

Final Project

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Topic

Planetary Explorer (Spacecraft)

Group Paper

~2 pages

Group Presentation

10 minutes

Point Breakdown

20 Points Paper

30 Points Presentation

50 points 20% of Lab Grade

Last Day of Lab (Week of Dec. 3rd)

Turn in paper at beginning of lab

Give presentation

First 10 – 15 minutes will be set aside
for last minute preparations

Paper

Goal

Tell the story of a space mission, from conception → inception → completion

Requirements

Written as a group

~2 pages, double spaced

Include citations

Grading

20 points

5 point increments

Introduction

Brief overview of project

Body

History

Goals

Results

Cultural Impact

Conclusion

Summarize key results

References

Presentation

Goal

Tell the story of a space mission, but with a greater emphasis on describing the technological and scientific aspects

Requirements

10 minutes

Divide speaking time among team members

Images / Videos

Good for illustrating concepts

Videos containing talking segments will not count towards time requirement

Questions to Address

How did/will the spacecraft operate?

e.g. *How was Magellan able to map the surface of Venus?*

How did/will the spacecraft reach its destination?

e.g. *How did NASA place a 1-ton rover on Mars? (Spirit & Opportunity, Curiosity)*

What important scientific discoveries has it made / hopes to make?

Grading

See rubric

Example Outline – Viking Program

Motivation & Background

Why investigate Mars?

Goal of the Viking program

Spacecraft Design

How did they work?

How did they get to Mars & land on the surface?

Scientific Impact

What did we learn from this mission?

What legacy did it leave behind?



Mission Options

Mercury

BepiColombo
Messenger

Jupiter

Galileo
Juno

Pluto

New Horizons

Venus

Magellan
Venera

Saturn

Cassini-Huygens

Minor Bodies

Deep Impact
Rosetta

Mars

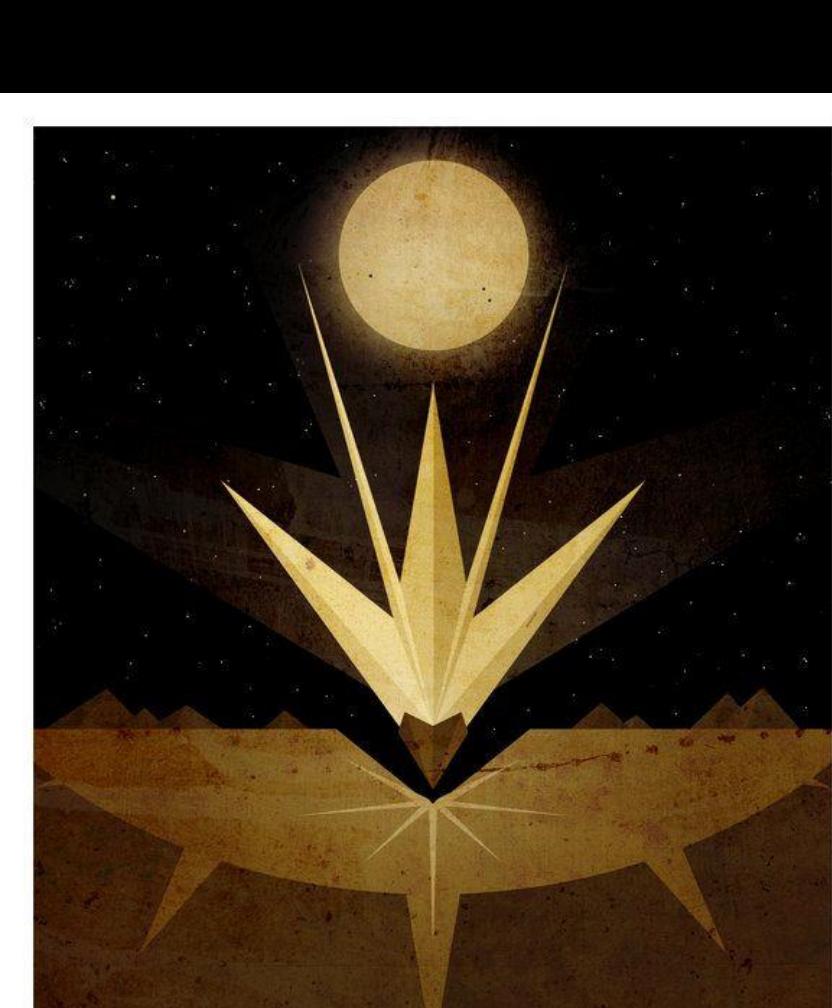
Curiosity
Mars Exploration Rover
Viking Program

