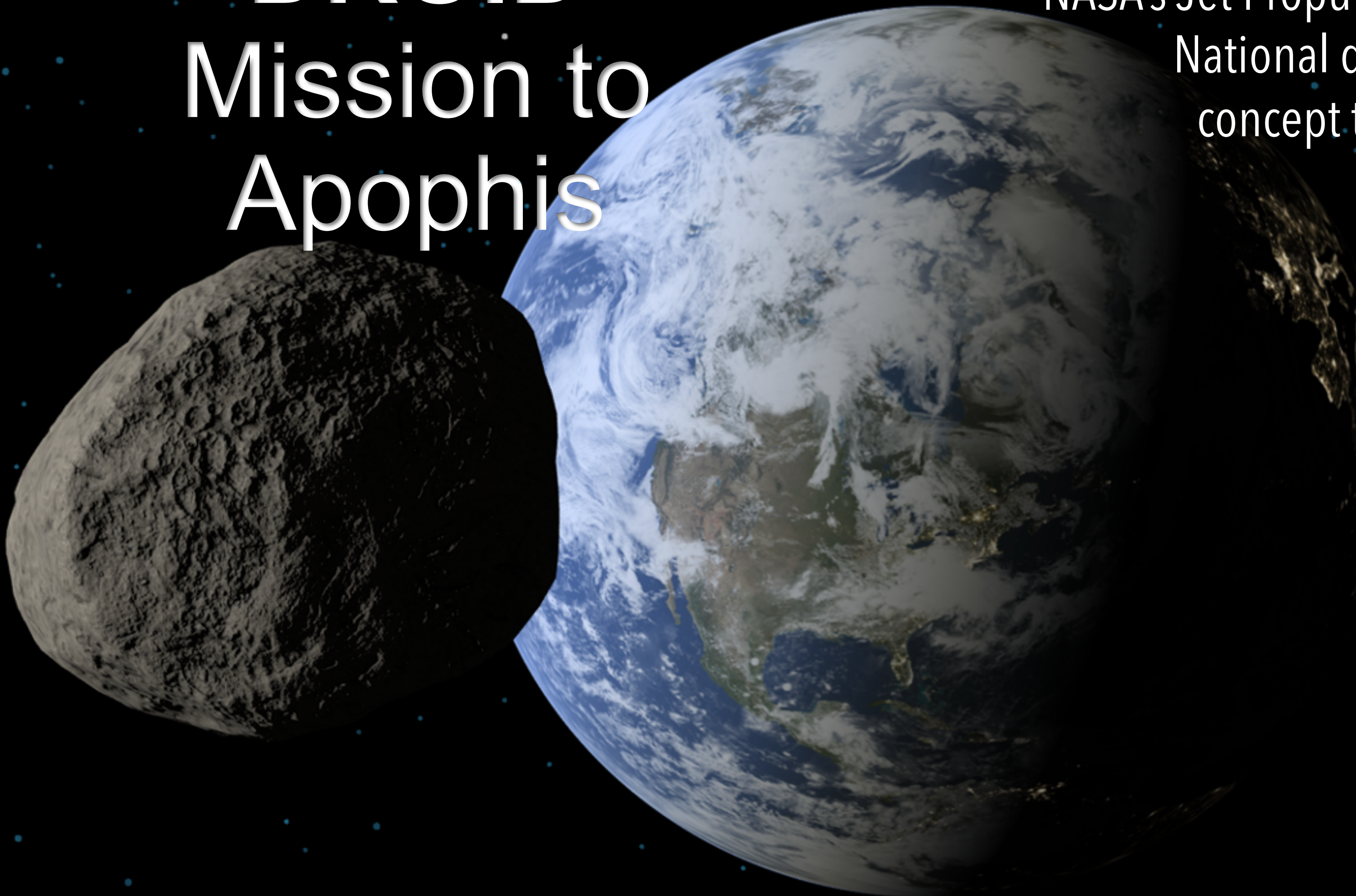


DROID Mission to Apophis

NASA's Jet Propulsion Laboratory (JPL) has been working with the French Centre National d'Etudes Spatiales (CNES) to develop a multi-spacecraft mission concept to rendezvous with Apophis for its Earth flyby on April 13, 2029

