Exploration of the Selk Impact Structure on Titan by the Dragonfly Rotorcraft

Ralph Lorenz

The 80-km impact crater, Selk, is a site of prominent astrobiological interest on the organic-rich ocean world, Titan. Spectroscopic data from Cassini point to exposures of water ice, suggesting that there may be accessible exposures of material where aqueous impact melt has interacted with photochemical organics, yielding a rich mixture of prebiotic molecules like pyrimidine bases and amino acids.

Impact craters can have challenging terrain, and the Dragonfly New Frontiers mission, presently in development for a 2027 launch, will negotiate terrain hazards and seek scientifically-interesting targets by exploiting aerial mobility. In Titan's low gravity and dense atmosphere, Dragonfly uses 8 rotors to fly many kilometers at a time, enabling it to visit many sites during a 3+ year traverse. Initially Dragonfly will land in a flat area among sand dunes to the south of Selk, and then (with the benefit of aerial reconnaissance) progress towards the Selk rim and water-rich material.

The Dragonfly rotorcraft vehicle, its scientific instrumentation, and the planned concept of operations, will be discussed.