

BIG STORIES

in

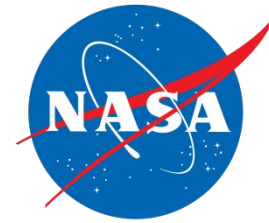
Planetary Science and Heliophysics

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RIP Opportunity



Spirit and Opportunity BY THE NUMBERS

6 YEARS
lifespan

SPRIT

124,838
raw images

4.8 MILES
traveled

30 DEGREES
steepest slope

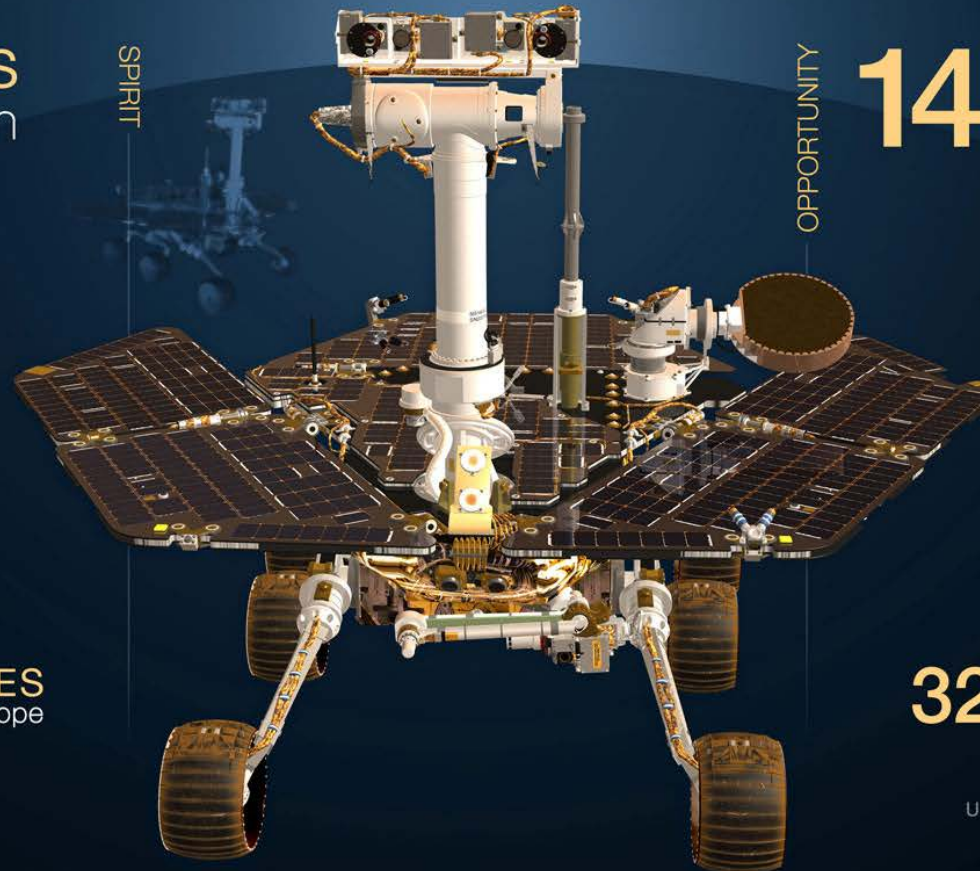
OPPORTUNITY

14+ YEARS
lifespan

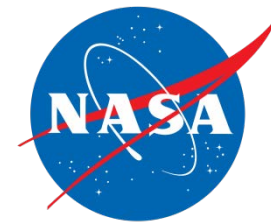
217,594
raw images

28 MILES
traveled

32 DEGREES
steepest slope



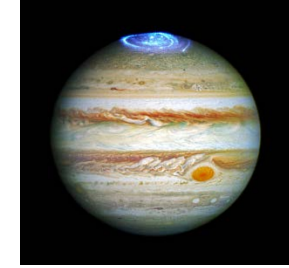
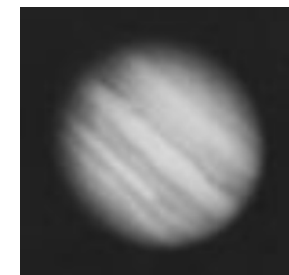
We've Come So Far

