The Mission Accessible Near-Earth Object Survey (MANOS)

N. Moskovitz[1] and . the MANOS Team[2]

[1]Lowell Observatory
[2]NASA Goddard; U. Hawaii; U. Arizona; Northern Arizona U.; MIT; UMass Boston; NRAO

Near-Earth objects (NEOs) are essential to understanding the origin of the Solar System through their compositional links to meteorites. As tracers of various regions within the Solar System they can provide insight to more distant, less accessible populations. Their relatively small sizes and complex dynamical histories make them excellent laboratories for studying ongoing Solar System processes such as space weathering, planetary encounters, and non-gravitational dynamics. Knowledge of their physical properties is essential to impact hazard assessment. Finally, the proximity of NEOs to Earth make them favorable targets for robotic and human exploration. However, in spite of their scientific importance, only the largest (km-scale) NEOs have been well studied and a representative sample of physical characteristics for sub-km NEOs does not exist.

To address these issues we are conducting the Mission Accessible Near-Earth Object Survey (MANOS), a fully allocated multi-year survey of sub-km NEOs that will provide a large, uniform catalog of physical properties including light curves, spectra, and astrometry. From this comprehensive catalog, we will derive global properties of the NEO population, as well as identify individual targets that are of potential interest for exploration. We will accomplish these goals for approximately 500 mission-accessible NEOs across the visible and near-infrared ranges using telescope assets in both the northern and southern hemispheres. MANOS has been awarded large survey status by NOAO to employ Gemini-N, Gemini-S, SOAR, the Kitt Peak 4 m, and the CTIO 1.3 m. Access to additional facilities at Lowell Observatory (DCT 4.3 m, Perkins 72", Hall 42", LONEOS), the University of Hawaii, and the Catalina Sky Survey provide essential complements to this suite of telescopes.

Targets for MANOS are selected based on three primary criteria: mission accessibility (i.e. $\Delta v < 7$ km/s), size ($H > 20$), and observability. Our telescope assets allow us to obtain rotational light curves for objects down to $V \sim 22$, visible spectra down to $V \sim 21$, and near-IR spectra down to $V \sim 19$. MANOS primarily focuses on targets that are recently discovered. We employ a regular cadence of remote and queue observations to enable follow-up characterization within days or weeks after a target of interest is discovered.

We will present a MANOS status report with an emphasis on noteworthy observations and ongoing efforts to achieve fully transparency by making target lists and data products publicly available online.

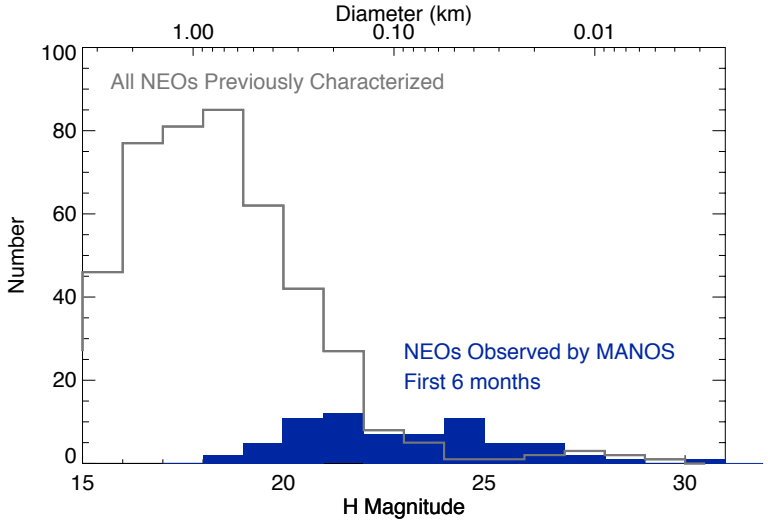

Figure: Absolute magnitude distributions of all previously characterized NEOs (i.e. visible spectra, near-IR spectra, and/or rotational light curves) and the set of 68 NEOs observed during the first 6 months of MANOS. In just one semester MANOS has become the predominant source of physical data collected for NEOs smaller than approximately 100 meters.