INTERPLANETARY FIELD ENHANCEMENTS: THE SOLAR WIND SIGNATURES OF COMETARY DUST TRAILS? G. H. Jones[1,2], T. Witchalls[3]. [1]Mullard Space Science Laboratory, University College London, Holmbury St. Mary, Dorking, Surrey RH5 6NT, UK, ghj@mssl.ucl.ac.uk. [2]Centre for Planetary Sciences, University College London, UK. [3]Department of Physics and Astronomy, University College London, UK.

Introduction: A phenomenon first reported in the solar wind in the vicinity of Venus [1], interplanetary field enhancements, IFEs, are events where the heliospheric magnetic field magnitude is seen to rise to a local peak and decrease again, almost symmetrically. The maximum in magnitude is usually sharp, giving a thorn-shaped profile to the feature. Typical durations are of the order of minutes to hours.

Surveys of IFEs near Venus and Earth have been performed [2,3]. There was a non-random distribution of the events in inertial space, and evidence of a link between near-Venus events and asteroid 2201 Oljato [4]. The distribution of IFEs out of the plane of the ecltipic was investigated using 11 years of Ulysses magnetometer data [5]. The vast majority of IFEs were found to have a discontinuity in magnetic field direction coincident with the peak in magnetic field magnitude. Many possessed "mirrored" discontinuities, i.e. discontinuities observed before the peak field magnitude were found to have a matching discontinuity after the peak, suggestive of the draping of magnetic field lines around an obstacle. A superposed epoch analysis of plasma parameters revealed no strong association between these and IFEs, expect for a tendency for ion number density to increase at IFEs.

The characteristics, locations and occurrence of IFEs are suggestive of a link with the dust trails of short-period comets [6], but unambiguous evidence of this link is still pending. Here, we present two types of evidence that add to the case for a causal link between dust trails and IFEs, though the likely cause of these perplexing features' formation is still undetermined.

Near-Earth Survey: We present the results of a new, multi-year survey of near-Earth IFEs, using the ACE magnetometer data obtained upstream of Earth. Where available, WIND magnetometer data are also analyzed. We find several regions in inertial longitude where IFEs are observed during successive years and by separate spacecraft.

Association with known Dust Trails: We show evidence for a link between the locations of IFEs and the presence of dust trails in the inner heliosphere, known either through remote observation in the visible or IR, or the calculated locations of local density enhancements in meteor streams that occasionally encounter the Earth.

References: [1] Russell C. T. et al. (1983) *Nature 305*, 612-615. [2] Russell C. T. et al. (1984) *Icarus 60*, 332-350. [3] Arghavani M. R. et al. (1985) *Icarus 62*, 230-243. [4] Russell C. T. et al. (1984) *Science 226*, 43-45. [5] Jones G. H. et al. (2003) *Icarus 166*, 297-310. [6] Sykes M. et al. (1992) *Icarus 95*, 180-210.

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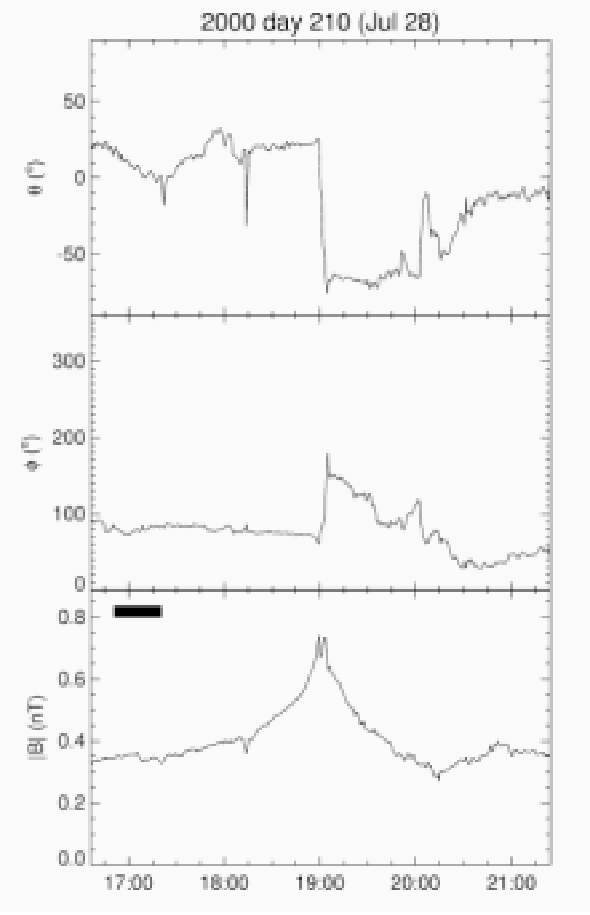

Heliospheric magnetic field azimuth, elevation, and magnitude, respectively, as observed during an IFE by the Ulysses spacecraft on 2000 July 28.