



A relocatable lander to explore Titan's
prebiotic chemistry and habitability

Planetary Protection for Dragonfly

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Dragonfly

Flights of exploration across Saturn's moon

Key Dates:

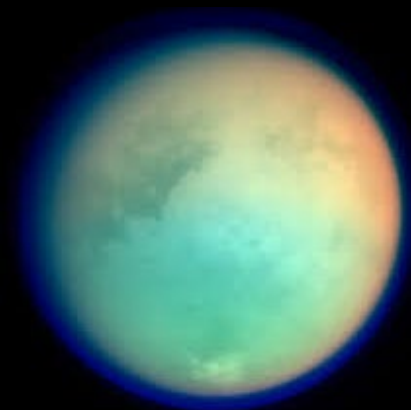
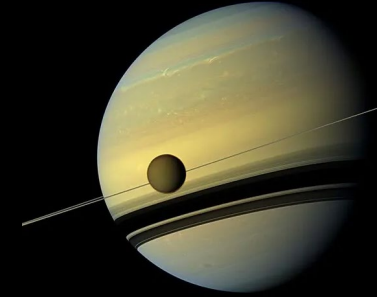
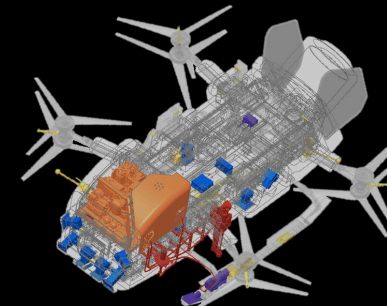
- NET July 2028: Dragonfly Launches
- NET Dec 2034: Dragonfly arrives at Titan

Prebiotic Chemistry: Analyze chemical components and processes at work that produce biologically relevant compounds.

Habitable Environments: Measure atmospheric conditions, identify methane reservoirs, constrain processes which mix organics with liquid water.

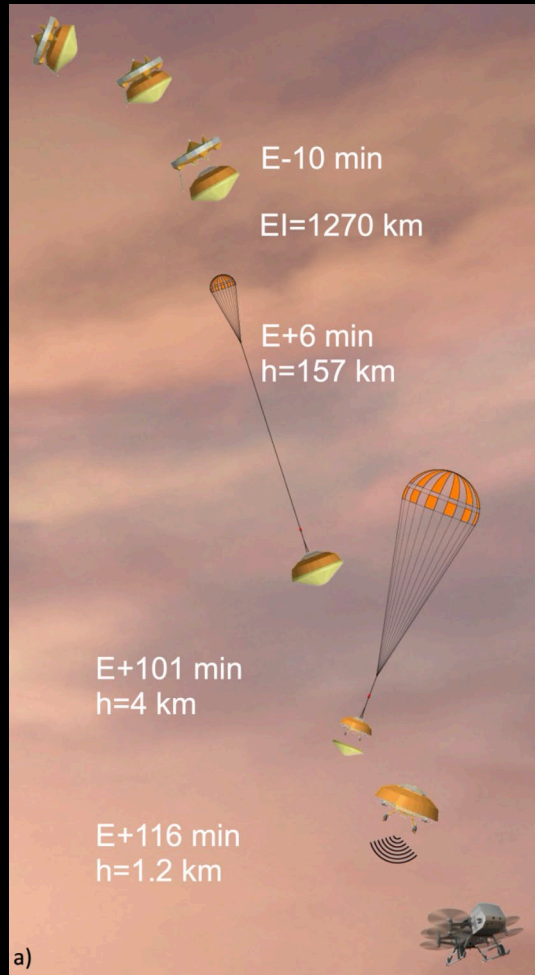
Biosignatures: Search for chemical evidence of water- or hydrocarbon-based life.

