Thermal Modeling of Comet-Like Asteroids from Infrared Observations with AKARI

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Since thermal inertia is considered as a direct measure of the bodies' surface characteristics and even particle size distrubution, it is of great importance to many scientists. From recent studies on small bodies, it has been suggested that their thermal inertias decrease with their sizes and spin rates. These relationships, however, are constructed only for asteroids and not for comet-like objects. AKARI satellite of JAXA successfully made spectroscopic observations for two of those comet-like targets, 107P/ (4015) Wilson-Harrington, which once showed cometary activity, and P/2006 HR30 (Siding Spring), which is a bare cometary nucleus. We investigated the physical characteristics of the targets using simple thermo-physical model and found geometric albedo of 0.040-0.060 (size of 3.6-4.4 km) and 0.035-0.050 (size of 23-27 km), respectively. For (4015) Wilson-Harrington, the thermal inertia is preferably less than 250 J m-2 K-1 s-0.5. It is also found that the pole orientation of P/2006 HR30 would exist near the ecliptic plane (the latitude between -40 and +70 deg). The best-fit thermal inertia can vary within certain degree depending on model assumptions. On the other hand, the geometric albedos, i.e., diameters, are confined to very narrow range for both targets as described above, and the values coincide well with previous studies ((4015) Wilson-Harrington) or an expectation for a cometary nucleus (P/2006 HR30). We discuss about the implications of the findings and future directions of thermal modeling of comet-like objects in the presentation.

Keywords: thermal modeling, asteroids

