**Outgassing and chemical evolution of C/2012 S1 (ISON)**

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**Abstract**

Volatile production rates, relative abundances, rotational temperatures, and spatial distributions in the coma were measured in C/2012 S1 (ISON) using long-slit high-dispersion ( ~ 2.5×104) infrared spectroscopy as part of a worldwide observing campaign. Spectra were obtained on UT 2013 October 26 and 28 with NIRSPEC at the W. M. Keck Observatory, and UT 2013 November 19 and 20 with CSHELL at the NASA IRTF. H2O was detected on all dates, with production rates increasing by about a factor of 40 between October 26 (Rh = 1.12 AU) and November 20 (Rh = 0.43 AU). Short-term variability of H2O production is also seen as observations obtained over a period of about six hours on November 19 show an increase in H2O production rate of nearly a factor of two. C2H6, CH3OH and CH4 abundances are slightly depleted relative to H2O in ISON compared to mean values for comets measured at infrared wavelengths. On the November dates, C2H2, HCN and OCS abundances relative to H2O appear to be close to the range of mean values, whereas H2CO and NH3 were significantly enhanced. We will compare derived chemical abundances in ISON to other comets measured with infrared spectroscopy.