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SIMULATING CURRENT AND FUTURE OPTICAL GROUND BASED NEO SURVEYS

Tommy Grav[(1)], Tim Spahr[(2)], Amy Mainzer[(3)], and James Bauer[(4)]
[(1)]*Planetary Science Institute, 1700 E. Fort Lowell Suite 106 Tucson AZ85719 USA, +1 812-272-6336,*
[(2)]*Independant, c/o T. Grav 1700 E. Fort Lowell Suite 106 Tucson AZ85719 USA,*
[(3)]*Jet Propulsion Laboratory, 4800 Oak Grove Dr. Pasadena CA91109 USA,*
[(4)]*Jet Propulsion Laboratory, 4800 Oak Grove Dr. Pasadena CA9109 USA, +1 818-393-6200,*

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ABSTRACT

Surveys for near-Earth objects (NEOs) have undergone rapid development over the last decade. The current suite of surveys has discovered more than 12,000 NEOs to date, and more than 1,400 new NEOs were discovered in the last year. More than 90% of NEOs larger than 1 km in diameter have been discovered to date, representing considerable progress by the astronomical community (Mainzer et al., 2011, ApJ, v743, p156). In 2005, the US Congress mandated that NASA should discover 90% of objects larger than 140 meter in diameter in 15 years, i.e. before 2020. We have undertaken a project to perform high-fidelity simulations of a variety of ground-based optical surveys, including present and future facilities, to evaluate the potential of these projects to reach this Congressionally mandated goal. Our survey simulation includes NEO population models based on the orbital element models of Bottke et al. (Icarus, 2002, v156, p399), Grav et al. (PASP, 2011, v123, p423), and Greenstreet et al. (2013, personal communications) as well as physical properties derived from recent measurements of diameters and albedos from Mainzer et al. (ApJ, 2011, v743, p156; ApJ, 2012, v752, p110). The simulations replicates the historical performance of the existing suite of ground-based projects such as the Catalina Sky Survey and PanSTARRS and predicts their future performance. The work also looks at future large ground-based optical surveys, including LSST and ATLAS.

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