AN EARLY REPORT ON IUE OBSERVATIONS OF THE IMPACT OF COMET SHOEMAKER-LEVY WITH JUPITER

W. M. Harris, G. E. Ballester , J. Barker , J. Clarke, M. Combi, M.Vincent (U. Michigan, USA), R. Gladstone (SRI, USA), J. Kozyra (U. Michigan, USA), R. Prangé (IAS, France), L. Ben Jaffel (IAP, France), J.-P. Bibring, C. Emerich (IAS, France), W. Ip (Max Planck I., Germany), S. Miller (U.C.L., UK), D. Rego (IAS, France), D. Southwood, and M. Dougherty (I.C.L., UK), T. A. Livengood (NASA/GSFC, USA), S.A. Budzien (NRL, USA), F. Espenak (NASA/GSFC, USA), G.F.Fireman (CSC, USA), T. Kostiuk (NASA/GSFC, USA), M. A. McGrath (STScI, USA), P. D. Feldman, D.T. Hall, D.F. Strobel, H.W. Moos (Johns Hopkins U., USA), L.M. Woodney (U. Maryland, USA)

We report on our International Ultraviolet Explorer (IUE) program to detect the effects of the impact of comet Shoemaker- Levy with Jupiter using the IUE satellite. The IUE was in a unique position to monitor this event, because it was the only UV instrument that had a continuous duty cycle during the encounter period, and was able to observe all of the impacts. This scientific program represents the combined efforts of four observing teams; 3 from the US and 1 from Europe with a total of 450 hours of satellite time between early June and mid August. Our primary target list included;

- Detection of changes in the NUV/FUV albedo from ablation, upwelling, and dust infall.

- Tracking of the zonal and meridional motion of this new material by stratospheric and thermospheric winds.

- Monitoring the Jovian auroral zones for changes in the intensity, distribution, optical depth, or particle energetics attributable to the comet.

- A search for intensity changes in the high altitude equatorial Ly-a enhancement.

- Monitoring the visible intensity of the Galilean satellites during the impacts with the IUE targeting camera for evidence of a reflected 'flash'.

- Observation of the plasma Io torus for changes in composition.

- Simultaneous observing with the FOC and WFPC-II instrument on HST, the EUVE satellite, and NSFCAM at the IRTF telescope.

Several early discoveries have emerged from our initial analysis of the spectra obtained. We detected short time scale evolution in the broad band albedo of the impact sites during the first 5 hours after the collisions. Later observations showing much slower development suggest that the bulk of the absorbing material forms in this time period. Observations of the general

 https://doi.org/10.1017/S1539299600012375

level of auroral activity during the impact week do not show any large scale changes in the auroral system. We do, however, note that the level of south auroral activity is somewhat suppressed relative to the north and the historical archive. Further review of the spectra from before and after the impact period is necessary to determine if this effect is related to the impacts. Lastly, we present the detection of significant UV emission from the area of the K impact event. The intensity of the emission suggests a non-thermal process, however further study of the spectral character of the emission, along with study of spectra from other impact sites will be necessary to isolate the source in detail.

JUPITER'S SYNCHROTRON RADIATION THROUGHOUT THE COMET P/SHOEMAKER-LEVY 9 IMPACT PERIOD

I. de Pater, C. Heiles, M. Wong (U. California, Berkeley, USA), R.J. Maddalena (NRAO, Green Bank, USA), M.K. Bird, O. Funke (U. Bonn, Germany), J. Neidhoefer (MPI für Radioastronomie, Bonn, Germany), R. M. Price, M. Kesteven, M. Calabretta (CSIRO, Australia), M.J. Klein, S. Gulkis, S.J. Bolton (JPL, Pasadena, USA), R.G. Strom, R.S. LePoole, T. Spoelstra, M. Robison (Netherlands Foundation Radio Astronomy, Dwingelo, The Netherlands)

Jupiter's microwave emission was observed throughout the SL9 impact period by many different telescopes, among which the NRAO 140-foot telescope in Green Bank (21 cm), Westerbork (92 cm), Effelsberg (6, 11 cm), Parkes (21 cm), NASA DSN (13 cm), and the Very Large Array (22, 90 cm). We determined the "average" total nonthermal flux density from the planet after having subtracted the thermal contribution, following the formulation by de Pater and Klein, (1989) and Klein et al., (1989). The flux density increased typically by 40–50% at 6 cm wavelength, 27% at 11-13 cm, 22% at 21 cm and 10–15% at 90 cm. Thus the radio spectrum hardened considerably during the week of cometary impacts. Following the week of cometary impacts, the flux density began to subside at all wavelength.

VLA images show the brightness distribution of the planet; a comparison of images taken before and during the week of impacts show marked changes in the brightness distribution. At a central meridian longitude $\lambda_{III} \approx 110°$, the left side of the belts increased considerably and moved inwards by ~ 0.2 R_J. This suggests that the increase in flux density is caused by energization of the resident particle population.

For more details on the variation in flux density and in the brightness distribution, the reader is referred to de Pater et al., "The Outburst in Jupiter's