- [DraMS](#): Mass Spectrometer – GSFC, CNES
- [DrACO](#): Drill for Acquisition of Complex Organics – Honeybee
- [DraGNS](#): Gamma-ray and Neutron Spectrometer – APL, LLNL
- [DraGMet](#): Geophysics & Meteorology – APL, JAXA
- [DragonCam](#): Camera Suite – MSSS, APL

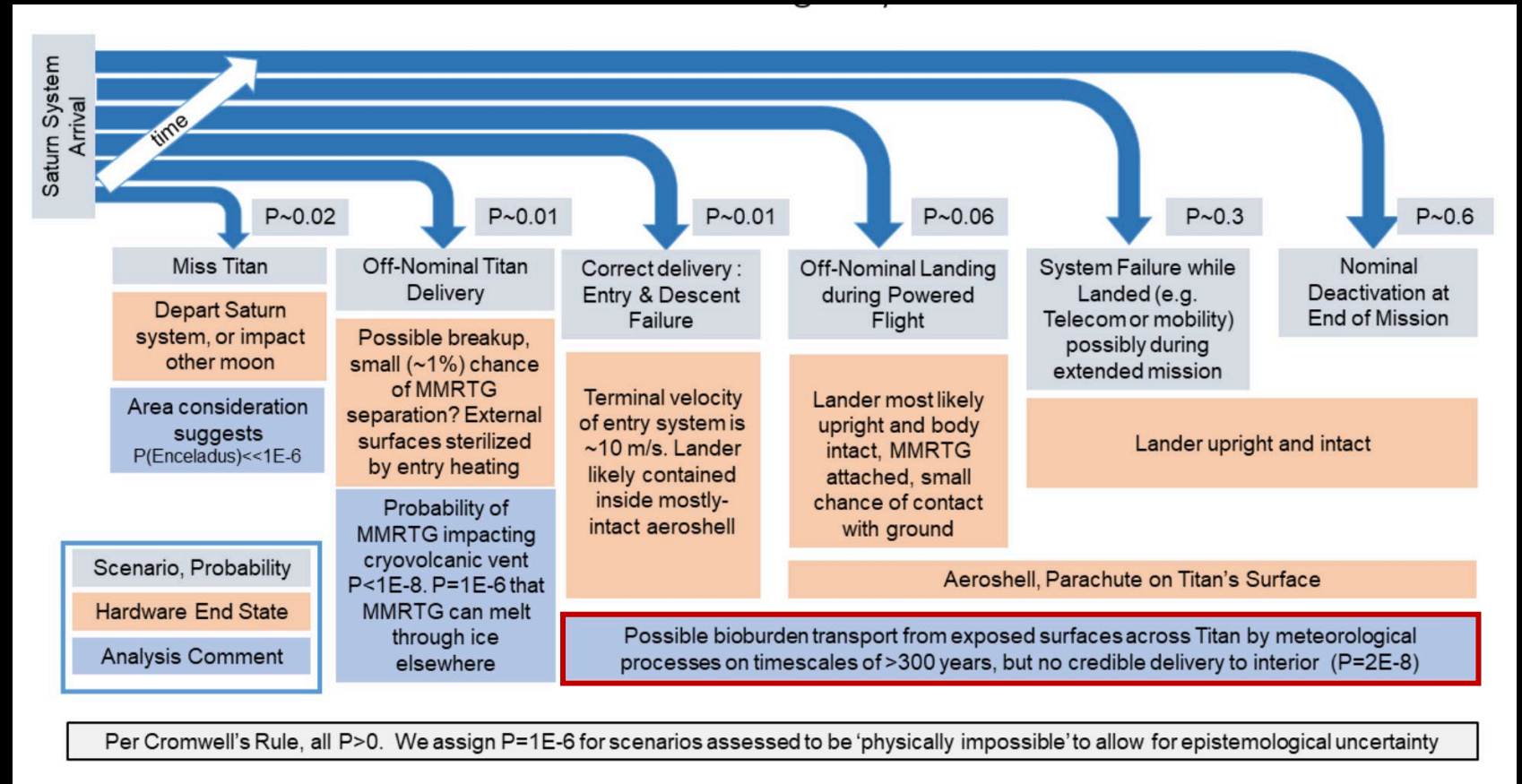


Category II Mission (Assigned by NASA SMD 2022)

