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Properties of H_3^+ and CH_4 at mid and equatorial latitudes in the Jovian atmosphere, observed with JIRAM on Juno

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The NASA Juno spacecraft is studying Jupiter's atmosphere in depth since August 2016. The Jupiter Infrared Auroral Mapper (JIRAM) experiment (Adriani et al. 2014), one of the scientific instruments on board Juno, is composed of two broad-band imagers and an infrared spectrometer, dedicated to the observation of the auroral and chemical composition of the Jupiter's atmosphere. Images and spectral observations in limb view geometry have been acquired since orbit 17 (December 2018) onwards, providing a wealth of details of the atmosphere at mid to equatorial latitudes, with a spatial resolution of the order of hundreds of meters per pixel. CH_4 and H_3^+ emissions around the 3- μm region show two well separated layers at 200 km and at about 500-600 km above the 1-bar level. The CH_4 emission is quite unexpected and shows a maximum of emission close to the equator. In this work we present the distribution of CH_4 and H_3^+ as observed at limb from December 2018 to September 2020 with the imaging subsystem of JIRAM. Their vertical distribution, obtained from simultaneous spectral measurements, is also shown. Temperature and volume mixing ratio (VMR) of the two species, retrieved using the spectral region between 3 and 4 μm (Dinelli et al. 2017, 2019) are discussed and compared with previous measurements.

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References

Adriani A., Filacchione G., Di Iorio T., et al. (2014). JIRAM, the Jovian infrared Auroral mapper. *Space Sci. Rev.* 213, 393, <https://doi.org/10.1007/s11214-014-0094-y>.

Dinelli, B.M., et al. (2017), Preliminary Results from the JIRAM Auroral Observations taken during the first Juno orbit: 1 - Methodology and Analysis Applied to the Jovian Northern Polar Region, *Geophys. Res. Lett.*, doi:10.1002/2017GL072929.

Dinelli B.M., Adriani A., Mura A., Altieri F., Migliorini A., Moriconi M.L., (2019). JUNO/JIRAM's view of Jupiter's H_3^+ emissions, *Phil. Trans. R. Soc.*