



## **Atmospheric loading corrections in VLBI analysis**

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Since station height and troposphere zenith delay parameters are correlated in VLBI solutions, neglecting atmospheric loading corrections at the observation level could affect station heights and zenith delays. With simulations at single stations and with global VLBI network solutions using all world-wide observed VLBI data since 1984 we investigate, whether it is sufficient to apply daily averages of atmospheric loading corrections a posteriori, i.e. to the estimated station height time series, or whether it is necessary to rigorously correct the individual observations before the least-squares adjustment. Whereas station heights in 'single station simulations' are clearly recovered by the use of a posteriori atmospheric loading corrections, the effect in VLBI network solutions is more complicated. Due to the small number of stations and the necessary datum constraints of a VLBI free network adjustment, the omission of a priori atmospheric loading corrections at the stations of a VLBI network can significantly affect the coordinates of each other station. In this case the station heights cannot be recovered by a posteriori corrections at individual stations and the scale of the network sessions will be changed. Thus, it is recommended to apply atmospheric loading corrections at the observation level in VLBI analysis or as mean values per session before stacking the normal equations, i.e. before determining the terrestrial reference frame. In the latter case, sub-diurnal non-tidal loading effects, which can be as large as 1 cm, are disregarded.