Solar Polar Explorer Enabling Launch Technology

SSC22-XI-06

Credit: Southwest Research Institute

Warren Frick
Northrop Grumman

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Target Sun

Heliophysics – the study of the sun

Extended exploration of Sun's polar details

Goal: Fly over Sun, Via Jupiter Gravity Assist

Credit: NASA

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Target Jupiter

To fly a high inclination orbit of the Sun, planetary gravity assist by Jupiter needed to decrease energy needed and change plane of orbit out of the ecliptic for solar polar orbit

C3 of < 125 km^2/sec^2 needed to perform Jupiter gravity assist during launch window specified

(C3 of > 1000 km^2/sec^2 needed to get to high inclination polar orbit directly from Earth)

Credit: NASA

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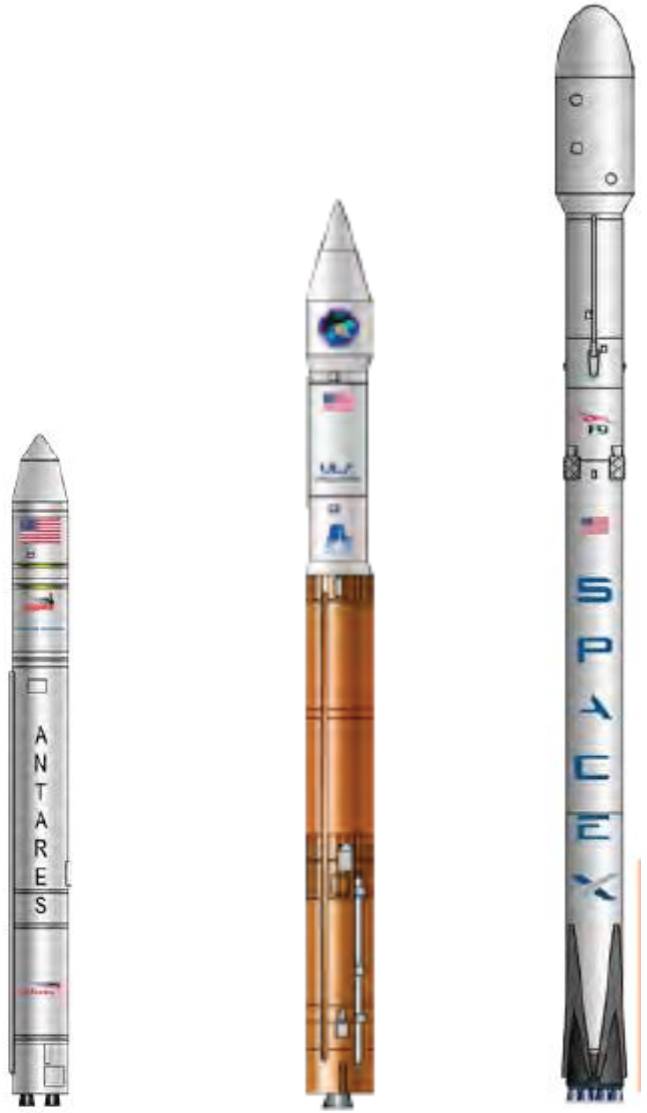
Gravity Well Escape

The Launch Options for Helio MIDEX 2019 were defined

Energy and size happen to coincide with current Launch Vehicles

- Antares 231/232
- Atlas V 401
- Falcon 9 RTLS

Vehicles Unlikely to Fly in 2026



Credit: Phil Smith, Bryce Space and Technology

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Velocity is Velocity

6 Km/sec needed starting from GTO to achieve C3 > 120 km^2/sec^2

Least expensive, quickest, most reliable way, highest heritage way to get 6 km/sec for a 400 kg satellite?

Heritage Solid Rocket Stages

Heritage Solid SLV Upper 2 Stages add 6 km/sec to a 400 kg satellite

Flight Heritage of Orion 50XL/Orion 38 Stage Set is Extensive

Credit: Northrop Grumman

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Familiar Configuration

Orion 50 XL stacked on LV with adapter

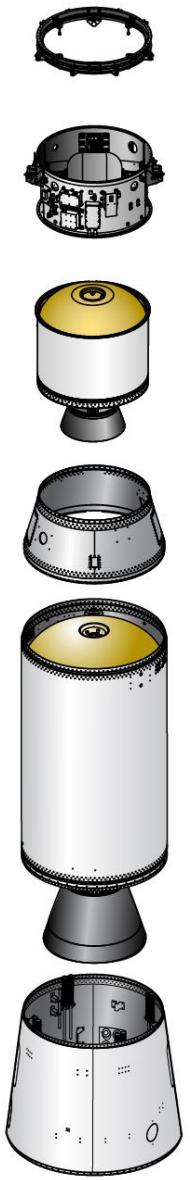
Orion 38 stacked on Orion 50 XL

Avionics and Attitude Control stack on Orion 38

Sep System stacked on Avionics Section

Flight Environments VERY well known

All Solaris Major Participants have Stage Experience



Credit: Northrop Grumman

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End Configuration

Easily fits in any UPCOMING Intermediate Class Vehicle Envelope

All Intermediate Class Space Launch Vehicles have Performance to put the Upper Stage Assembly and Observatory to GTO

How to get to the Sun's Poles on a Budget!

Credit: Southwest Research Institute

Questions?


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