

# Examination of Improving the Precision of Ionospheric F-Layer Electron Density Estimation Using Thunder-origin Whistler Wave

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The ionosphere temporally and spatially fluctuates by solar activity or an atmospheric weather phenomenon. It is known that the fluctuation of the electron density which constitutes the ionosphere causes the positioning error of GPS or the instability of the communication, so it is important for engineering of investigating the spatiotemporal condition of the ionosphere over the whole world. There are various methods for measuring the electron density of the ionosphere, but it is difficult to obtain the electron density data on sea far from the land because they are almost based on ground observation. To obtain the data over the world, this study focuses on estimation method of the ionosphere F-Layer electron density using whistler wave derived from the thunder generated on both ground and sea. In the previous study, the electron density estimation above the middle latitude almost correspond to the model of the ionosphere (IRI), but the data in low latitude is largely different. As the result of underestimating real propagation distance because of assuming that lightning was generated right under the satellite, it has the possibility to overestimated the electron density estimation.

Therefore, the purpose of this study is to investigate the possibility of improving the precision of ionospheric F-Layer electron density estimation using the whistler wave. Specifically, arrival direction of the whistler wave is determined by using the data of 3 magnetic field components observed by the low altitude satellite DEMETER. We aim to improve the precision of electron density estimation, especially low latitude by considering the propagation distance in the ionosphere which is estimated from the whistler wave's propagation course.

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