The Big Questions of Solar System Exploration

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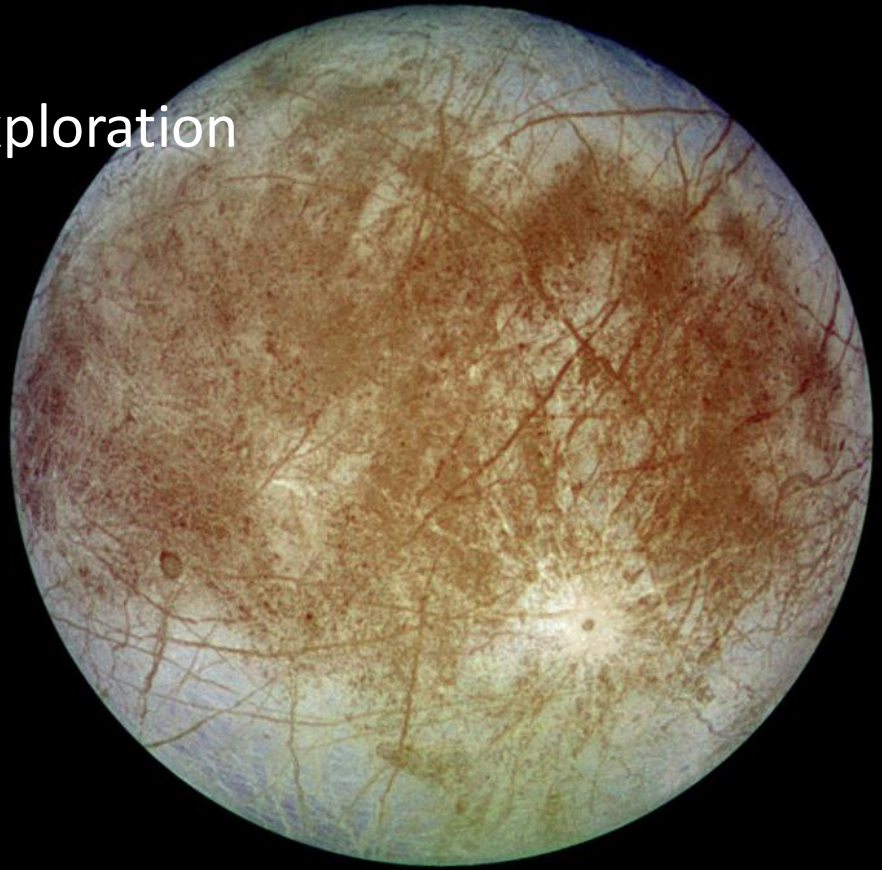

NASA/JPL-CalTech/DLR

What are we looking for?

What might we measure?

How would we do it?

What are we looking for?

Are we alone?

Credit: Elkins-Tanton on Midjourney

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What might we measure?

Are we alone?

Microorganisms
Molecules: Complexity, composition, DNA/RNA
Atoms: Carbon, Isotopic fractionation
Chemical processes
Microscopic structures
Disequilibrium processes
Incubation? Long-term observation

Intelligent life
Signals, structures

How would we do it?

Are we alone?

Credit: Dreamdreamdrea on Midjourney

How would we do it?

Are we alone?

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What are we looking for?

How do space weather and planetary atmospheres interact?

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What might we measure?

How do space weather and planetary atmospheres interact?

Loss of atoms and molecules from solar wind stripping...and gain of particles from the solar wind.

