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MODELING THE PHOTOMETRIC BEHAVIOR OF THE NEAR-EARTH COMET POPULATION

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ABSTRACT

Predictions of cometary magnitudes are a critical portion of the development of a model solar system that can be used to verify and validate the performance of future survey missions. While the number of known Near-Earth Comets (NECs) is substantially smaller than the number of Near-Earth Asteroids, these icy bodies still present a significant impact hazard to the Earth. The known NECs come from all classes of comets, including Jupiter Family Comets (JFCs), Halley Type Comets (HTCs), and Long Period Comets (LPCs). Due to the volatile nature of the materials which define comets, their magnitude does not follow a straightforward brightening trend such as is found for asteroids. The behavior of the outgassing of volatile species (including H_2O, CO_2, and CO) and the dust that is lifted off the comet's surface by these volatiles must be modeled in order to make accurate predictions of

the comet’s magnitude as it orbits the Sun. While the activity of comets is notoriously difficult to predict for individual objects due to the possibility of outbursting and seasonal events, the behavior of comets as an ensemble population is a somewhat more tractable problem. Predictions of cometary magnitudes will be folded in to the Reference Small Body Population Model (RSBPM) that is being developed by the Near-Earth Object Camera (NEOCam) team which can be used to verify and validate the performance of future survey missions and allow for debiasing of the observed comet populations.

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