



## **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 ( $\sim 10$  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  $\sim 10$  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  $\sim 10$  hours emissions. In addition, characteristic  $\sim 40$  min periodic variations were often seen superimposed on the  $\sim 10$  hour flux increases (for example days 348-352/03). However, a more surprising ion phenomenon could be seen observed in the heliosphere between days  $\sim 320$ -332/03. Previous studies have already shown that Ulysses observed the passage of a coronal mass ejection (CME) between d.  $\sim 320$ -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  $\sim 10$ h separated short ( $\sim 1$ -3 hours) duration low energy ( $\sim 0.05$  -  $\sim 2.00$  MeV) ion bursts were observed by the spacecraft ACE, which were accompanied by  $\sim 10$  hour spectral variation of low energy ( $\sim 40$  -  $\sim 100$  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 ( $\sim 2.5$  days) and approached / removed quasi-periodically ( $\sim 10$  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  $\sim 10$  quasi-periodicities in low energy ion observations in the outer (inner) heliosphere during the time period examined in this study.