Investigation of the dependence between ZTD and vertical position of GNSS stations on the example of long-term EPN measurements.

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Propagation time of the GNSS (Global Navigation Satellite System) signal through neutral part of the atmosphere is delayed by its physical properties. The value of this delay depends on such meteorological parameters like air temperature, pressure and. For many years, processing of GPS observations was focused mostly on positions estimation, which were primary product of this system. Tropospheric delay was seen as a factor affecting positions reliability, especially considering vertical component. Consequently, many studies were related to the investigations of influence and correlation between the ZTD modeling on Up coordinate estimation. However, in recent years, tropospheric delay parameter derived from GPS, has become one of the essential products of the GPS processing. It has, among others, started to play significant role in researches associated with climate monitoring. For this reason it is essential not only to know how the state of the troposphere affects the GNSS stations height, but also the reverse case is investigated: how the tropospheric delay is affected by other factors resulting also from height estimation (either real motion of the station or signal propagation effects). In this paper results of investigation on dependency between vertical position and ZTD are presented. Observations collected at the selected stations of the EPN (EUREF Permanent Network) between 1996 and 2014 were taken into account. Assessment of the vertical movements of GNSS stations impact on the long-term troposphere parameters estimation can be essential from the point of view of climate studies.