



Near-Infrared spectroscopy and imaging of the 2009 Jupiter impact debris field: Constraints on particle composition, size and vertical distribution.

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We present results of near-infrared imaging of the 2009 Jupiter impact site and its associated debris field obtained between 20 July 2009 (approximately 20 hours after impact) and 15 August 2009 (nearly one month post-impact). Our data were acquired with NASA/Infrared Telescope Facility (IRTF) facility instrument, SpeX, a 1- to 5-micron spectrometer. On 20 July, the impact site appeared as a localized region, close to and brighter than Jupiter's south polar haze. The footprint of the field was approximately 5 by x 14 deg. The impact site then expanded longitudinally in both east and west directions. Nearly four weeks later, the debris field was characterized by a few localized structures or "cores" northwest of the original impact site, with an associated footprint approximately 7 x 39 deg, indicating very little meridional dispersion. Early multi-spectral images and spectra of the debris identify concentrations of ammonia gas in the debris field, consistent with mid-infrared spectroscopy. Spectra and images of the debris material in subsequent weeks, redistributed by the zonal and meridional wind field of Jupiter, indicate that the debris continued to be very prominent at 2 microns, comparable in reflectivity to the south polar haze and high in the atmosphere. In the 2-micron region, the debris reflectivity also diminished with time, mostly as a result of coagulation and/or downward sedimentation. Our initial solution for the putative debris cloud observed on July 20 is a thin, gray layer of particles located near 200 mbar, composed of bright particles. Changes of these parameters over one week (to 26 July 2009), two weeks (to 4 Aug 2009) and one month (to 15 Aug 2009) will be described. Our results will also be compared with those of the SL9 fragment impacts and with the "undisturbed" Jovian atmosphere, constraining the vertical distribution of the perturbation, composition and particle sizes of the debris.