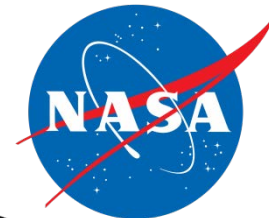


- 1600's Community acceptance of a sun centered "universe".
- 1761 1st accurate distance to the sun, computed – Jerome Lalende
- 1838 1st accurate distance to nearby star (61 Cygni) measured – Friedrich Bessel
- 1800's The sun shines by infalling planetesimals!!
- 1939 The sun shines by fusion reaction (proton-proton reaction) – Hans Bethe
- 1908 "Mars: As the Abode of Life" - Percival Lowell
- 1965 Mars is a dead – 1st successful Mars flyby (Mariner 4)
- 1859 Solar Wind 1st theorized – Richard Carrington
- 1959 1st direct observation of the solar wind – Soviet Luna 1
- 1973/79 Pioneers 10 and 11 flyby Jupiter and Saturn
- 1977 Voyagers 1 and 2 launched
- 2015 New Horizons Pluto Flyby
- 2018 New Horizons MU69 Flyby

Observations of Mars

2.0. 1877	1877	0 **
30. 1877	1877	** 0 *
2. 1877	1877	0 ** *
3. 1877	1877	0 ** *
3. 1877	1877	* 0 *
4. 1877	1877	* 0 **
5. 1877	1877	** 0 *
6. 1877	1877	** * 0
10. 1877	1877	* * * 0 *





Big Questions

PLANETARY SCIENCE

How did the SS form?

How will the SS evolve?

Are we alone?



HELIOPHYSICS

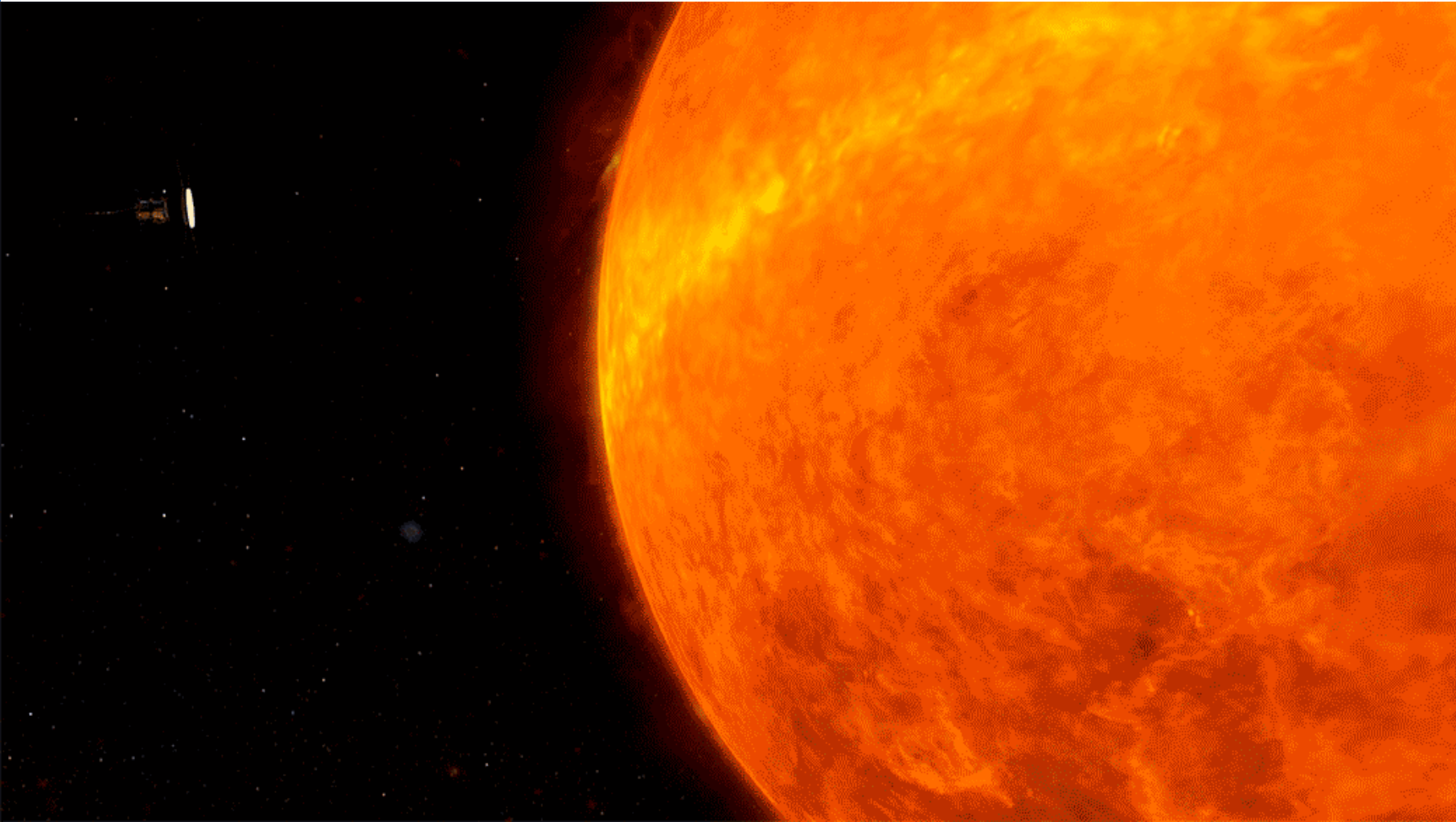
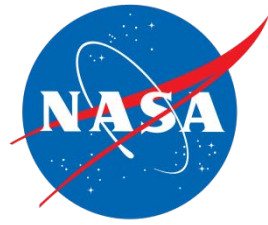
What drives changes in the sun?

