

New Worlds Observer Precursor Mission

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ABSTRACT

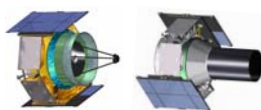
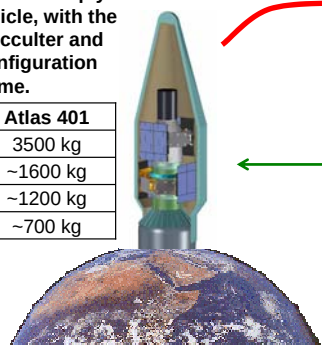
The New Worlds Observer Precursor mission is a mission concept capable of directly imaging gas giant planets, as well as terrestrial planets around stars closer than 10 pc. This mission uses a 1.1 meter telescope with a 14 meter occulter, and is targeted for NASA's "medium" mission class, estimated at a \$500M mission cap with launch vehicle costs included. This precursor mission contains all the elements of the NWO Terrestrial Planet Finder architecture: deployable occulter, solar electric propulsion, and a separate telescope spacecraft. This precursor mission is designed to demonstrate the major NWO technologies, including formation flying, occulter deployment, occulter-telescope alignment, and occulter slewing, as well as validate the occulter optical performance.

Mission Concept

Occulter and telescope launched in a 2 stack configuration on an Atlas 401.

The full scale NWO mission simply uses a larger launch vehicle, with the corresponding larger occulter and telescope. Launch configuration remains the same.

Assumed LV	Atlas 401
Launch Mass to L2	3500 kg
Occulter S/C	~1600 kg
Telescope S/C	~1200 kg
Launch Margin	~700 kg

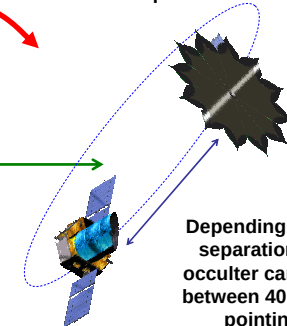


Occulter and telescope deploy shortly after launch. Check out and calibration occurs en route to L2 (3 month transit)

Earth to L2 = 1.5 million km

Science Performance			
Separation	Contrast	IWA (mas)	Detection
8,000 km	10^{-9}	150	Earths @ <10pc
10,000 km	10^{-8}	120	Neptunes
12,000 km	10^{-8}	100	Saturns/Jupiters

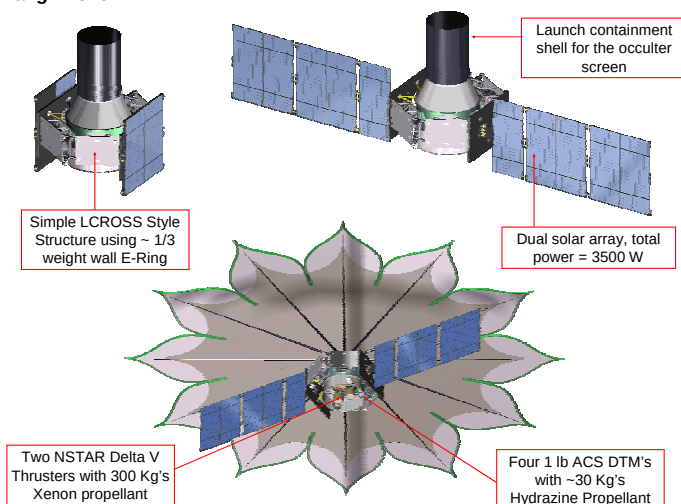
Orbit injection into an L2 Halo orbit. Occulter and Telescope have same orbit, but have the required separation



Depending on the separation, the occulter can make between 40 and 80 pointings

Occulter Spacecraft

The occulter is 14 meters in diameter. A 15 cm aspect camera is mounted in the forward cone for astrometry and telescope alignment. This inexpensive ESPA-derived spacecraft bus has 6 panels for modularity. Dual propulsion with 300 kg Xenon and ACS thrusters for alignment.



Telescope Spacecraft

Telescope is "off the shelf" 1.1 m aperture with fixed secondary. A deployable sugar scoop baffle enables observations within 45 degrees of the sun. Same structure as the occulter (ESPA ring) but no lightweighting necessary, unless required by launch vehicle constraints