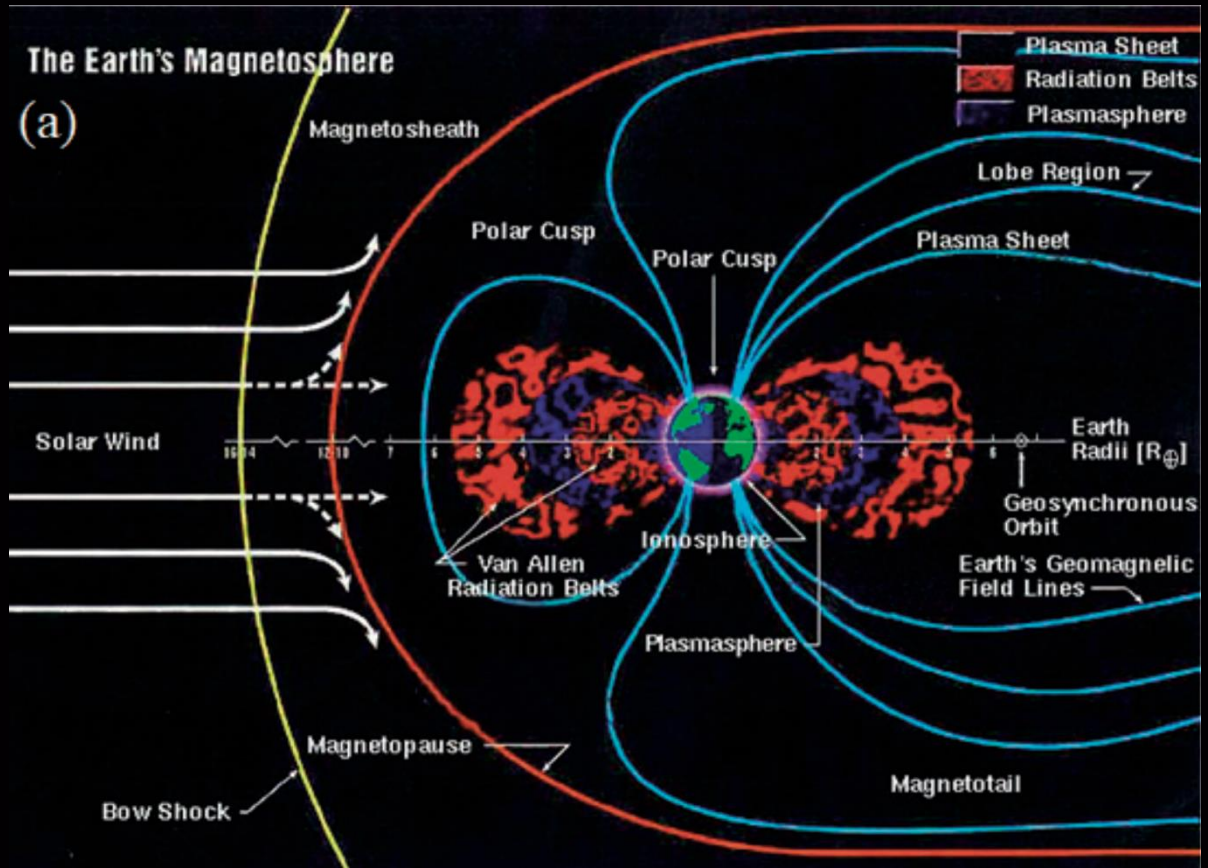
Dynamics in the magnetic field, exosphere, and atmosphere caused by space weather changes.

How magnetic storms begin and then release electric currents.

Net flux of energy in from the sun vs out from the Earth.

How would we do it?

How do space weather and planetary atmospheres interact?



Nwankwo et al. (2020)

How would we do it?

How do space weather and planetary atmospheres interact?

