



Observing atmospheric HCN on Titan from space and ground-based observatories: an inter-comparison study from Herschel, APEX and IRAM 30m telescopes

Miriam Rengel¹, Denis Shulyak¹, Paul Hartogh¹, Hideo Sagawa², Raphael Moreno³, and Christopher Jarchow¹

¹Max-Planck-Institut für Sonnensystemforschung, Göttingen, Germany (rengel@mps.mpg.de)

²Kyoto Sangyo University, Japan

³LESIA, Observatoire de Paris, Meudon, France

In support of the Herschel Space Observatory and in the framework of the program “Water and Related Chemistry in the Solar System” [1], hydrogen cyanide (HCN) on Titan was observed from ground at submillimetre wavelengths. We carried submm heterodyne spectroscopy observations of HCN (4-3) at 345.5 GHz with the Atacama Pathfinder Experiment (APEX) and the APEX-2 heterodyne receiver, and of HCN (3-2) at 265.9 GHz with the Institut de radioastronomie millimétrique (IRAM) 30-m telescope (IRAM 30m) and the Heterodyne Receiver Array (HERA) receiver in Titan atmosphere. Observations were carried out on June 16, 2010, and March 19, 2011, under non-favorable and favorable weather conditions, respectively. We report here the APEX and IRAM 30m observations, and by using a line-by-line radiative transfer code and the least-squares fitting technique, the analysis to infer the HCN abundance. Our HCN mixing-ratio estimations confirm the result of Marten et al. (2002) [2]. We compare our results with the those with Herschel/PACS and SPIRE acquired during 2010 [3,4]. Measured HCN abundances on Titan with data acquired at different epochs and transitions exhibit similar abundance distributions. Beyond the intrinsic scientific interest, these observations proven their usefulness in supporting spacecraft observations of Solar System bodies, in particular, of Titan’s atmosphere.

[1] Hartogh, P.; Lellouch, E.; Crovisier, J., et al. 2009, *Planetary and Space Science*, Volume 57, Issue 13, p. 1596-1606. [2] Marten, A.; Hidayat, T.; Biraud, Y. et al. *Icarus*, 2002, Volume 158, Issue 2, p. 532-544. [3] Rengel, M.; Sagawa, H.; Hartogh, P., et al. 2014, *A&A*, 561. [4] Courtin, R., Swinyard, B. M., Moreno, R., et al. 2011, *A&A*, 536, L2.