

Three-dimensional structure of the ionosphere observed by the Magnesium Ion Imager on board the S-310-38 sounding rocket

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In order to study the three-dimensional structure of the ionospheric plasma in the E region, the resonance scattering from Mg^+ in the E region was observed by the Magnesium Ion Imager (MII) on board the S-310-38 sounding rocket.

Two resonance lines of Mg^+ at 279.6 and 280.3 nm are absorbed by the stratospheric ozone, and therefore these lines can be observed only from space. It was found recently that the spatial structure of sporadic E (Es) layer is closely related to field-aligned irregularity (FAIs), but it is very difficult to observe the three-dimensional structure of the ionospheric plasma in the E region so far. Since metal ions such as Mg^+ are major constituents of the Es layer, observations of the three-dimensional structure of Mg^+ can lead to understand the formation mechanism of FAIs.

The MII was installed on the S-310-38 sounding rocket, which was launched from Uchinoura Space Center in Kagoshima, Japan, at 18:14:40 JST on 6 February, 2008. The MII is a filtered multianode PMT, scanning the Mg^+ density distribution from above the Es layer by combining spin and horizontal motions of the rocket. In this paper, we report on the measurement method and the preliminary result of the observation.