What drives solar storms
and the solar wind?

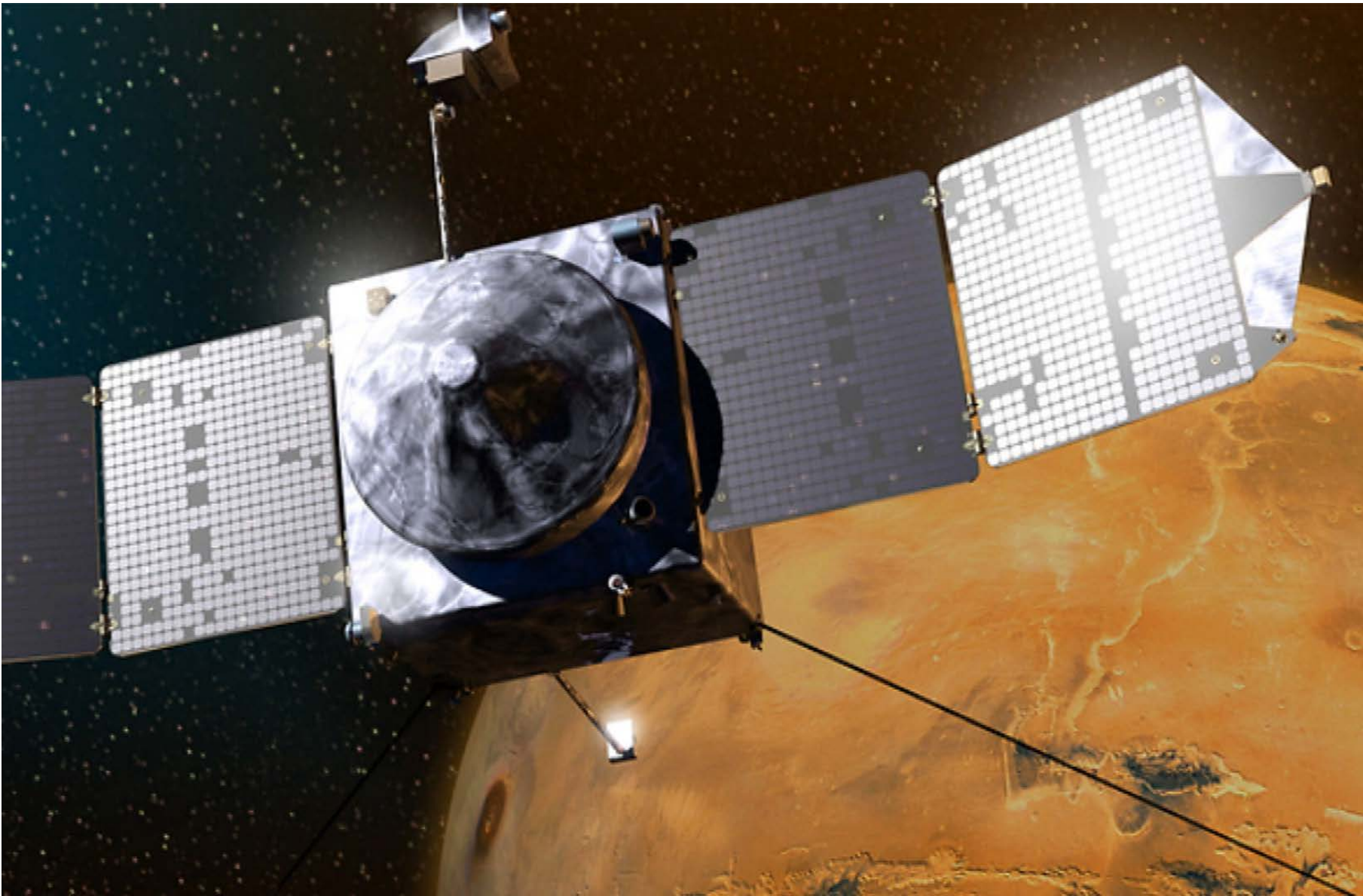
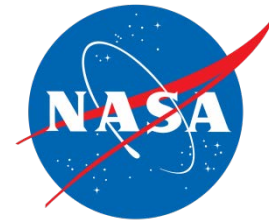
How does the sun impact humanity
and the solar system?

