

A NASA/ESA Ulysses Study of Discontinuities, Alfvén Waves, Magnetic Holes/Magnetic Decreases and Ion Heating in Interplanetary Space

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Some old (1970s) interplanetary space magnetic field and plasma observations will first be reviewed. Although the phenomena (directional discontinuities, Alfvén waves, magnetic holes/magnetic decreases and proton heating) were all originally thought to be unrelated to each other, recent results demonstrate a clear linkage among them. The talk will focus on nonlinear ($\Delta\bar{B}/B \sim 1$ to 2) Alfvén waves and the Ponderomotive Force. Cross-field energetic ~ 1 MeV proton diffusion due to nonresonant interactions with magnetic magnitude structures (magnetic holes/magnetic decreases) will be discussed, as well as current directions in this research topic.