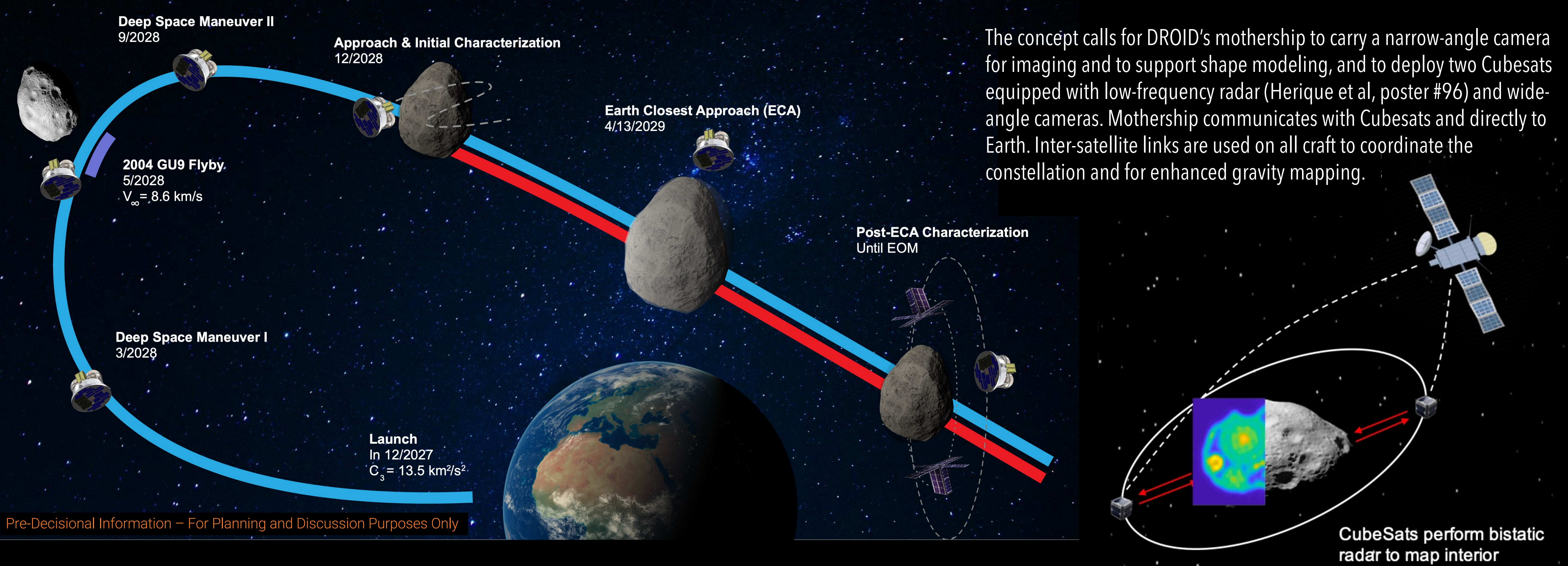


Why DROID?

- NASA's OSIRIS-APEX mission will rendezvous with Apophis after Earth closest approach (ECA) to perform detailed science investigation—but it won't see Apophis up close before/during the ECA.
- DROID escorts Apophis through ECA, imaging before, during and after, to understand how asteroids respond to external forces.
- DROID uses ground-penetrating radar and gravity to probe the interior state of Apophis in ways that enhance OSIRIS-APEX's observations.
- DROID is a Rapid Response Reconnaissance Pathfinder, executing a challenging 3-year implementation, with a possible fast flyby of GU09.

