れいめい衛星による夜側オーロラ帯での沿磁力線降下イオンの観測

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Field-aligned ion precipitation observed by Reimei in the nightside auroral oval

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While the orbital altitude of the Reimei satellite is about 640 km, beam-like field-aligned ion precipitation signatures have been often observed in the nightside sector. It is typical that the occurrence of these sharp ion beam signatures is discrete and intermittent and that the duration time is short, a few hundreds of msec to a few sec. It is also common that the pitch angle width of the field-aligned ion beam signatures is a few tens of deg. and that the characteristic energy of the ions distributes from 100 eV up to a few keV. The time and angular resolution of the Reimei ion sensor are generally 40 msec and less than 15 degree, and the energy coverage range is 12 eV to 12 keV, which means that the ion sensor specification satisfies the requirements for the significant measurement of the field-aligned precipitating ion beams. Because these Reimei observations have been made in the upper ionosphere, it would be normal that the magnetospheric ion components show an isotropic pitch angle distribution with a loss cone. The diffuse (trapped) ion components can be recognized in an energy range above a few keV for a long term and a wide latitudinal width in the nightside auroral oval, which are contrast with the sporadic appearance of the field-aligned ion precipitation. These big differences in the duration time, the pitch angle distribution, the latitudinal distribution, and the energy range between these ion properties indicate that some local and instantaneous field-aligned (downward) acceleration mechanism may produce the short-term and beam-like field-aligned ion precipitation. It is also noticeable that in most of cases the sharp ion precipitation components show anti-correlation with the electron signatures, especially like inverted-V electrons. It is therefore plausible that no auroral emissions are associated with these discrete ion signatures, and the simultaneous observations for auroral emission and particle by Reimei could provide us with crucial results on the correspondence. We have been investigating these peculiar ion precipitation signatures through the survey of the Reimei observational results and here present some distinguished properties by contrasting their features with the diffuse ion components and the discrete electron signatures in the nightside auroral oval.