



HCN and CN in Comet 2P/Encke: A three-dimensional view on Comet Encke's outgassing

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In November 2003 comet 2P/Encke was observed simultaneously with the 10m Heinrich Hertz Submillimeter Telescope on Mount Graham, Arizona, USA, and the 2m optical telescope on Mount Rozhen, Bulgaria. Simultaneous radio observations of the 4–3 and 3–2 rotational transitions of HCN and the 0–0 transition of the CN violet band system provide a three-dimensional view on the comet, as the HCN line profile contains information along the line of sight missing in the CN images. In contrast to the opinion of Sekanina (1988, “Outgassing asymmetry of periodic comet Encke. I Apparitions 1924–1984” *Astron. J.* 95, 911-924) the so-called “sunward fan” visible in photographs of comet Encke taken at true anomalies of the comet similar to ours does not consist of dust but of gas. The pole position provided in this work is however confirmed in our observations. Monte Carlo models of the outgassing from an active region on comet Encke’s nucleus will be presented. The models treat the motion of the presumed parent HCN as well as the corresponding daughter product CN. HCN line profiles derived from the model are compared with the observed ones. Similarly model images of CN are compared with the observed images. Of particular interest is the question if there is a modulation of the active vent with rotational phase. Sekanina (1988) derives the latitude of the active region from the width of the fan and the question of rotational modulation remains open. We will provide models where the active area is treated like an active latitude all the way around the nucleus or where the active area occupies the polar cap down to Sekanina’s “latitude of the active vent” (i. e. models without a rotational modulation) and compare them with models of a rotating active spot restricted in longitude (i. e. with rotational modulation). There is

some evidence for another possible parent for CN besides HCN.