



DRAGONFLY

FLIGHTS OF DISCOVERY ON TITAN

NASA explores the unknown in space with the revolutionary Dragonfly rotorcraft, the first science mission to explore another world by flying from location to location.

Carried aloft by eight rotors, Dragonfly's mission is to fly to different geologic sites on Saturn's moon Titan, where its suite of science instruments will analyze the composition of surface samples and provide insight into the habitability of Titan's environment and the development of pre-life chemistry.

With launch scheduled no earlier than 2028, Dragonfly arrives at Titan about 6 years later for its more than 3-year mission. The rotorcraft will find a cold world with a varied landscape shaped by dunes, impact craters, rivers of liquid hydrocarbons like methane and ethane, methane weather, and a complex organic chemistry that resembles early Earth.

Dragonfly's flights through Titan's yellowish, hazy, nitrogen-rich atmosphere will take it to diverse locations, miles apart, where its onboard laboratory will analyze surface samples to determine how far prebiotic chemistry has progressed and to identify compounds that may be of astrobiological interest, such as amino acids.

NASAfacts



Investigating Chemistry Before Life

As Dragonfly explores Titan's complex organic chemistry, it won't be searching for life, per se, but rather for the chemical processes that come before the emergence of life, which is known as prebiotic chemistry.

Titan is rich in carbon-based organic molecules and is one of the few places in our solar system where these materials may have undergone chemical reactions when mixed with liquid water, particularly at impact craters where the collisions melted part of Titan's icy crust. Titan's environment may have preserved evidence of these reactions, which scientists believe may be similar to the processes that occurred on Earth billions of years ago. Dragonfly's investigations offer a rare opportunity to study how the ingredients for life could emerge on a planetary scale.

Science on Board

DraMS (Dragonfly Mass Spectrometer); analyzes chemical components and processes and can identify whether biologically relevant compounds have been produced on Titan. Developed by NASA's Goddard Space Flight Center, and CNES (Centre National d'Études Spatiales).

DrACO (Drill for Acquisition of Complex Organics): drills, samples, and pneumatically transfers surface material to DraMS. Developed by Honeybee Robotics, a Blue Origin company.

DraGNS (Dragonfly Gamma-ray and Neutron Spectrometer): measures elemental composition beneath the rotorcraft to classify surface materials. Developed by the Johns Hopkins Applied Physics Laboratory (APL) and Lawrence Livermore National Laboratory.

DragonCam (Dragonfly Camera suite): characterizes landforms and surface processes at multiple scales, conducts surface and aerial imaging. Developed by Malin Space Science Systems and APL.

DraGMet (Dragonfly Geophysics and Meteorology Package): monitors atmospheric conditions, constrains regolith properties, and detects and characterizes seismic activity. Developed by APL and JAXA (Japan Aerospace Exploration Agency).

Rotorcraft Specs

Weight: Approximately 2,100 pounds (953 kg)

Dimensions: 12.5 feet (3.85 m) long, 12.5 feet (3.85 m) wide, 5.5 feet (1.75 m) tall

Rotors: Four pairs of 53-inch (1.35 m) coaxial blades

Communications: via NASA's Deep Space Network (DSN) using high-gain and medium-gain antennas, and APL-designed Frontier radio (X-band)

Power: 147 ampere-hour battery and Multi-Mission Radioisotope Thermoelectric Generator (MMRTG), which uses the heat from the decay of nuclear material and thermoelectric materials to generate electric power. The MMRTG is supplied by the U.S. Department of Energy through NASA's Radioisotope Power Systems Program.

Mission Team

Dragonfly is designed and built under the direction of the Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland, which leads the mission for NASA. Elizabeth Turtle of APL is the principal investigator. Dragonfly is the fourth mission in NASA's New Frontiers Program, managed by NASA's Marshall Space Flight Center in Huntsville, Alabama, for the agency's Science Mission Directorate in Washington.

