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☐ **NEO Characterization**

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OPTIMAL STRATEGIES FOR CHARACTERIZING POTENTIALLY DANGEROUS ASTEROIDS BELOW THE TRADITIONAL SIZE LIMIT

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ABSTRACT

Surveys for near-Earth asteroids (NEAs) have pressed to fainter magnitudes (<V> ~ 20 in 2013) and smaller objects (<H> ~ 22 in 2013). Two thirds of newly discovered NEAs H > 22 have a minimum orbit intersection distance (MOID) < 0.05 AU with Earth. Although these objects are smaller than the 140 m diameter criterion adpoted for the formal definition of “potentially hazardous asteroids” (PHAs), the Chelyabinsk event of February 2013 has taught us that even ~20 m. diameter NEAs can be a danger. In this revised sense most newly discovered NEAs we could call “potentially dangerous asteroids” (PDAs) . This large discovery rate is set to increase with Pan-STARRS-1 now being a full-time for NEA discovery and upgrades to the Catalina Sky Survey in progress. Discovery rates of 2000/year for PDAs under this extended definition are likely soon. These new PDAs appear at magnitudes that permit detailed characterization only briefly, typically for a few days, and almost all are much (~5 magnitudes) fainter on subsequent apparitions. These facts imply that an aggressive rapid response program is needed (see Galache et al., this meeting).

We have investigated optimal strategies for such a scaled-up characterization program. We have: (1) investigated the location and number of ground-based telescope sites required subject to realistic constraints; (2) refined the estimate of time from discovery needed to determine MOID sufficiently accurately to trigger

characterization which informs the trade-off between number of characterizations and telescope size; (3) given these response times, determined the size of telescope needed (a) for accurate astrometry at sufficiently long arc lengths to refine the orbit usefully and (b) to obtain high quality spectrophotometry to determine surface composition and hence albedo and size to refine assessments of potential damage.

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