

Mid-infrared Observations of Cometary Dust by Subaru Telescope

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Crystalline silicate is sometimes observed in comets as an 11.2-micron resonant emission feature, and may be used for probing early history of the solar system. Because the formation of the crystalline silicate grains requires high temperature, they are thought to be produced from amorphous silicate grains of interstellar origin at the inner region of the early solar nebula, and then transported toward the outer region where comets were born. This transportation is supposed to produce the difference in the fraction of crystalline silicate in the cometary dust grains for two dynamical types of comets. The fraction of crystalline silicate in the dust grains of Oort-cloud comets (OCs) is expected to be generally higher than Ecliptic comets (ECs) due to the different heliocentric distances of their birth places. In order to verify this scenario quantitatively, we have conducted observational study of crystalline silicate in comets [1, 2]. We have observed four OCs and eight ECs thus far in mid-infrared wavelength region using Cooled Mid-Infrared Camera and Spectrometer (COMICS) mounted on the Subaru Telescope on Mauna Kea, Hawaii. Although there can be seen a dispersion among the ECs, OCs basically have rather higher fraction of crystalline silicate than ECs. A significant correlation between the strength of the silicate feature and the semi-major axis is proposed for ECs [3, 4]. We will also discuss these correlations of our targets based on their orbital parameters.

References

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