

PDC2025
Stellenbosch, Cape Town, South Africa

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- Ongoing and Upcoming Mission Highlights**
- Apophis: T-4 Years**
- Hypothetical Asteroid Threat Exercise**
- Key International and Policy Developments**
- Near-Earth Object (NEO) Discovery**
- NEO Characterization**
- Deflection / Disruption Modeling & Testing**
- Space Mission & Campaign Design**
- Earth Impact Effects & Consequences**
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- Public Education and Communication**
- The Decision to Act: Political, Legal, Social, and Economic Aspects**

JWST As a Tool for Early Characterization of Potential Impactors

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Asteroid impacts have profoundly affected the evolution of life on Earth. Over the last 30-40 years, the field of planetary defense has identified the scope of the threat and is working to develop plans and technology to prevent asteroid impacts if possible and mitigate their effects as necessary. In particular, if an object were on a collision course with the Earth, early knowledge of key impactor characteristics is vital to inform the next planetary defense actions [1,2]. We further note the key importance of early size measurements by pointing to the objects that trigger SMPAG mission planning options: larger than 50 m diameter or $H < 26$ if a direct size measurement is not available, the latter condition necessary to account for 50-m, low-albedo NEOs. The vast majority of $H < 26$ objects will be much smaller than 50 m, but without the ability to measure their sizes they must be treated as though they are larger. Only two facilities have the capability to make the needed size measurements: Goldstone

Planetary Radar, which requires a very close and lucky pass of the NEO in question, and JWST.

JWST has unique capabilities to provide early knowledge of the potential threat, in particular the Mid-Infrared Instrument (MIRI), which can make photometric and spectroscopic measurements from 5—28 μm , with the ability to distinguish > 50-m from < 50-m objects even if they are lurking in the middle of the asteroid belt. If an impact threat to Earth is found, it is likely that JWST/MIRI will be the best, fastest way to obtain a useful size measurement for such an object. This will be especially true during the upcoming period between first light for the Vera Rubin Observatory and the launch and operations of NEO Surveyor, when we can anticipate a flood of NEO discoveries of objects far beyond the reach of non-JWST mid-infrared platforms.

We will present the capabilities of JWST for early characterization of impactor sizes, including a study of how it would have performed in previous PDC and TTX impactor scenarios, and suggest how a program could be designed to trigger JWST observations in case of a credible impactor threat.

Comments:

This could also potentially go into the threat exercise category? But I'm planning to slant this in a more general direction vs. just looking at the current exercise.