

Far tail plasma sheet: Properties and correlation with solar wind parameters and geomagnetic disturbances

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On 06-30 April 1994 the Geotail satellite was in the far tail of magnetosphere ($X \sim 200 R_E$) near the equatorial plane. During the interval the satellite moved from the one magnetosphere flank to another that. When the satellite was in the plasma sheet the tailward plasma flows were generally detected. The velocity of the flows was some 400-600 km/s. We found that the long-term (some hours) velocity variations in the plasma sheet correlate very well with the variations of the solar wind velocity. Moreover, near the flank of magnetosphere the plasma sheet velocity was just equal to that in the solar wind, and it slightly decreased with the distance from the flank. Also plasma density in the plasma sheet correlates with that in the solar wind. From this consideration we conclude that the solar wind plasma is the very important source of the plasma sheet population in the distant tail. Sporadic tailward plasma flows of 1000 km/s are often observed as well. These flow bursts are connected statistically with both ground magnetic activity (inferred from AE-index) and intervals of negative excursion of the B_z component of the interplanetary magnetic field. For many cases these very fast plasma flows do not associate with plasmoid events. Thus, we suppose that, more likely, the flows do not necessary relate to substorms but enhanced reconnection at the distant neutral line due to southward B_z . Earthward flows are also observed at the distant tail. Statistically they were observed after intervals of positive B_z and low variability of the ground activity. It shown that typically the pressure balance applies across plasma sheet. Statistical properties of the plasma across the distant plasma sheet are also discussed. The distributions of the plasma parameters has been constructed regarding the parameter β (ratio of the plasma and magnetic pressures). The distributions exhibit statistically valuable extremes at some preferred β .