Planet Hoppers

Mariner Program
Voyager Program

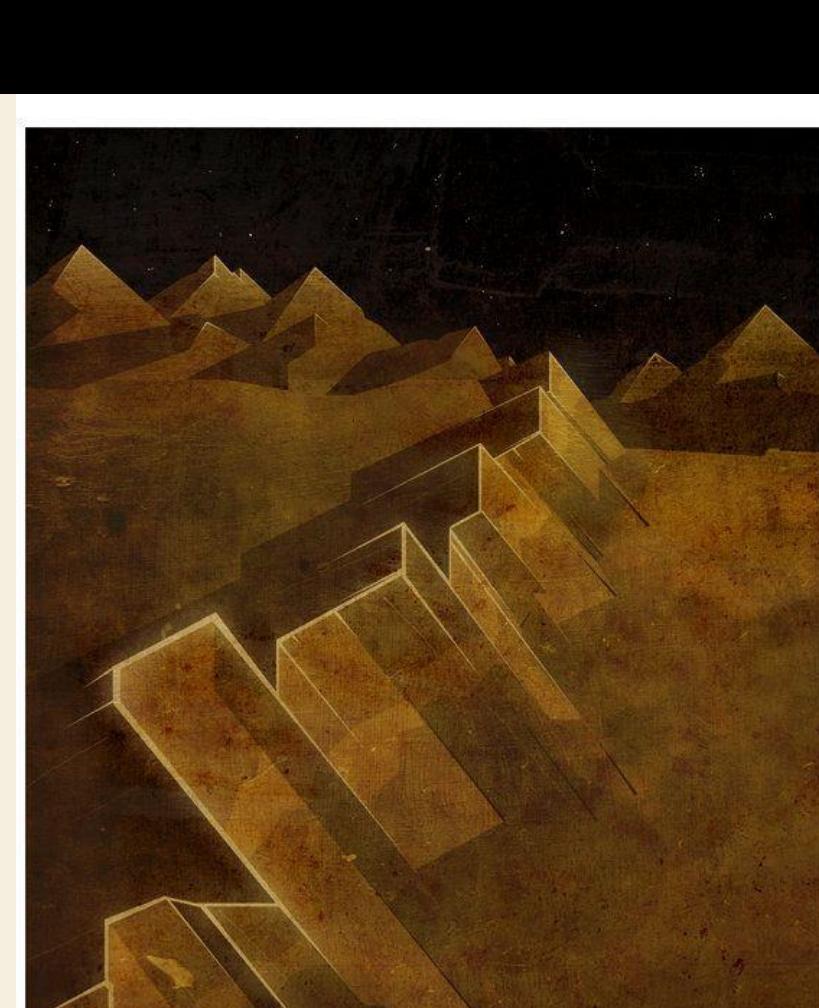
Moons

Europa Clipper
Titan Saturn System
Mission



CALORIS BASIN

MERCURY



RAMEAU CRATER

MERCURY

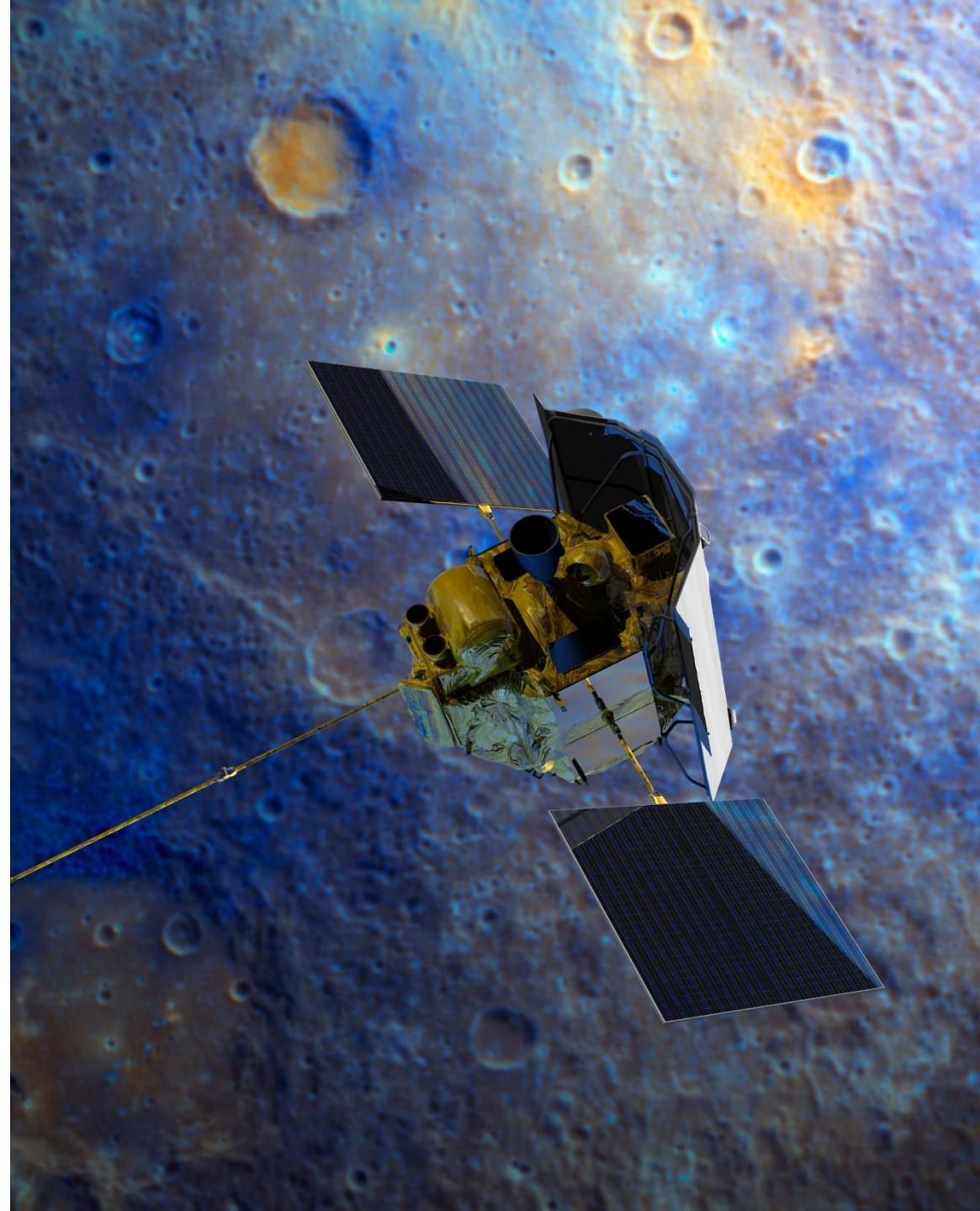
MESSENGER

Mercury Orbiter

Launch 2004

Goals

Study Mercury's chemical composition, geology, and magnetic field



BepiColombo

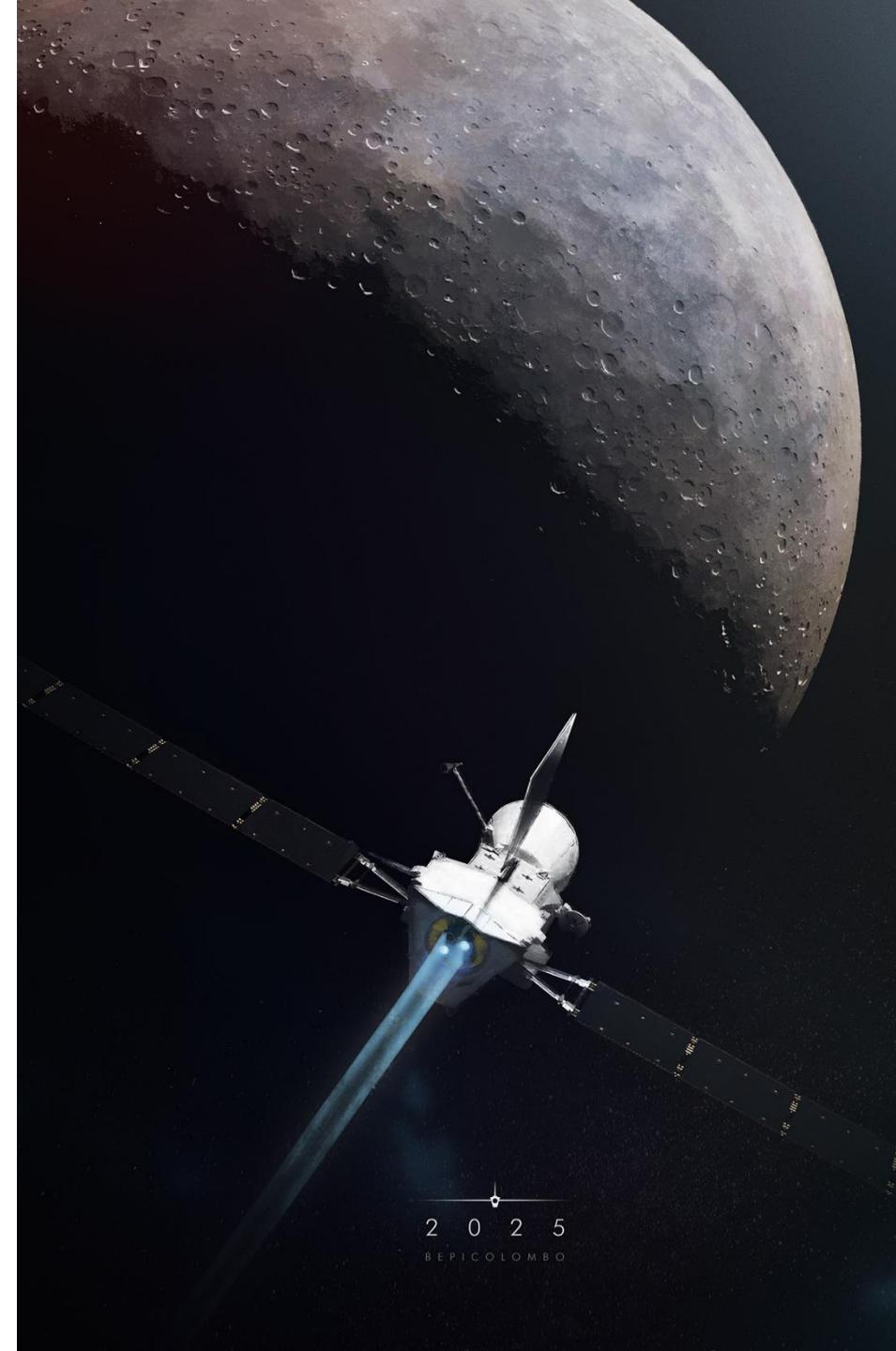
Mercury Orbiters

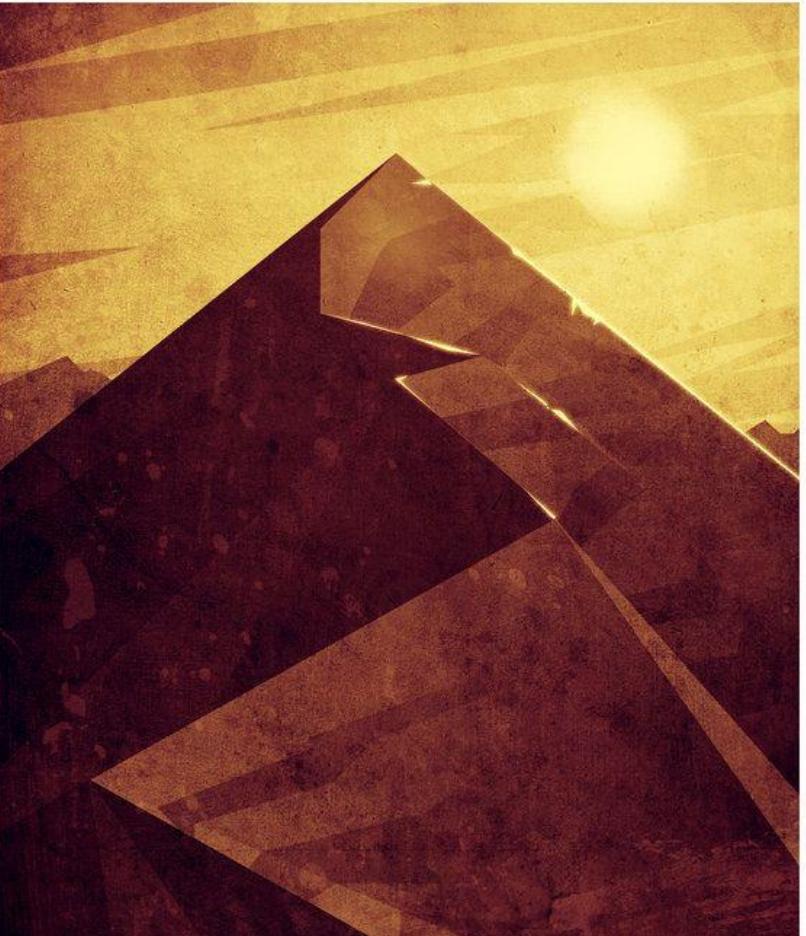
Two satellites

Launch 2018

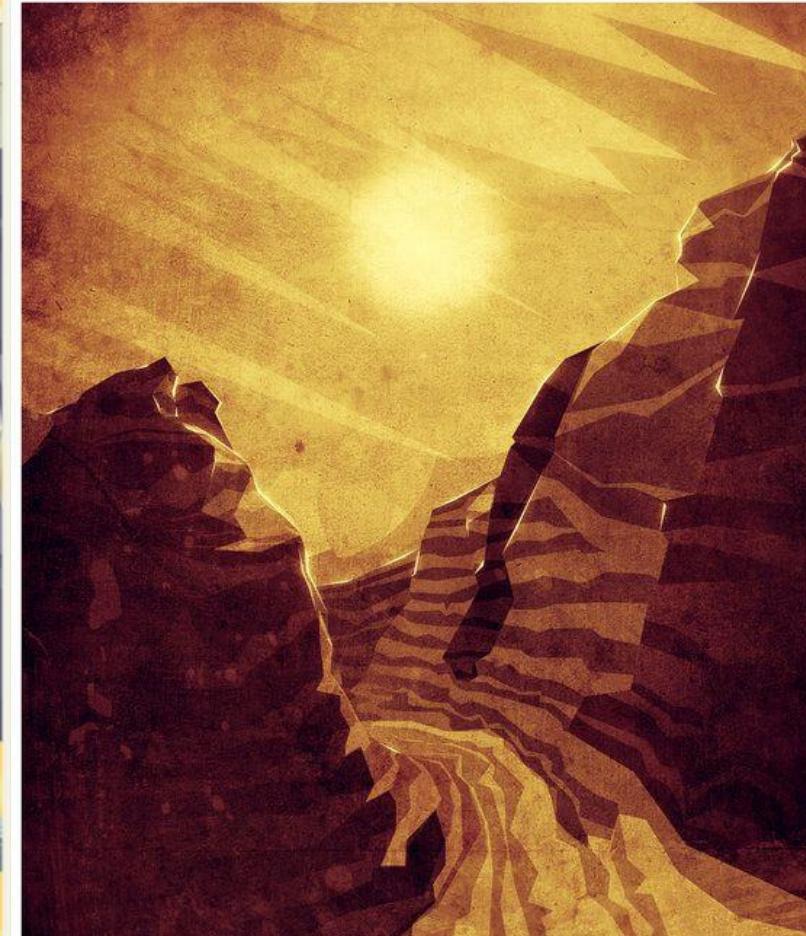
Goals

Study Mercury's interior,
surface, magnetic field, and
magnetosphere





MAXWELL MONTES
VENUS



ARTEMIS CHASMA
VENUS

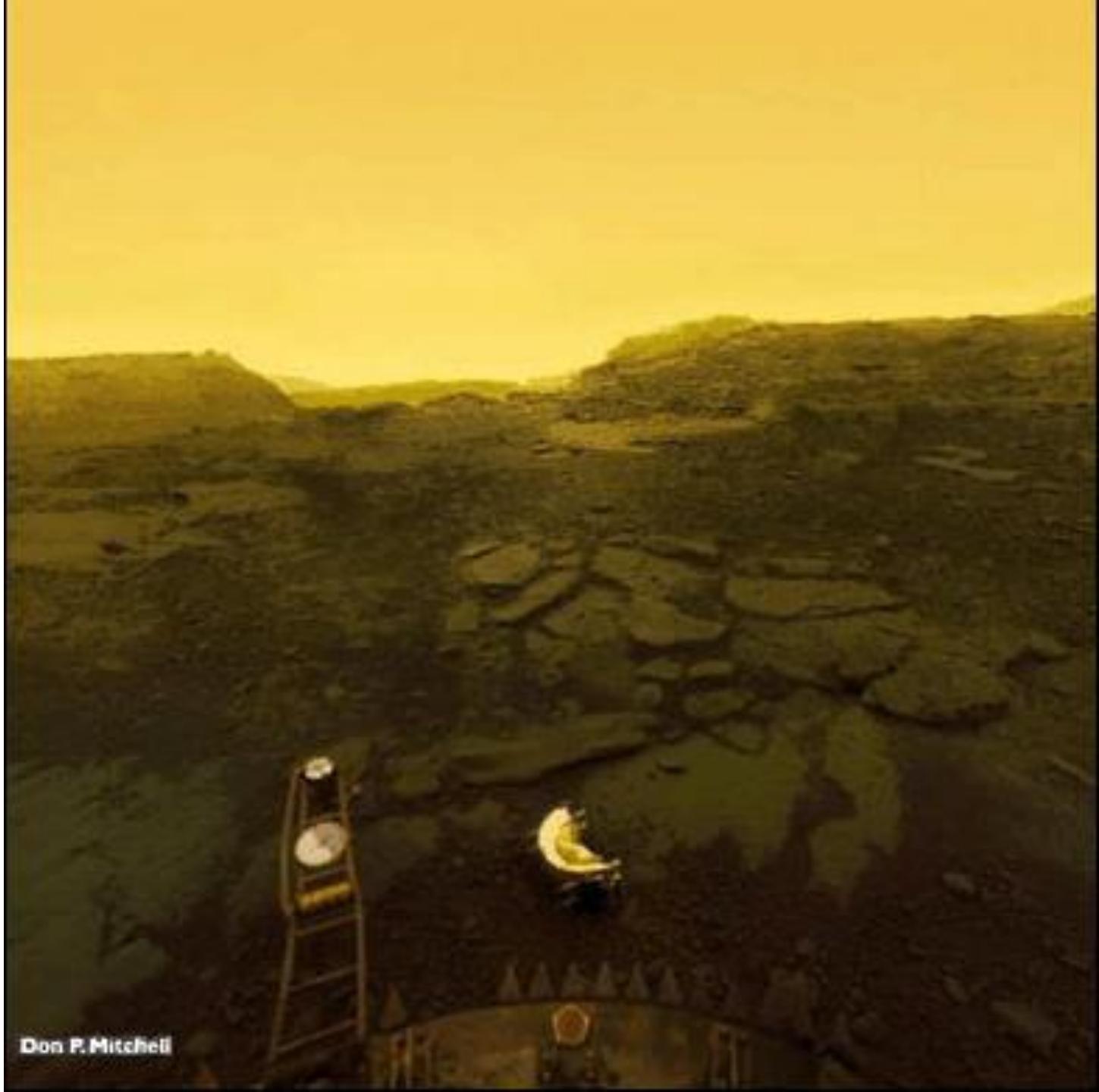
Venera

Venus Landers

Launch 1961 – 1984

Goals

Study the atmosphere and
safely land on the surface



Don P. Mitchell

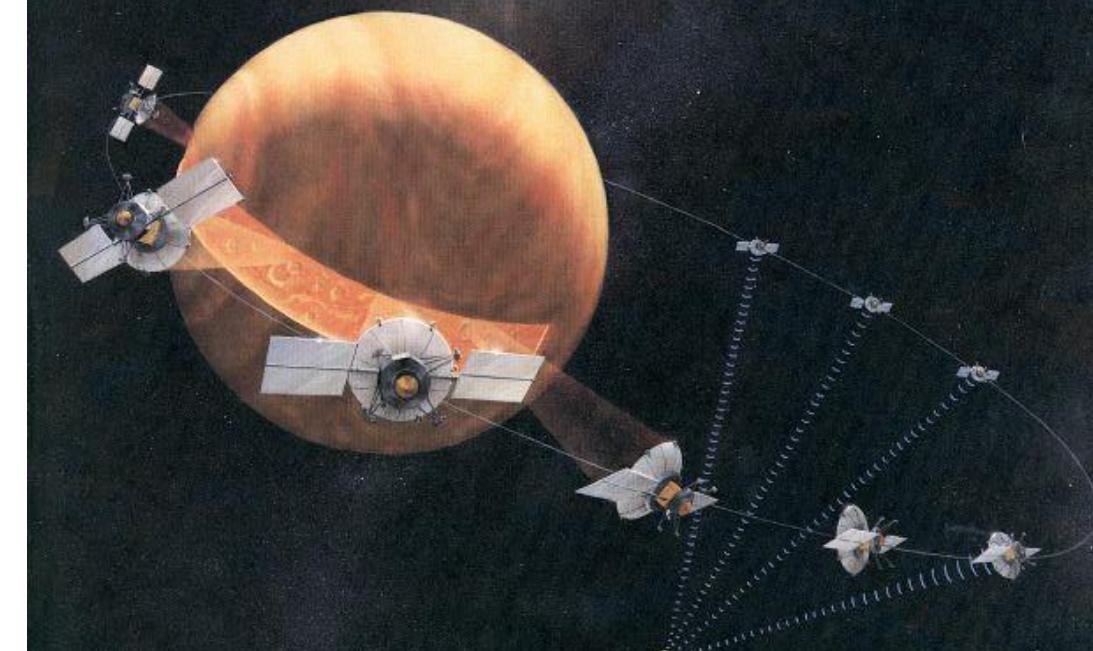
Magellan

Venus Surveyor

Launch 1989

Goals

Map the surface of Venus



