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IONOSPHERIC IMPACT ON PRECISE GNSS DISTANCE MEASUREMENTS IN ANTARCTICA

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The effect of higher–order ionospheric terms on different GNSS–derived products has to be considered especially in precise positioning. There are several publications related to the investigation and modeling of higher–order ionosphere terms on radio signal propagation [Fritsche et al., 2005]. The aim of the report is explanation the sources of slightly different results, following the authors of cited paper. We present the international team investigation to take into account ionospheric impact on the high-quality geodetic GNSS-solutions in the framework of the project "Atmospheric impact on GNSS observations in Antarctica in relation to Geophysical research". In the differential geodetic results such as GNSS-solutions for distances and heights, higher–order ionosphere terms are minimized in the case of similarity of ionosphere conditions at the ends of vector. At the Antarctic region such a similarity isn't actual especially if one station is placed near the geomagnetic pole. In this presentation we show the time series of GNSS-solutions for two groups of vectors, nearby and far from the geomagnetic pole. Vectors in first group are based on the CAS1 permanent GNSS-station and in the second one are based on the newly installed GPS-site at the Ukrainian Vernadsky Antarctic station. Time series of vectors length are shown in relation to the time series of total electron content (TEC) in ionosphere. Correlation of vector length and TEC variation are investigated. The presence of evident coupling of ionospheric dynamics and GNSS-solutions in first group and absence of one in second group are discussed in relation with higher–order ionospheric terms on radio signal propagation. The consideration of tiny ionospheric effects becomes necessary for scientific applications, especially in the investigation of regional geodynamics in Antarctica.

M. Fritsche, R. Dietrich, C. Knöfel, A. Rülke, S. Vey, M. Rothacher, P. Steigenberger. Impact of higher-order ionospheric terms on GPS estimates (2005), *Geophys. Res. Lett.,* 32, L23311, doi:10.1029/2005GL024342