

## An observational study on the time and spatial variations of the localized ionospheric delays with a dense GNSS receiver

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The integrated amount of water vapor along the zenith angle, or PWV (Precipitable Water Vapor) can be estimated by GPS (GNSS) meteorology, which is a method to compute atmospheric parameters from troposphere-induced delays in signals of GPS (GNSS). We deployed a dual-frequency (DF) GNSS network around Uji campus of Kyoto University, Japan, with inter-station distances of few kilometers. By using this dense network, we built a basic system to observe PWV fluctuations occurring within a small horizontal scale (less than 10 km), which were then analyzed to identify possible precursors of local torrential rain.

To utilize this network as a practical heavy rain early warning system for urban area, using inexpensive single-frequency (SF) receivers would be better for economic reasons. However, Using SF receivers occurs error in computing PWV because we cannot eliminate the ionospheric delay by using SF receivers. So we investigate and estimate ionospheric delay within this dense network system in many cases. From this investigate, we aim to find the appropriate method to correct the effect of ionospheric delays on SF observations in this dense GNSS network system.

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