via BLQ files is a valid approach to improve the position solutions and, consequently, the uncertainty velocity vectors.