**ALBEDO AND TAXONOMIC CLASS RELATIONSHIPS OF NEAR-EARTH OBJECTS OBSERVED BY THE WIDE-FIELD INFRARED SURVEY EXPLORER (WISE).**

C. K. Maleszewski,[1] J. Masiero[2], R. S. McMillan[1,3,4], A. Mainzer[2], J. V. Scotti[1,4], J. A. Larsen[4,5], and the WISE Team, [1]Lunar and Planetary Laboratory, University of Arizona (1629 E. University Blvd, Tucson, AZ 85721 USA, maleszew@lpl.arizona.edu, bob@lpl.arizona.edu), [2]Jet Propulsion Laboratory (California Institute of Technology, Pasadena, CA 91109 USA), [3]Steward Observatory (University of Arizona, Tucson, AZ 85721 USA), [4]Visiting Astronomer, National Optical Astronomy Observatory, which is operated by the Association of Universities for Research in Astronomy (AURA) under cooperative agreement with the National Science Foundation, [5]U.S. Naval Academy (Annapolis, MD 21402 USA).

The Wide-field Infrared Survey Explorer (WISE) was launched in December 2009 to search for the most luminous galaxies and the closest brown dwarfs to the Solar System. This was achieved by completing an all-sky survey in four different wavelength bandpasses: 3.4, 4.6, 12, and 22 microns. The WISE bandpasses are many times more sensitive than other infrared surveys such as IRAS [1]. As an enhancement to the main mission, the NEOWISE program was developed to archive all single frame images and to create a pipeline to detect moving objects within the survey data [2]. This led to the observation of thousands of small bodies, including over 500 near-Earth objects (with 127 discoveries). Thermal models such as NEATM [3] can be used with WISE infrared fluxes to derive diameter; when combined with visible fluxes, albedo can be computed.

Two of the more common asteroid taxonomic systems in use today are the Tholen [4] and Bus-Binzel/Bus-DeMeo systems [5, 6]. These systems define classes based on the spectral properties of the asteroids. While albedo measurements have been used to help distinguish objects in some classes such as the Tholen EMP class [5], the distribution of NEO albedos within classes has not been studied in detail with a significant number of objects. Results from the SMASSII survey suggest a bimodal distribution of albedos with respect to the C- (low albedo) and S-classes (high albedo) [5]. On the other hand, small samples of NEOs have been shown to exhibit a wider range of albedos as a function of diameter [7]. Such studies will be improved by completing albedo and taxonomic measurements in order to improve statistics.

The goal of this project is to classify the WISE-sampled NEO population and determine the albedo distribution between the taxonomic classes in both systems. Preliminary results will be based on objects that have been classified previously in the literature. Future classification work will focus on the use of broad-band photometry, which has been shown to successfully classify NEOs [8]. Photometric observations of WISE-observed NEOs have been obtained with the 2.3-m Bok Telescope of Steward Observatory, the 4-m Mayall telescope of KPNO, the 3.5-m WIYN telescope, and the 4-m Blanco telescope of CTIO. Additionally, archived photometry from the Sloan Digital Sky Survey Moving Object Catalog [9] will be used to classify additional NEOs using the ugriz bandpass system. Broadband photometry will be used in order to observe as many of the WISE-observed NEOs as possible, so that we are not biased against the faintest objects.

Refining knowledge of the relationships between albedo and taxonomic classes will allow us to further constrain the physical properties and composition of the NEOs we investigate. Knowledge of these properties will improve our understanding of early solar system conditions and of processes such as space weathering. Finally, knowledge of NEO diameters and compositionally-inferred densities will allow estimates of the kinetic energies of potential impactors.

**Acknowledgments:**

This publication makes use of data products from the Wide-field Infrared Survey Explorer, which is a joint project of the University of California, Los Angeles, and the Jet Propulsion Laboratory/California Institute of Technology, funded by the National Aeronautics and Space Administration. This publication makes use of data products from NEOWISE, which is a project of the Jet Propulsion Laboratory/California Institute of Technology, funded by the Planetary Science Division of the National Aeronautics and Space Administration.

The National Optical Astronomy Observatory is operated by the Association of Universities for Research in Astronomy, under contract with the National Science Foundation. The WIYN Observatory is a joint facility of the University of Wisconsin-Madison, Indiana University, Yale University, and the National Optical Astronomy Observatory.

**References:**

[1] Wright E. L. et al. (2010) *AJ*, *140*, 1868-1881.
[2] Mainzer A. et al. (2010), *ApJ*, *submitted*.
[3] Harris A. W. (1998) *Icarus*, *131*, 291–301.
[4] Tholen D. J., (1984). *Asteroid Taxonomy from Cluster Analysis of Photometry*. Doctoral Thesis. Univeristy of Arizona.
[5] Bus S. J., and Binzel R.P. (2002) *Icarus*, *158*, 146-177.
[6] DeMeo F. E. et al. (2009) *Icarus*, *202*, 160-180
[7] Delbó M. et al. (2003) *Icarus*, *166*, 116-130.
[8] Dandy C. L., et al. (2003) *Icarus*, *163*, 363-373.
[9]http://www.astro.washington.edu/users/ivezic/sdssmoc/sdssmoc.html