A powerful new southern hemisphere survey for near-Earth objects

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For nearly a decade, the Catalina Sky Survey (CSS) operated the Siding Spring Survey (SSS) in partnership with the Australian National University. The SSS was the only professional, full-time NEO survey in the Southern Hemisphere during this period. The SSS ceased operations in July of 2013, and the lack of a full-time, state-of-the-art survey in the Southern Hemisphere leaves a significant blind spot in NASA's ongoing effort to identify and track near-Earth objects (NEOs) that may pose a hazard to the Earth, or that may be appropriate destinations for robotic or human missions.

The CSS and the Las Cumbres Observatory Global Telescope Network (LCOGT) are partnering to fill this gap, by rapidly building, deploying and operating a network of three dedicated 1.0-meter survey telescopes at Cerro Tololo, one of the premiere astronomical sites in the Southern Hemisphere. The partnership between CSS and LCOGT provides a fast-track, low-risk, and cost-effective survey capability that will be fully dedicated to the NEO discovery effort. The first of three survey telescopes will be operational ∼18 months after the start of funding, with the second and third telescopes coming online within an additional ∼12 months.

Our joint survey will be a powerful new NEO survey capability. The telescopes are based on the field-tested LCOGT 1.0-m design, modified to feature a faster f/1.8 primary and a prime focus camera that will deliver an 8.6 deg^2 field of view (FOV), with a resolution of 1.0 arcseconds per pixel. The three co-located telescopes will offer the operational flexibility to survey together (acting as a 1.7-m telescope), or separately (effectively delivering a 25+ deg^2 FOV), and will have no competing science goals to compromise from the primary mission of NEO discovery. The telescopes will be robotically operated, and the data will be processed, validated, and reported in near real-time from the CSS headquarters in Tucson. Same-night and subsequent night astrometric follow-up observations will be carried out on the LCOGT network, which includes two 2.0-m and nine 1.0-m telescopes at 5 sites in both hemispheres.

We calculate figures of merit (FOM) for this and other NEO survey systems, based on clear aperture, field of view, optical throughput, focal-plane fill factor and open-shutter efficiency. Our new survey program will be among the most powerful NEO survey systems in operation once deployed, with a FOM approximately 25 × larger than the SSS, larger than all CSS assets in Arizona combined, and larger than Pan-STARRS 1.