Thermal Modeling of Comets Using the NEOWISE and NEOCam Surveys

E. Kramer[1], A. Mainzer[1], E.L. Wright[2], J. Bauer[3], R.M. Cutri[4], Y. Fernandez[5], T. Grav[6], J. Masiero[1], T. Spahr[7] and the NEOCam Team

[1] *Jet Propulsion Laboratory/Caltech, Pasadena, CA, United States*
[2] *University of California, Los Angeles, Los Angeles, CA, United States*
[3] *University of Maryland, College Park, MD, United States*
[4] *IPAC, MS 100-22, Caltech, Pasadena, CA, United States*
[5] *University of Central Florida, Orlando, FL, , United States*
[6] *Planetary Science Institute, Tucson, AZ, United States*
[7] *NEO Sciences, LLC, E-mail: tspahr44@gmail.com*

Between the prime WISE mission (Dec. 2009 – Jan. 2011) and the restarted NEOWISE mission (Dec. 2013 – present), hundreds of comets have been observed in the infrared allowing thermal modeling of these icy bodies to be done on a much larger scale, and over a much broader population, than previously has been done before. Several projects have been completed to date on the data (e.g. Stevenson et al. 2014, Bauer et al. 2017, Kramer et al. 2017, Rosser et al. 2018), and several more are underway (e.g. comet trail analysis [Sykes et al. 2014], dust tail analysis [Kramer et al. 2019, in prep.],

nucleus modeling of restarted mission data [Milewski et al. 2019, in prep.]). This rich data set has allowed for techniques in comet thermal modeling to be generalized to a small survey scale.

The Near-Earth Object Camera (NEOCam) is a proposed mission under the auspices of NASA's Planetary Defense Coordination Office which would use two next-generation thermal imaging channels to survey the sky in order to detect and characterize Near-Earth Objects (NEOs). NEOCam is expected to detect thousands of comets during the lifetime of the mission, thereby increasing our sample size by an order of magnitude. This dramatic increase in the sample size will make the characterization of comets too time consuming to be done on an individual basis, and will thus necessitate the further development of comet thermal modeling tools which can be applied in a batch format to the data as they are taken by NEOCam.

We will present here some of the thermal modeling techniques that have been applied to the NEOWISE comet data set, and how we anticipate these techniques being expanded to be used with NEOCam data.