

Large Density Depletions in the Nighttime upper Ionosphere during the Magnetic Storm of July 15, 2000

이재진¹, 이은상¹, 민경욱¹, 김준²

¹한국과학기술원, 물리학과

²한국항공우주연구원

We measured electron density and temperature of the nighttime upper ionosphere for the several key intervals during the progress of the magnetic storm on 15 July 2000 with the Langmuir probe on Korea Multipurpose Satellite-1 (KOMPSAT-1). Density crests were seen in both sides of the geomagnetic equator near 245E before the onset of the storm, however after a period of moderate level disturbance preceding the storm. During the main phase of the storm KOMPSAT-1 detected a very deep and extensive the trough of electron density centered around the geomagnetic equator near 0E. The electron density dropped sharply by more than an order of magnitude from 4105/cm³ to less than 2104/cm³ with the trough region extended over 1400 km along the satellite track. The electron temperature was seen enhanced everywhere, except in the trough region where reliable temperatures were not obtained due to its low density. Small scale density irregularities, accompanied by temperature fluctuations, were encountered near the southern boundary of the trough, which are believed to be the equatorial bubbles. Later in the recovery phase, KOMPSAT-1 observed severe distortion still persisted in the region near 245E, with increased electron temperature. Together with DMSP observations, we estimate the size of the observed trough to be at least 5500 km in the longitudinal direction. We suggest that the trough was the result of the enhanced eastward electric field which lifted the equatorial F-region ionosphere upward.