SUMMIT

OLYMPUS MONS

The solar system's highest peak



| MARS COLONIZATION AND TOURISM ASSOC. |



DISCOVER

VALLES MARINERIS

LAND OF MARTIAN CHASMS AND CRATERS



| MARS COLONIZATION AND TOURISM ASSOC. |

Viking Program

Mars Orbiters / Landers

Viking 1 & 2

Launch 1975

Goals

Study the atmosphere and surface; search for evidence of life



Mars Exploration Rover

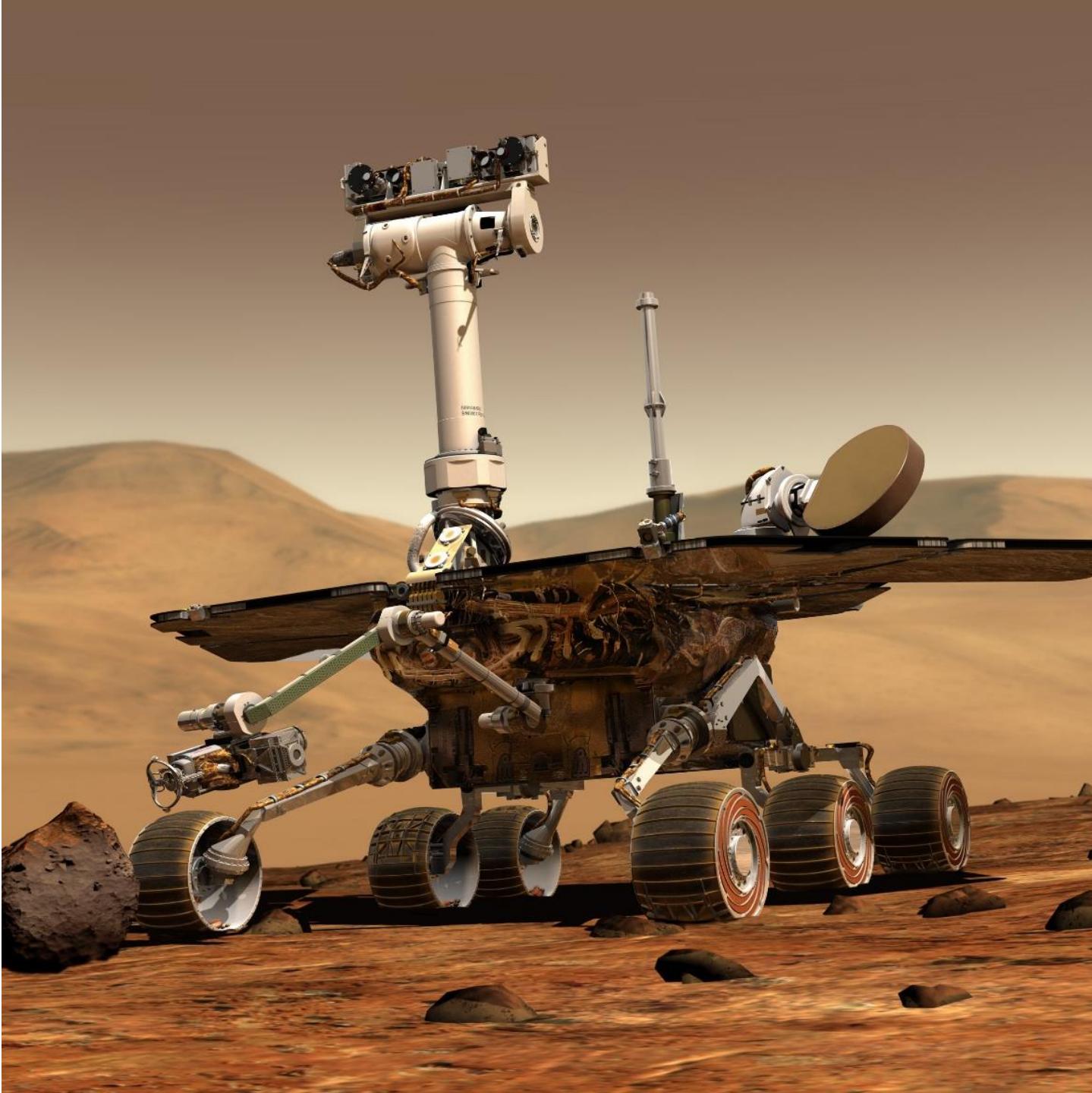
Mars Rovers

Spirit & Opportunity

Launch 2003

Goals

Study past water activity by examining rocks and soils



Curiosity

Mars Rover

Launch 2011

Goals

Investigate conditions for life
on Mars, both past and
present





Future Mars Missions

Landers

Insight (NASA, land 26 Nov 2018)

Rovers

ExoMars 2020 (ESA + Russia)
Mars 2020 (NASA)

Orbiters

HOPE (United Arab Emirates)
China, India
Landers, Rovers (?)

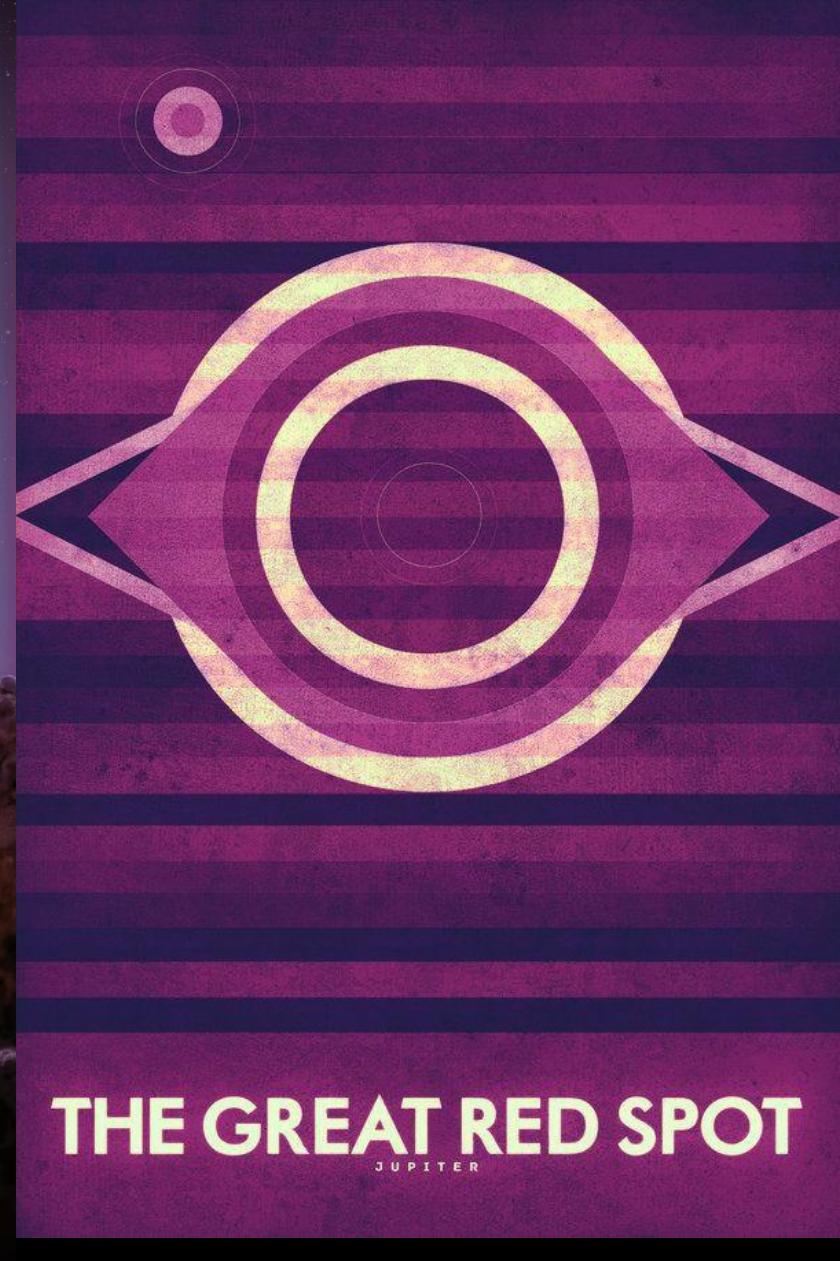
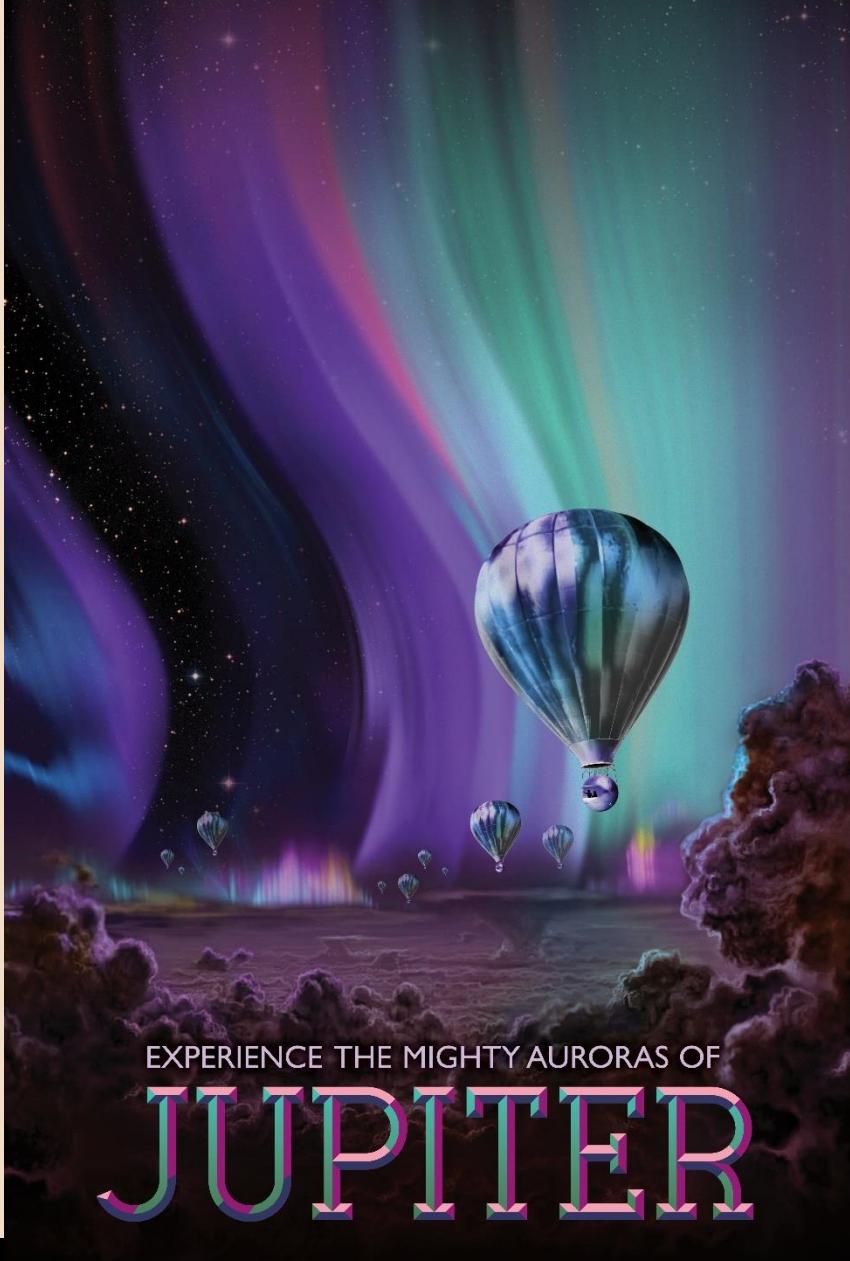
"Giant, whirling and fierce"



