

# Simultaneous DMSP, All-Sky Camera, and IMAGE FUV observations of a substorm onset arc

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We investigated characteristics of auroral particles and fields associated with a substorm onset arc on October 31, 2000, using ground all-sky TV images, IMAGE FUV auroral images, and particle, magnetic field, and plasma flow data obtained by the DMSP F12 satellite. The arc brightening at Tixie (61.7MLAT), Russia, occurred at 1003 UT (18.4 MLT) coincident with a mid-latitude Pi 2 magnetic pulsation. The brightening arc, which came from east of Tixie, did not show global development, indicating that this event is a pseudo auroral breakup. Auroral images obtained by the IMAGE satellite indicates that the main local time of the auroral brightening is ~2.5 hours nightside of Tixie. The DMSP F12 satellite crossed the brightening arc at 1004 UT in the field-of-view of Tixie. The DMSP data show that the precipitating particles associated with the brightening arc correspond to an electron inverted-V structure at the equatorward edge of the electron precipitation region. The arc is also located in the energetic (more than 1 keV) ion precipitation region, near the equatorward boundary of the upward region 1 field-aligned current, and at the peak of the sunward convection velocity. These results indicate that the source of the substorm onset arc is located in the sunward-convecting inner plasma sheet and at the boundary between the region 1 and 2 current systems.