

Substorm onset determination based on POLAR/VIS and POLAR/UVI observations

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Earth auroral phases, growth, expansion, and recovery phases, are the signatures of Earth's substorm event in the polar regions. Auroral emissions in Earth's northern hemisphere were observed in November 6, 1998, by the Visible Imaging System (VIS) the Ultraviolet Imager (UVI), instruments onboard POLAR spacecraft. Auroral morphology during 8:00UT –9:00UT was studied based on images taken by several filters, giving the variations of the emission in different wavelengths, for VIS; 557.7, 130.4, 391.4, 630.0 nm and for UVI; 130.4, 135.6, 150, and 170 nm. In addition, the time series plot of integrated auroral flux at magnetic latitude between 60-65 degrees and magnetic local time between 22.0-1.0 hr was used to assist the determination of onset time. Base on the combination of analysis on 2D images from several filters, the bright emission was seen to extend westward from the initial brightening between 08:34:29.5 UT and 08:35:32 UT, which is indicated as the beginning of the expansion phase. From time series plot, this behavior was clearly seen as the brightening of integrated photon flux of wavelength 557.7 nm. This onset time determination will further assist the investigations of auroral behavior, in corresponding to other observations, e.g., magnetic field and particle measurements.

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