Cosmic Vision 2015-2025
Technology Plan

Industry day, Estec 21 November 2008

This file corresponds to one of a series of presentations made during this meeting. The complete set of presentations is available to download from:

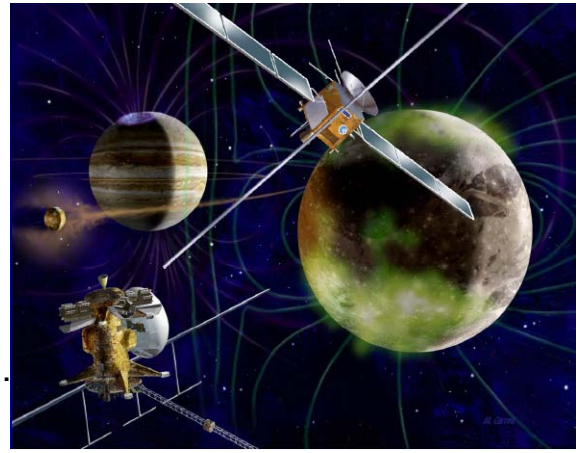
http://sci.esa.int/CVIndustryDay2008

Directorate of Science
and Robotic Exploration

Overview of L-class Missions

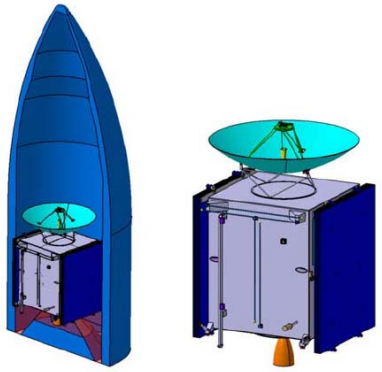
ESA/NASA Outer Planet candidate mission

- ESA: Jupiter Ganymede Orbiter (JGO), Jupiter System Science (atmosphere, magnetosphere) with focus on Callisto and Ganymede
- NASA: Jupiter Europa Orbiter (JEO). Jupiter System Science with focus on Europa, Io (NASA-JEO)



Space Segment (ESA, Jupiter Ganymede Orbiter (JGO))

- Launch: Ariane 5 (CSG) 2020, Transfer: 5.9 y (6.5y) VEEGA-type, no deep space manoeuvre
- Arrival: 2026, Jupiter insertion ($12.5R_J$ x 224 R_J) with Ganymede Gravity Assist
- Jupiter tour with multiple fly-bys at Callisto and Ganymede (low altitude, typ. 200 km)
- (1) Callisto resonant orbit, (2) Ganymede elliptical orbit (200x6000km), (3) Ganymede circular orbit (200 km)
- Avoidance of high radiation ⇨ JGO stays <100krad (8mm) total dose, 80kg shielding mass
- 3-axis stabilized S/C, dry mass (wet)= 1254kg (3480kg)
- Solar power ($540W_{EOL}$), array = 52 m^2, LILT technology, no concentrators, no RTG or RHU
- Chemical propulsion (total Δv = 2467m/s + 445m/s navigation)



Payload: ~80kg science instruments, nationally provided

JGO = Jupiter Ganymede Orbiter

Technology

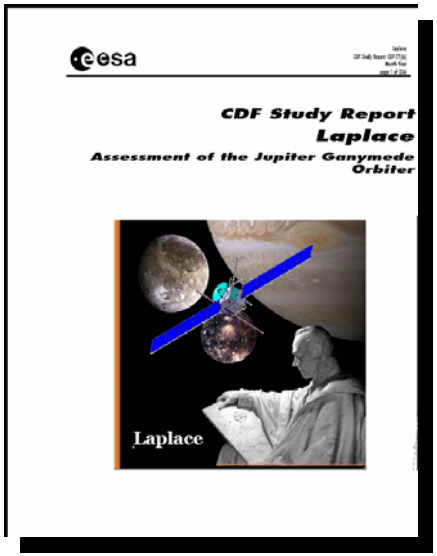
- Radiation hardening and tolerance / tailored shielding
- Improved Environmental modelling
- Solar Cell Technology (LILT)

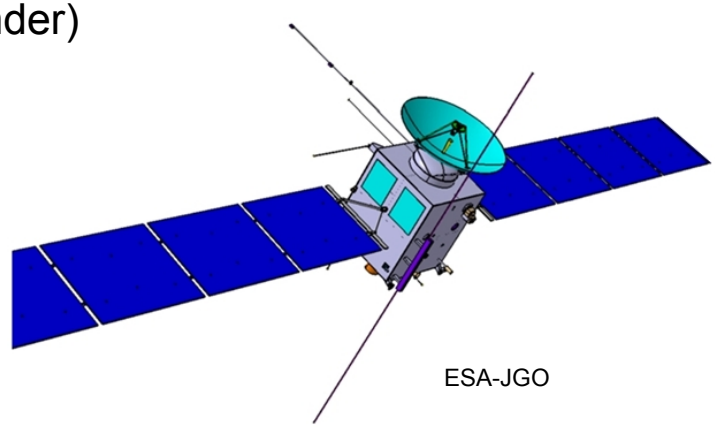
Status

- ESA and NASA Phase 0 studies completed.
- ESA and NASA individual & joint reports completed
- ESA/NASA down-selection Jupiter / Saturn ⇨ Jan. 09
- Industrial Studies: start in ~ May/Jun 09

