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Catalina Sky Survey's Increased Discovery and Follow-up Capability

Eric Christensen[(1)], Brian Africano[(1)], Gregory Farneth[(1)], Carson Fuls[(1)], Alex Gibbs[(1)], Al Grauer[(1)], Hannes Gröller[(1)], Richard Kowalski[(1)], Steve Larson[(1)], Gregory Leonard[(1)], Robert Seaman[(1)], Frank Shelly[(1)]

[(1)]*The University of Arizona, Lunar and Planetary Laboratory, 1629 E. University Blvd., Tucson AZ 85721, (520) 621-3800, eric@LPL.arizona.edu*

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ABSTRACT

The Catalina Sky Survey (CSS) operates four telescopes on Mt. Lemmon, Arizona, in support of NASA's effort to detect and catalog near-Earth objects (NEOs). Both survey telescopes (MPC codes G96 and 703) have been recently upgraded with larger cameras, and have reached stable levels of operation. In 2018 CSS discovered over 1,000 new NEOs, a first for any survey program. During 2018 CSS discovered 2018 LA: only the third asteroid discovered immediately prior to Earth impact. CSS remains the only survey with proven ability to discover, report, and follow up small imminent impactors, enabled by expert observers, real-time processing and reporting, and integrated follow-up capability.

Maintaining a robust, integrated follow-up capability has long been a hallmark of CSS operations, and in recent years we have strengthened and expanded our follow-up reach. The dedicated 1.0-m follow-up telescope (I52) is now operated a full 24 nights per lunation. I52 is flexibly scheduled, either operated remotely from the University of Arizona campus by a dedicated observer, or operated simultaneously with any other CSS survey or follow-up telescope. Since 2017B we have ramped up our use of the competitively allocated 1.5-m Kuiper telescope (MPC

code V06), from an initial 3 nights per lunation, to our current allocation of 9 dark and grey nights per lunation. Between these two facilities, CSS is also a leader in NEO follow-up, providing more astrometry of NEOs and NEOCP objects than any other program.

Aiming to leverage our follow-up expertise and coordinate follow-up activities across the NEO community, CSS has begun development of a targeting broker called NEOfixer. NEOfixer will provide a simple, customized interface to help observers determine which objects are most worthwhile to observe. NEOfixer's scoring algorithm considers an object's importance to planetary defense, the benefit provided to the orbit from new observations, the cost to obtain those observations, and other temporal considerations, such as the near-term observability circumstances, or whether other sites are likely to observe it. Once deployed, NEOfixer will help balance the follow-up load across the NEO observing community, leading to higher impact observations, more NEO discoveries, and an improved catalog of NEO orbits. NEOfixer will help maximize the impact of the current suite of follow-up facilities, and will also scale to meet the challenges offered by future survey systems that may provide a significantly increased rate of NEO discovery.

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