

Dawn-Dusk Asymmetry in Dayside and Nightside auroral Ovals: Surveys of auroral emissions based on the all-sky imagers in Arctic and Antarctic

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The synoptic distributions of dayside aurora in the Northern and Southern Hemispheres, acquired from all-sky imagers at Yellow River Station in Arctic and South Pole Station in Antarctica, respectively, present the same two-peak structure, namely, the prenoon 09:00 MLT and postnoon 14:00-15:00 MLT peaks. The auroral intensity presents a hemispheric asymmetry, i.e., the postnoon intensity is less than the prenoon intensity in the Southern Hemisphere but more in the Northern Hemisphere. The hemispheric asymmetry is not changed with the change of IMF's polarity, although 1) the negative (positive) IMF B_y favors the postnoon 557.7/630.0-nm auroral emissions, and the positive (negative) B_y favors the excitation of 630.0-nm auroral on prenoon oval in the Northern (Southern) Hemisphere; 2) the 630.0-nm auroral intensity in dayside oval increases dramatically during the negative IMF B_z . We suggested that 1) the two-peak structure in the dayside oval are predominantly related with the prenoon/postnoon antiparallel reconnection in high-latitude magnetopause produced to the prenoon and postnoon peaks; 2) the IMF B_y should modulate the dayside aurora through the inter-hemispheric current, which is produced by a north-south oriented electric field, and changing the distribution of midday R0-R1 current; 3) the opposite prenoon-postnoon asymmetries of dayside auroral distributions in the two hemispheres are the combined effect of the prenoon-postnoon variations of the magnetosheath density and the variation of the local ionospheric conductivity in the two ground-based observatories.

The synoptic distributions of nightside aurora in the Northern Hemisphere, acquired from all-sky imagers at China-Iceland joint Aurora Observatory (CIAO) in Iceland, present that there are different characteristics on 427.8, 557.7, and 630.0 nm: 1) There is a two-peak structure on 427.8 and 557.7 nm, namely the pre-midnight 20:00- 21:00 MLT and post-midnight 04:00 peaks. For 427.8-nm auroral emission, the intensity of two peaks are same. For 557.7-nm emission, the maximal intensity is at peak 21:00 MLT. 2) There is only one peak on 630.0 nm, namely the pre-midnight 20:00-21:00 MLT. The dawn-dusk asymmetry in the nightside auroral oval should be related with the asymmetries of field-aligned currents and plasma waves in magnetosphere.

Keywords: dawn-dusk asymmetry, dayside & nightside auroral oval, particle precipitation, auroral morphology