

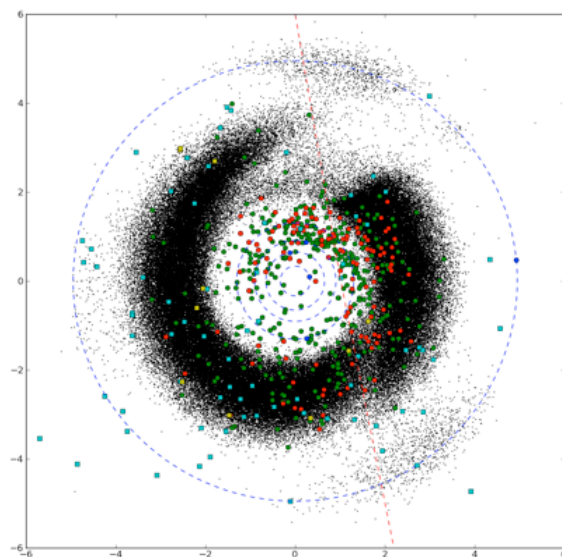
NEOWISE – An Infrared View of the Solar System. A. K. Mainzer¹, J. M. Bauer¹, T. Grav², R. M. Cutri³, J. Dailey³, J. Masiero¹, R. S. McMillan⁴, R. Walker⁵, E. Wright⁶, D. Tholen⁷, and the WISE Team,¹4800 Oak Grove Dr., Pasadena, CA 91109 USA, Jet Propulsion Laboratory, California Institute of Technology, ² Department of Physics and Astronomy, Johns Hopkins University, ³Infrared Processing and Analysis Center, California Institute of Technology, ⁴Lunar and Planetary Laboratory, University of Arizona, ⁵Monterey Institute for Research in Astronomy, ⁶Department of Physics and Astronomy, University of California, Los Angeles. ⁷Institute for Astronomy, University of Hawaii

The Wide-Field Infrared Survey Explorer (WISE) has imaged the entire sky two times between January, 2010 and January, 2011 at four wavelengths spanning the near through mid-IR at sensitivities hundreds of times greater than previous surveys [1]. The WISE band-passes (3.4, 4.6, 12 and 22 μ m) sample the flux from most inner-solar-system bodies near the peak of their thermal emission. Overlapping sky regions were sampled repeatedly at 3 hour intervals. The same region of sky was observed a minimum of 8 times.

While the primary WISE science objectives focus on ultra-luminous infrared galaxies and brown dwarfs, additions to the baseline WISE pipeline (collectively known as “NEOWISE”) have enabled the detection of undiscovered moving objects, as well as previously known bodies [2]. As of December, 2010, NEOWISE has detected more than 155,000 minor planets, including more than 500 near-Earth objects (NEOs), ~2000 Jupiter Trojans, 120 comets, and ~20 outer Solar System objects such as Centaurs. The survey has discovered ~34,000 new minor planets, including 130 new NEOs and 20 new comets. NEOWISE was the most prolific observer of minor planets in 2010, having detected nearly 100x more objects than its predecessor, the Infrared Astronomical Satellite (IRAS) [3]. The NEOWISE data will drive a panoply of new Solar System investigations.

NEOWISE allows determination of IR-derived diameters and albedos for minor planets throughout the Solar System, with increased sensitivity for the darkest members of these populations. The survey also provides measurements of:

- asteroid thermal inertias,
- lightcurves
- dust grains in the coma of active comets,
- albedos & diameters of cometary nuclei,
- comet debris trails and zodiacal dust bands,
- and the diameters & albedos of large outer



solar system objects.

Figure 1: A top-down view of the objects observed by NEOWISE; the outermost dashed line is Jupiter’s orbit. Red dots are NEOs discovered by NEOWISE; green dots are previously known NEOs. Cyan and yellow squares are comets. The dropoff in density near the top of the figure is due to the depletion of the WISE secondary tank cryogen on 5 Aug, 2010.

References:

- [1] Wright et al. (2010) AJ 140, 1868
- [2] Mainzer et al. (2010) ApJ submitted
- [3] Matson, D., ed. 1986 JPL D-3698

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