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Heliospheric current and plasma sheet: Dependence of thickness on distance

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Among the most common features of space plasmas are current sheets surrounded by plasma sheets. However, many fundamental questions still remain unanswered such as: what determines the thickness of these structures? Studying how changes in the field and plasma parameters affect thickness can provide the answer. The Heliospheric Current-Plasma Sheet is an obvious candidate for study because of its persistence throughout the Heliosphere and the large variation with distance of the field- plasma parameters. We have carried out a study of the HCS-HPS using recent Ulysses data near 5 AU. When the results were compared with earlier studies at 1 AU, they were surprising and unexplained. Although the plasma sheet grew thicker, the embedded current sheet grew thinner! Because the data were based on only two distances under different circumstances, we have extended the analysis in two ways. First, the same current-plasma sheets studied at 5 AU have been identified at 1 AU using ACE data. Second, data obtained while Ulysses was en-route to Jupiter near 3 AU have been analyzed. This three- point investigation enables re-examination of the earlier result and provides further information on thickness in an intermediate range of field and plasma parameters.