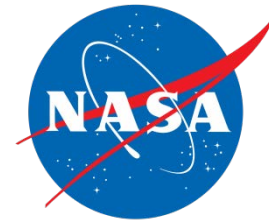


Sun / Parker Solar Probe



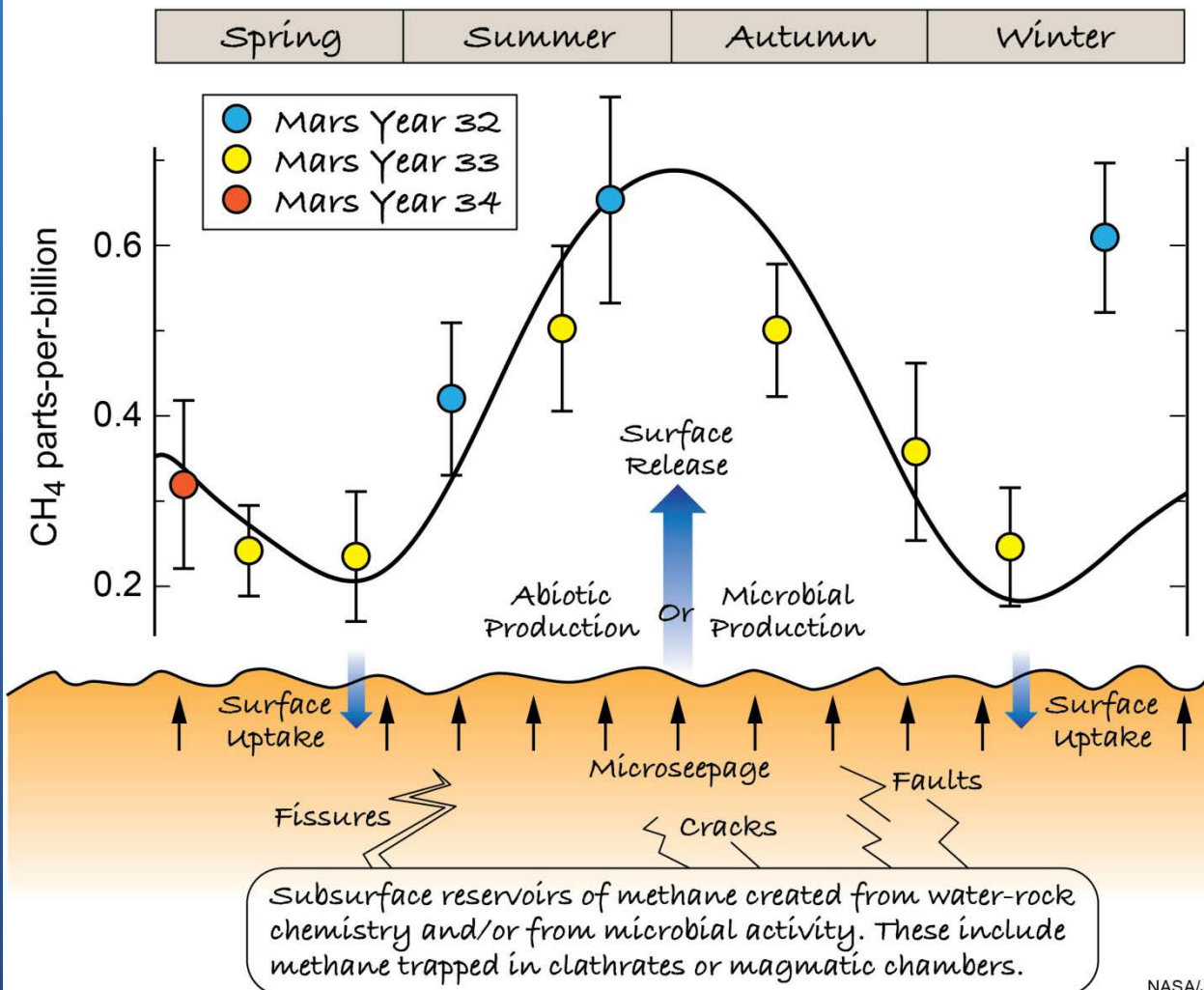
