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Optical survey of cometary dust trails with the Kiso Schmidt telescope

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The maximum size of dust particles contained in cometary nuclei is an important parameter to understand the formation and evolution of comets. Existing of cm-sized particles is confirmed by the EPXI mission when the spacecraft flew by Comet 103P/Hartley. In addition, the Rosetta spacecraft is beginning to take amazing images of Comet 67P/Churyumov-Gerasimenko. Obviously, in situ observations with spacecrafts are powerful, however, it is impractical to send spacecrafts to a number of comets to search the size distribution of dust particles for each comet. Cometary dust trail is a good object to study this issue through remote observations. Dust trail is a structure extending along the orbit of the parent body, it is composed of dust particles large enough not to be blown off by the radiation pressure of the Sun. This structure was first discovered for eight short-period comets by the Infrared Astronomical Satellite in 1983. Then, Reach et al. reported that dust trails are a generic feature of short-period comets based on the observations with the Spitzer Space Telescope. Although their deep imaging was sufficient for detection, the field of view was not enough to examine the particle size accurately. In this study, we present wide-field images of dust trails taken with the Kiso Schmidt telescope, we estimate the size of dust particles composing them, and discuss similarity or difference among observed comets.

Keywords: comet, dust trail, interplanetary dust, meteor, ground-based observation