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**Near-Earth Object (NEO) Discovery**

**JPL Scout's Imminent Impactor Warning Performance:  
2022 EB<sub>5</sub> and 2022 WJ<sub>1</sub>**

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**ABSTRACT**

There have so far been six Earth-impacting asteroids that were formally discovered prior to impact, starting with the first case in 2008, through 2022, when two impacts were predicted. In the most recent cases, the Scout monitoring system, developed and operated by JPL's Center for NEO Studies, issued alerts within 20 minutes of the discovery by observers. And for both of the cases in 2022, CNEOS analysts were monitoring the data flow and automated analyses by Scout from the outset and in real time.

In this presentation we will describe the timeline of discovery, observation and impact prediction for the two most recent cases, both of which were meter-scale impactors. The first of these, 2022 EB<sub>5</sub>, was discovered by K. Sarneczky from Piskéstető Station in northern Hungary on 2022-Mar-11. 18 minutes elapsed from the conclusion of the first four observations until Scout issued its alert, including 3 minutes for Scout computations. 1.7 hours after the first Scout warning, 2022 EB<sub>5</sub> impacted above the Norwegian Sea near Jan Mayen. In many ways a similar case, 2022 WJ<sub>1</sub> was discovered by the Catalina Sky Survey, Mount Lemmon Station (G96) in Arizona on 2022-Nov-19 UT. From the end of data taking on the first tracklet until the earliest Scout alert, only 20 minutes passed, including 6 minutes for Scout computations. 2022 WJ<sub>1</sub> entered the Earth's atmosphere over southern Ontario, Canada 2.8 hours after Scout issued its first warning.

The time from discovery to impact for the 2022 impactors was only 2-3 hours, and yet in both cases the prompt warning allowed for dozens of observations from numerous observing stations before the objects entered the atmosphere. The short 20-minute warning latency for 2022 EB<sub>5</sub> and 2022 WJ<sub>1</sub> stands in sharp contrast to the previous impactors that were discovered prior to impact, where the time from discovery to warning ranged from 2 hours to over 24 hours. This improvement is a result of progress in minimizing delays at every step in the chain of communication, from the observer reporting observations to the Minor Planet Center, to the MPC posting the measurements to their NEO Confirmation Page, to the impact hazard assessment by Scout, after which an alert can be issued.

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**Comments:** *Requesting Oral Presentation*