

All-sky imaging polarimetry of OI 630 nm aurora

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Auroral polarimetry potentially contributes to bring us new information on electron collision with atmospheric particles and local process in the ionosphere. Recent ground-based measurement data showed that auroral emission at OI 630 nm probably polarized with a degree of 1-4 % [*Lilensten et al., Polarization in aurorae*, 2008], and the polarization is maximized in the magnetic perpendicular direction [*Barthelemy et al., Polarisation in the auroral red line during coordinated EISCAT Svalbard Radar/optical experiments*, 2011]. However, past experiments were carried out with a photometer mainly in the polar cap region, and examples were limited. To measure polarization degrees continuously from the magnetic perpendicular direction to the magnetic parallel direction, the all-sky imaging polarization observation combined with a fish-eye lens and 2-D CCD or CMOS detector is the most feasible.

We plan to carry out a campaign measurement of imaging polarimetry of auroral 630 nm emission at Poker Flat Research Range, Alaska during a new moon period of 2012-13 winter with a newly developed all-sky polarization imager. In addition, we will make a model to estimate atmospheric scattering along the line-of-sight path between aurora and the ground. The instrument will be precisely calibrated since its optical system may produce artificial polarization. All-sky imaging auroral polarization data bring us to examine the dependence of the polarization degree on the magnetic field angle. In this talk, we report our plan of the auroral polarimetry measurement, and the current status of the developments in detail.