



Low Energy ($> \sim 40$ keV) Ions and Electrons of possible Jovian origin in the outer Heliosphere (Ulysses) and near Earth (ACE) between days 290/2003 – 90/2004.

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Low energy ion flux / spectral modulation and magnetic field directional variations with the Jupiter rotation period (~ 10 hours) were observed by Ulysses during its Distant Jupiter Encounter, as long as Ulysses moved from north to south heliolatitudes, between days 290/2003 - 90/2004. In general this ~ 10 hour ion modulation was found to be more evident around times of passage of CIRs and was observed by Ulysses after the detection of Jovian bKOM and nKOM ~ 10 hours emissions. In addition, characteristic ~ 40 min periodic variations were often seen superimposed on the ~ 10 hour flux increases (for example days 348-352/03). However, a more surprising ion phenomenon could be seen observed in the heliosphere between days ~ 320 -332/03. Previous studies have already shown that Ulysses observed the passage of a coronal mass ejection (CME) between d. ~ 320 -324 / 03 (Koning et al. [2005]) and that Jovian $> \sim 3$ MeV electrons were ejected within the CME (McKibben et al, 2005). On days 329-331 / 03 (25-27, November 2003), a series of ~ 10 h separated short (~ 1 -3 hours) duration low energy (~ 0.05 - ~ 2.00 MeV) ion bursts were observed by the spacecraft ACE, which were accompanied by ~ 10 hour spectral variation of low energy (~ 40 - ~ 100 keV) electrons and $\sim 10/5$ hour quasi-periodic IMF directional variations. At those times, ACE was at a distance of $\sim 240 R_E$ from Earth and located near IMF lines connecting Sun with Jupiter. The analysis of energetic ion pitch angle distributions suggest that a large scale particle layer was “near” ACE for a long time (~ 2.5 days) and approached / removed quasi-periodically (~ 10 hours) from the ACE spacecraft. During the main phase of ACE ion bursts, field aligned flows from the anti-sunward direction were observed, but a comparison of simultaneous observations at

ACE, Goetail, IMP-8 and geostationary spacecrafts (LANL-01A, LANL-02A, LANL-97A, 1994-084, 1991-080, 1990-095) rather suggest that the Earth's magnetosphere / bow shock was not the source of the $\sim 10 / 5$ quasi-periodic ion flows. We believe that the Jovian magnetosphere triggered by the impact of the CIRS (CME) was most probably the source of the ~ 10 quasi-periodicities in low energy ion observations in the outer (inner) heliosphere during the time period examined in this study.