

## Estimating ionospheric property by using simultaneous observations of lightning and whistlers from ISS GLIMS mission

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The atmospheric in the VLF frequency range from lightning penetrating through the ionosphere are observed as lightning whistlers. In particular, whistlers observed in the space just after penetrating through the ionosphere are so-called fractional hop whistlers. Since whistlers penetrate through the ionosphere plasma, which is dispersive medium, the group delays of whistler waves with different frequency contain the information of the electron density of ionosphere. In this paper, we estimate the maximum electron density of the ionosphere F2 layer by using the delay time introduced by the optical observation and electromagnetic observation of Global Lightning and SprItE Measurements (GLIMS) mission onboard ISS. And we use another analysis method, the dispersion of whistles. As a result, we found that estimated electron densities from two analysis methods are in good agreement with those from IRI model for whistlers with a small dispersion. We consider that maximum electron density estimation of the ionosphere F2 layer over the ocean or remote area by using whistler dispersion information is useful.

Keywords: Whistler, ionosphere F layer, GLIMS, International Space Station