The WISE Moving Object Pipeline Subsystem – Design and Implementation. , J. M. Bauer[1], T. Grav[2], , J. Dailey[3], J. Myers[4], A. K. Mainzer[1] J. Masiero[1], R. Cutri[3], R. McMillan[5], R. Jedicke[6], L. Denneau[6], R. Walker[7], E. L. Wright[8], and the WISE Team,[1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91011, [2]Department of Physics and Astronomy, Johns Hopkins University, [3]Infrared Processing and Analysis Center, California Institute of Technology, [4]LSST Corporation, Tuscon, Arizona, [5]Lunar and Planetary Laboratory, University of Arizona, [6]Institute for Astronomy, University of Hawaii, Manoa [7]Monterey Institute for Research in Astronomy, [8]Department of Physics and Astronomy, University of California, Los Angeles.

Introduction: The Wide-Field Infrared Survey Explorer (WISE) is scheduled to be launched in early December of 2009, imaging more than 99% of the sky in the near and mid-IR for a 9-month mission life time. While the primary WISE science objectives focus on ultra-luminous infrared galaxies and the nearest brown dwarfs, WISE will detect a large number of Solar System bodies, a large fraction of which have been previously unknown.

Challenge: The WISE Moving Object Pipeline Subsystem (WMOPS) was designed to detect solar-system objects in the WISE scan data, with particular emphasis on the detection of Near-Earth objects (NEOs). To facilitate ground-based recovery efforts and extend the observing arc of 8-12 detections beyond the span of a few days (on average), the detections and astrometry were to be reported to the community as soon as possible. Hence, WMOPS should report the tracks of candidate object detections within a few weeks of their detection times.

The WISE spacecraft and instrument functioning parameters present their own challenges unique to IR observations from spacecraft platforms. Parallax motion is minimized by the terminator-following orbit of WISE, making the distances to moving objects more difficult to determine, and objects with low projected sky-velocities more difficult to detect, than from ground-based observatories. Latent images on IR detectors from bright sources (see Figure 1) mimic solar system object motions very effectively. The quantity of moving objects, on the order of 10^5 over the course of the mission, a large fraction of which will be main-belt asteroids (MBAs), require automated vetting and approval of candidate tracklets, so as not to overwhelm the WMOPS team with thousands of by-eye evaluations for each scan period, while maintaining a high degree of reliability for the reported tracklets.

Design: We designed WMOPS to meet these challenges in a unique fashion. Sensitive to both slowly and rapidly moving objects, the sub-system will run on processed scan data, minimizing the time required to process the astrometry on new objects for reporting to the Minor Planet Center. This talk will discuss the design of the WMOPS sub-system in the context of the detection statistics reported in the related paper [2].

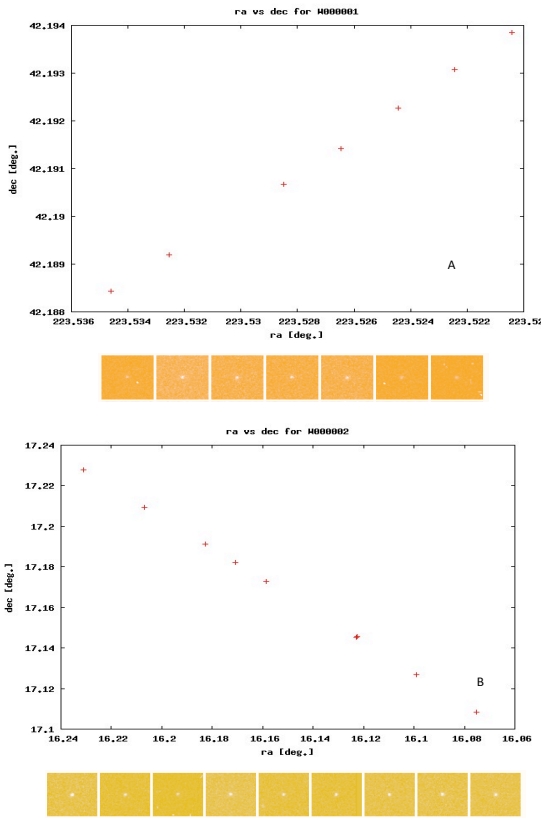

Figure 1: Panel A (top) :Detector latent image and Panel B (bottom): moving object tracklet (B) in simulated data.

References: [1] McMillan, R. S. *et al.* (2009) *B.A.A.S, 41,* p. 364. [2] Grav, T. *et al.* (2010) *This Conference.*

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