JUPITER

— AND ITS ICY MOONS —

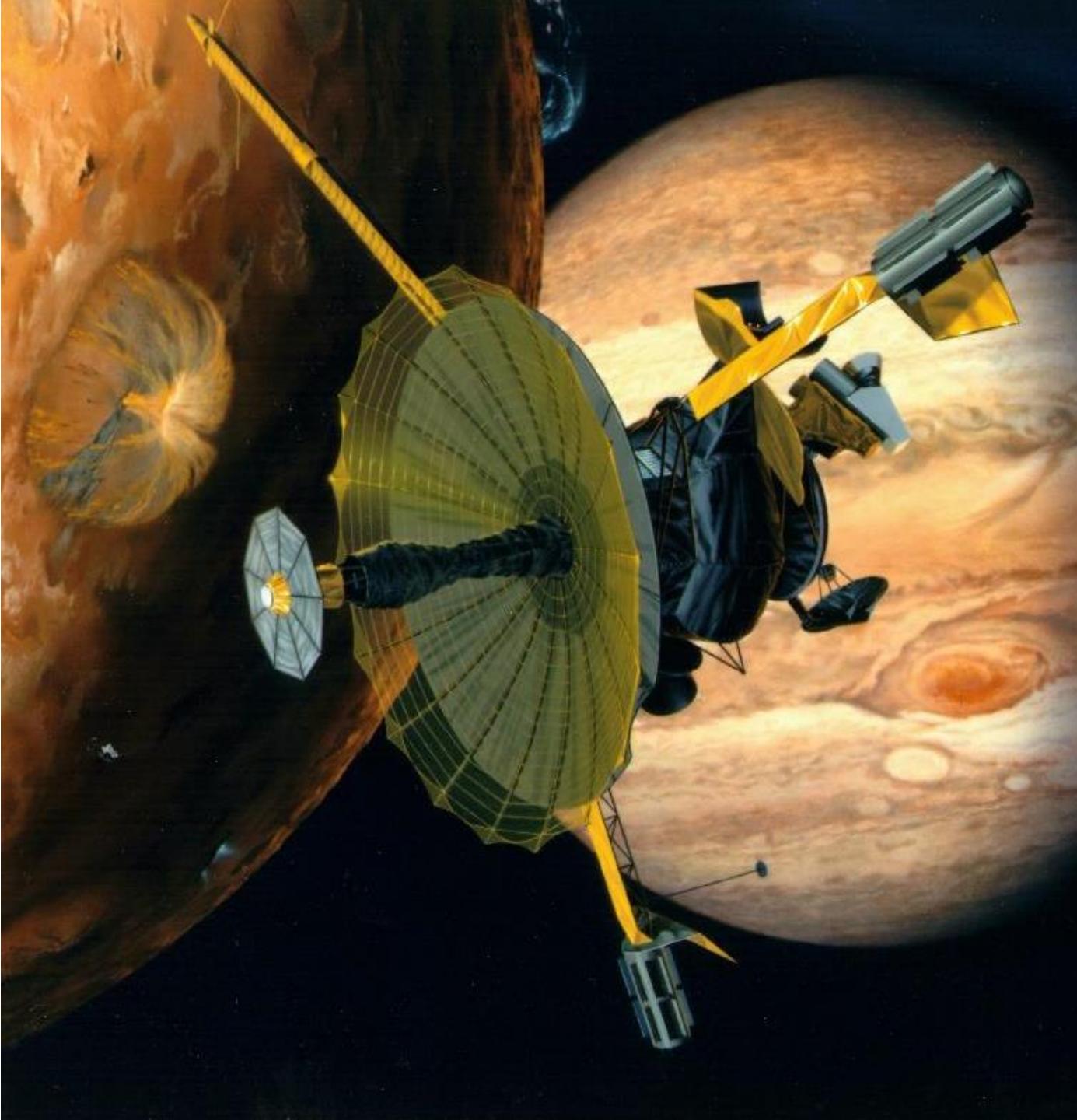
[Narrated By Olly Mann]



