Geophysical Research Abstracts, Vol. 9, 07121, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07121

Tropospheric wet delay retrieval from Raman lidar measurements and GPS during the VAPIC campaign

P. Bosser (1), O. Bock (2, 3), M.N. Bouin (3)

(1) LOEMI, Institut Géographique National, France, (2) IPSL/SA, Univ. Paris 6, Paris, France, (3) LAREG, Institut Géographique National, France (Pierre.Bosser@ign.fr / +33.1.43.98.85.81)

Determination of GPS heights with sub-millimeter precision needs a proper calibration of tropospheric delay. Since several years, different methods have been proposed in order to correct accurately this effect. Currently, hydrostatic delay is well modeled thanks to the low variability of the hydrostatic part of the atmosphere and the use of meteorological observations. Accurate wet delay correction is still difficult because of the high variability of water vapor in the troposphere. In order to correct GPS signals for wet path delay, a pointing Raman lidar has been developed conjointly by the Institut Géographique National (IGN) and the Service d'Aéronomie (SA). This lidar provides accurate humidity profiles up to 7 km in vertical pointing and 5 km in slant path pointing, during nighttime, with a 5 min temporal resolution. Wet path delays, calculated from these humidity profiles, are expected to reduce GPS positioning errors and to be a key step towards 1-mm accuracy in GPS height estimates.

As a first step, we present here a comparison of wet path delays obtained from lidar profiles and estimated from GPS data during the VAPIC campaign (17 May - 15 June 2004). Two GPS processing software are compared: GAMIT (double difference positioning) and GIPSY (precise point positioning). RMS between GPS ZTD from the two software reaches about 5mm. Agreement about a few millimeters is found from zenithal lidar measurements and GPS and moderate agreement (10 mm) from slant paths. Part of the differences is attributed to water vapor heterogeneities that are not properly estimated from GPS data processing. Delays are also compared to radiosonde and WVR data. RMS fluctuate between 3 and 10 mm. Deviations are mainly due to atmospheric and observation conditions.