Analysis of AAT Near-Infrared Imaging Spectroscopy of the Impacts of Sl9 with Jupiter

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We used the Infrared Imaging Spectrometer (IIRS) on the 9m Anglo-Australian Telescope to observe the collisions of 8 of the Comet Shoemaker-Levy 9 fragments with Jupiter. Past rates of photometry was taken for N and V. Spatially resolved (> 0.6'/pixel) and temporally resolved (2 - 20 minutes) moderate-resolution (300 λ/Δλ) spectra were obtained during the impacts of C, D, G, H, Rand W. These spatially (0.6°/pixel) and temporally resolved (> 2 minutes to 6 minutes after the impact, and 6 minutes before strong emission from CO (λ>2.29 μm) and H2O (2.0 and 2.3 μm). The delayed appearance of the CO and H2O is probably consistent with high-energy comet-rich ejecta, which attains a higher altitude, and has a longer flight path than Jovian material from the edge of the shock tube, which is ejected at lower velocities. We have used a line-by-line radiative transfer model to create synthetic spectra of the splash event in the range 2.0 - 2.4 μm. The model includes emission from the gases C11, N11, CO, and 112). Preliminary results indicate that a splash containing ambient Jovian CH4 abundance produces emission in excess of that observed. This would imply either strong CH4 self-absorption or low abundance of CH4 in the splash. We also find that the high density of C111 emission in this region forms a 'pseudo-continuum,' at the spatial resolution of the data, reducing the importance of particulate emission to explain the observed continuum. Results to date on derived absolute gas abundances will be presented, although this analysis is complicated by the relatively large sampling interval between observations (40s - 2 min) and the rapid cooling rates for the shock-heated Jovian stratosphere.

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