Mars / Maven



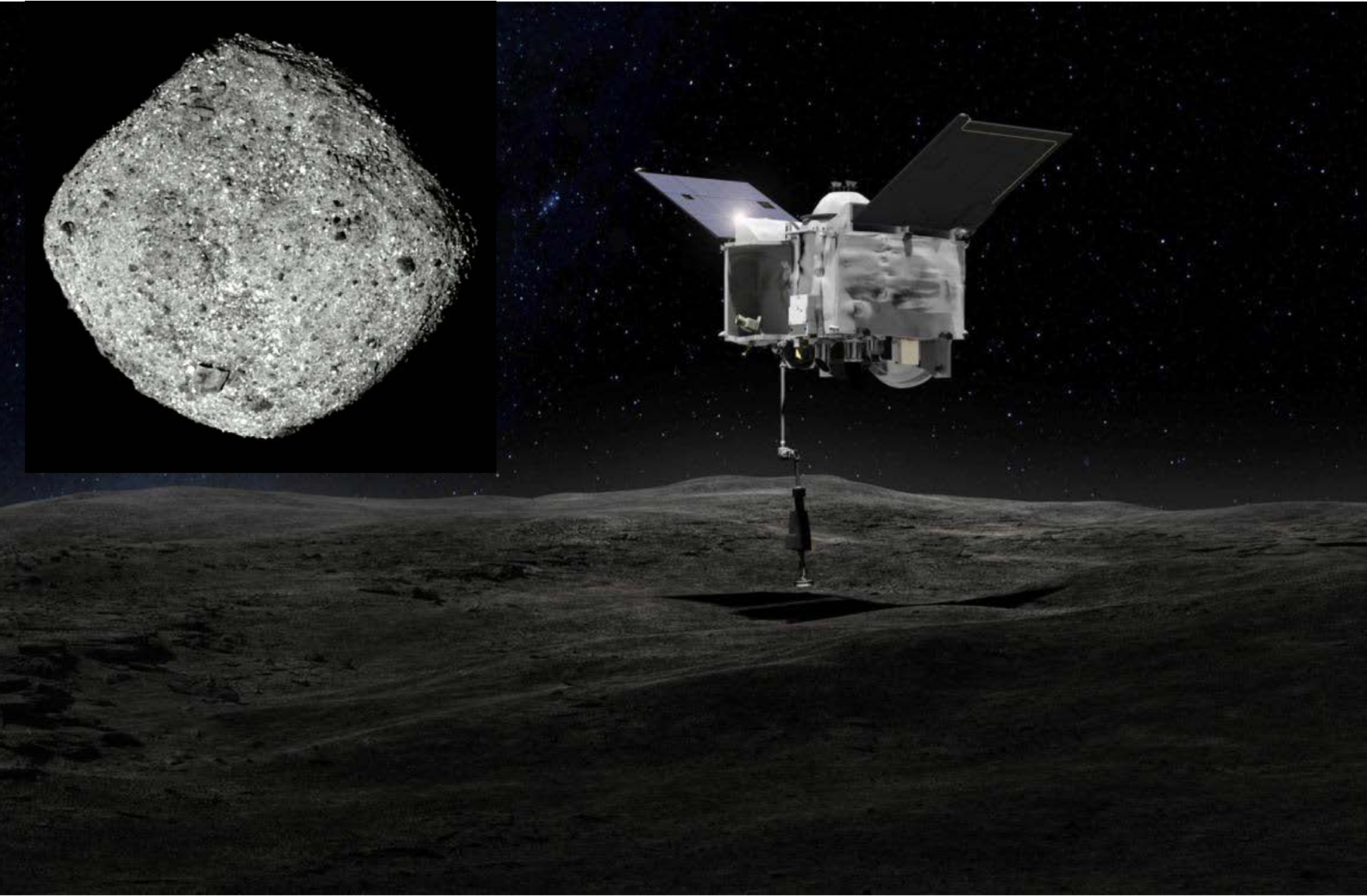
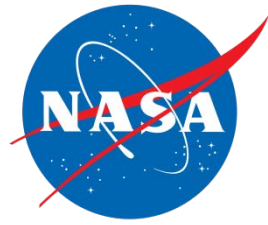