Titan is a Category II* target

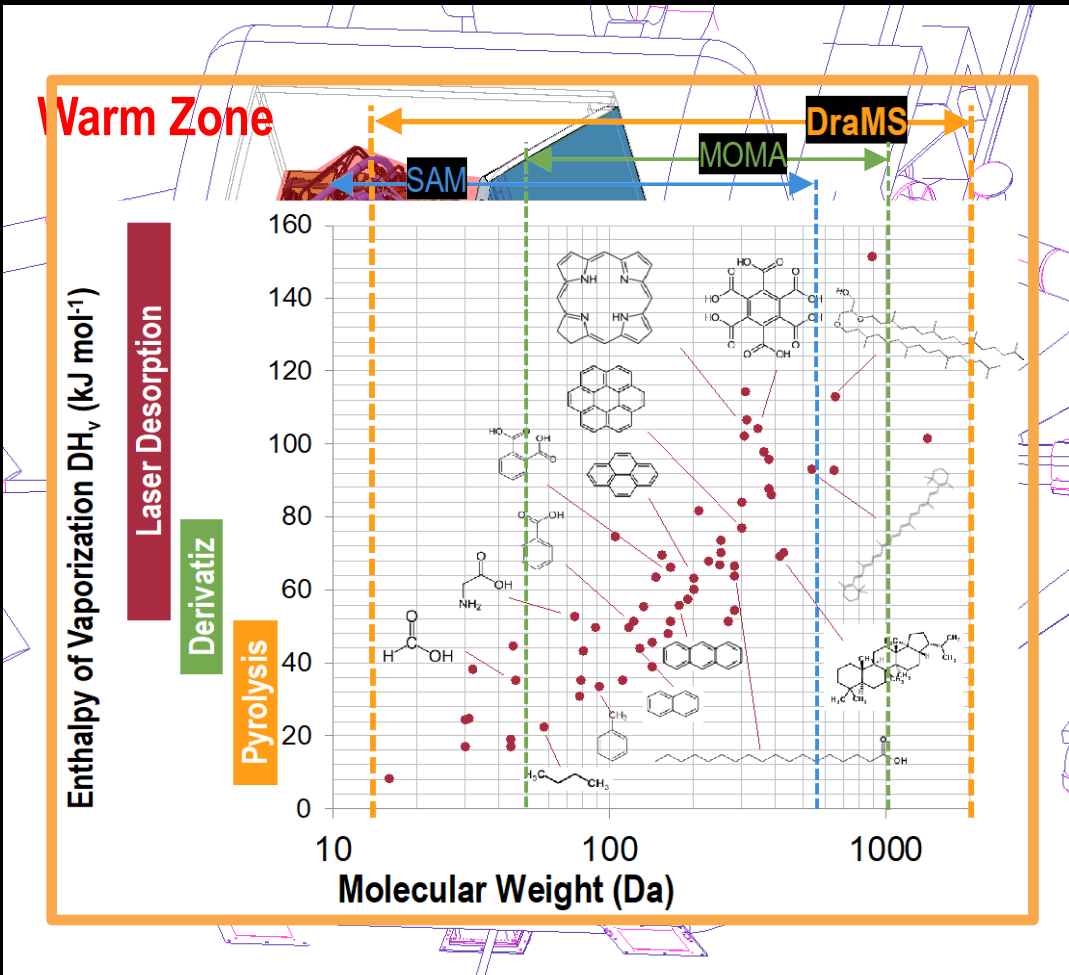


Probabilistic Assessment of Dragonfly Hardware End-States



Lorenz et al. 2022

DraMS Instrument Drives Cleanliness Requirements



- Due to the sensitivity of the DraMS (Dragonfly Mass Spectrometer) instrument, Dragonfly must have stringent contamination requirements (not driven by planetary protection):
 - Level 1 Science Requirement: Inventory prebiotically relevant molecules and potential biosignatures down to 500 ppbw.
 - Contamination requirement set at <50 ppbw for any single organic compound, <1 ppmw for total allowable terrestrial contamination (for sample intimate surfaces).
- DraMS cleaned and assembled to a level approaching ISO 5 (Class 100 - 3,520 particles/ m^3)
- Entirety of Dragonfly assembled in an ISO 8 (Class 100,000) clean room at APL
- Handbook updates do not affect Dragonfly's Planetary Protection plan.