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SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs for Future Missions, Platforms (3)

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AN ASSESSMENT OF CURRENT AND PROPOSED ALTERNATIVES FOR DETECTING SMALL NEAR EARTH OBJECTS (NEO)

Abstract

Ever since the Chelyabinsk airburst in February 2013, there is increasing awareness of the potential threat from smaller – 30-50 m diameter – Near Earth Objects (NEO). While NEOs of this size would not cause damage on a global scale, the energy release from their impact—comparable to that of a thermonuclear weapon—would be capable of causing considerable local damage. In this paper, we will present the results of an assessment of the United States Government's ability to detect and track smaller NEOs.

Ground-based systems for NEO detection use optical telescopes to survey space to detect and track objects. These telescopes are not optimized for detecting small NEOs, and it could take up to a century to complete a survey for NEOs as small as 30 meters in diameter using these current assets. Even if future planned ground telescopes were available to search for small NEOs, inherent limitations of ground-based systems would affect their ability to identify and track small NEOs at a reasonable rate. Furthermore, ground-based systems may provide only near-term warning—up to a few weeks—of potential impacts by NEOs of 30–50 meters in diameter. Studies have shown that a space-based infrared detector would therefore be the most effective method for locating NEOs on a timescale of less than a decade.

The STPI team identified two proposed space-based infrared detection alternatives to detect NEOs. In the judgment of the research team, the first option offers lower technical risk at higher cost, and the second offers lower cost for potentially faster detection and a more innovative—though riskier—architecture, and neither seems well-positioned to be launched as planned given current funding status. Notwithstanding which mission goes forward, reliable detection and tracking of NEOs smaller than 140 meters in a timely manner may require a space-based system to be supplemented by ground-based telescopes. If both missions go forward, one possibility is to augment the first option for the technologically more complex—and expensive—task of detecting NEOs in the 30–50 meter range, and having second focus on the 140-meter and greater sized NEOs.