Monitoring Observations of the Jupiter-Family Comet 17P/Holmes during its 2014 Perihelion Passage

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17P/Holmes is known as an object that underwent a historic outburst in October, 2007. Subsequent observation revealed that the refractory surface layer (so-called dust mantle) was blown off by the outburst and the nucleus remained active around its aphelion passage in 2010, showing lingering dust tail even beyond 5 AU [1]. In this study, we performed a monitoring observation of 17P/Holmes during its 2014 perihelion passage that is the first time after the outburst, using the 105 cm Murikabushi telescope at the Ishigakijima Astronomical observatory, the 50 cm telescope at the Okayama Astrophysical Observatory (OAO), the 188 cm telescope at OAO, the 2 m Nayuta telescope at the Nishi-Harima Astronomical Observatory (University of Hyogo), the 1.8 m telescope at the Bohyunsan Optical Astronomy Observatory (Korea Astronomy and Space Science Institute), and the 50 cm telescope at the Siding Spring Observatory (operated by iTelescope). We investigated the dust production and the fractional active area using these data [2].

Figure 1 shows selected R_C-band images just after its 2014 perihelion passage. The active dust emission seen after the outburst could not be confirmed, although the circumnuclear coma and the feeble tail were confirmed. Figure 2 shows the active area fraction estimated from the observation as a function of the heliocentric distance (upper horizontal axis) or the true anomaly (lower horizontal axis). Although the fraction was 20–40 % just after the 2007 outburst, it was significantly decreased to 0.1–0.3 % during its 2014 perihelion passage. We presumed from these results that the fresh nucleus would be covered with the newly formed dust mantle to be inactive in only several years. The dust layer of ~10 cm would be piled up to the nucleus from the estimation of the ejected dust amount. This suggests that icy volatile materials in the comet can be maintained with the dust piled up only ~10 cm.

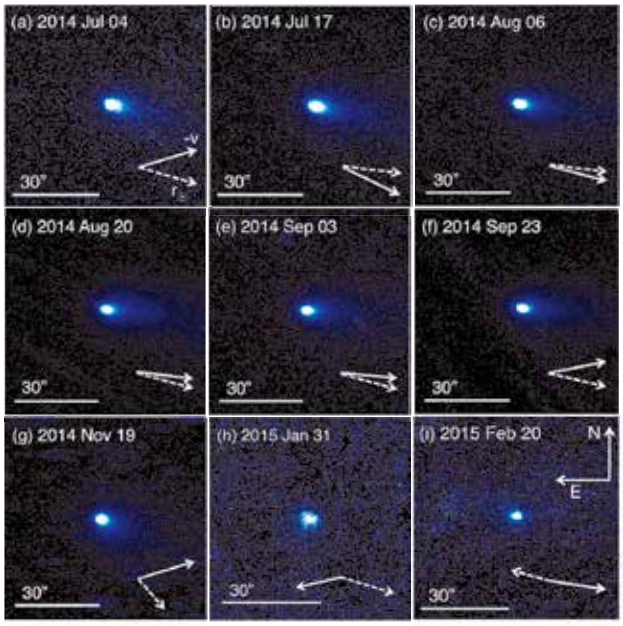

Figure 1: Comet 17P/Holmes immediately after its 2014 perihelion passage.

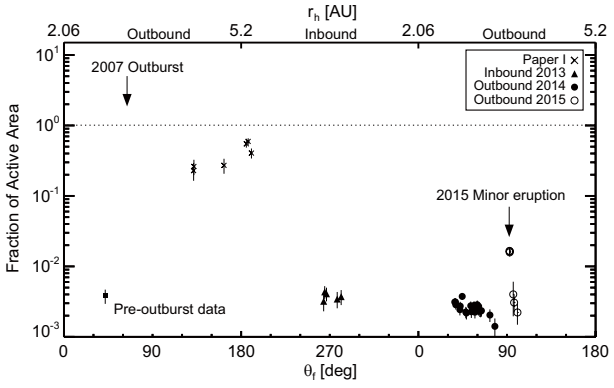

Figure 2: Time evolution of the active area fraction over the cometary surface.

References

[1] Ishiguro, M., et al.: 2013, *ApJ*, **778**, 19.
[2] Kwon, Y., et al.: 2016, *ApJ*, **818**, 67.