LauncherOne VIP: The Dedicated Launch Solution for Interplanetary Small Satellites

ISSC 2020

Virgin ORBIT

LAUNCHERONE

LOW COST
ON DEMAND
AT ANY TIME
TO ANY ORBIT

Virgin ORBIT

Launch From Anywhere

- Ultimate portability:
  - Aircraft as launch platform
  - Trailerized ground support equipment
  - Mobile mission control

- Multiple launch sites for flexibility and resiliency
  - Mojave, CA
  - Shuttle Landing Facility, FL
  - Guam
  - Oita, Japan
  - Cornwall, UK

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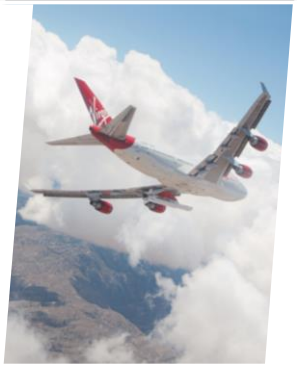
Responsive Launch: Founded on a Modular Approach

Vertically-integrated and high rate manufacturing base

Globally transportable support assets

Fully mobile launch pad in the sky



Growing network of international spaceports

L1 “VIP” Exploration 3-Stage Variant for Interplanetary Missions

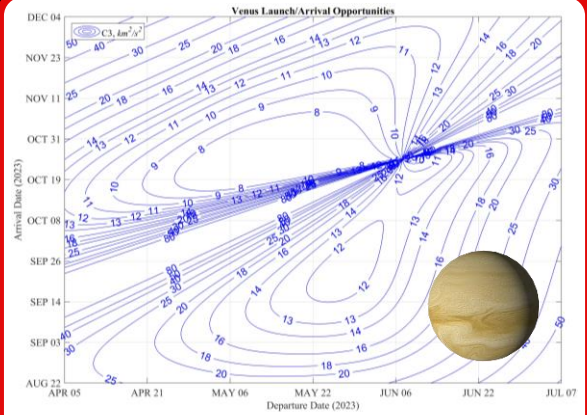
- L1 paired with an “EUS” third stage shown forms an ideal exploration class launcher
- Requires minimal changes to the existing 2-stage, mature L1 flight architecture
- Ample packaging opportunity within existing L1 fairing volume
- System fields from various low-inclination spaceports to further tailor inclination/declination targets of launch windows

L1 “VIP” Exploration 3-Stage Variant for Interplanetary Missions

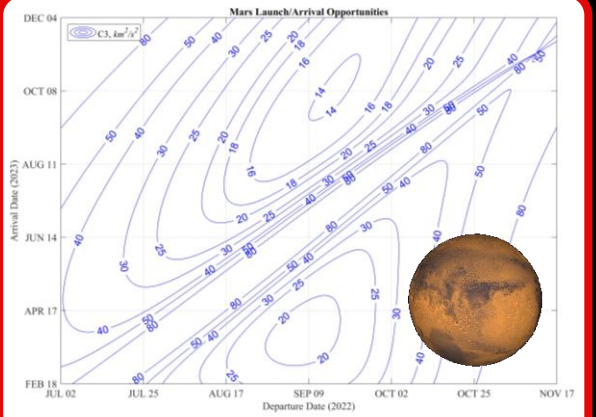
L1 air-launch ability enables high degree of access to low declinations at maximum performance, enabling longer launch windows and tailored access to various solar system targets

Launch Window & Performance Examples

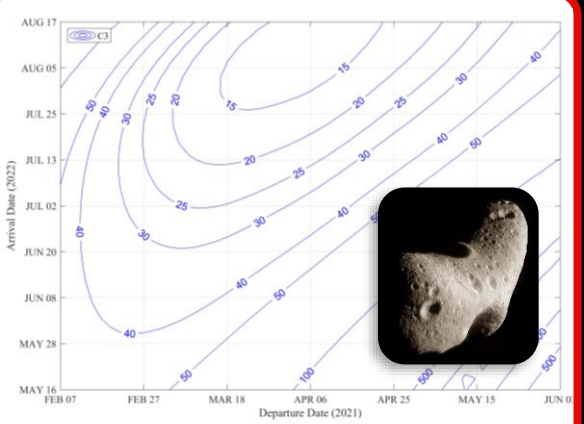
Daily Cis-Lunar TLI or Lagrange Access
C3: -1 to 0 km^2/sec^2
Up to ~100 kg payload



