

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration including Ocean Worlds (5)

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DEVELOPMENT OF A GAS CHROMATOGRAPH FOR THE DRAGONFLY MISSION

Abstract

Dragonfly is a NASA New Frontiers Mission, managed by the Johns Hopkins University's Applied Physics Laboratory (APL), which will send a rotorcraft lander to Saturn's moon Titan. The lander will be able to sample surface materials and determine compositions at multiple locations. Dragonfly is planning for a 2027 launch, with on Titan by 2034.

The primary science goals of the Dragonfly mission are to investigate Titan's prebiotic chemistry, assess habitability, and search for potential chemical signatures of water- or hydrocarbon-based biological processes.

To address these science goals, a suite of four instruments will be onboard the Dragonfly rotorcraft:

- DraGMet: Geophysics Meteorology Package (APL, JAXA)
- DragonCam: Camera Suite (MSSS)
- DraGNS: Gamma-ray Neutron Spectrometer (APL, LLNL, GSFC, Schlumberger PNG)
- DraMS: Mass Spectrometer (GSFC, CNES)

CNES, together with several French labs (LATMOS, LESIA, LGPM and LISA), will provide the Gas Chromatograph (DraMS-GC) to be integrated into the DraMS instrument by NASA GSFC (Goddard Space Flight Center).

Both the GSFC and French teams have extensive experience in the development of gas chromatograph mass spectrometers, as evidenced by (among others) the successful implementation and operations of the SAM (Sample Analysis at Mars) instrument suite onboard the Curiosity rover for more than ten years on Mars.

Nevertheless, the design of the DraMS-GC cannot be fully inherited from the previously developed GCs as it has to be compatible to the Dragonfly mission's interfaces, environment, and scientific objectives. After a successful PDR in 2022, the project is now in Phase C of its development and the DraMS-GC Engineering Model is being integrated for a delivery later this year.

After introducing the Dragonfly mission and its objectives, and an overview of the DraMS instrument, the paper will focus on the development of the GC.