Improved troposphere modeling for near real-time and post-processing GPS applications at swisstopo

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For several years, swisstopo has being involved in data analysis of GPS permanent networks. One main activity concentrates on the computation of troposphere parameters in near real-time. Zenith total delay estimates are delivered every hour with a time delay of about 45 minutes to various partners, such as the European project TOUGH (Targeting Optimal Use of GPS Humidity) and the Federal Office of Meteorology and Climatology (MeteoSwiss), with the goal to use the data for numerical weather prediction. At present, a network of 75 permanent sites is processed on a routine basis. In line with the switch from Bernese GPS Software Version 4.2 to 5.0, a number of new features related to troposphere parameter determination became relevant. The modeling of the troposphere delay is now done using a continuous, piece-wise linear parameter representation, and the dry-Niell in conjunction with the wet-Niell mapping function are applied. The influence of these and other model changes on the resulting troposphere analysis products, and comparisons with solutions coming from a real real-time positioning software (GPSNET) are presented in this paper. Estimating tropospheric gradient parameters, which improve the horizontal site coordinate repeatability significantly in post-processed solutions, may be expected as a promising model improvement for near real-time applications.