Analysis of atmospheric loading computations

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Modeling computations show that atmospheric loading can cause vertical displacements with a amplitude of 2-5 mm. The uncertainty associated to these computations can also be in the order of a few mm. There are, in fact, errors and artifacts in the surface pressure data, in the inverted barometer assumption and discrepancies on how the data are treated by the different softwares. These effects, for different reasons, limit the accuracy of loading predictions both in the long and short-term. Additionally, there is the problem of the reference frame in which the displacements must be presented: a frame fixed to the solid Earth or one fixed to the centre of mass of the combined solid Earth/atmosphere system.

Although, at the moment, the GPS noise level on the estimate of the vertical component is still at the level of a few to several mm for daily solutions, it is important to improve the atmospheric loading computations in view of future GPS noise level reductions. In particular, efforts shall be undertaken to compare the results of different software packages. Examples are the atmospheric pressure loading time series available at the IERS Special Bureau for Loading, those provided by the NASA Goddard VLBI group and the time series obtained with the software packages OLFG and CARGA. The differences will be quantified and, where possible, the source of the discrepancies will be identified.