Galileo

Jupiter Orbiter
Launch 1989

Goals
Study Jupiter and its moons



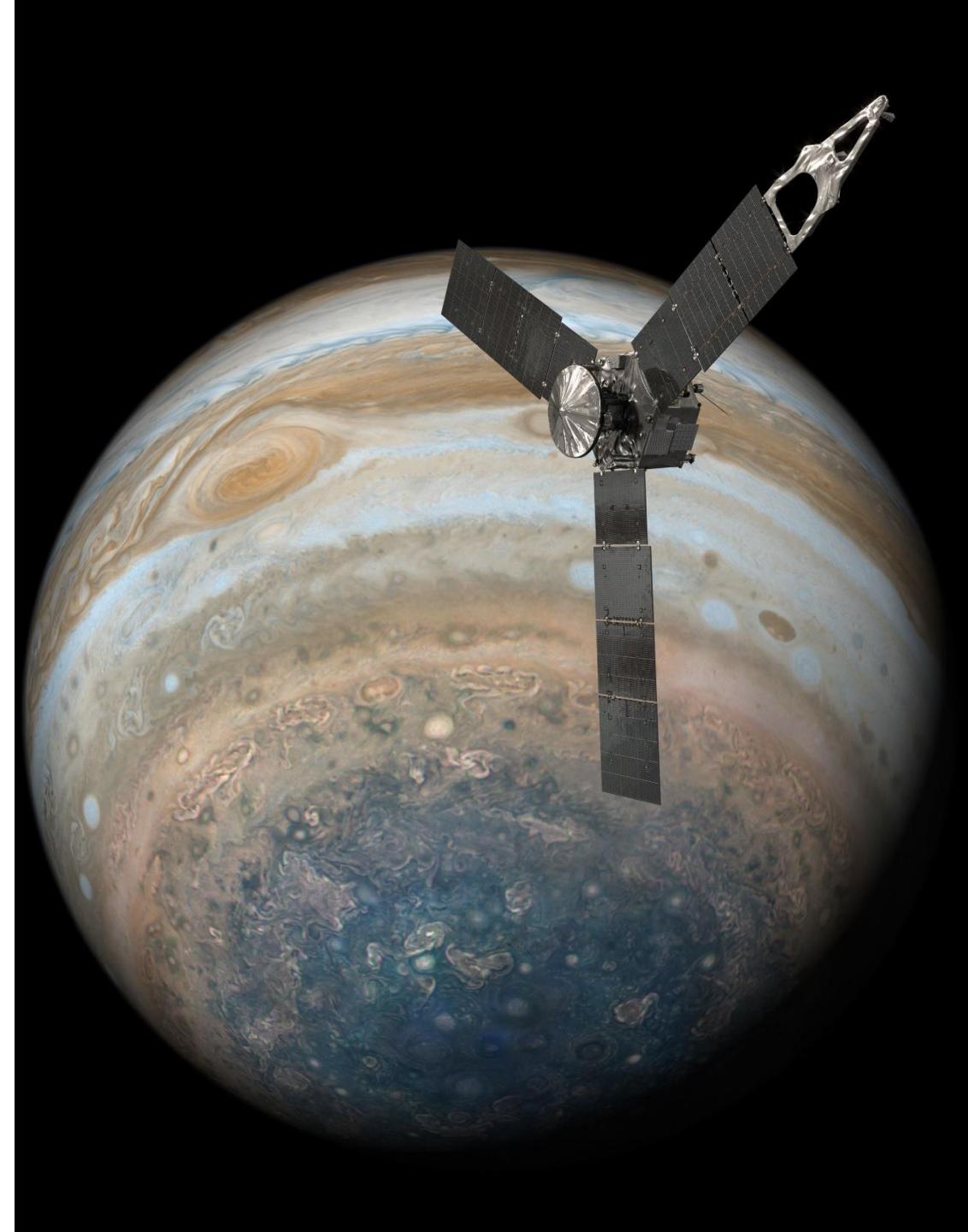
Juno

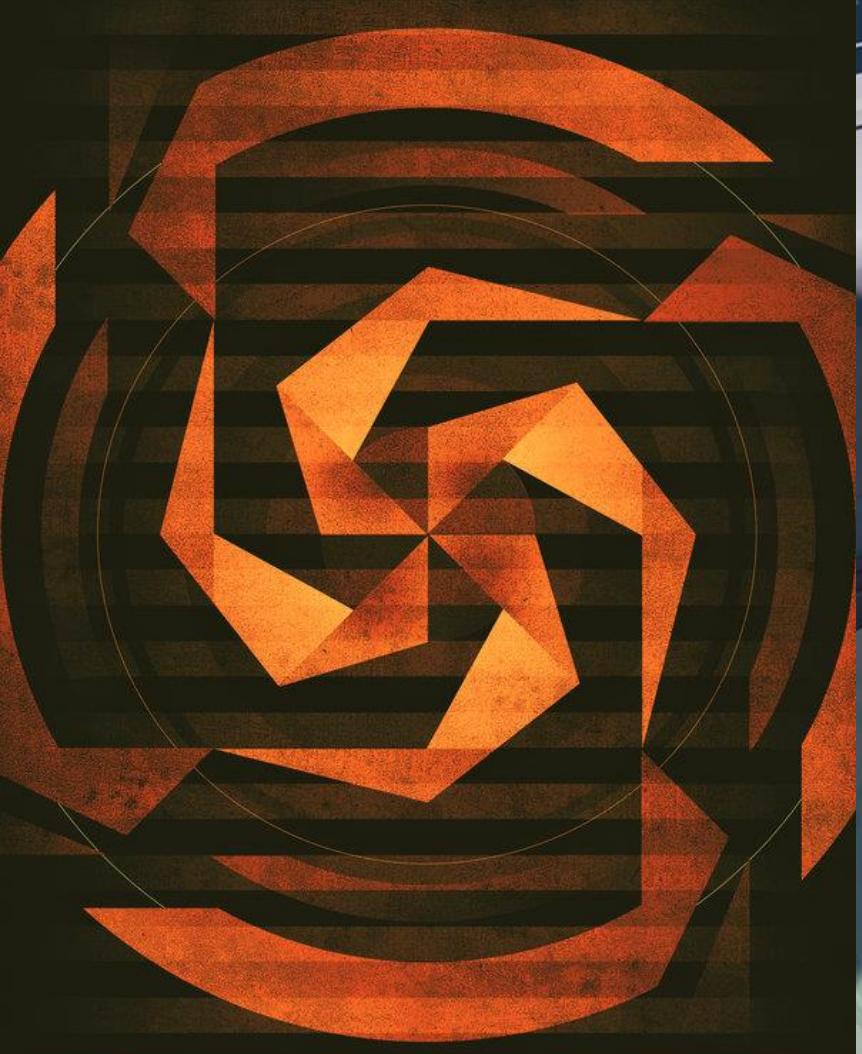
Jupiter Orbiter

Launch 2011

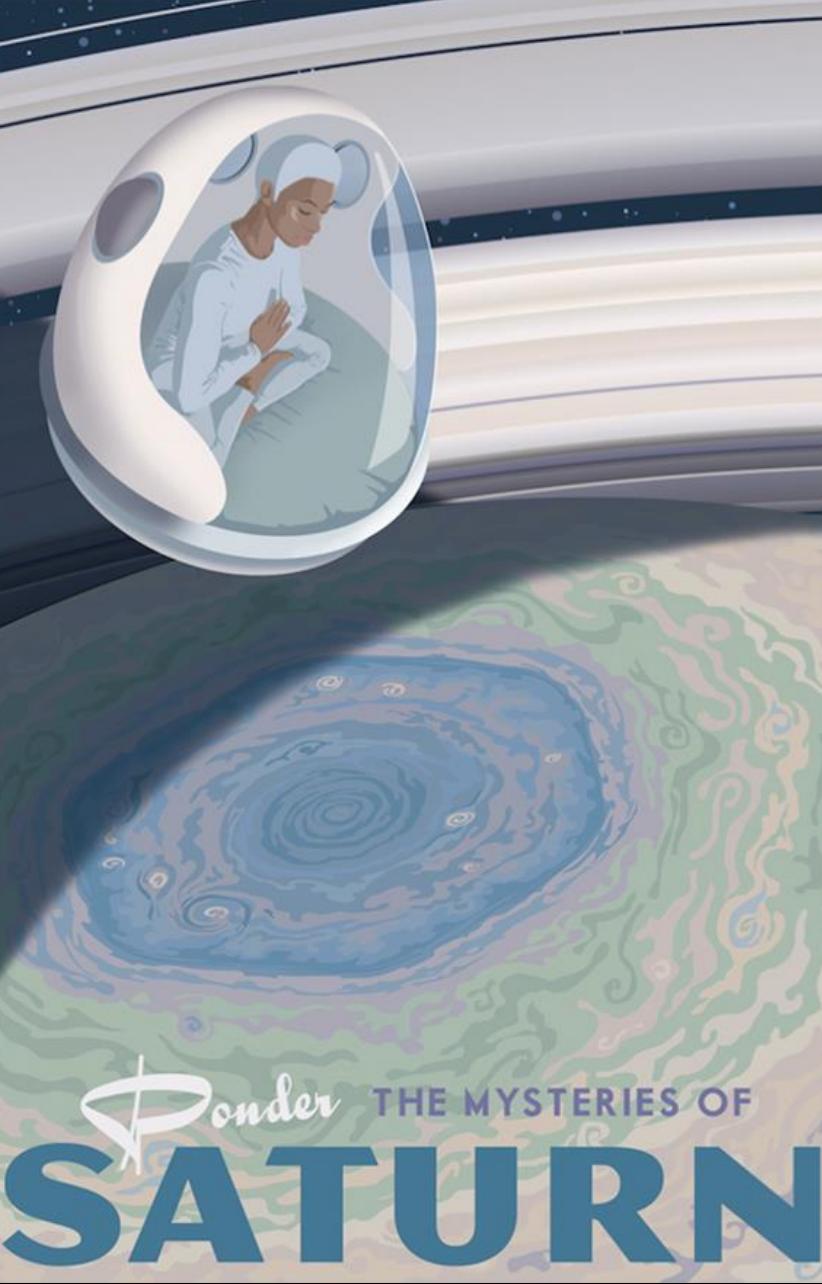
Goals

Study the dynamics and
composition of Jupiter

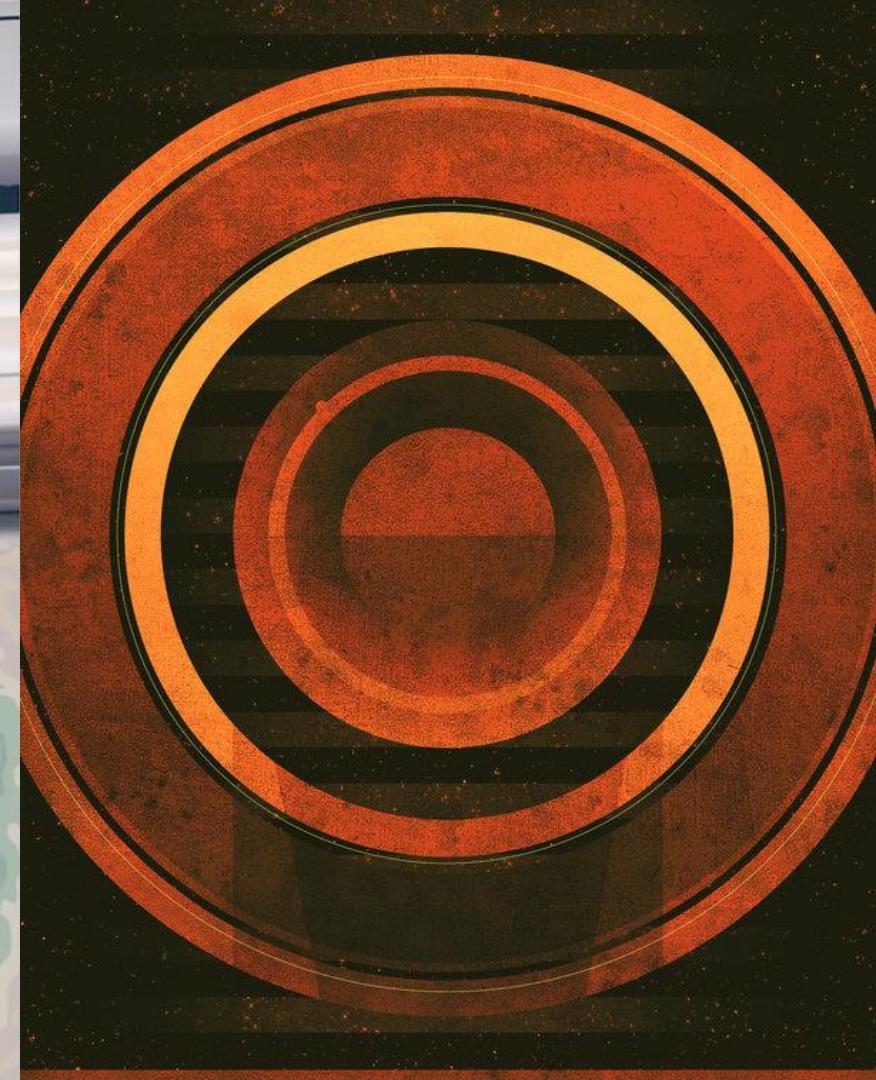




THE ROSE
SATURN



Ponder THE MYSTERIES OF
SATURN



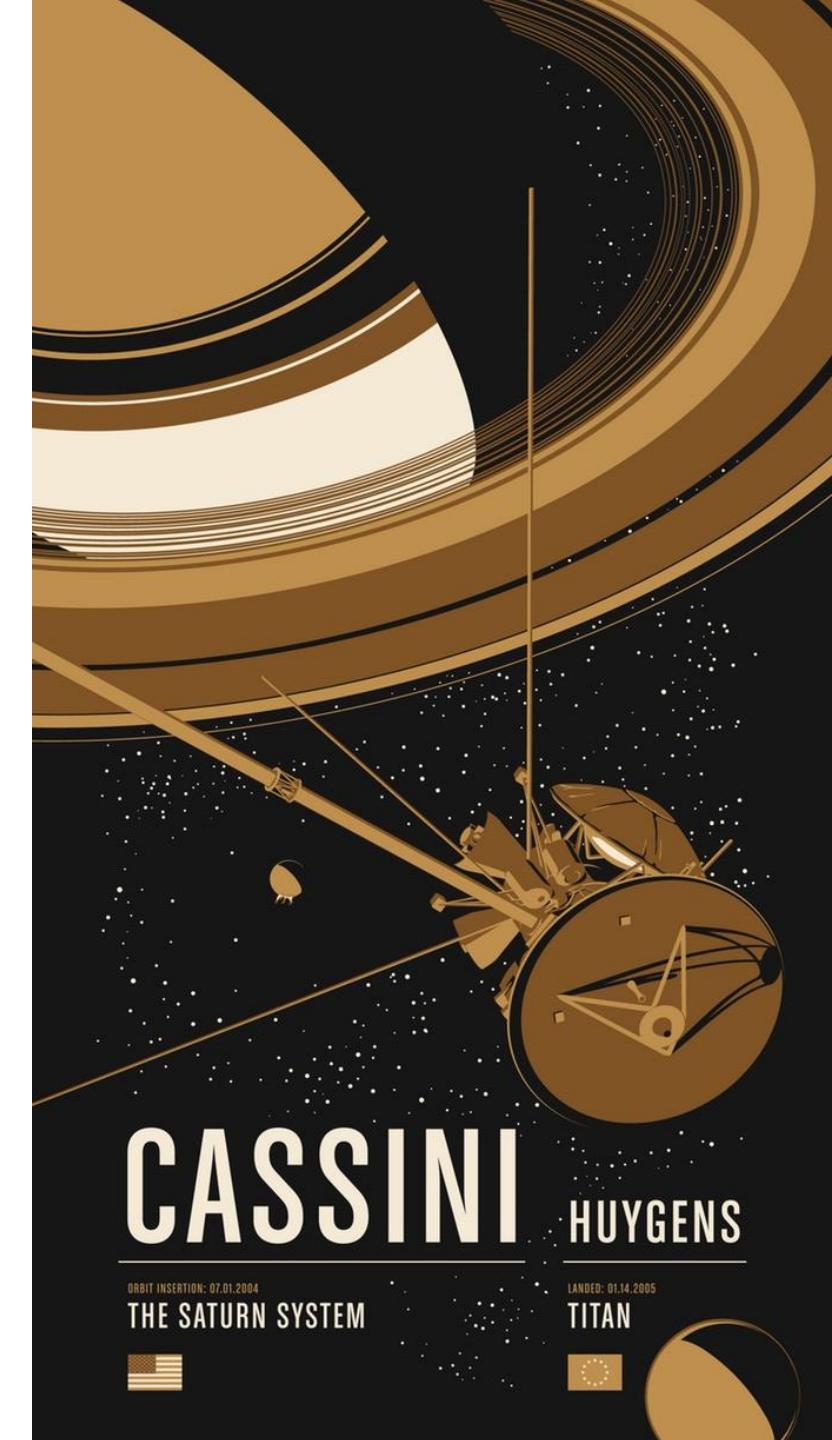
