Geophysical Research Abstracts,
Vol. 11, EGU2009-4095, 2009
EGU General Assembly 2009

Sensitivity analyses of turbulence theory-based variance-covariance matrices of tropospheric slant delays

M. Vennebusch and S. Schön
Institute of Geodesy, University of Hannover, Hannover, Germany, (vennebusch@ife.uni-hannover.de)

Atmospheric turbulence induces physical correlations on any space geodetic technique based on electromagnetic waves. Thus, also GNSS phase observations are both temporally and spatially correlated due to refractivity fluctuations along the signal's path from the transmitter to the receiver. Currently, these physical correlations are rarely considered in GNSS data analysis; yielding too optimistic parameter variances and covariances.

Based on turbulence theory, Schön and Brunner (2008) developed a formulation of the variances and covariances induced by refractivity fluctuations in the troposphere. This model adequately describes the variance-covariance matrix (VCM) of tropospheric slant delays. The parametrisation is mainly based on the turbulence structure constant, the outer scale length, the integration height, the wind direction and the observation geometry.

The VCM can adequately be used to determine synthetic slant delay time series. In this paper, this strategy will be described by using an exemplary GPS configuration. Furthermore, the latest results of simulation studies and sensitivity analyses of this VCM model w.r.t. the model parameters are presented. As a result, the most dominant parameters (that should be either determined with special care or precisely known) will be identified.