



## **Giant Planet Atmospheres: The Illusion of Element Enrichment**

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Contrary to expectation, the mass spectrometer on the Galileo Probe into Jupiter's atmosphere revealed that the abundances of N, C, S, Ar Kr, and Xe relative to hydrogen are all super-solar (Niemann et al. *J. Geophys. Res.* 103, 22831-22846 (1996), Owen et al. *Nature* 402, 269-270 (1999)). The most recent values and their uncertainties for both Jovian and solar abundances show an apparent enrichment of  $3.5 \pm 1.5$  X the solar values. Subsequently the abundance of carbon (as methane) on Saturn was found by the Cassini IR spectrometer (CIRS) to be  $10.9 \pm 0.5$  X solar (Fletcher et al. *Icarus* 199, 351-367 (2009)).

Attempts to explain these anomalies have focused on delivery of the excess abundances by icy planetesimals. However, new studies of  $^{15}\text{N}/^{14}\text{N}$  in Saturn, comets and the solar wind support an alternative hypothesis viz., these apparent super-solar abundances are actually the result of a depletion of hydrogen and helium in the matter that made the planets (Guillot and Hueso, *Mon. Not. R. Astron. Soc.*, 367, L47-L51 (2006)). This depletion is the result of photoevaporation and viscous spreading of the solar nebula. There is no requirement for augmentation of specific element abundances; the accretion-collapse model for giant planet formation remains valid.