



## Detection of ethylene produced by the July 2009 impact with Jupiter

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We report the detection of ethylene ( $C_2H_4$ ) on the site of the 19 July 2009 impact on Jupiter, about two months after the collision. Observations were made on 18 and 30 September 2009 at the Very Large Telescope using the VISIR spectrometer at high spectral resolution around  $10.54 \mu m$ . Emission from several  $C_2H_4$  lines was clearly detected along the whole instrument slit, covering about  $3^\circ$  in latitude and  $18^\circ$  in longitude. This is the first observation of a compound produced by shock chemistry on this recent impact site. The derived  $C_2H_4$  column density is larger than that observed in July 1994 on the site of a large impact (K) from Comet Shoemaker Levy 9 (SL9). The total mass integrated over the estimated area of the 2009 debris field is only slightly smaller than that over the SL9 K site. As observations of the impact debris tend to indicate that the mass of the 2009 impactor was significantly smaller than a large SL9 fragment, the relatively large mass of ethylene produced may indicate a different, more reducing, chemistry in the shocked Jovian air compared with SL9. This might point to an asteroidal origin of the 2009 impactor. We did not detect stratospheric ammonia at the impact site, two months after the collision, in contrast to its detection at the Gemini telescope on July 24. This indicates rapid removal of ammonia by photolysis, as expected from photochemical considerations.