

Subaru/COMICS Mid-Infrared Observation of the Near-Nucleus Region of Comet 17P/Holmes at the Early Phase of an Outburst

Watanabe, Jun-Ichi(NAOJ), Honda, Mitsuhiro(Kanagawa University), Ishiguro, Masateru(NAOJ), Ootsubo, Takafumi(ISAS/JAXA), Sarugaku, Yuki(University of Tokyo), Kadono, Toshihiko(Osaka University), Sakon, Itsuki(University of Tokyo), Fuse, Tetsuharu, Takato, Naruhisa(NAOJ/Hawaii), Furusho, Reiko(NAOJ)

A Mid-infrared imaging and spectroscopic observations of comet 17P/Holmes in the early phase of its outburst in brightness were performed on 2007 October 25–28 UT using the Cooled Mid-Infrared Camera and Spectrometer (COMICS) on the 8.2-m Subaru Telescope. We detected an isolated dust cloud that moved toward the south-west direction from the nucleus at 8.7 ± 0.3 (″/day) (fig. 1). The $11.2 \mu\text{m}$ peak of a crystalline silicate feature onto a broad amorphous silicate feature was detected both in the central condensation of the nucleus and the isolated dust cloud. The color temperature of the cloud is estimated to be $\sim 200\text{K}$. Our analysis of the motion indicates the isolated cloud moved anti-sunward(fig. 2). We propose several possibilities for the motion of the cloud; fluffy dust particles in the isolated cloud started to depart from the nucleus by radiation pressure almost as soon as the main outburst occurred, or dust particles moved by some other forces such as rocket effect and photophoresis when the surrounding dust coma became optically thin.

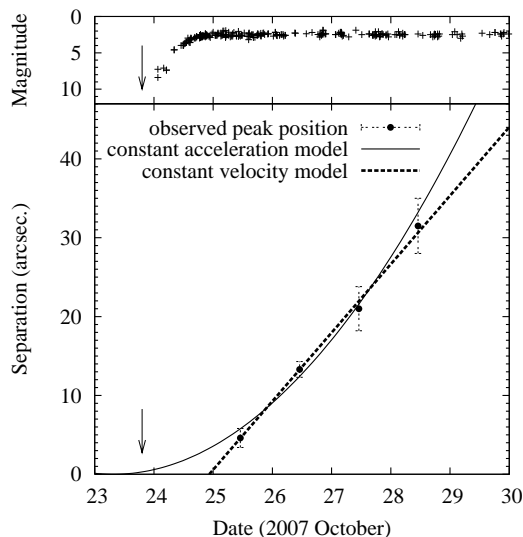


Figure 1: (Top) Light curve of comet 17P/Holmes. (Bottom) Motion of the isolated dust cloud to the central condensation. The dashed and the solid lines denote the first-order (a constant velocity model) and second-order fits (a constant acceleration model), respectively. The estimated onset time of the outburst is indicated by arrows.

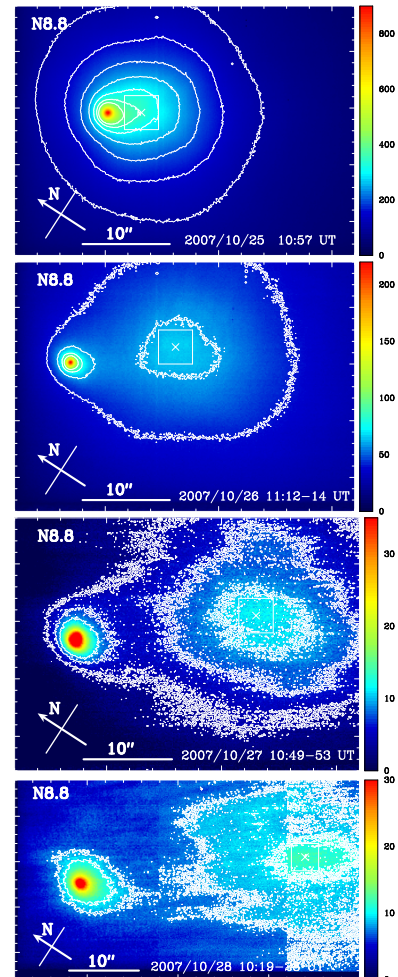


Figure 2: N8.8 images of 17P on Oct. 25, 26, 27, and 28, 2007 UT. The flux unit is in Jy/pixel. The pixel scale is $0.13''$. The cross indicates the center of cloud and the rectangular region is the aperture for photometry ($31 \text{ pix} \times 31 \text{ pix}$). The isolated cloud was moving toward the anti-sun direction.

References

- [1] Watanabe, J., Honda, M., Ishiguro, M., Ootsubo, T., Sarugaku, Y., Kadono, T., Sakon, I., Fuse, T., Takato, N., Furusho, R.: 2009, *Publ. Astron. Soc. Japan*, **61**, 67