

**PLANETARY DEFENSE: FINDINGS AND RECOMMENDATIONS FROM THE
NATIONAL ACADEMIES PLANETARY SCIENCE AND ASTROBIOLOGY
DECADAL SURVEY 2023 - 2032**

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Keywords: *NEO Detection and Characterization, Impact Modelling and Information Integration, Technology Demonstration Missions, Impact Preparedness Activities, International Cooperation*

ABSTRACT

The National Academies of Sciences, Engineering, and Medicine was chartered by the NASA Science Mission Directorate (SMD), with support from the National Science Foundation, to conduct a new decadal survey to develop a comprehensive science and mission strategy for planetary science (1). The survey was tasked to determine the current state of knowledge and to identify the most important scientific questions to be addressed in astrobiology and planetary science during the upcoming decade of 2023 - 2032. For the first time, the decadal survey also included and addressed the topic of planetary defense, now recognized as a key element of NASA's planetary science activities under the direction of NASA's SMD Planetary Defense Coordination Office.

The topic of planetary defense was included in the decadal survey as a dedicated chapter, divided into five sections based on the framework from the U.S. National NEO Preparedness Strategy and Action Plan (2). These sections discussed:

NEO Detection, Tracking, and Characterization
NEO Modelling, Prediction, and Integration
NEO Deflection and Disruption Missions

International Cooperation on NEO Preparation NEO Impact Emergency Procedures and Action Protocols

Content of these sections included identifying the activities, ground- and space-based assets, facilities, resources, technologies, and missions that should be considered to enable NEO preparedness over the next decade. Supporting inputs to this chapter involved contributions from submitted white papers authored by many members of the NEO science and planetary defense communities. In addition, a planetary defense rapid mission architecture study commissioned by the decadal survey small bodies panel and led by the Jet Propulsion Laboratory examined several different types of in-situ characterization and mitigation demonstration missions. All of this input contributed to the formulation of 42 findings and 11 recommendations that suggest a path forward for increasing our understanding of the NEO population and their associated physical characteristics, modelling the impact probabilities and hazard potential of these objects, and implementing plans to develop and test NEO impact mitigation capabilities.

Including planetary defense in the decadal survey has helped sharpen the focus on this international issue and provided key inputs for stakeholders and decision makers to consider when developing future planetary defense-related activities. Such information is vital for developing a long-term integrated planetary defense capability able to protect humanity in the decades to come.

(1) *Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023 – 2032*, National Academies of Science, Engineering, and Medicine, 2022, <https://www.nationalacademies.org/our-work/planetary-science-and-astrobiology-decadal-survey-2023-2032>

(2) *National Near-Earth Object Preparedness Strategy and Action Plan*, National Science and Technology Council, 2018, <https://www.nasa.gov/sites/default/files/atoms/files/ostp-neo-strategy-action-plan-jun18.pdf>