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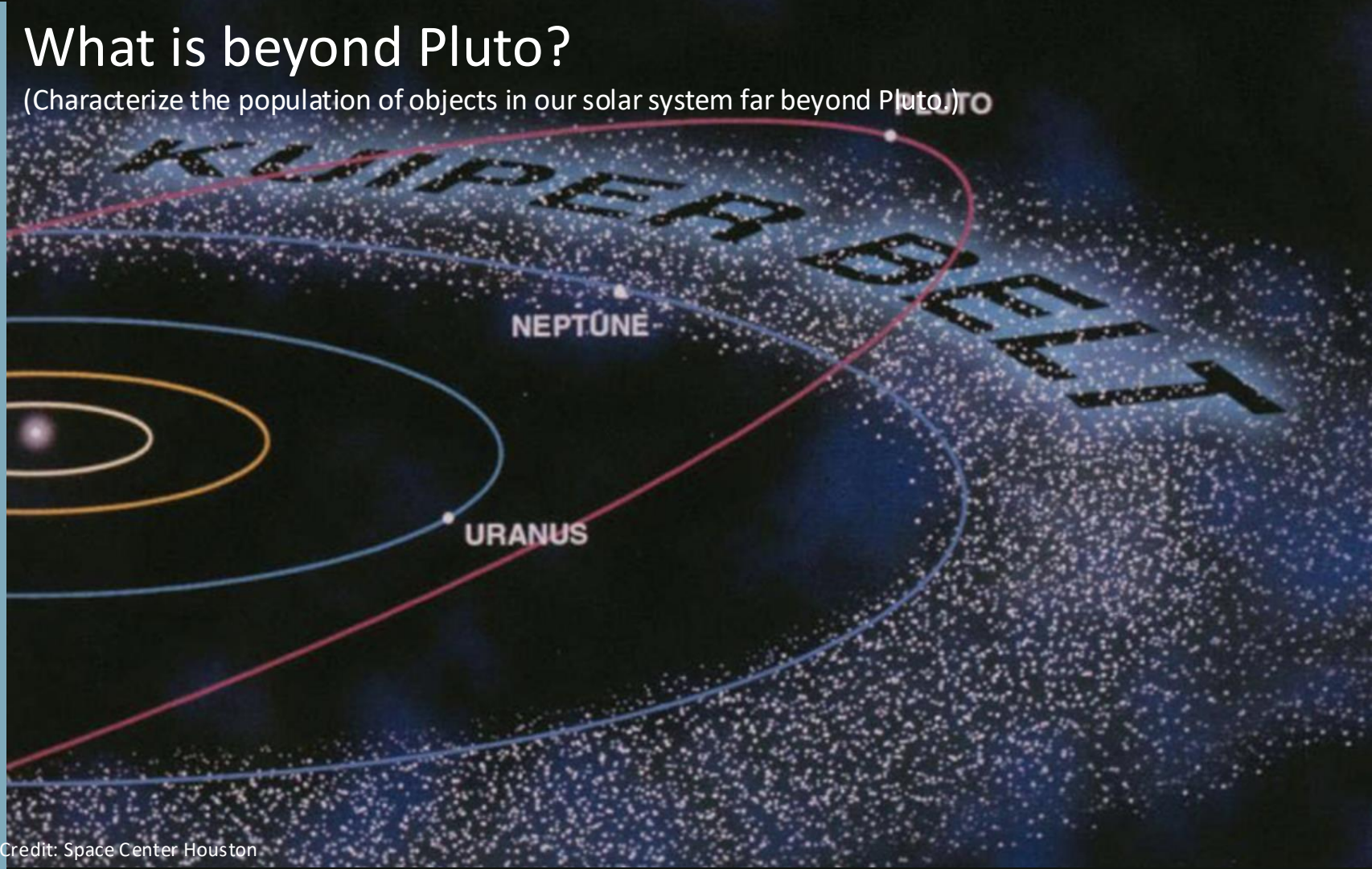
What are we looking for?

What is beyond Pluto?

(Characterize the population of objects in our solar system far beyond Pluto.)



