# TRIDENT

## MISSION TO AN EXOTIC ACTIVE WORLD

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ExoPAG

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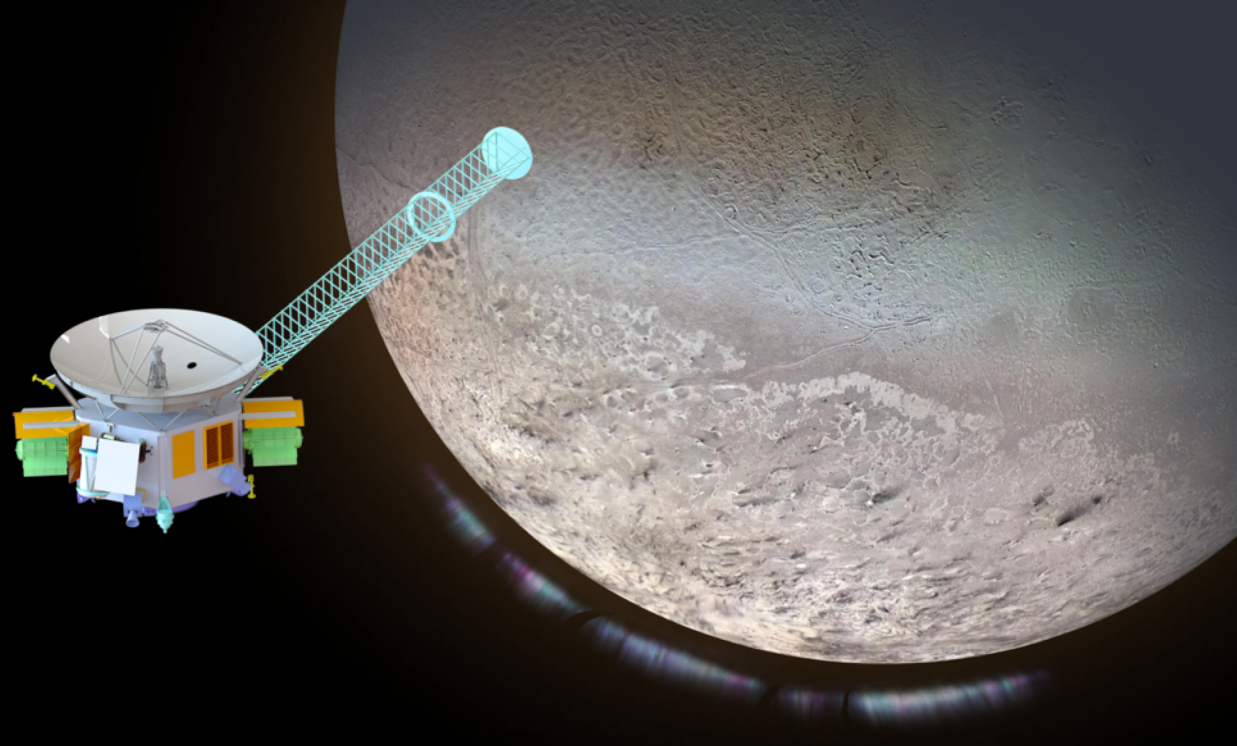
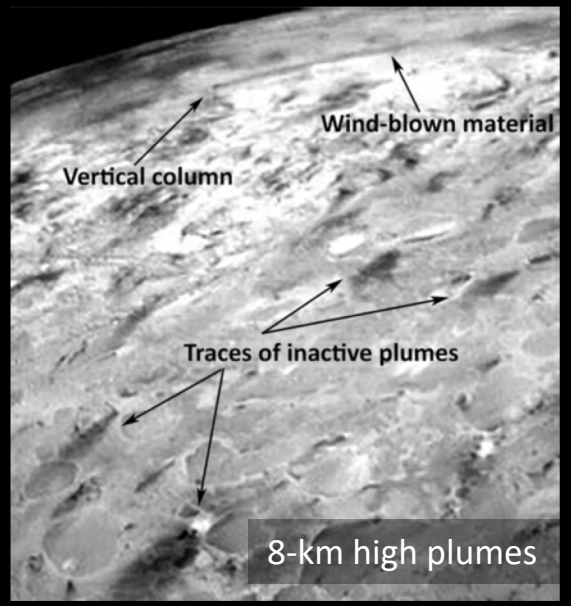


