A statistical study on the correlations between plasma sheet and solar wind based on DSP explorations

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By using the data of two spacecraft TC-1 and ACE (Advanced Composition Explorer), a statistical study on the correlations between plasma sheet and solar wind has been carried out. The results obtained shows that the plasma sheet at geocentric distances of about 9∼13.4 Re has apparent driving relationship with solar wind. It is found that, (1) There is a positive correlation between the duskward component of interplanetary magnetic field (IMF) and the duskward component of geomagnetic field in plasma sheet, with a proportionality constant of about 1.09. It indicates that the duskward component of the IMF can effectively penetrate into the near earth plasma sheet, and can be amplified by sunward convection in the corresponding region at geocentric distances of about 9∼13.4 Re. (2) The increase of the density or the dynamic pressure of the solar wind will generally lead to the increase of the density of the plasma sheet. (3) The ion thermal pressure in the near earth plasma sheet is significantly controlled by the dynamic pressure of solar wind. (4) Under the northward IMF condition, the ion temperature and ion thermal pressure in plasma sheet decrease as the solar wind speed increases. This feature indicates that plasmas in the near earth plasma sheet can come from magnetosheath through LLBL. Northward IMF is one important condition for the transport of the cold plasmas of magnetosheath into plasma sheet through LLBL, and fast solar wind will enhance such transport process.