Venus 2023
C3: ~8 to 14 km^2/sec^2
Up to ~70 kg payload

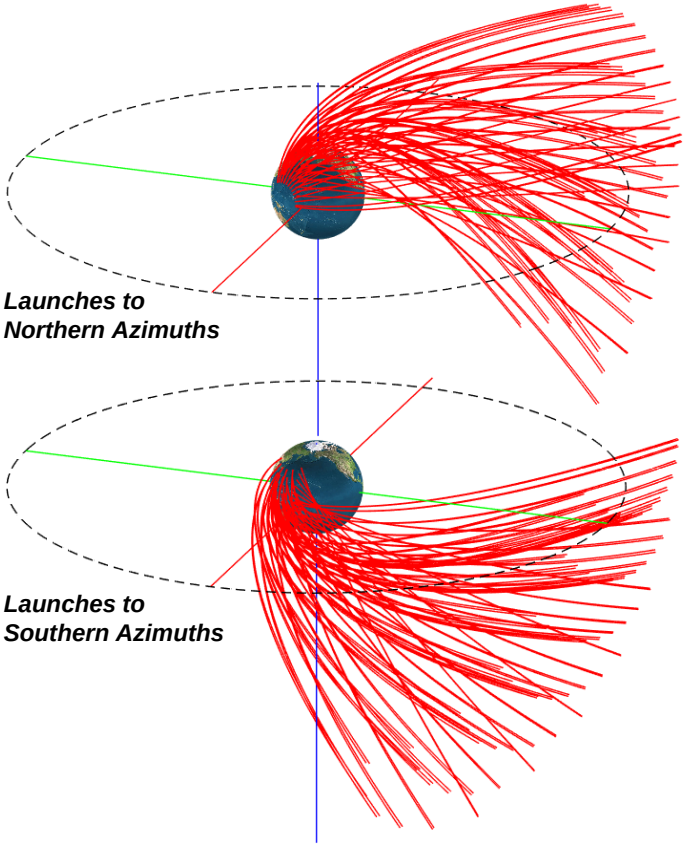


Mars 2023
C3: ~14 to 20 km^2/sec^2
Up to ~50 kg payload



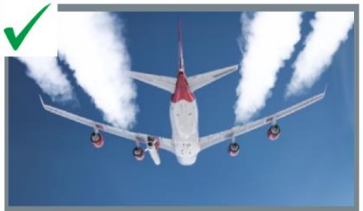
Eros Asteroid 2021
C3: ~14 to 20 km^2/sec^2
Up to ~50 kg payload

Air-Launch Enables Highest Degree of Exploration Access



- Air-launch can send interplanetary spacecraft where other vehicles sometimes cannot
- Varying the rocket release site enables high degree of precision in optimizing interplanetary launch
- Escape trajectories can reach azimuths and inclinations that ground vehicles cannot due to launch corridor restrictions or population overflight
- Result: Maximized payload performance, increased precision, and longer launch windows when targeting missions far beyond Earth orbit

FINAL PROGRESSION **TO LAUNCH**



EMPTY ROCKET
FLIGHT TEST CAMPAIGN

UPPER STAGE HOT FIRE
TEST CAMPAIGN

GROUND OPERATING
SYSTEM CHECK-OUTS

INTEGRATE FLIGHT
STAGES

FUEL AND LOADING
TEST CAMPAIGN

FULL ROCKET
FLIGHT TEST CAMPAIGN

MAIN STAGE HOT FIRE
TEST CAMPAIGN

INTEGRATED FLIGHT
ROCKET CHECK-OUTS

GNC DESIGN, SOFTWARE
INTEGRATION & QUAL

CRYOGENIC CAPTIVE
CARRY FLIGHT

DROP TEST

Virgin ORBIT **LAUNCH DEMO**

FULL WET DRESS REHEARSALS

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Thank You