A Close Relationship between Temporal Anomalies in Horizontal Coordinates and Zenith Tropospheric Delay in GSI's GPS Array

Tetsuya Iwabuchi [1], Isao Naito [2], Katsushi Chida [3]


Under a simple assumption of azimuthally homogeneous distribution of water vapor in Global Positioning System (GPS) analysis, a close relationship between temporal anomalies in horizontal coordinate and zenith tropospheric delay (ZTD) is found in the operational analysis of nationwide GPS array of Geographical Survey Institute (GSI) over the Japanese Islands, in particular, during weather conditions that systematic horizontal gradient of water vapor exists in cases of front passages and tropical cyclone. The ZTD gradient of 50 mm per horizontal distance of 100 km is found to cause apparent horizontal coordinate variation of about 10 mm. These relationships become useful information to diagnose if unusually large horizontal coordinate variations reflect net crustal movements or not.