

SNAP

Small Next-generation Atmospheric Probe
Enabling Future Multi-Probe Missions

Funded by:

SMD PSD Planetary Science Deep Space SmallSats Studies (PSDS3) Program

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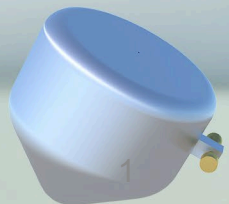
NASA Langley Research Center

Mission Design:

NASA Langley Research Center Engineering Design Studio

Supported by NASA Grant NNX17AK31G from:

SMD PSD Planetary Science Deep Space SmallSats Studies (PSDS3) Program



Take Home Message

SNAP IS A 30-KG ATMOSPHERIC PROBE
THAT ENABLES
MULTI-PROBE MISSIONS
TO SATURN, URANUS AND NEPTUNE

Galileo Probe



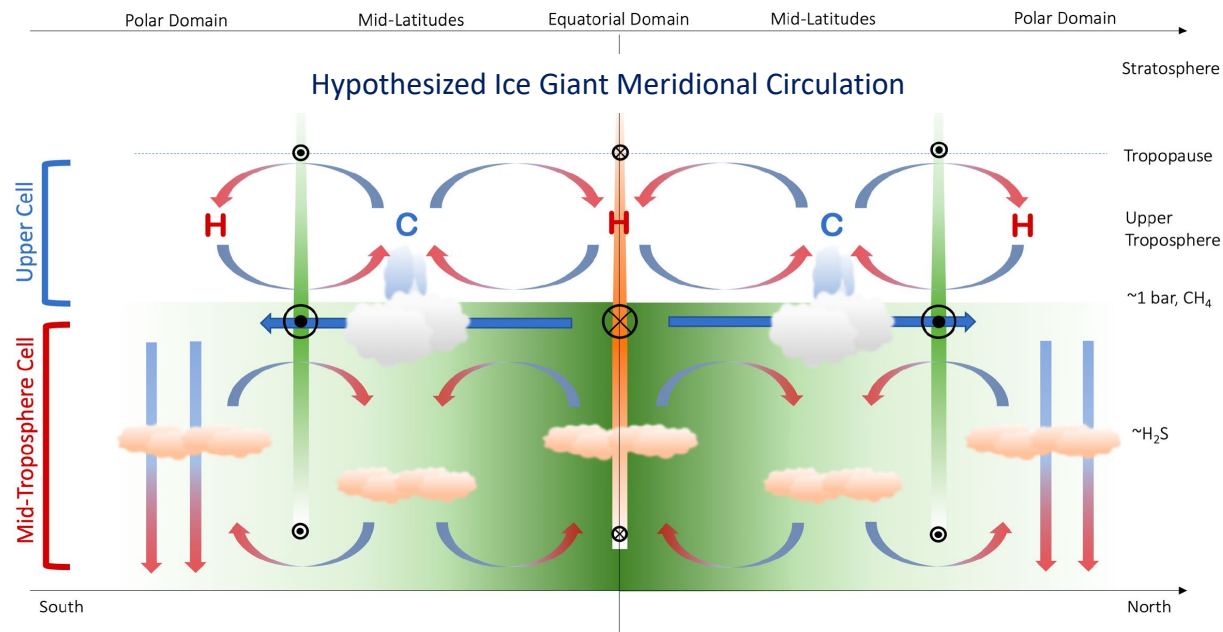
SNAP Probe



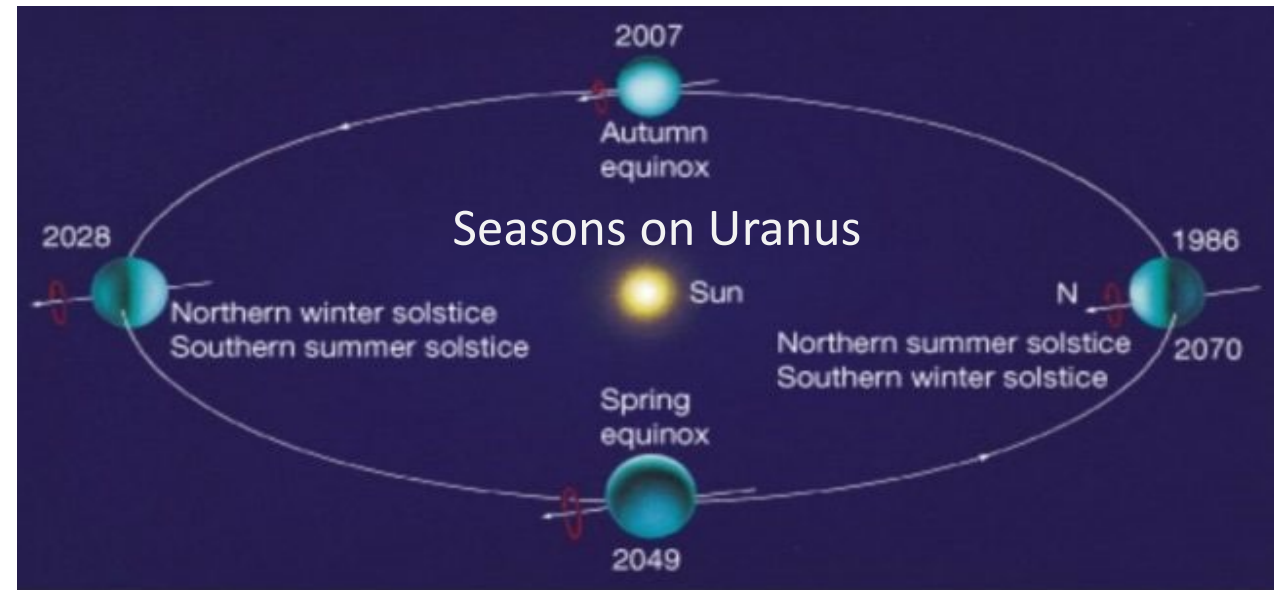
Multi-Probe Justification: Atmospheric Horizontal Variabilities

UOP Objectives:

- How does atmospheric circulation function ... in an ice giant?
- What is the 3D atmospheric structure in the weather layer?



