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Development of the high-resolution horizontal distribution of water vapor monitoring system using by GNSS

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The GPS meteorology that began in 1990's produces many results of research. It was demonstrated that the accuracy of the weather forecast improved greatly by assimilating GPS data in a numerical weather prediction model. As a result, It understood that information of the quantity of water vapor included in GPS data was very effective.

In the case of concentrated downpour, it is important to grasp a change of increase and the horizontal distribution of the water vapor to appear in real time. But, it did not utilize the water vapor information in a true real time because it used GPS data for an initial value by the present data assimilation technique every 3 hours.

Therefore we develop the system which finds the water vapor with high time resolution using only the ground GPS meteorology.

The estimated water vapor was the stability means of a radius of 20 km to use all GPS satellites. However, if it uses a satellite staying in the high position for a long time, such as Quasi Zenith Satellite System (QZSS) "Michibiki" which was launched in September, 2010, it is thought that the horizontal resolution of the estimated water vapor is improved to less than 1 km. In addition, it is necessary to locate a lot of GPS receivers on a network to get the wide-area distribution of the water vapor. So, it generates the ionospheric correction model by the data obtained from the double frequency receivers and must maintain the accuracy by applying to the single frequency network.

We are going to carry out the experiment using the roof of public schools around the Uji campus, Kyoto University to solve these problems.

In this presentation, we report the estimated accuracy of the water vapor that we analyze only with the high positioning satellite that assumed QZSS using by data of past density observation campaign in 2001 and an example of concentrated downpour in Kyoto city on August 8, 2005.

Keywords: GPS, water vapor, dense network, QZSS