



## **Global multi-satellite and ground-based observations of a substorm onset on 2 Sept. 2004**

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With fortunate constellation of spacecrafts in various regions of geospace and ground-based stations, a study is made on the global manifestation of an isolated substorm onset event occurring on 2 Sept. 2004. During the substorm the magnetic activity was quite low, with max. AE index about 150 nT, min. Dst  $\sim$ -22 nT and Kp  $\sim$  1. This substorm is believed to be triggered by a northward turning of IMF Bz. IMAGE FUV images of the southern auroral region and Pi-2 pulsations by IMAGE (International Monitor for Auroral Geomagnetic Effects) magnetometer network at the northern pole indicated that the substorm onset occurred at the same time of 20:14:09 UT in both hemispheres. Immediately after the onset Double Star TC-1 located in near-Earth central magnetotail (XGSM = -12.3Re, YGSM = 1.4Re, ZGSM = -0.03Re) observed clearly characteristic signature of magnetic field dipolarization. A noticeable sudden decrease in plasma density and an increase in temperature and electron flux were observed almost simultaneously after the onset. About 2-3 min later than FUV and Pi-2 onset, Cluster Quartet (X = -15.7Re, Y = -2.7Re, Z = 3.0Re) observed large earthward flow of about 1000 km/s and field dipolarization around the midnight tail, which might suggest that the magnetic reconnection process formed in the mid-tail after the auroral substorm onset. Furthermore, Field-aligned and Hall currents observed concurrently with the onset by CHAMP are consistent with the signature of a westward traveling surge evolving out of the Harang discontinuity. SuperDARN observations also showed a clear procession from a main dawn-dusk convection electric field to a main northward convection electric field just after the onset. In addition, POLAR magnetic and

particle observations will be included for a consistent global picture.