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After lining up ambitious moon and Mars exploration missions, U.S. space agency National Aeronautics and Space Administration (NASA) has set its eyes on Saturn's largest moon, Titan.

NASA's Dragonfly mission to explore Titan is scheduled for launch in 2027, and the spacecraft is expected to arrive at its destination in around 2034.

Titan is the second largest moon in our solar system (after Jupiter's Ganymede). It is larger than Mercury, and has lakes, rivers, clouds, and rain of methane on the surface. Titan is around 10-times farther than the earth from the sun, and as such, its surface temperature is around -179°C .

Of all the moons in our solar system, Titan is the only one with a thick atmosphere. In fact, its atmosphere is four times denser than that of the earth. This, along with the moon's low gravity and freezing environs, will allow Dragonfly to stay aloft above the surface of the moon with less energy than it would need on other bodies.

According to NASA, Titan's building blocks are expected to be similar to those on the earth before life took root. While both the earth's and Titan's atmospheres contain abundant nitrogen, Titan lacks oxygen. On the other hand, the presence of methane and nitrogen in Titan's atmosphere could allow their component atoms – carbon, hydrogen, and nitrogen – to potentially exist and recombine to form a rich variety of organic compounds. Scientists hope Dragonfly's instruments will assess how far, in this milieu, pre-life chemistry could have progressed on Titan.

At each site of study, a 'Drill for Acquisition of Complex Organics' will collect samples of less than a gram each, which will be irradiated by an onboard laser or vapourised in an oven and observed by the Dragonfly Mass Spectrometer. This instrument will inspect the materials in each sample.

The Dragonfly mission is part of NASA's 'New Frontiers' programme, which also includes the New Horizons mission to Pluto and the Kuiper Belt; Juno to Jupiter; and OSIRIS-REx to the asteroid Bennu. The 'New Frontiers' programme is designed to explore the solar system with medium-class spacecraft missions that conduct high-science-return investigations.

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