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The non-conjugate aspect of large-scale aurora: A review of optical and particle observations

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The question whether the aurora seen in the Northern Hemisphere is a mirror image of its counterpart in the Southern Hemisphere is still outstanding. From the global point of view, the aurora can be seen most frequently in the premidnight sector, followed by the so-called 1500 MLT auroral "hot spot" in the postnoon sector and a weaker "warm spot" in the prenoon sector. The large amount of auroral particle data accumulated by DMSP satellites has revealed a strong seasonal effect on the occurrence of electron inverted-V events (auroral arcs) - auroral arcs are suppressed in the sunlit part of the oval [Newell et al., 1996]. Global auroral images acquired by the Polar ultraviolet imager show a similar effect in terms of the auroral intensity, with the three regions responding differently to the season [Liou et al., 1998]. These results, along with many others, suggest that there is an asymmetric occurrence/intensity of the aurora in the two hemispheres, probably due to the asymmetry in the ionospheric conductivity. This paper will review these work and discuss their probable causes and implications. Synoptic auroral distributions derived from satellite FUV auroral images for both hemispheres will also be presented to test some previous thoughts.