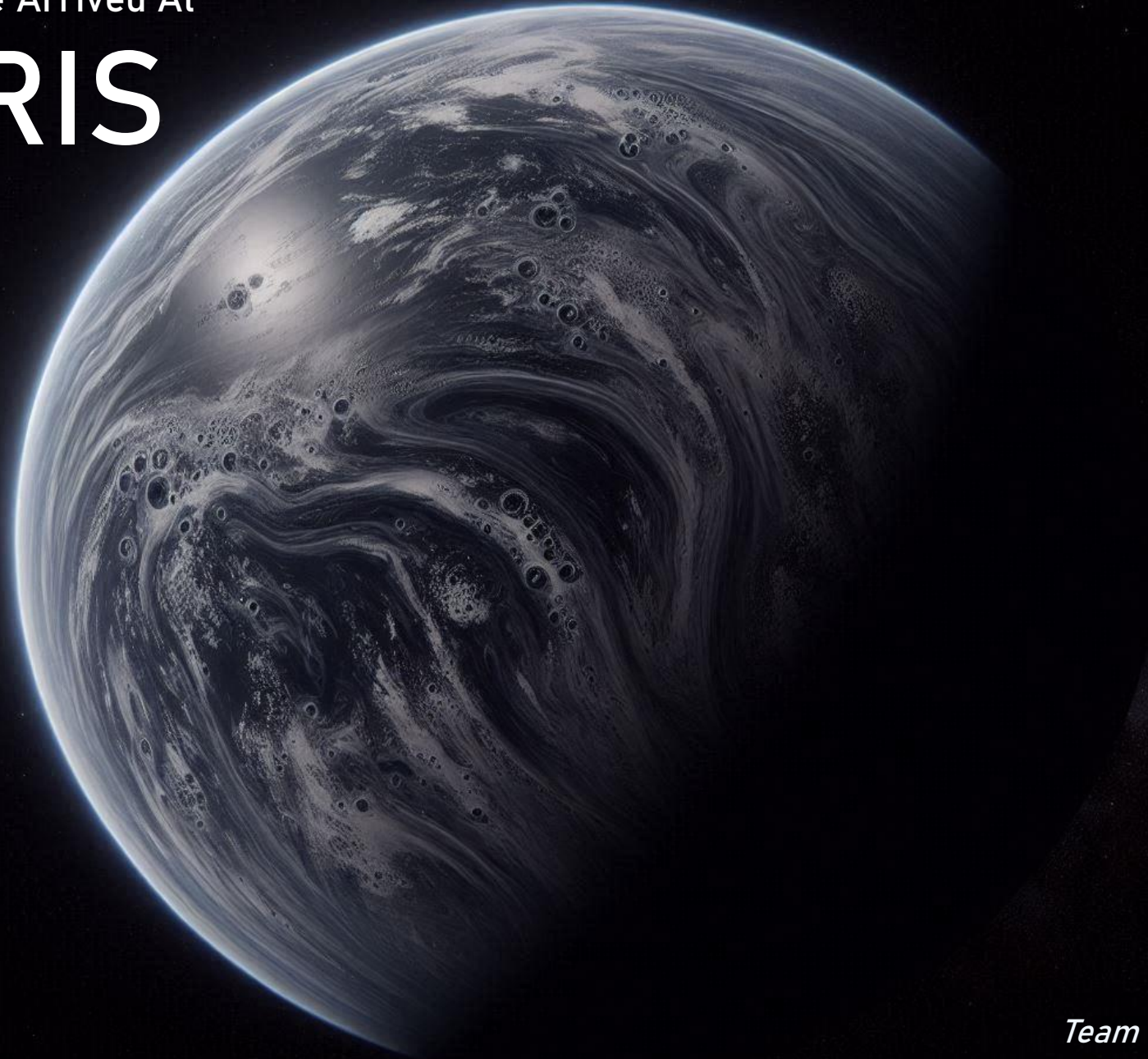


Dear Explorers, We Have Arrived At

TENEBRIS



Team HSpace (Individual/Singapore)

Background Image: Generated using Microsoft Designer

NASA International Space Apps 2024 - Beyond Sunlight: An Aquatic Chemosynthetic World

WHAT IS TENEBRIS?

- Latin for “darkness”
- A dark, oceanic world that hides a harsh (high-pressure and high-temperature) underwater environment teeming with chemosynthetic life
- The ideas in this project are largely inspired/derived from three main sources:
 - NASA's exoplanet research (particularly Europa and Enceladus)
 - NASA's deep ocean and hydrothermal vents research
 - Monterey Bay Aquarium Research Institute (MBARI)

THE PROJECT

- A website that documents various aspects of this alien world, stylized as a journal
- Focuses on hypothesizing possibilities with AI-generated art for visualization
- Encapsulates my learnings about astronomy, biology, chemistry and everything in-between
- This presentation is a project summary and to give the reader an essence of the journal's (website) content



Website: <https://tenebris-hspace.vercel.app/>

Background Image: Generated using Microsoft Designer

GEOLOGY



Hydrothermal Vents of Tenebris

- Hydrothermal Vents & Underwater Volcanic Ridges
- Presence of chemosynthetic bacteria that supports chemosynthesis and the conversion of energy
- This forms the basis of the Tenebrian ecosystem

ECOSYSTEM & FOOD CHAIN



Tenebrian Giant Tube Worms

- Details the ecosystem consisting of primary and secondary producers and consumers
- Symbiotic relationships between micro bacteria and giant tube worms living near hydrothermal vents, facilitating chemosynthesis
- Predator-Prey relationships between crustaceans that feed on these bacteria and giant ocean predators that well, eat pretty much everything else
- Nutrient cycling to sustain the ecosystem

FLORA & FAUNA



Tenebrian Vent Crustaceans

- Various life-forms with similar adaptations
 - Tough exoskeletons
 - Sensory organs to detect chemicals and replace reliance on vision/sight
- These life-forms come in all shapes and sizes
 - Micro bacteria housed in giant tube worms
 - Extremophile organisms that call hydrothermal vents their home
 - Deep sea fishes much like our own but with unique sensory organs and adaptations

SURVEY TECHNOLOGY



AUV exploring Tenebris

- Autonomous Underwater Vehicles (AUVs)
- Remotely Operated Vehicles (ROVs)
- Inspired by Seaglider AUV, Jason II and ROPOS ROVs

RESPONSIBLE EXPLORATION



ROV exploring Tenebrian Ocean

- Encouraging responsible and conservative exploration
- What would that look like on Tenebris specifically?