

Dragonfly New Frontiers Mission to Titan : Science Plans and Current Status

*Ralph Lorenz¹

1. Johns Hopkins University Applied Physics Laboratory

Dragonfly was selected in 2019 as NASA's fourth New Frontiers Mission : it is a relocatable lander to Titan. Roughly the size of the Curiosity rover, it will use a set of 8 rotors to fly in Titan's dense atmosphere to visit a range of sites of geological and astrobiological interest over a 3.3 year nominal mission. Dragonfly will explore the complex organic and inorganic composition of Titan's surface materials, around the Selk impact crater where melting of water-rich material may have promoted prebiotic synthesis. Additionally, Dragonfly will make meteorological and geophysical measurements. This presentation will review the science objectives and operations concept, as well as the current status of the project.

In 2020, NASA directed the project to adopt a launch in 2027, with arrival in the mid-2030s. After a successful internal System Requirements Review in summer 2020, Phase B activities are now centered on detailed requirements definition and design.

A new Titan simulation chamber (operating at 1.5 bar and 94K) has been commissioned at the Johns Hopkins Applied Physics Lab (JHU-APL) and is being intensively used for development testing. This has included pneumatic sample transfer testing, calibration of wind sensors, trials of pneumatic dampers to absorb landing loads on the legs, and thermal tests with a simulated MultiMission Radioisotope Thermoelectric Generator (MMRTG). Despite logistical challenges due to the COVID-19 pandemic, the project has also accomplished rotor tests in the large 14x22 wind tunnel at NASA Langley to validate Computational Fluid Dynamics (CFD) codes used to simulate flight performance at Titan. In addition to contributions from DLR and CNES, an important element in Dragonfly is a seismometer from ISAS/JAXA, which may diagnose the seismic activity on Titan and perhaps determine the thickness of ice above Titan's internal water ocean. Further details on the project are at dragonfly.jhuapl.edu

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