

Small Mission for Exploration Ariane 6 Access to the Moon

STS/AXX Ariane 6 Missions and System Engineering

20/09/2023

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Ariane 6 For Exploration



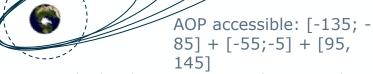
- For the Ariane 6 missions entirely dedicated to the Moon, a set of injection strategies to reach the lunar orbit has already been studied. The mission profile can be adapted according to the propulsion capacities of the satellites, acceptability of long mission duration before orbit injection and the required performance in terms of payload mass.
- Exploration missions may be implemented sharing the volume under the fairing with another passenger (e.g. from GTO). The transfer to LTO orbit may then be achieved by the compound use of the Ariane 6 Upper Stage and the ASTRIS kick-stage that is currently under development.
- By 2027, new launch solution opportunities will complete the Ariane 6 offering: improved launcher performance, new payload structures for small payloads (Multi Launch Services, ASPRA). Moreover, ASTRIS vehicle is being designed in a way that makes possible to use it as an additional propulsion module so reducing drastically schedule, cost and risks of space missions.

Ariane 6 For Exploration – Injection strategies for dedicated lunar missions



GTO (250 km x 36 000 km @28°)

Upper stage bi-boost with circular parking orbit to chose the AOP



➤ Limited S/C phasing strategy but propulsion capabilities requested to reach the Moon

GTO+ (250 km x 80 000 km @6°-28°)



May require S/C phasing or imposed launch date slots & propulsion capabilities to reach the Moon

LTO (200 km x 380 000 km @6°-28°)

Mono-boost



May require S/C phasing or imposed launch date slots but limited propulsion capabilities to reach the Moon

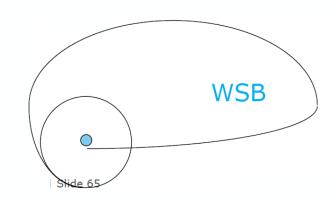
Bi-boost with circular parking orbit to chose the AOP



Limited S/C phasing & propulsion capabilities required

Weak Stability Boundary (WSB) (Apogee @ 1,600,000 km)

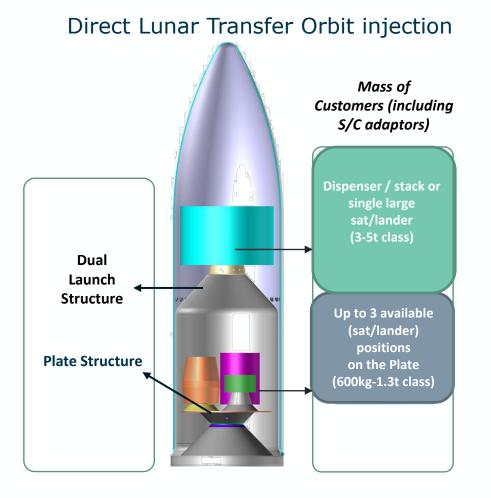
Mono-boost mission using the L2 Lagrangian point



Ariane 6 for Exploration – Injection strategies for dedicated lunar missions



Example of a launch configuration for a mission targeting a Lunar Transfer Orbit 380,000 km x 200 km x 23°



Ariane 6 for Exploration – Conclusions



- Exploration missions sharing the launch service with another passenger allows to reduce the cost of the space transportation service. The same applies to rideshares to a given orbit that is very attractive for Small Missions.
- The new versatility features of the Ariane 6 system that include new S/C accommodation structures and a storable propulsion kick-stage make Ariane 6 very well suited to the execution of Exploration Small missions targeting Moon, Mars or other destination for both orbital systems and landers.
- ESA-STS supports and encourages initiatives that will prepare for major missions like Argonaut by providing a flight demonstration of access to the Moon. Synergies between Small Missions for Exploration and Space Transportation Proof-of-Concept initiatives are key for the implementation of an ESA short/medium-term strategy for the development of the exploration economy while proving Ariane 6 capabilities for Exploration.