Mars / MSL-Curiosity

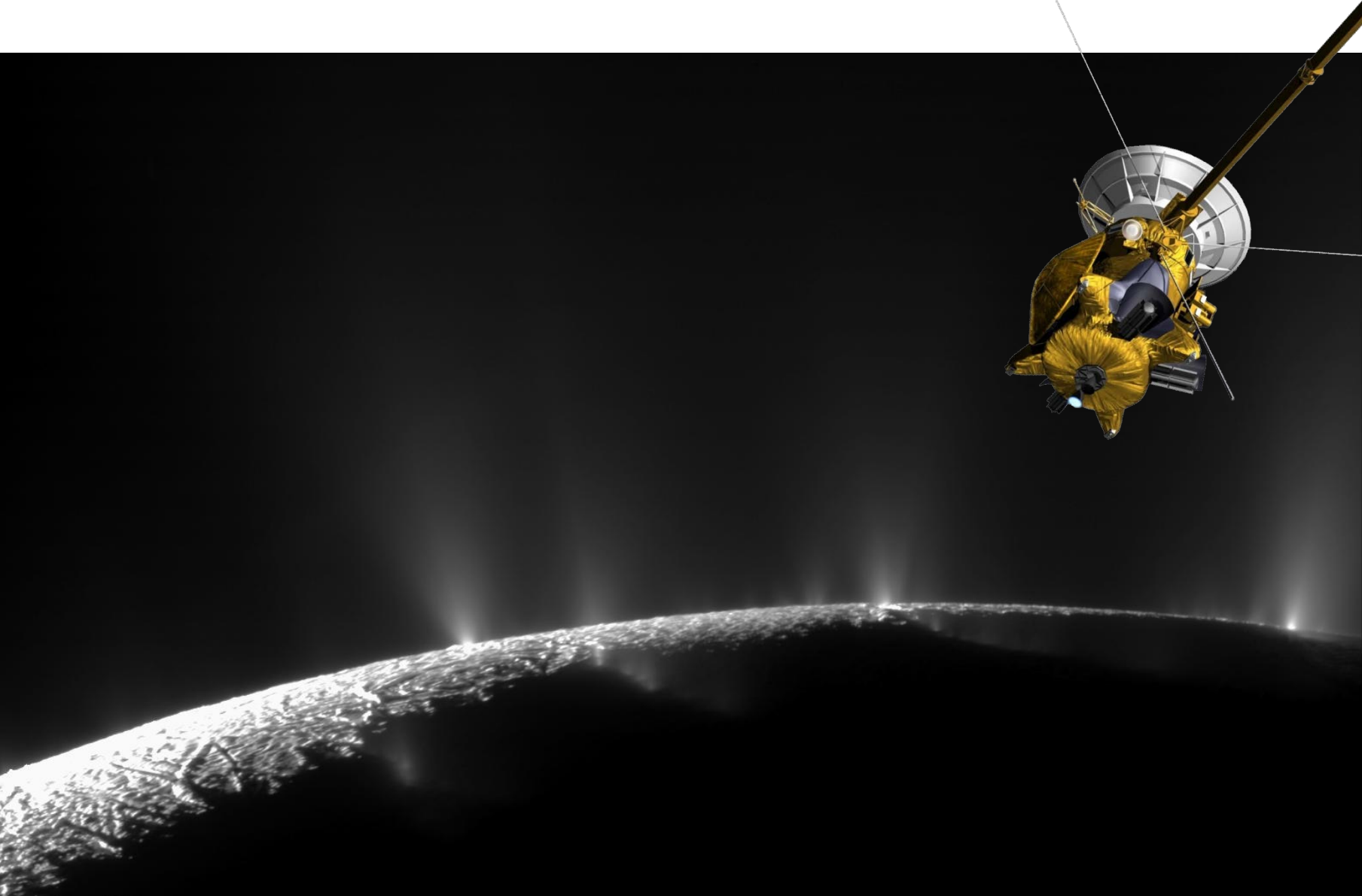
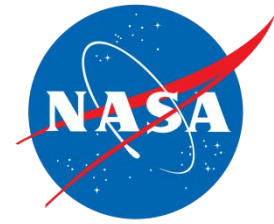
Curiosity Discovers Seasonal Cycle in Mars Methane



