

# **Near-Earth Asteroid Rendezvous Missions with the Orion Crew Exploration Vehicle.**

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# Background

- Chris McKay (NASA Ames) suggested a search for *near term* opportunities for *human missions* enabled by Constellation (or other contemporary) hardware.
- Basic and applied science aims may provide a Catalytic (*hypergolic?*) mix to acquire support.
- Human mission potential to provide highest quality/quantity science return
  - Human missions are an accelerant for robotic exploration
  - provides something extra “exploration grandeur”

# Mission Opportunities

- Selected from a survey of total NEO population
- Opportunities filtered using criteria:
  - Orbital inclination  $< 2$  degrees
  - Orbital eccentricity  $< 0.20$
  - Opportunities between 2015 - 2024
  - Magnitude  $< 25$  (diameter range  $\approx 30$ -50 meters)
- 18 distilled as potentially accessible
  - 20 opportunities,
  - 7 possible missions examined

# Key Mission Design Assumptions

- Ares I and Orion CEV enabling technology:
  - Extended life support upgrade.
- Modularized EELV *advertised* capability growth potential materializing
  - in time frame 2015- 2024
  - up to 100 ton LEO payload
- Accompanied by Centaur Modular EELV growth (up to 12:1 growth in delta v or payload capability beyond current versions)

# Mission Option Results

- Virtually all NEOs considered could be reached with upgraded EELV combinations
- 1998 KY<sub>26</sub> appeared most accessible
- Mission Opportunity (6/1/24)
- Ares-1 & Derivative EELV
- Or two EELV upgrades,
  - Crew Rating of EELV

