NEOCam Survey Cadence and Simulation. Tommy Grav[1], Amy Mainzer[2], Tim Spahr[3], Joseph Masiero[2], James M. Bauer[3], Roc M. Cutri[5], Emily Kramer[2], Sarah Sonnett[1] and the NEOCam Team. [1]Planetary Science Institute, (tgrav@psi.edu), and [2]Jet Propulsion Laboratory, California Institute of Technology, and NEO Sciences LLD, and [4]Dept. of Astronomy, University of Maryland, and [5]IPAC, California Institute of Technology.

Introduction: The Near-Earth Object Camera (NEOCam) is a space mission that is designed to discover, track, and characterize at least two-thirds of potentially hazardous asteroids (PHAs) that are larger than 140 m and therefore capable of causing significant regional damage [1]. NEOCam will also detect more than 2000 comets, more than 300,000 smaller NEOs, and millions of more distant main belt asteroids and other solar system bodies. NEOs emit most of their energy at thermal infrared wavelengths. NEOCam therefore will image the sky at two IR bandpasses (6-10 and 4-5.2 microns) designed to maximize sensitivity and to provide robust measurements of physical properties, such as effective spherical diameter, while sensitive to both low and high albedo objects.

The NEOCam Survey Simulator (NSS) is a set of tools that are being developed to verify NEOCam's ability to meet the mission's scientific objectives. The NSS consists of a comprehensive representation of the mission's performance, including the flight system hardware, mission operations, and ground data system processing. The NSS takes as its input a reference population of small solar system bodies, the NEOCam Reference Small Body Population Model (RSBPM), and performs a frame-by-frame simulation of the survey over the course of its entire operational lifetime. The ground data system's ability to extract detections, and link detections into tracklets and tracks is also modeled.

NEOCam Survey Simulator: The NSS has been used as a tool to investigate mission architecture trades as well as to determine a cadence suitable for PHA discovery and tracking. In addition, the NSS is being used as a project systems engineering tool to verify and validate performance against the mission's scientific objectives and flow down detailed requirements on each of the flight and ground subsystems. Here, we will report on the use of the NSS to optimize the survey cadence for PHAs, which requires a delicate balance between the ability to perform intra- and inter-night linking of detections, provide secure orbits, and maximize overall discovery numbers.

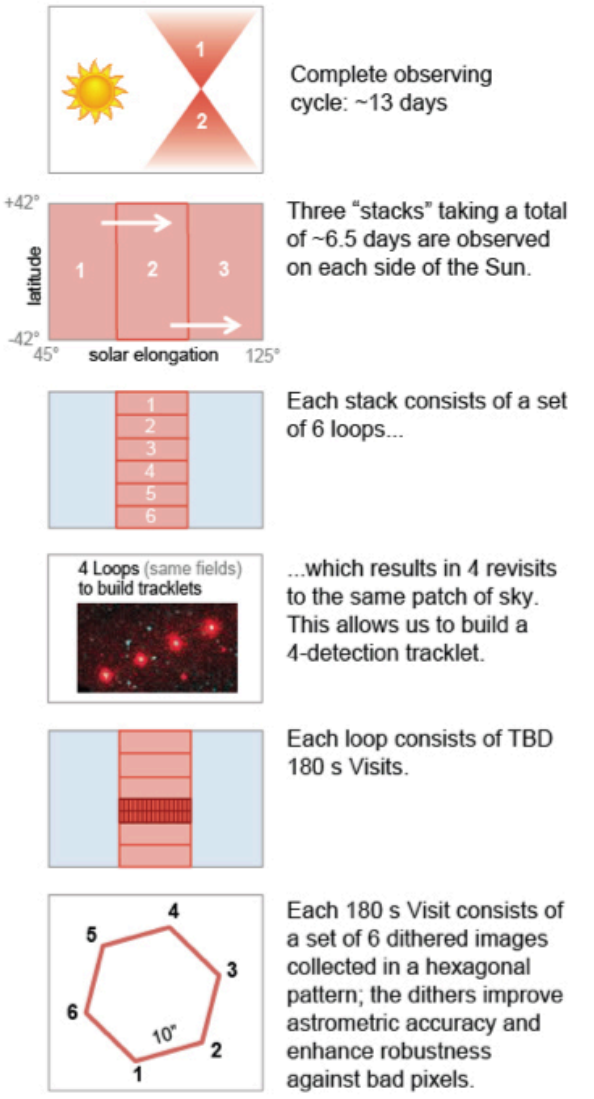

Figure 1. Schematic cartoon of the NEOCam survey cadence showing the different structures from Exposure (of which 6 is dithered and stacked to create a 180s Visit) to the Side (which is a region from 45-120 degree solar elongation and ±42 degree ecliptic latitude on either side of the sun.

References:

[1] Mainzer A. et al. (2015) *AJ, 149,* 172–189.