

## **Uranus Orbiter and Probe (UOP)**

Uranus is one of the most intriguing bodies in the solar system. Its low internal energy, active atmospheric dynamics, and complex magnetic field all present major puzzles. A primordial giant impact may have produced the planet's extreme axial tilt and possibly its rings and satellites, although this is uncertain. Uranus's large ice-rock moons displayed surprising evidence of geological activity in limited Voyager 2 flyby data and are potential ocean worlds. UOP science objectives address Uranus' (1) origin, interior, and atmosphere; (2) magnetosphere; and (3) satellites and rings. UOP will provide groundtruth relevant to the most abundant, similarly sized class of exoplanets. UOP can launch on an existing launch vehicle.

The Uranus Orbiter and Probe mission will deliver an in situ probe into Uranus's atmosphere, then complete a multi-year orbital tour of all aspects of the Uranian system including the atmosphere, interior, magnetosphere, rings, and satellites. The orbital science on the study payload include visible and thermal imaging, visible/near-infrared imaging spectroscopy, fields and particles science, and radio/gravity science. The probe instruments measure atmospheric composition and isotopic ratio profiles, provide critical ground truth for the hydrogen ortho-para fraction and the vertical temperature profile, and determine abundances of the noble gases and their isotopes, as well as the vertical wind profile, parameters inaccessible to remote sensing.

UOP can be launched on an existing heavy lift expendable rocket, with or without a Jupiter gravity assist. The primary and secondary launch opportunities occur in June 2031 and April 2032, and both benefit from a Jupiter gravity assist available at those times to place ~5000 kg in orbit at Uranus after a ~13-year cruise. These optimal launch and cruise times could be achieved with a FY24 start of the UOP mission. Other launch opportunities from 2032 through 2038 (and beyond) utilize multiple inner solar system gravity assists (including a Venus flyby) to place up to 5900 kg in orbit with an increased, ~ 15-year cruise time. These diverse launch opportunities provide significant schedule flexibility and were considered by the committee to be a major strength of the Uranus mission concept.

The full Uranus Orbiter and Probe mission study report is available at [https://drive.google.com/file/d/1TxDt\\_qU6H2j2fYGqcDUTJQioSJ2W\\_KnN/view?usp=sharing](https://drive.google.com/file/d/1TxDt_qU6H2j2fYGqcDUTJQioSJ2W_KnN/view?usp=sharing)