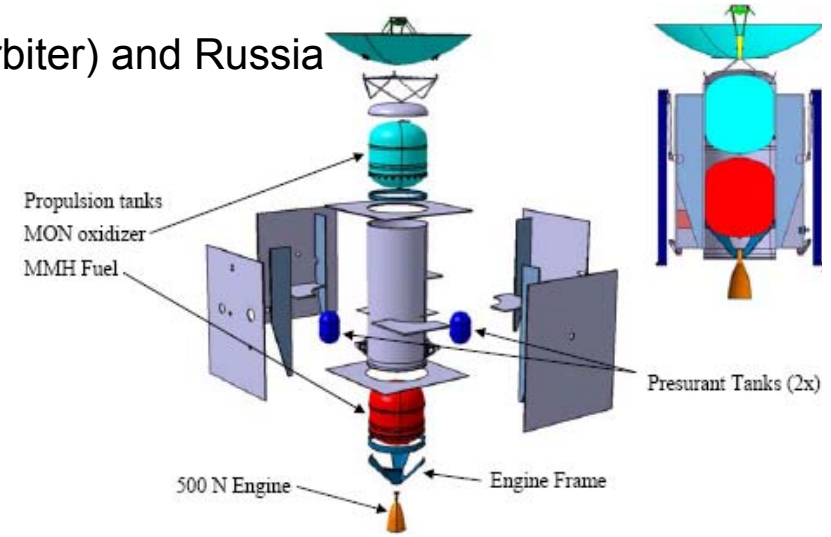
International collaboration extension

- possibly JAXA (Jupiter Magnetosphere Orbiter) and Russia (lander)





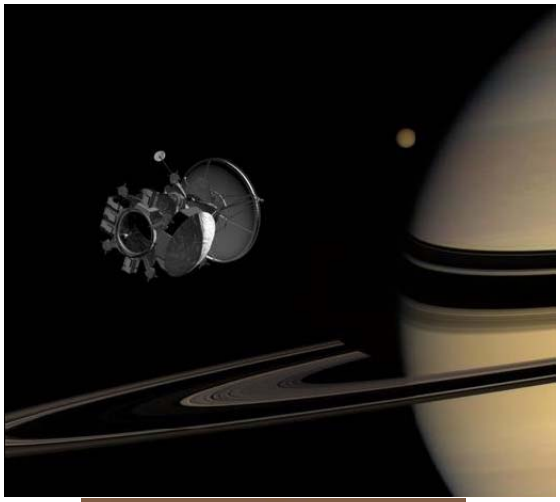
ESA-JGO



ESA-JGO

ESA/NASA Outer Planet candidate mission

- Saturn System science, Titan in-situ science (atmosphere, surface, lake)
- NASA: Titan orbiter carrying In-Situ Elements (ISEs)
- ESA: ISEs, Mongolfiere Balloon and short-live Lander
- Balloon Technology from CNES



Space Segment

- Launch by NASA, Orbiter carrying ISE's (up to 800 kg)
- Release of ESA in situ elements after SOI at 3rd Titan fly-by
- Montgolfier: 599 kg (24 kg P/L), targeted at mid latitude (20° N), power MMRTG
- Short lived (battery) lander: 190kg (27kg P/L), northern polar lakes (Kraken Mare)

Montgolfier

Payload: Nationally provided

- 24 kg on montgolfiere,
- 27 kg on lander

Technology

- Balloon (CNES) – material & inflation

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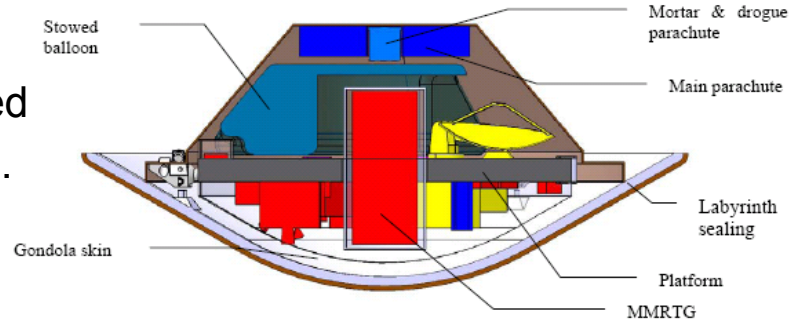
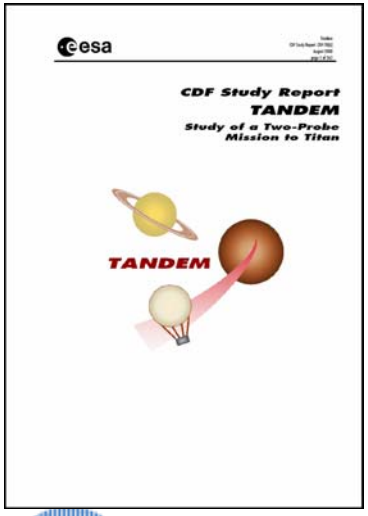
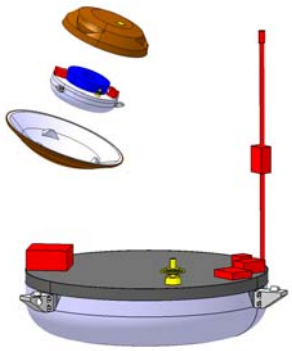




CDF report - Tandem



Short life lander