To test the hypothesized circulation system, probes are needed in downwelling and upwelling branches of the circulation.



To understand seasonal effects, probes are needed in Opposite Hemispheres.

Multi-Probe Objectives

Multi-Probe Shared Objectives:

Determine spatial variability in atmospheric properties:

- Vertical distribution of cloud-forming molecules
- Thermal stratification and static stability
- Atmospheric dynamics as a function of depth
- Achievable with low-mass/volume/cost instruments
 - Second probe would be lower-cost than primary probe

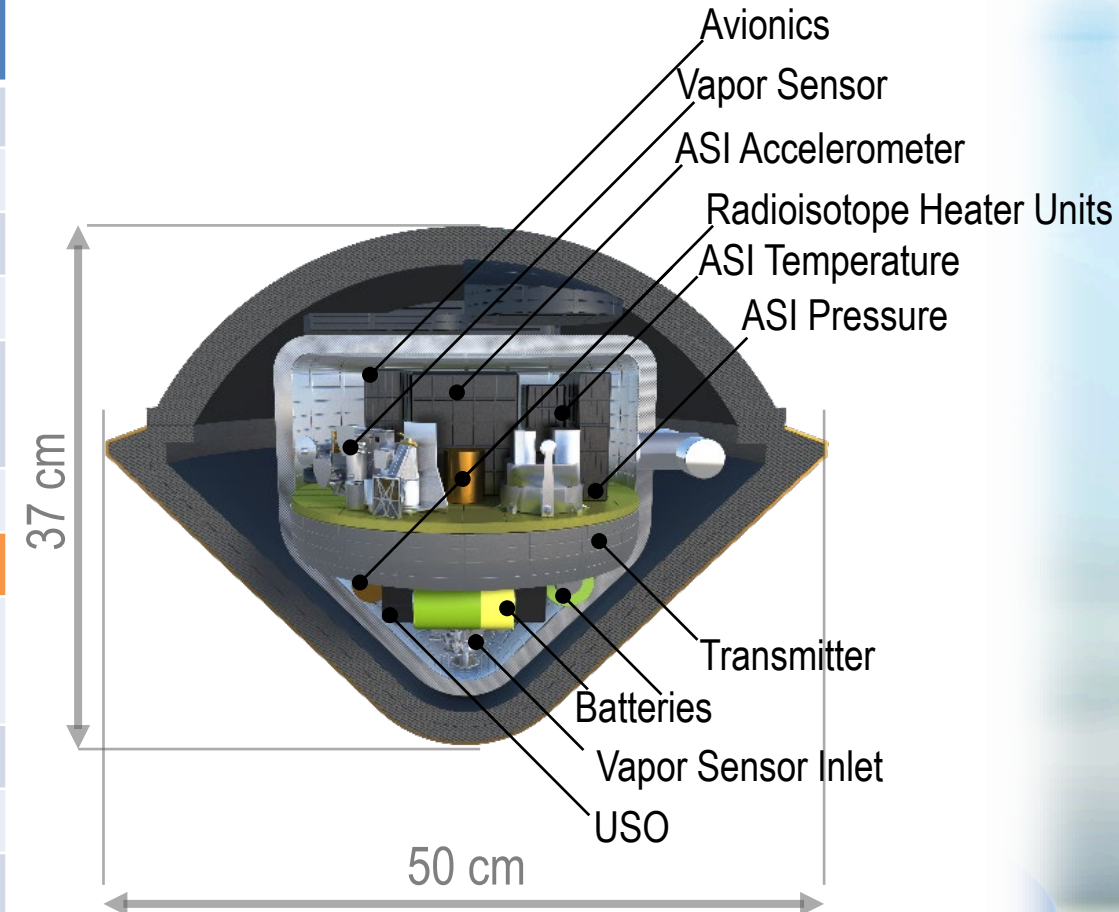
Main Probe-only Objectives:

Determine Bulk Composition:

- Measure abundances of the noble gases (He, Ne, Ar)
- Measure isotopic ratios of H, C, N, and S
- Require a Mass Spectrometer (>10 kg mass)

SNAP Design Summary

Subsystem	CBE (kg)	+30% MGA (kg)	+15% Margin (kg)
Forebody TPS (HEEET)	3.7	4.9	5.6
Forebody Structure	2.0	2.6	3.0
Backshell TPS (PICA)	0.7	0.8	1.0
Backshell Structure	1.4	1.8	2.1
Separation Parachute & Mortar	1.3	1.7	1.9
Separation System	0.8	1.0	1.2
Aeroshell Total	9.9	12.9	14.8
Descent Module Structure	1.4	1.8	2.1
Descent Parachute	0.4	0.6	0.6
Science Instruments	4.4	5.7	6.6
Engineering Systems	3.93	5.1	5.9
Descent Module Total	10.2	13.2	15.2
Total Mass Entry Mass	20.1	26.1	30.0



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SNAP Probe



Study Team

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