WISE results for the Main Belt Asteroids

J. Masiero[1], A.K. Mainzer[1], T. Grav[2], J.M. Bauer[1], R. Cutri[3], J. Dailey[3], M. Delbo[4], R.S. McMillan[5], M. Mueller[4], R.G. Walker[6] and E.L. Wright[7]
[1]Jet Propulsion Laboratory/California Institute of Technology (joseph.masiero@jpl.nasa.gov), [2]Johns Hopkins University, [3]Infrared Processing and Analysis Center, California Institute of Technology, [4]Observatorie d'Cote Azur, [5]Lunar and Planetary Laboratory, University of Arizona, [6]Monterey Institute for Research in Astronomy, and [7]University of California, Los Angeles

Data

We present our analysis of Main Belt asteroid data found in the *Wide-field Infrared Survey Explorer (WISE)* survey database. *WISE* [1] launched December 14, 2009 and began survey operations January 14, 2010, scanning the sky from a sun-synchronous polar orbit in four thermal infrared wavelengths simultaneously. Known objects are identified in the field of view automatically, while new objects are discovered through the NEOWISE enhancement [2] using the *WISE* Moving Object Processing System (WMOPS). Thermal infrared observations, in particular the *WISE* 12 μm and 22 μm bandpasses (W3 and W4, respectively) allow us to model the diameter of an asteroid. Using optical observations from the Minor Planet Center (MPC) and followup campaigns, along with the infrared diameters, we can break the degeneracy inherent to optical data to determine the albedo of an asteroid.

WISE has reported observations of over $155,000$ minor planets to the MPC, of which over $34,000$ are new discoveries. Most of these detections are of Main Belt asteroids (MBAs). We have produced preliminary thermal models for over $100,000$ previously known MBAs with sufficient S/N ($i.e.$ $> 5\sigma$), all of which have previous optical data allowing for albedo measurement as well. The unprecedented size of this infrared data set allows us to focus on specific regions or families in the Main Belt while putting these subsets in context of the greater population.

Results

We present albedo and diameter distributions for various subpopulations of the Main Belt, and compare these to the general population trends observed for the Belt as a whole. The trend of decreasing albedo observed across the Main Belt has been known since IRAS [3], but now with a data set ~ 100 times larger we can investigate the structure of this transition. This provides important clues to the understanding of the evolution of MBAs. These results are also discussed further in Masiero, et al. [4].

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.

References

[1] Wright, E.L., Eisenhardt, P.R.M., Mainzer, A.K., Ressler, M.E., Curti, R.M, et al., 2010, AJ, 140, 1868.
[2] Mainzer, A.K., Bauer, J.M., Grav, T., et al., 2010, ApJ, submitted.
[3] Tedesco, E.F., Williams, J.G., Matson, D.L., Weeder, G.J., Gradie, J.C. & Lebofsky, L.A., 1989, Icarus, 97, 580.
[4] Masiero, J.M., Mainzer, A.K., Grav, T., et al., 2011, in prep.