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Determination of GPS Height Using Surface Meteorological Measurements

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This investigation addresses the tropospheric effect on GPS height determination. Data obtained in 2003 from GPS receivers and co-located surface meteorological instruments are adopted in this study. The Ministry of the Interior (MOI), Taiwan, established these GPS receivers as continuous operating reference stations. Two different approaches, namely parameter estimation and external correction, were utilized to correct the zenith tropospheric delay (ZTD) by applying surface meteorological measurements (SMM) data. Incorrect pressure measurement leads to very poor accuracy. The GPS height can be affected by a few meters, and the root-mean-square (rms) of the daily solution ranges from a few millimeters to centimeters, irrespective of the approach adopted. For parameter estimation approach applied, the effect is least obvious when using SMM data. However, the accordant corrections to the GPS height occur more often at higher altitudes. For external correction approach applied, the Saastamoinen model with SMM data makes the repeatability of the GPS height to a few centimeters order. But the rms of the daily solution was improved about 2–3 mm (the content of paper had been published on Geophys. Res. Lett., 35, L23809, doi:10.1029/2008GL035929).