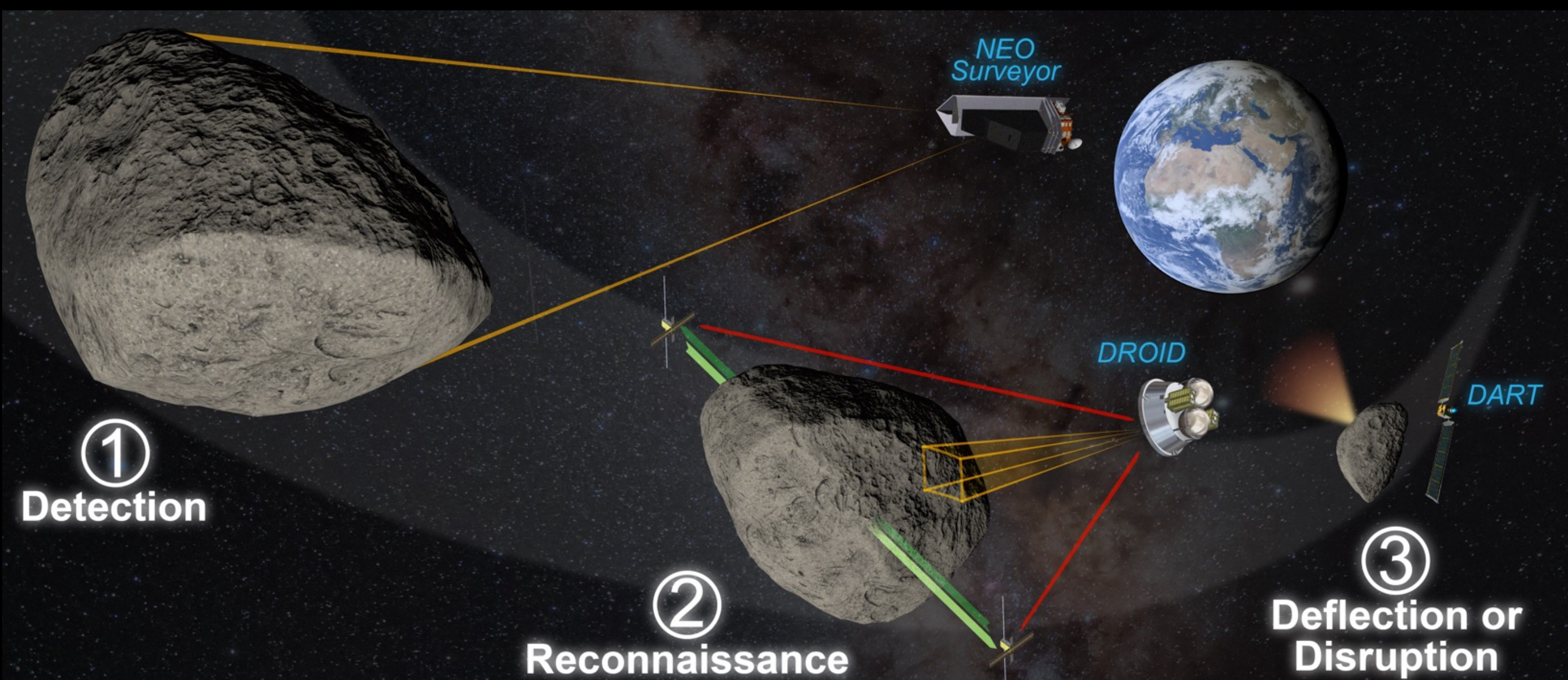
C. A. Raymond¹, R. B. Amini¹, P. C. Adell¹, S. Bandyopadhyay¹, P. Bousquet², S. Bhaskaran¹, B. J. R. Davidsson¹, F. Esteve², L. Fesq¹, M. Haynes¹, A. Herique³, R. Karimi¹, J.T. Keane¹, N. Mastrodemos¹, P. Michel⁴, R. Pinède², N. Verdier²

Mission Concept Architecture and Timeline



The concept calls for DROID's mothership to carry a narrow-angle camera for imaging and to support shape modeling, and to deploy two CubeSats equipped with low-frequency radar (Herique et al, poster #96) and wide-angle cameras. Mothership communicates with CubeSats and directly to Earth. Inter-satellite links are used on all craft to coordinate the constellation and for enhanced gravity mapping.

DROID's Role in Space-Based Planetary Defense



DROID would be a high ΔV mission with complete remote sensing suite to serve as a design reference for Planetary Defense Reconnaissance missions

DROID results on response of a rubble pile asteroid to impulsive force and mapping of the interior structure can be leveraged in deflection & disruption missions

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