
From Titan to hot super-Earths : Building a HCN vertical distribution reference for hot super-Earths

Miriam Rengel (Max-Planck-Institut für Sonnensystemforschung)

Rengel M., Shulyak D., Hartogh P., Sagawa H., Moreno R., Jarchow C., Breitschwerdt D.

Hydrogen cyanide (HCN) may be present in hot super-Earths with nitrogen-dominated atmospheres and may become a primary specie to be searched for in thermal emission. In this study, we derived an HCN vertical distribution reference for modelling the atmospheres of hot super-Earths or Titan-like exoplanets. Our mean HCN vertical profile reference is based on our measurements of HCN in the most HCN-rich atmosphere in the Solar System, Titan. The measurements consisted of ground-based submillimetre observations acquired quasi-simultaneously with the Herschel ones. We applied a line-by-line radiative transfer code to calculate the synthetic spectra of HCN, and a retrieval algorithm to retrieve the HCN vertical distributions. Our HCN inter-comparisons allowed us also to perform a consistency check between space and ground-based observations and to obtain a profile that could be assimilated into climate models, chemistry calculations, as a guide to understanding what to expect in an N-dominated atmosphere, and as a reference in preparation for future observations of Titan and Titan-like exoplanets for example.