Credit: Space Center Houston

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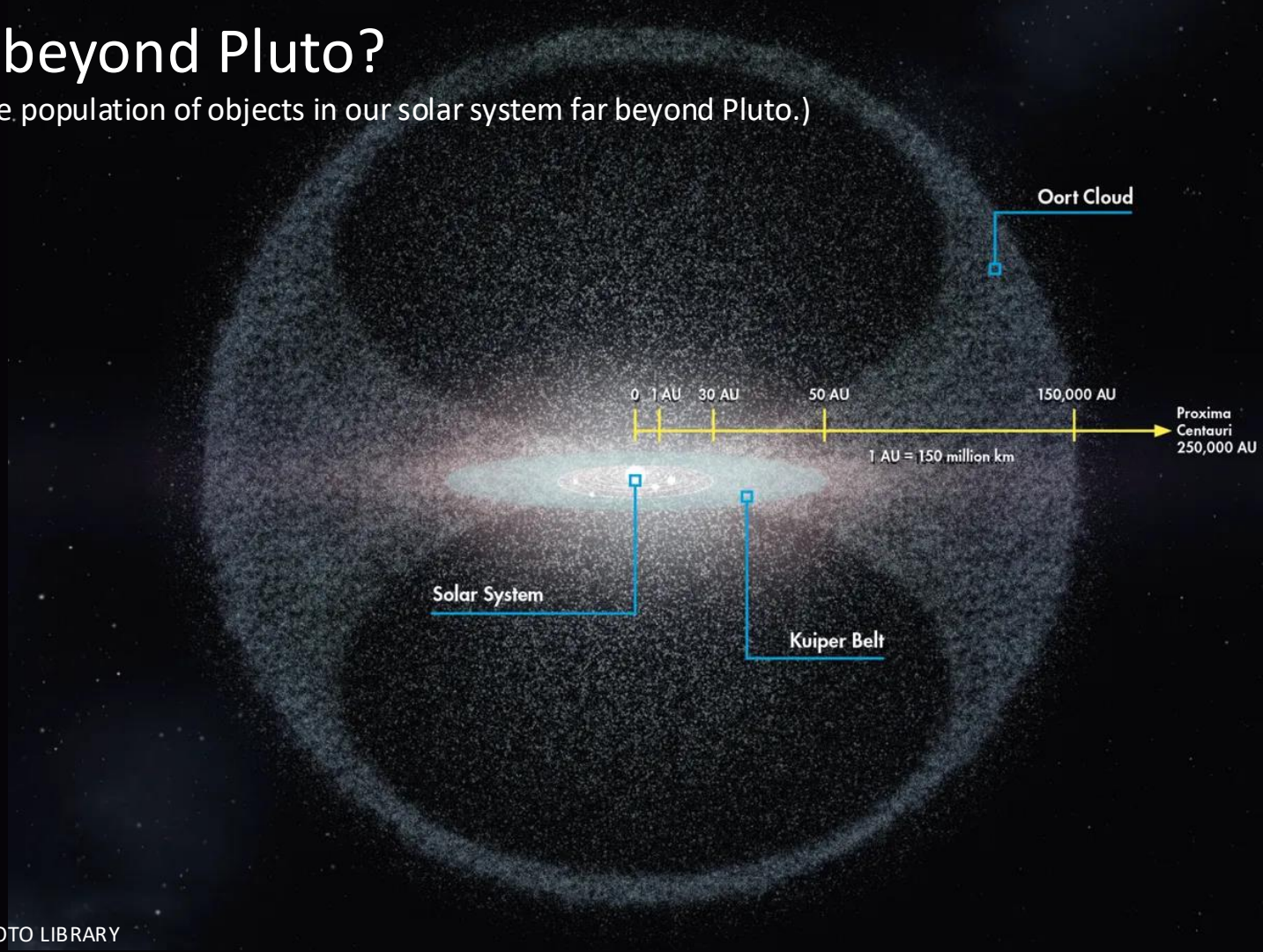

Credit: MIKKEL JUUL JENSEN / SCIENCE PHOTO LIBRARY

What is beyond Pluto?

(Characterize the population of objects in our solar system far beyond Pluto.)

What might we measure?

Sizes, compositions, and orbits of objects beyond the Kuiper Belt.

Rogue planets and other objects not bound to our Sun.

What is beyond Pluto?

How would we do it?

Credit: Elkins-Tanton on Midjourney

A Few More Questions

How is a habitable planet built?

How could we survive long-term away from Earth?

What makes up the fabric of interstellar space?

What conditions are necessary for life to arise, and how fast does it arise once those conditions are met?

Do all solar systems have habitable planets?

Happy Exploring!