WISE/NEOWISE COMETS: PRELIMINARY PROPERTIES OF NUCLEI & GAS EMISSION. James M. Bauer1,2, A.K. Mainzer1, T. Grav1, J. R. Masiero1, E. Kramer3,4, Y. R. Fernandez2, R. Walker2, K. J. Meech5, C. M. Lisse2, P. R. Weissman1, R. Stevenson1, J. Dailey1, R. Cutri2 and the WISE team; 1Jet Propulsion Laboratory/Caltech, 2Infrared Processing and Analysis Center/Caltech, 3Planetary Science Institute, 4Dept. of Physics, University of Central Florida, 5Monterey Institute for Research in Astronomy, 6Institute for Astronomy, University of Hawaii 7Applied Physics Laboratory, Johns Hopkins University.

The Wide-field Infrared Survey Explorer (WISE) mission began regular survey operations in January 2010, and continued through January 2011, ending survey operations on February 1, 2011[1]. NEOWISE, a program dedicated to utilize the survey data for solar system objects, provided the capability of discovering new objects in the sample and provided for analysis of known bodies.

The NEOWISE project identified 21 new comets (Figure 1). During the WISE mission, the spacecraft imaged over 154 comets simultaneously in four bands, at thermal (12 and 22 μm) and mid-IR (3.5 and 4.6 μm) wavelengths. These observations provide a unique opportunity to measure many of the otherwise inaccessible properties of a large sample of comets. Long period comets (LPCs) comprise roughly a third of the sample, along with Jupiter family and Halley type comets (JFCs & HTC). This ensemble provides meaningful statistics on comet population sub-types regarding nucleus sizes and albedos, dust characteristics, dust mass loss rates, and emission of gas species.

We present here preliminary analysis of nucleus size and albedo distributions for a subset of the LPCs, HTCs, JFCs, and related bodies observed by WISE. We also provide initial estimates of dust production, and by estimating the dust contribution to the signal, we estimate CO/CO2 gas emission these bodies based on 4.6 μm flux excess [2]. Related work by Kramer et al. [3] and Fernandez et al. [4] provide comparative analyses of dust behavior in the active bodies across different comet populations, and demonstrate how the WISE data may be used in combination with other data sets to study individual comets in detail.

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Figure 1: The 21 WISE comet discoveries, including the three known bodies that NEOWISE found to be active (upper left; magenta labels). Each comet is shown here in 4.6, 12, & 22 μm three-color images. This sub-sample of the >130 comets detected by WISE is demonstrative of the variation in observed activity and sub-populations seen on the total sample. The newest comet discovery, P/2010 JC81 (WISE), is shown offset to the lower left.