THE RINGS
SATURN

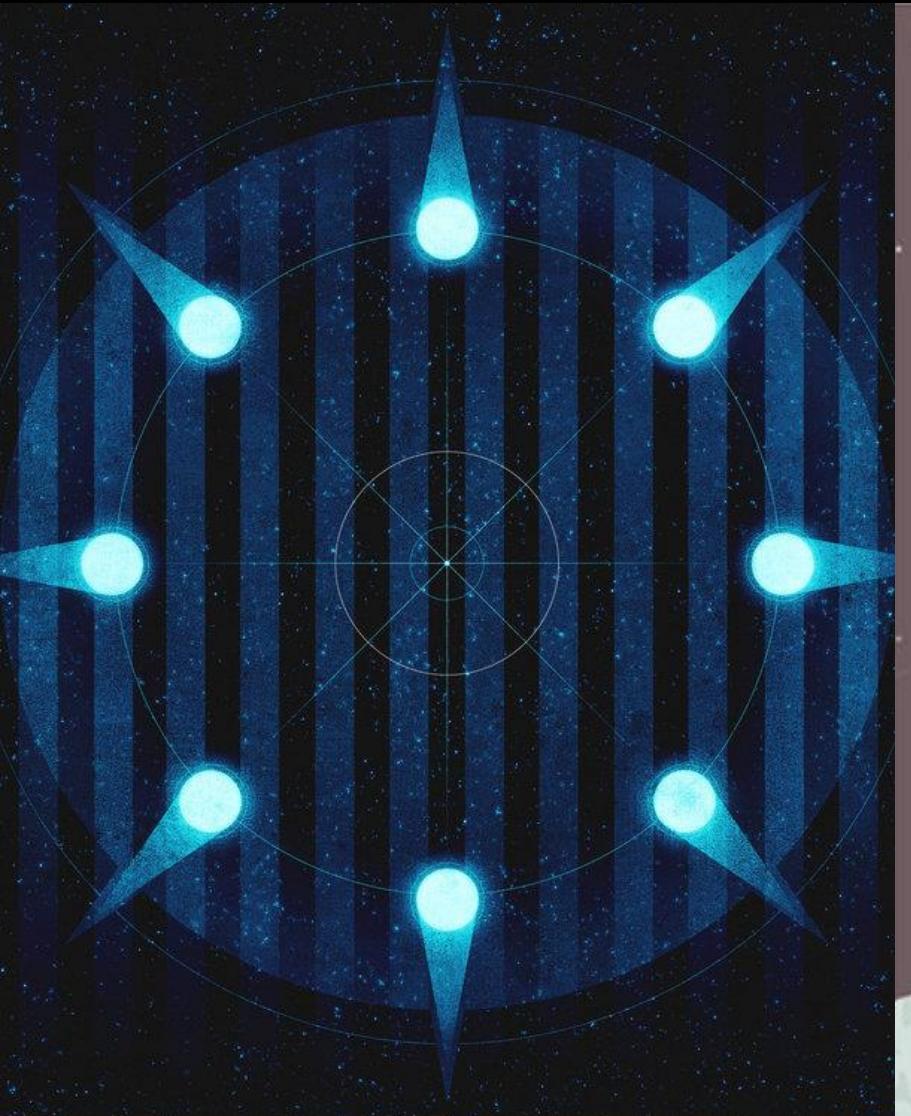
Cassini-Huygens

Saturn Orbiter / Titan Lander
Launch 1997

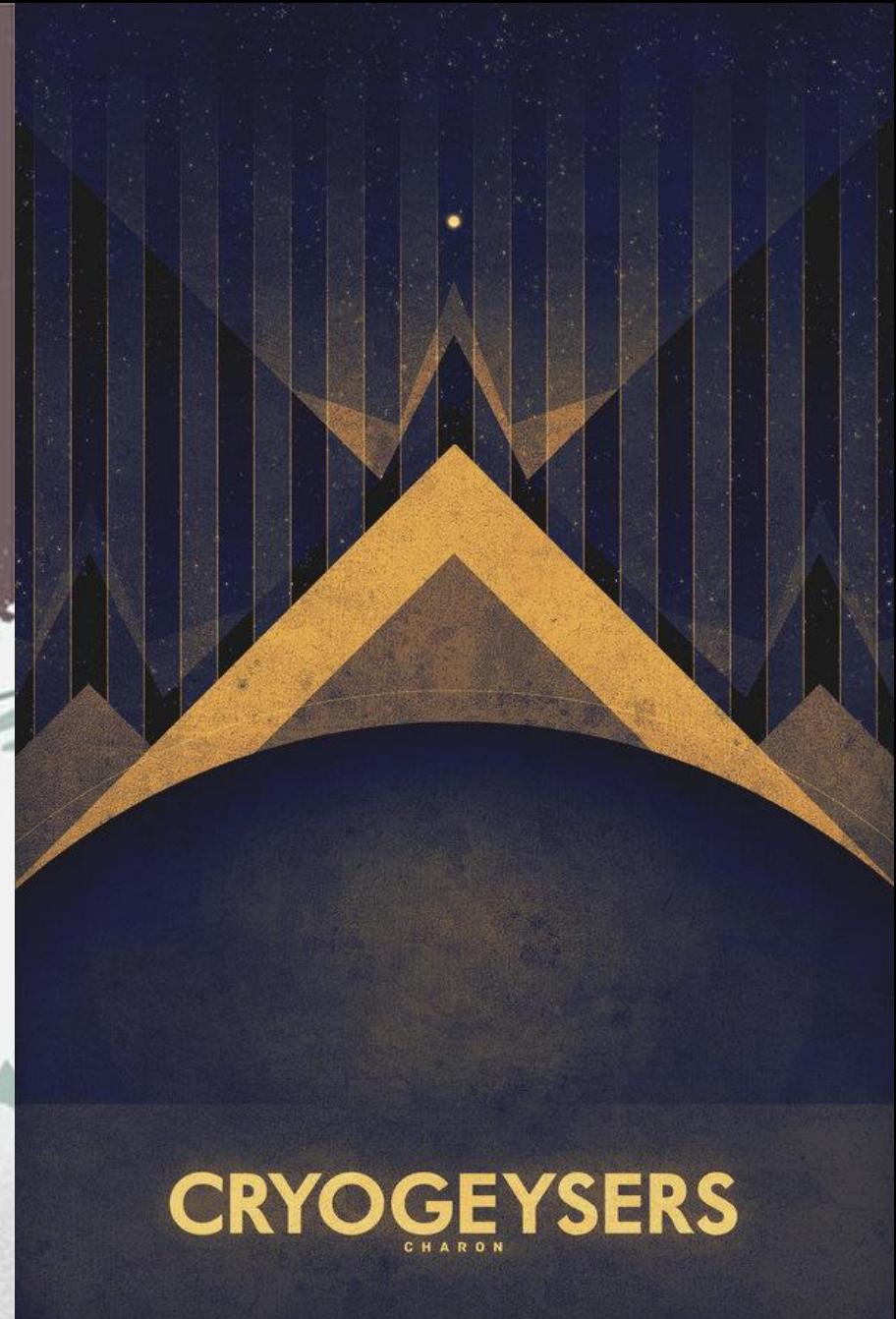
Goals

Study Saturn and its moons





KUIPER BELT
SOL SYSTEM



CRYOGEYSERS
CHARON

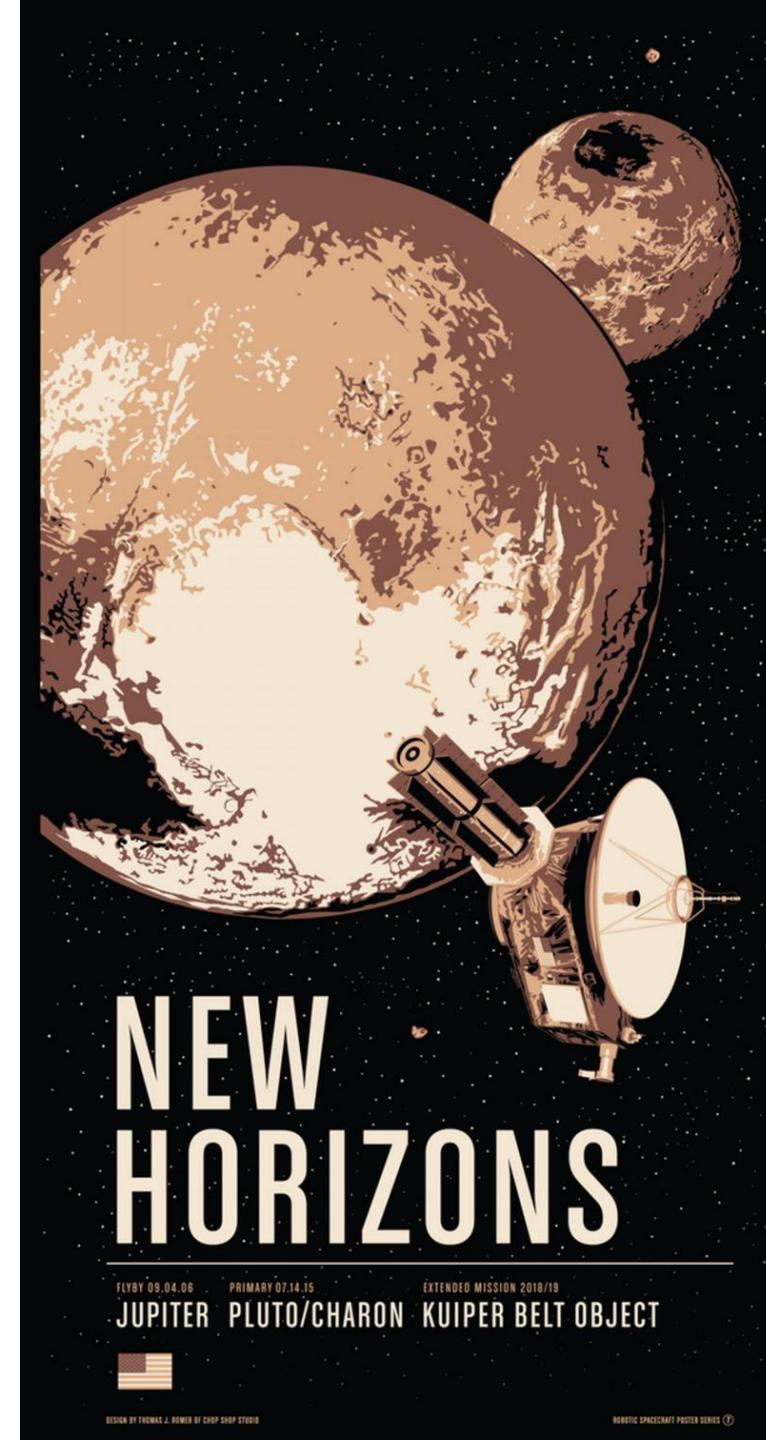
New Horizons

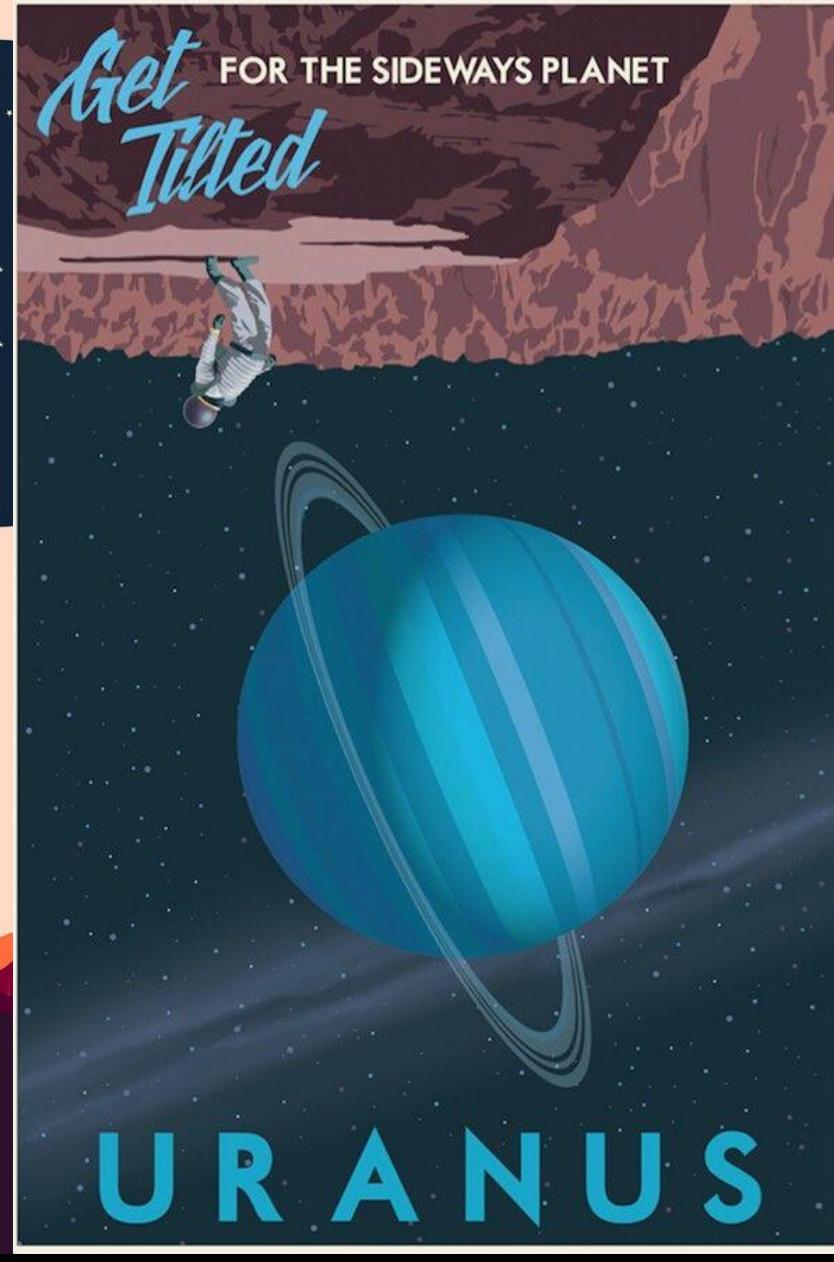
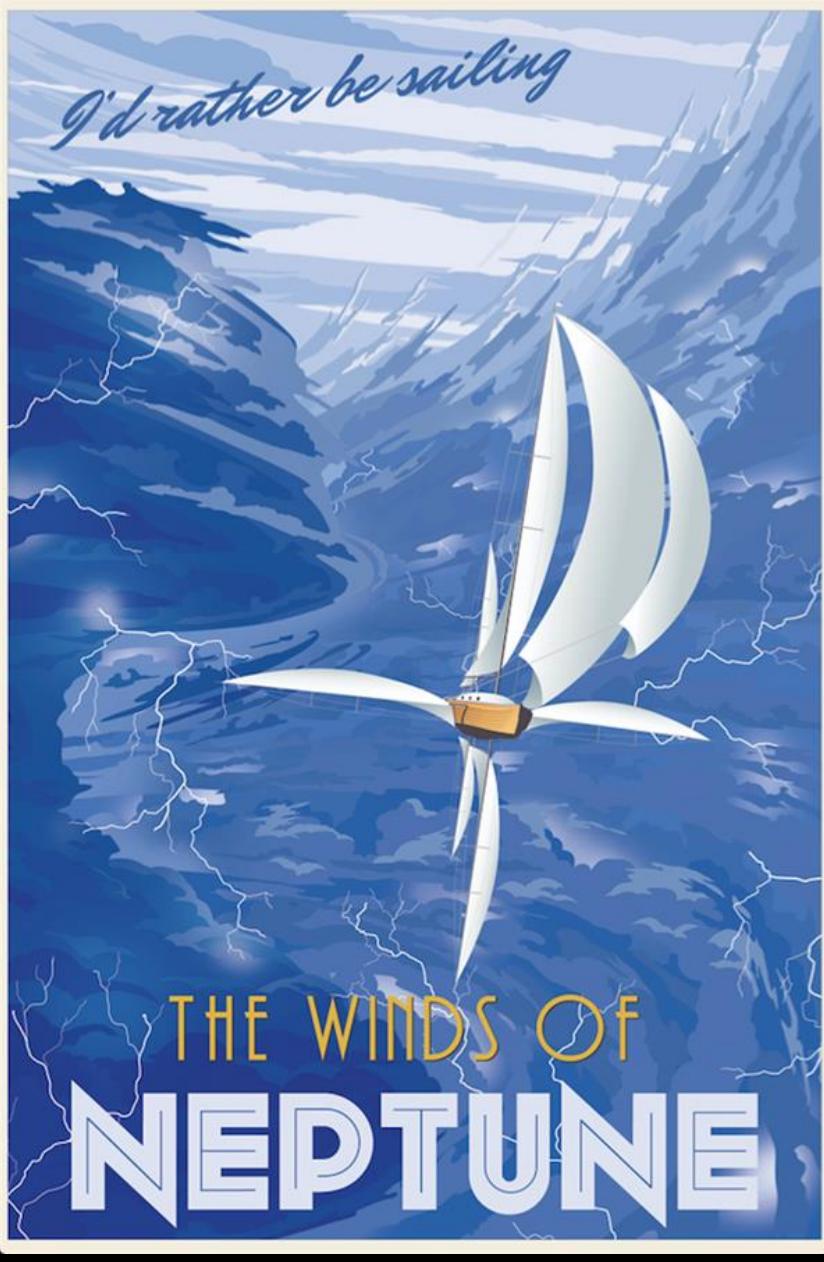
Pluto Flyby

