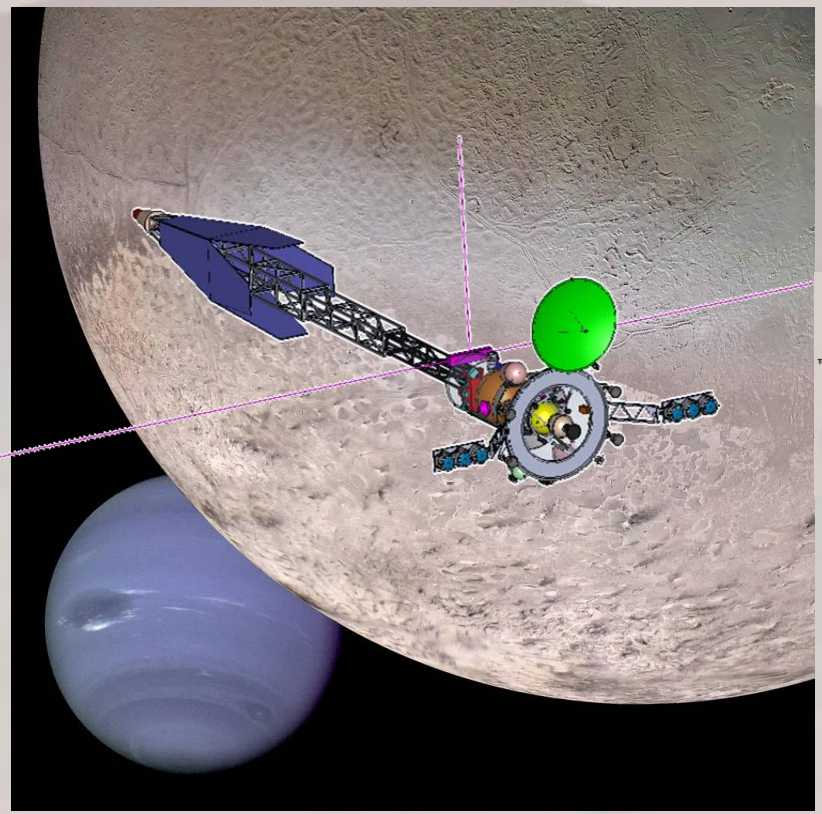
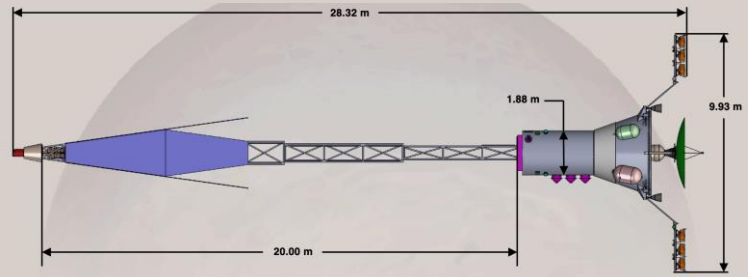
Triton Hopper NEP Delivery Vehicle

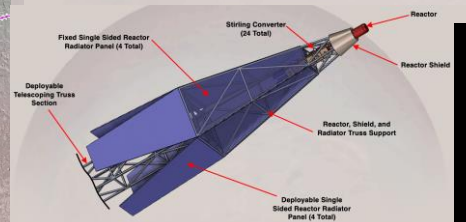
(2020 Concept)

Steve Oleson, NASA GRC

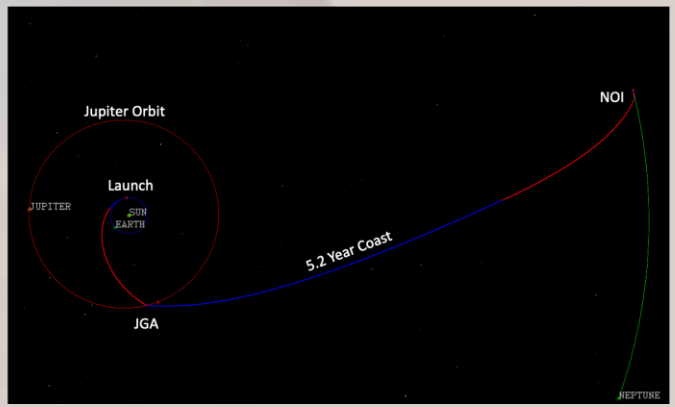
- **Mission**: An NEP Vehicle delivering a Triton Hopper and supporting it with imaging, commanding and Relay
  - Launch: June 2030, SLS Block 1, C3 ~69 km^2/s^2
  - *Arrive Neptune/chem capture*: 13.4 yrs after launch
  - *Spiral to Low Triton Orbit/deliver Hopper*: arrive 14.6 yrs after launch
- *Map and Relay for Triton Hopper* for 1.7 years
- **Science**: 320 kg Triton Hopper (dry), Three 30 kg Neptune Probes, ~150 kg on-board science including hi-rez imager
  - ~4m rez map of Triton in 2 yrs, Higher 10cm preparatory maps of ~ 100 Hopper landing sites
  - Relayed ~ 9 Tb of Triton surface/atmospheric data
- **Power**: 17 kWe Reactor, 24 Stirling convertors, 1 kW for Bus/payload, 100 krad shield, 15+ yr life
- **Electric Propulsion**: 2+4 Long Life direct dive NEXT Thrusters, ~5000 kg Xenon propellant Load
  - Direct Drive PPU (99%), Thruster Feed, Thruster, Spherical COPV Tank
- **Mechanical**: Cylindrical Bus with Propulsion and Science Decks, Four section extendable reactor boom
- **Communications**: 4000 W in, 540 kb/s Data rate, Ka Band, 3 m Antenna
- **AD&C**: Four reaction wheels (for imaging/comm. Stability), 2 Star Cameras, IMU
- **Thermal**: MLI and Heaters, Reactor isolated
- **Dual Mode Chemical Propulsion** (for Capture at Neptune)
- **New Technologies**: 17 kWt reactor based on Lunar Power Demonstrator, 700 We Stirlings, NEXT direct drive units











MEL Summary: Case 3 NEP Delivery to Triton CD-2020-177	Delivery Vehicle	Triton Hopper and SRM	Probe	TOTAL
Main Subsystems	Basic Mass (kg)	Basic Mass (kg)	Basic Mass (kg)	Total Basic Mass(kg)
Element Dry Mass (no prop,consum)	3968	484	94	4546
Element Propellant	4144	385	0	4529
Element Mass Growth Allowance (Aggregate)	902	87	27	1016
MGA as %'age	23%	18%	29%	22%
Predicted Mass (Basic + MGA)	4869	571	121	5562
Recommended Mass Margin (Additional System Level Growth) 15%	595	73	14	682
Element Dry Mass (Basic+MGA+Margin)	5464	644	136	6244
Element Inert Mass (Basic+MGA+Margin)	5718	656	136	6510
Total Wet Mass (Allowable Mass)	*9609*	*1028*	*136*	*10773*

LV Summary: Case 3 NEP Delivery to Triton CD-2020-177	Single Launch	
Architecture Details	**All**	**Units**
Launch Vehicle	SLS Block 1B	
Energy, C3	69.3	km2/s2
Performance (pre-margin)	11000	kg
Margin (%)	0%	%
Performance (post-margin)	11000	kg
Adapter (Stays with LV)	159	kg
Performance (post-adapter)	10841	kg
Total Wet Mass w/15% Growth	**10773**	kg
Available LV Margin	**68**	kg
Available LV Margin (%)	1%	%