

すばる望遠鏡によるアイソン彗星の中間赤外線観測 Mid-infrared Observation of sungrazing comet C/2012 S1 (ISON) with Subaru+COMCIS

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Comets are the frozen reservoirs of the early solar nebula and are made of ice and dust. Dust grains in comets have been used to investigate the formation conditions of the solar system. A silicate feature is often observed in comet spectra in mid-infrared region, for example 11.3-micron, and may be used for probing early history of the solar system. In most cases the feature shows the existence of crystalline silicate together with amorphous silicate. Since the crystalline silicate grains are generally made through high-temperature annealing above 800K from amorphous ones, it is believed that the crystalline silicate grains produced at the inner part of the disk were transported to the outer cold regions where comet nuclei formed.

Comet C/2012 S1 (ISON) is a long-period Oort cloud comet, discovered in September 2012. In particular, comet ISON is a sungrazing comet, which is predicted to pass close by the Sun and Earth and becoming a bright object. Mid-infrared observations of this new comet and investigation of the 10-micron silicate feature help us to understand the formation of crystalline silicate grains in the early solar nebula.

We observed comet ISON in mid-infrared wavelength region using Cooled Mid-Infrared Camera and Spectrometer (COMICS) mounted on the Subaru Telescope on Mauna Kea, Hawaii. The observation of comet ISON was carried out on 2013 October 19th and 21st UT. Since the weather condition was not so good when we observed, we carried out N-band imaging observations (8.8 and 12.4 micron) and N-band low-resolution spectroscopy. The spectrum of C/ISON can be fit with 260–265 K blackbody spectrum when we use the 7.8–8.2 and 12.4–13.0 micron region as the continuum. The spectrum has only a weak silicate excess feature, which may be able to attribute to small amorphous olivine grains. We could not detect a clear crystalline silicate feature in the spectrum. We will compare the spectrum with other Oort cloud comets, such as comets C/2011 L4 (PanSTARRS) and C/2013 R1 (Lovejoy), and discuss the dust properties and the birthplace of the comet C/ISON.

Keywords: comet, dust, silicate, infrared