Launch 2006

Goals

Perform a close-up study of
Pluto and the Kuiper Belt





Mariner Program

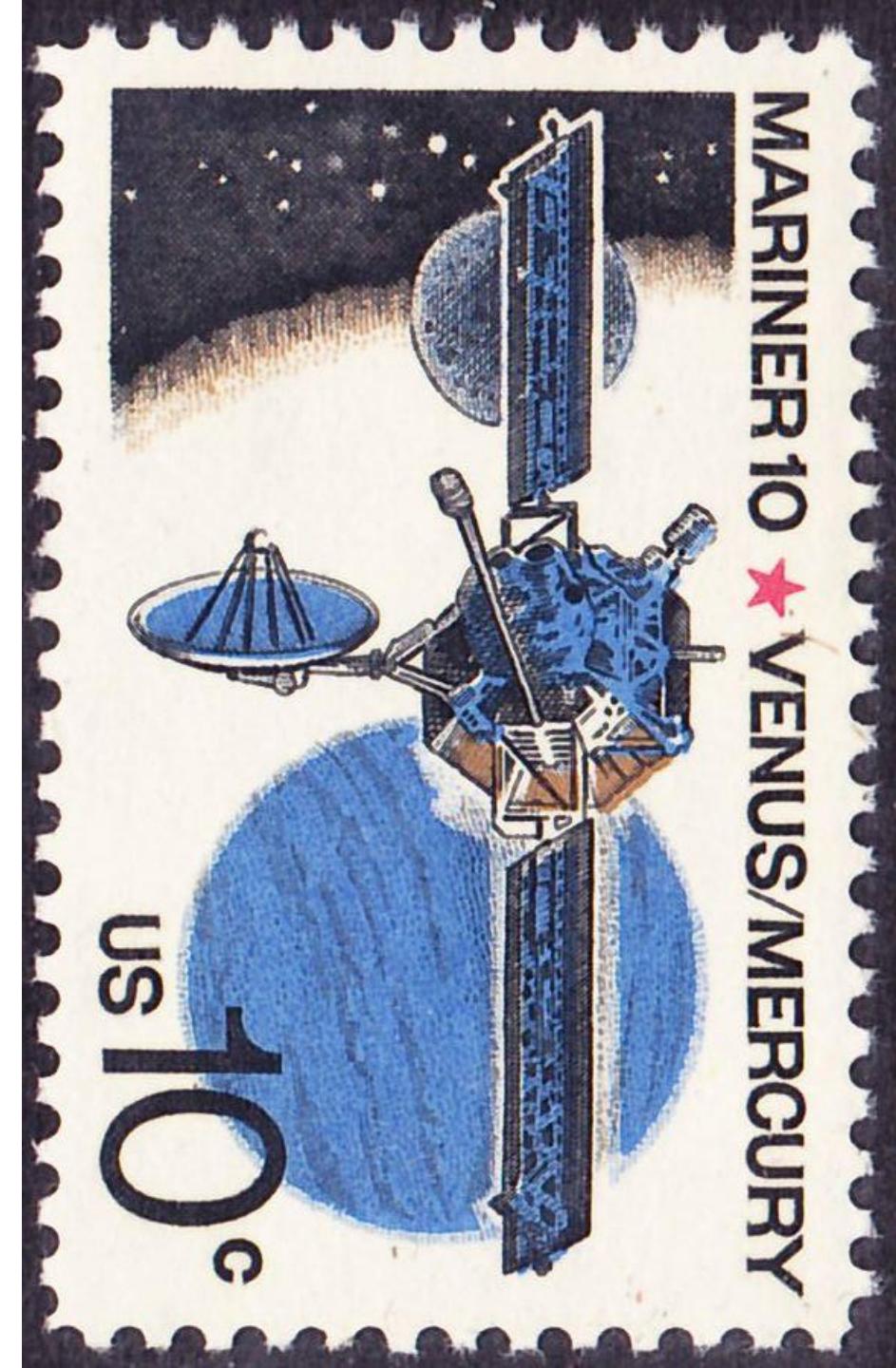
Inner Solar System Explorers

10 missions

Launch 1962 – 1973

Goals

Study the terrestrial planets
Mercury, Venus, and Mars





Voyager Program

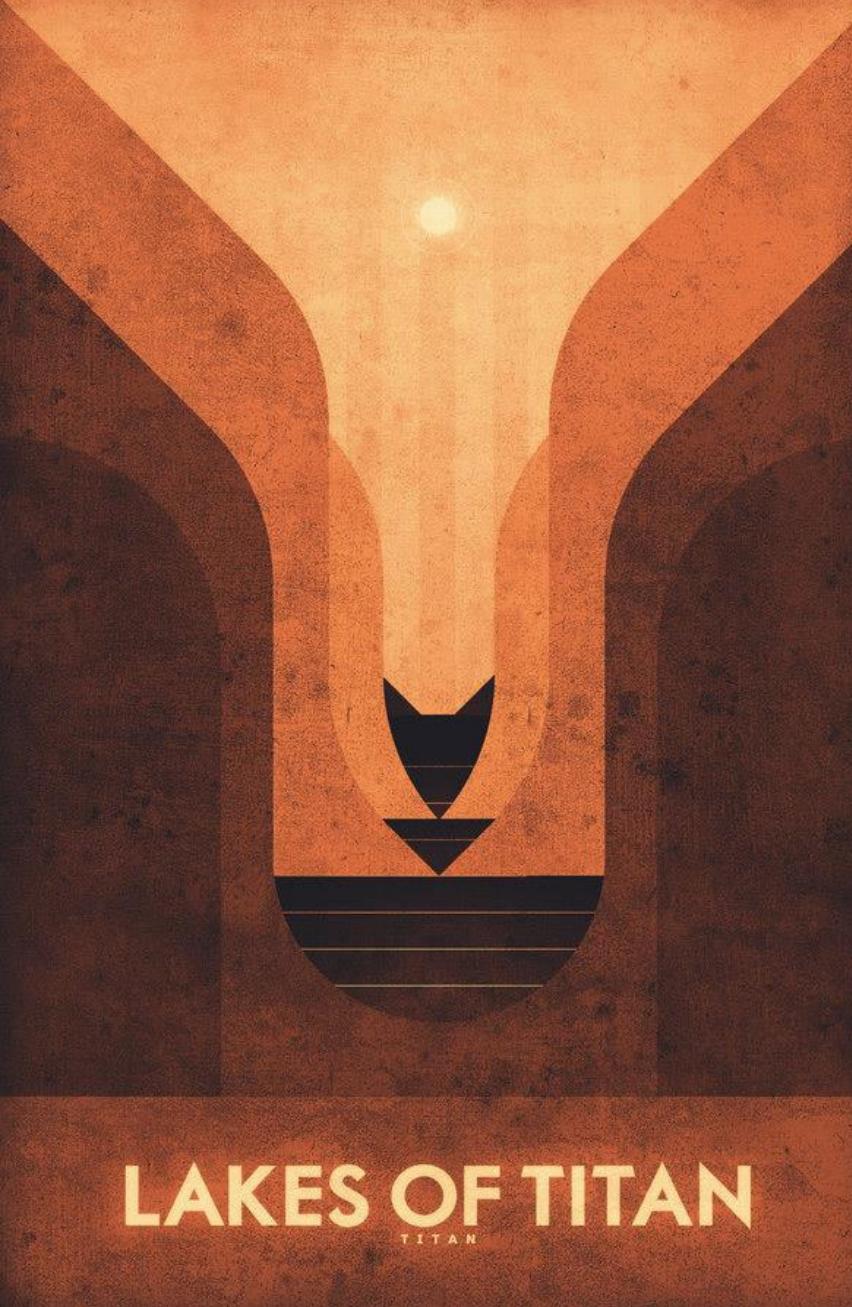
Deep Space Explorers

Voyager 1 & 2

Launch 1977

Goals

Study the outer solar system



Europa Clipper

Jupiter Orbiter

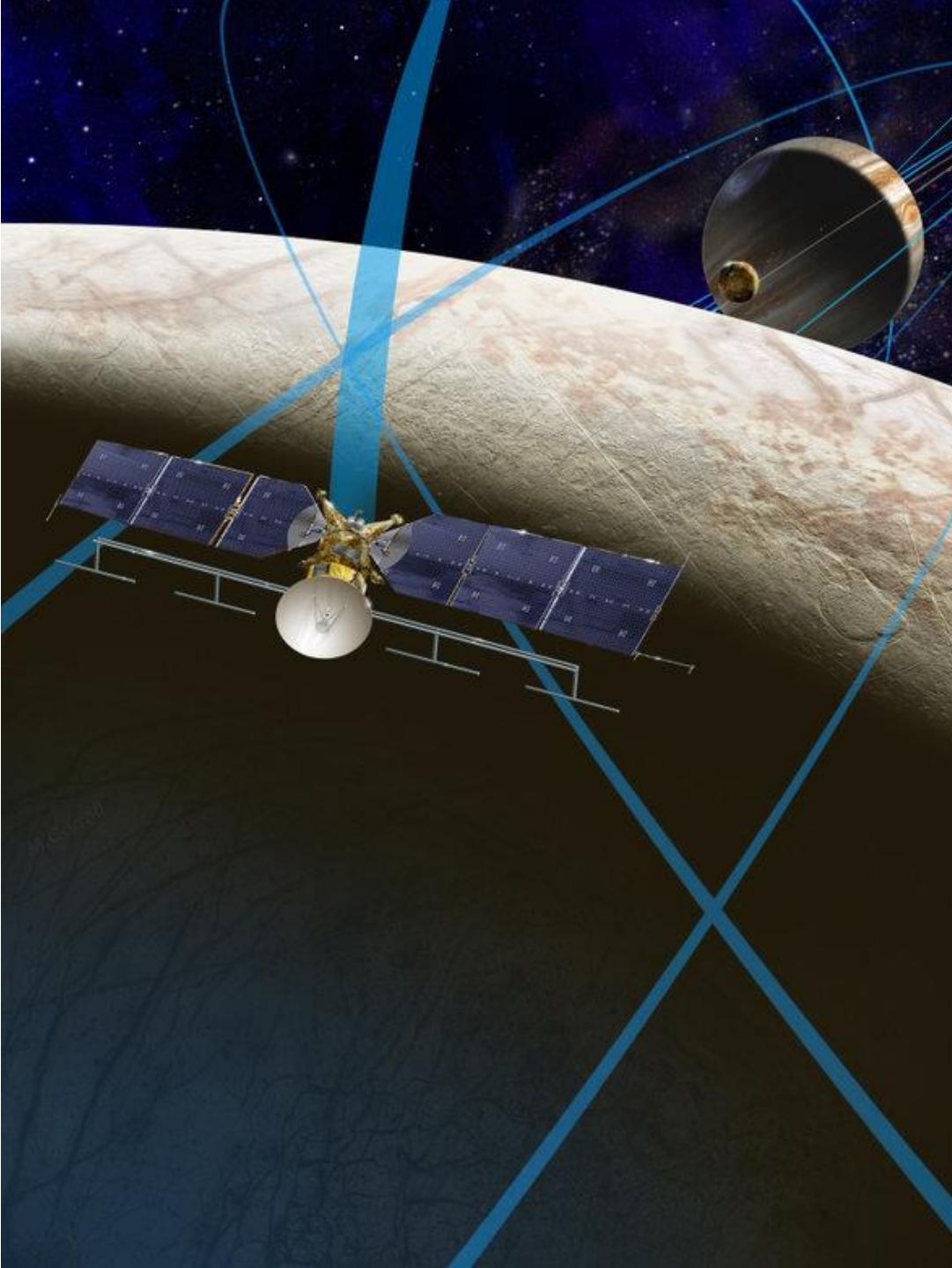
Europa Flybys

Launch 2022 – 2025

Goals

Study the water below the surface and its interactions with the surface ice.

