

Morphological signature of Omega band auroras

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It is well known that the poleward boundary of a diffuse aurora occasionally develops large-scale wavy structures, called omega bands or torch structures, in the morning sector of the auroral oval. We examined Omega band auroras observed with the THEMIS ground based all-sky imager network. Using 8 years data from January 2007 we found a large number of events (~ 330) that showed characteristics of omega band aurora. We examined optical signatures on the generation of omega band aurora from the growth to the declining through expansion period. We found that Omega band aurora can be classified into the following three sub-types: 1) Classical Omega band, 2) Tongue/Torch, and combined type of 3) Omega band and Tongue/Torch. The interesting features for the growth of omega band aurora are as follows: the omega band aurora grew from a faint seed, not via distortion of pre-existing east-west band aurora. The aurora did not show any shear motion during the growth of auroral activity. A black hole-like dark aurora was found during growth and expansion period. The boundary on omega aurora shows a clear contrast between light and darkness. Omega band aurora generally consists with intense pulsating auroras. In this study we show morphological features on the generation and dynamics of optical omega auroras and also show statistical results on the occurrences of three different type of aurora. Then we attempt to provide insight into the generation of these auroral forms in the magnetosphere-ionosphere system.