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The heliospheric magnetic field during solar minimum, as seen by Ulysses

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Ulysses has provided valuable observations of the three dimensional structure of the heliosphere through almost two solar cycles. Magnetic field measurements of the declining phase of cycle 23 were analysed and the results were compared to the previous cycle. It was established that in the fast polar wind the magnetic flux was smaller in the last, unusual cycle than in the previous one. The warp and the location of the heliospheric current sheet (HCS) was also studied. The excursion of the HCS was significantly larger in cycle 23 than in cycle 22. However, no difference was found in the latitudinal offset of the HCS between the two succeeding cycles, which was found a few degree southward in both cases. As far as fluctuations are concerned, power spectral density of the magnetic field fluctuations was determined through the Ulysses mission. The scattering mean free path of energetic particles was modeled on the basis of the quasi-linear theory. It was obtained that the latitudinal dependence of the scattering mean free path is a step function at the fast solar wind - slow solar wind interface. The implication for the charged particle propagation is discussed.