Triton, the Solar System's weirdest moon, is a captured Kuiper Belt Object and possible ocean world. Trident would encounter Triton to:

- Explore how worlds become habitable
  - *Is Triton an ocean world?*
- Explore what drives processes on active worlds
  - *What processes resurface Triton?*
  - *What processes drive Triton's plumes?*
  - *Why is Triton's ionosphere so intense?*
- Explore vast, unseen lands
  - *View Triton's unseen hemisphere!*





*All images: NASA/JPL*

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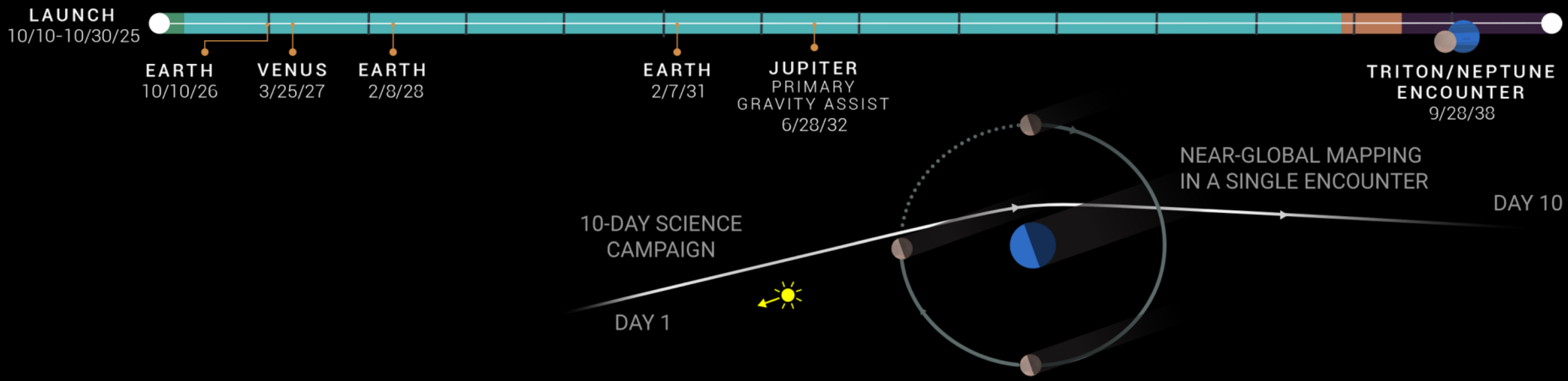
# Highly efficient ballistic trajectory makes Trident possible on a Discovery budget




- *New Horizons-like encounter of Triton*
- *Discovery mission cost ($500M)*
- *Launch: 2025, arrive at Triton 2038*
- *Ballistic trajectory*
- *2 MMRTGs, large battery for encounter operations*

## Primary participating organizations

**JPL** – Flight system management, mission management

**Ball** – Spacecraft, AIT&V

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# Neptune as an Ice Giant 'archetype'

- Although our primary target is Triton, we would also be able to make observations of Neptune (in work)
- Trident would provide a unique new comparison dataset that will allow us to understand Ice Giant worlds around other stars in a new context, breaking away from Earth's sunlit view of these worlds
- The spacecraft would make specific observations that can be compared with recent or expected Earth-based (or near-Earth-based) observations of exoplanets, allowing us to compare and contrast sub-Neptune worlds with a Solar System object – here are three examples of how Trident will support exoplanetary studies:

| Exoplanet observation | Trident observation | Comparison |
|---|---|---|
| Spectra of Ice Giant exoplanets at a wide range of inclinations and phases | Infrared spectral measurements of Neptune at multiple phases, from near-full illumination to near-darkness | Resolve the differing infrared reflectance and absorption features from an Ice Giant for the first time |
| Measurements related to heat flow from exoplanets | Visible images of Neptune's atmosphere at different phases, modelling the Bond Albedo | Modelling would give an understanding of an Ice Giant's heat flow and energy budget |
| Exoplanet radio or infrared auroral emissions, indicating magnetic fields and rotation | Nightside visible and infrared aurora observations, revealing the detailed structure of Neptune's aurora for the first time | This would help us understand the coupling between highly-complex Ice Giant magnetic fields and their surrounding space environment |