Follow up mission with lander (*Europa Lander*)?



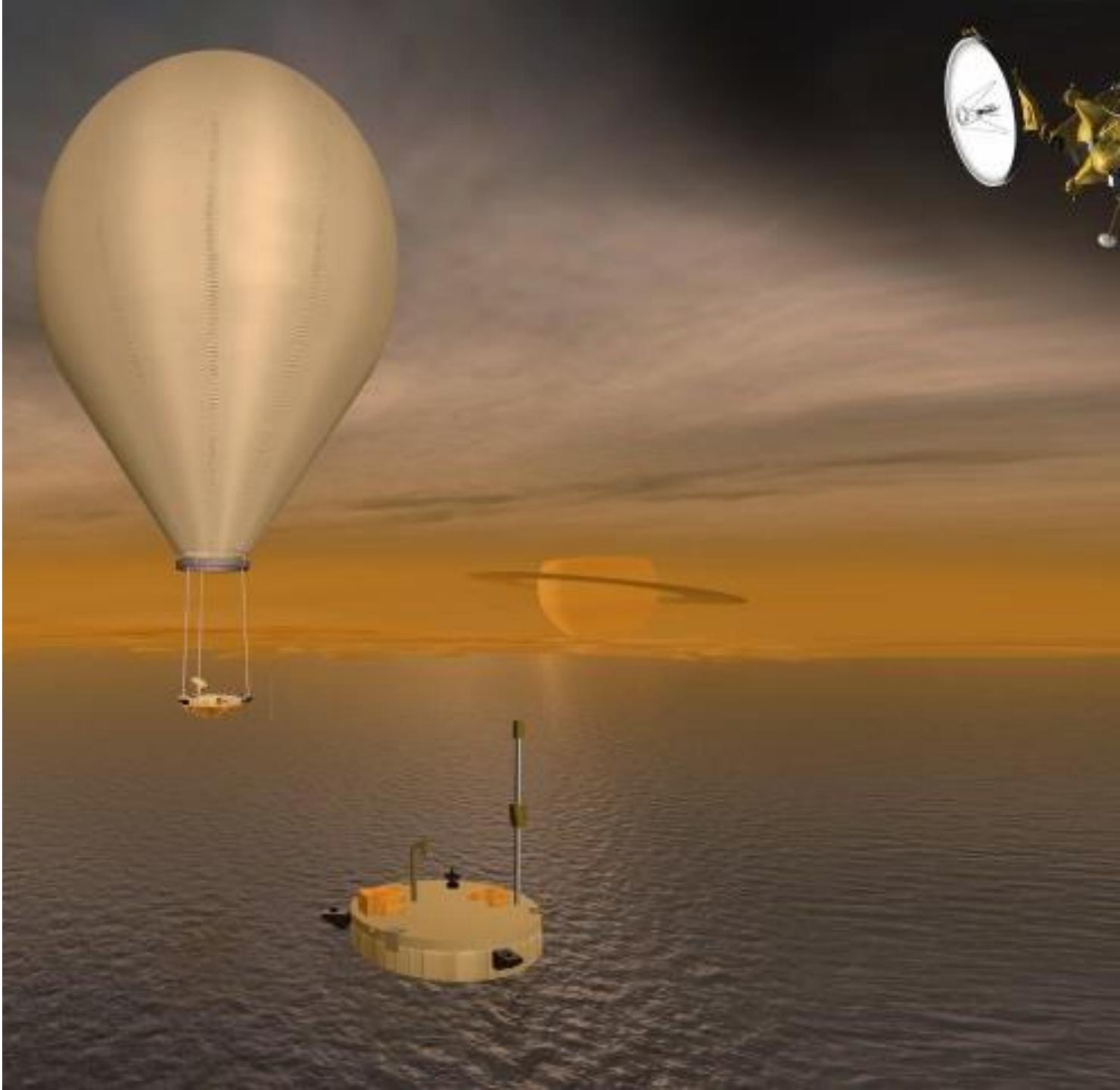
Titan Saturn System Mission

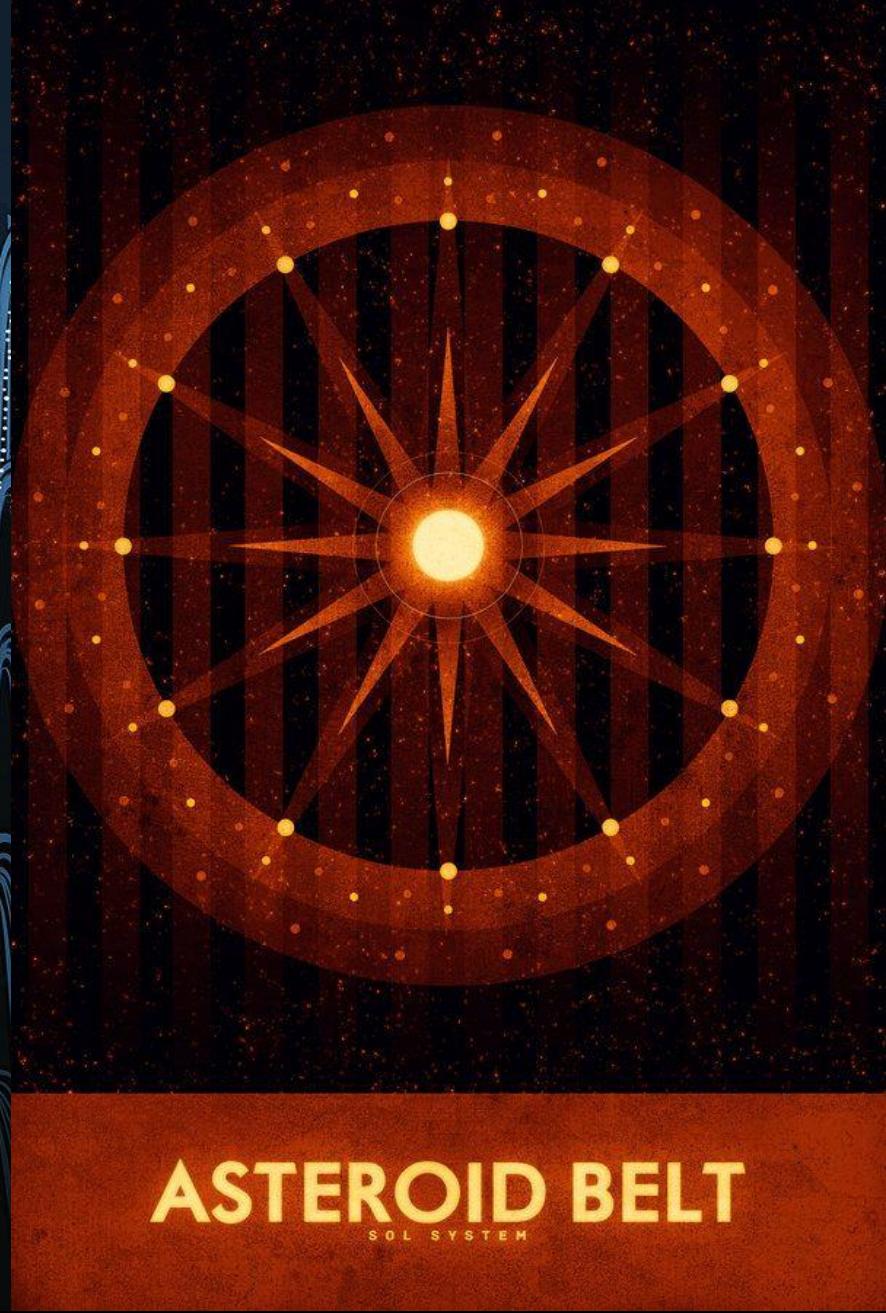
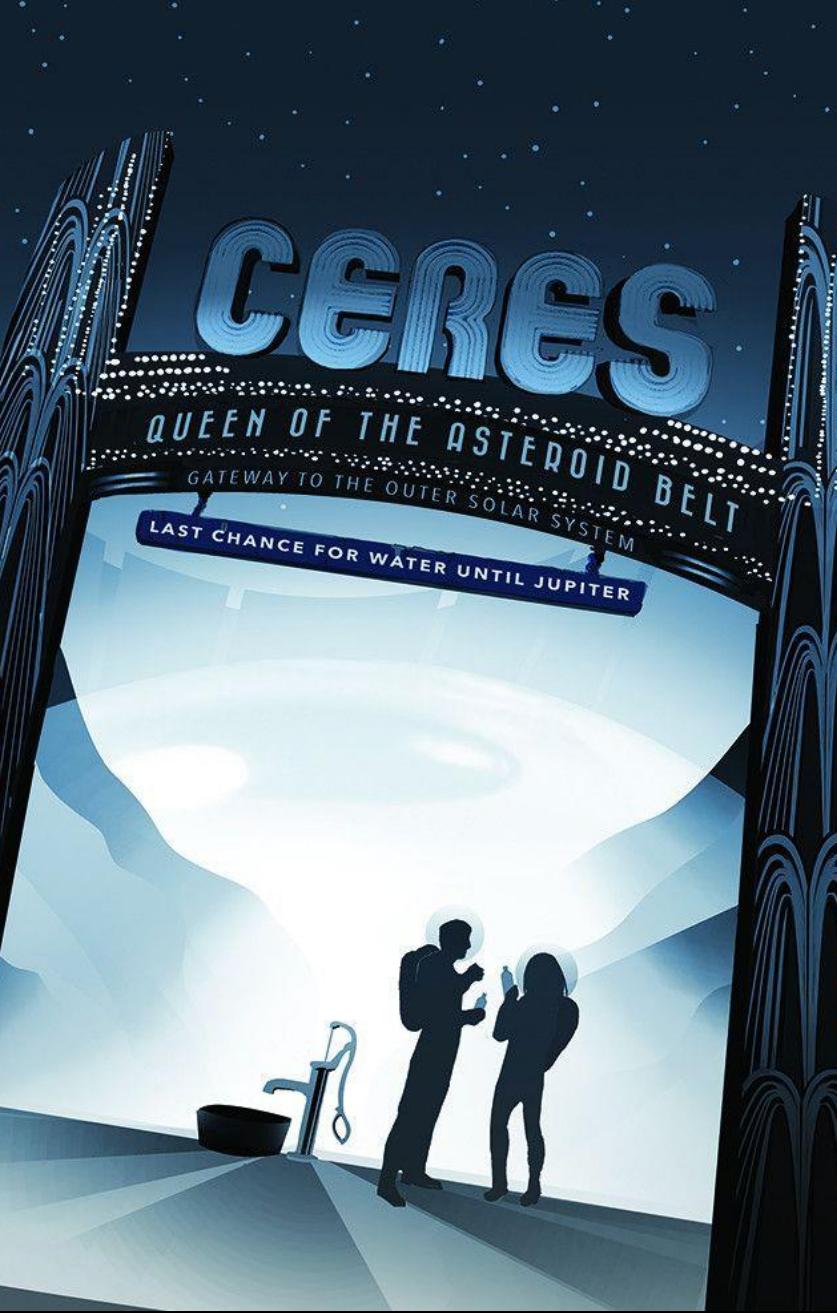
Titan Explorer

Orbiter, Lake Lander, Balloon
Proposal Phase

Goals

Explore the Titan system and
its astrobiological potential





Rosetta

Comet Chaser

Orbiter and Lander

Launch 2004

Goals

Improve our understanding
of the early solar system



Deep Impact

Comet Crasher

Launch 2005

Goals

Study the interior composition
of a comet

