



An attempt towards using permanent GPS stations as a tool for atmospheric water vapor tomography; case studies GPS meteorology in Iran

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Absence of radiosonde and radiometer stations of atmosphere water vapor determination in Iran has motivated us to experience the feasibilities of using GPS observations made at permanent GPS stations within the country to obtain a 3-D model of water vapor distribution in the atmosphere. In other words we have used the Zenith Total Delay (ZTD) in order to estimate water vapor from GPS stations to obtain a tomographic map of water vapor distributions within the atmosphere. As the primary step of case study permanent GPS station (TEHR) of National Cartographic Center (NCC) of Iran located in Tehran/Iran during the period days 22 and 23 (DOY: 357 and 358) of Dec. 2000 is used. GPS observations of the three IGS permanent station BAHN, KIT3 and NISP for those days are downloaded and have been used to compute the relative positions. Precise orbit, precise coordinate and earth orientation parameters from the CODE center are used to improve the relative positioning accuracy. Pressure and temperature observations at the nearest meteorological station are used to compute the dry atmospheric delay. The Zenith Total Delay (ZTD) is computed by GPS observations and Zenith Hydrostatic Delay (ZHD) is obtained from pressure and temperature observations to compute the PWV for the Tehran permanent GPS station. Besides, the RMS of the difference between computed ZTD at three IGS permanent stations mentioned above, and what we have derived, is 9mm, which shows the consistency of our computations with that being computed by IGS. After being sure of possibility of GPS ZTD for water vapor estimations, the method has been extended to produce 3-D tomographic maps of water vapor variation by using a net of permanent GPS stations.