AOGS 2005
©2005 Asia Oceania Geosciences Society, Singapore

Grain Properties of Oort cloud Comets: Modeling the Mineralogical Composition of Cometary Dust from IR Emission Features

TAKAFUMI OOTSUBO[1], JUN-ICHI WATANABE[2] and HIDEYO KAWAKITA[3]
[1]*Nagoya University*
[2]*National Astronomical Observatory of Japan*
[3]*Gunma Astronomical Observatory*

Comets are believed to be the most pristine remnants from the early solar nebula era of dust grain formation. These early grain formation processes are important in understanding how dust grain in the solar nebula condensed. By determining the precise mineralogical composition (especially amorphous-tocrystalline silicate ratio) and properties of grains in comets, we can assess the origin of dust grains incorporated into the small, icy bodies of the solar system, and constrain solar nebula models.

The shape and relative strength of the IR emission from a grain is dependent on the intrinsic properties of the dust (shape, porosity, size and composition), as well as the temperature of the grain. Many thermal emission models of comets were assuming a single, identical temperature for dust grains of cometary comae. Harker et al. constructed the cometary grain model by assuming that the cometary dust of each size and composition is in radiative equilibrium with solar radiation field separetely[1]. We also use this model in analysis and compare it to other models, and discuss about the temperature of the crystalline silicate and the amorphous-to-crystalline silicate ratio.

We carried out low spectral observations (R~250) of comet C/2002 V1 (NEAT), C/2001 RX14 (LINEAR)[2], and of C/2001 Q4 (NEAT) at 10 micron band. We present the detailed results of our model fitting analysis, and compare with other results of C/2001 Q4 (NEAT) at different heliocentric distance[3].

Keywords: comets; dust; infrared; silicate

References

[1] D. E. Harker, D. H. Wooden, C. E. Woodward and C. M. Lisse, *Astrophys. J.* **580**, 579 (2002).
[2] M. Honda et al., *Astrophys. J.* **601**, 577 (2004).
[3] D. H. Wooden, C. E. Woodward and D. E. Harker, *Astrophys. J.* **612**, L77 (2004).