

IAF SYMPOSIUM ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS (E10)  
Planetary Defense from Asteroids and Comets (1)

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KEY TAKEAWAYS AND LESSONS LEARNED FROM THE 4TH PLANETARY DEFENSE  
INTERAGENCY TABLETOP EXERCISE

**Abstract**

The Planetary Defense Interagency Tabletop Exercise 4 took place on February 23 and 24, 2022. The exercise was designed to inform and assess the U.S. government's ability to respond effectively to a simulated asteroid impact threat. This was the first end-to-end exercise for this type of disaster and exercised many aspects of a potential asteroid impact response (initial detection, uncertainty, notification, potential mitigation, ground preparation, and ground recovery). This joint NASA- and FEMA-developed exercise was designed and executed by personnel from the Johns Hopkins Applied Physics Laboratory (APL), the NASA Jet Propulsion Laboratory's Center for Near Earth Object Studies (CNEOS), the NASA Ames Asteroid Threat Assessment Project, and Goddard, FEMA, and Winston-Salem Forsythe County Emergency Management in North Carolina, USA. This exercise brought together participants from several U.S. government agencies across both the civil and national security sectors, as well as participants from the State of North Carolina and from Winston-Salem in Forsythe County, North Carolina. The exercise was simultaneously hosted and facilitated across three locations: at APL in Laurel, Maryland (federal decision makers), Raleigh, North Carolina (state decision makers), and Winston-Salem, North Carolina (local decision makers).

The exercise was designed and implemented based on FEMA's Homeland Security Exercise Evaluation Program (HSEEP) doctrine. The overall exercise objectives included: (1) educate participants on aspects of planetary defense as well as the roles of specific United States local, state and federal organizations including the newly established US Space Command, (2) assess the communication protocols amongst these organizations and evaluate techniques for communicating complex information about asteroid impact probabilities and damage risk to decision-makers and the public, and (3) for the first time, practice post-impact protocols at the federal, state and local levels. The exercise scenario began with the initial

discovery of an asteroid, called 2022 TTX, that had a 5% chance of impacting Earth about six months from discovery. The scenario evolved through four time periods (6 months before impact, 2 months before impact, 6 days before impact, and the immediate hours and days post-impact). During each time period, participants were presented with new information about the asteroid's impact probability and damage potential, possible mitigation techniques, legal and policy constraints, and critical preparedness and response decision needs. Participants engaged in facilitated discussions in which they were prompted with tailored questions guided by the exercise objectives, leading to the identification of key recommendations to better prepare for a potential real-world asteroid impact.