Ionospheric Disturbances Observed in Japan During a Storm-Time Substorm on August 26, 1998.

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We show an enhancement of OI 630nm airglow emission observed at Shigaraki (34.8N, 136.1E) for 15:10-16:10UT (00:10-0110LT) on August 26, 1998 using data from a north-south meridian scanning photometer and an all-sky cooled-CCD camera. The maximum zenith emission rate reached up to 250 R. We investigate ionospheric disturbances during this event using 1) total electron content (TEC) data obtained by more than 900 GPS receiver network in Japan, 2) ion drift data obtained by the DMSP satellites, 3) F-region virtual height data obtained at four stations of the Communication Research Laboratory in Japan.

We show an enhancement of OI 630nm airglow emission observed at Shigaraki (34.8N, 136.1E) for 15:10-16:10UT (00:10-0110LT) on August 26, 1998 using data from a north-south meridian scanning photometer and an all-sky cooled-CCD camera. The maximum zenith emission rate reached up to 250 R. The enhancement was mainly seen in the southern sky of Shigaraki. Ground magnetometer data indicate that a substorm occurred coincide with the airglow enhancement during the initial phase of a magnetic storm. Total electron content (TEC) data obtained by more than 900 GPS receiver network in Japan show similar enhancement in the southern part of Japan associated with the substorm. Intense subauroral ion drift (SAID - westward ion flow) was observed at 15:19UT in the evening sector (20MLT, 55-60MLAT) by the DMSP-F12 satellite at an altitude of 800 km, suggesting a penetration of magnetospheric electric field to subauroral latitudes. However, the penetration of the substorm-associated electric field is not seen in the variation of F-region virtual heights obtained at four stations of the Communication Research Laboratory in Japan. Based on these data, we discuss possible mechanisms that caused observed airglow and TEC enhancements during the storm-time substorm.