

PDC2025
Stellenbosch, Cape Town, South Africa

Near-Earth Object (NEO) Discovery

DISCOVERING NEAR-EARTH ASTEROIDS WITH THE BOK NEO SURVEY

**Melissa J. Brucker⁽¹⁾, Cassandra Lejoly⁽²⁾, D. Carson Fuls⁽³⁾,
Robert S. McMillan⁽⁴⁾, Alexander R. Gibbs⁽⁵⁾**

*(1,2,3,4,5)Lunar and Planetary Laboratory, Kuiper Space Sciences Building, University of Arizona, 1629 E. University Blvd, Tucson, AZ, 85721-0092, USA, 520-621-6963
mbrucker@arizona.edu⁽¹⁾, lejoly@arizona.edu⁽²⁾, fulsdavid@arizona.edu⁽³⁾,
rmcmilla@arizona.edu⁽⁴⁾, gibbs@arizona.edu⁽⁵⁾*

Keywords: *near-Earth asteroids, NEO discovery, NEO follow-up, survey*

In 2019, the Catalina Sky Survey invited SPACEWATCH® to collaborate with them and the University of Minnesota on a new survey for near-Earth objects (NEOs) using Steward Observatory's Bok 2.3-m telescope on Kitt Peak in Arizona to discover faint near-Earth asteroids and to search for Earth Trojans. We propose for 6 to 9 nights of dark/grey time each lunation for the new Bok NEO Survey which had its first observations on November 19, 2019 UT. This is the largest aperture ground-based NASA-funded optical survey for NEOs. With the 90Prime prime focus wide-field imager on the 2.3-m, we can observe and discover objects as faint as $V \sim 23.4$. Our specific goals are to discover and characterize the population of potentially hazardous NEOs larger than 140m and the presumptive population of Earth Trojan asteroids.

Working together since 2019, as of December 15, 2024, we have submitted over 4600 lines of astrometry of NEOs, comets, and outer solar system objects, including 739 with discovery credit. The NASA Planetary Data System (PDS)'s Small Bodies Node has ranked the Bok NEO Survey as making the fourth-most discoveries published in Minor Planet Electronic Circulars (MPECs) in the past twelve months and over the past five years. Even though the Bok survey began in November 2019, it has already made the eighth-most discoveries since September 1993. Our most recent Bok NEO Survey observing run, spanning November 26 through December 4, 2024 UT, was the most productive yet, discovering 79 new objects, including the impactor 2024 XA1.

SPACEWATCH® was founded by Professor Tom Gehrels and Dr. Robert S. McMillan in 1980 to explore populations of small solar system objects. We began discovering asteroids in the 1980s. We use the Steward Observatory 0.9-m telescope (MPC code 691) on Kitt Peak, Arizona, the Lunar and Planetary Laboratory (LPL) 1.8-m telescope (MPC code 291), and bright time the Spacewatch Cassegrain Camera on the Bok 2.3-m telescope (MPC program codes ^695 and D695) for follow-up NEO observations. We are working on streamlining our precovery search program that identifies images in our archived data that may contain new objects. We also collect time series of observations of NEOs to determine their rotational lightcurve periods and amplitudes.

Comments: *Oral presentation is preferred, Poster presentation is acceptable*