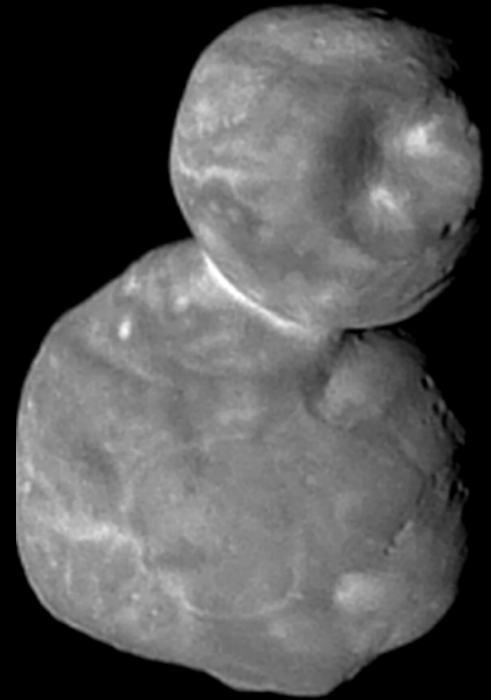
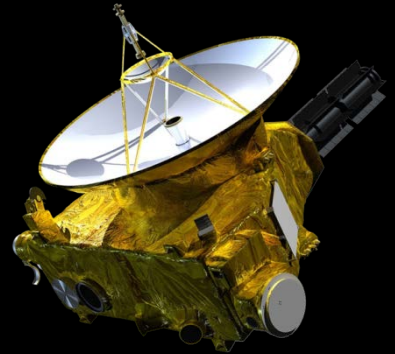
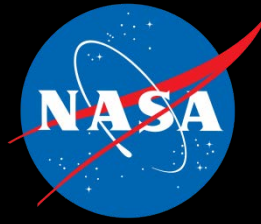
Bennu / OSIRIS REx



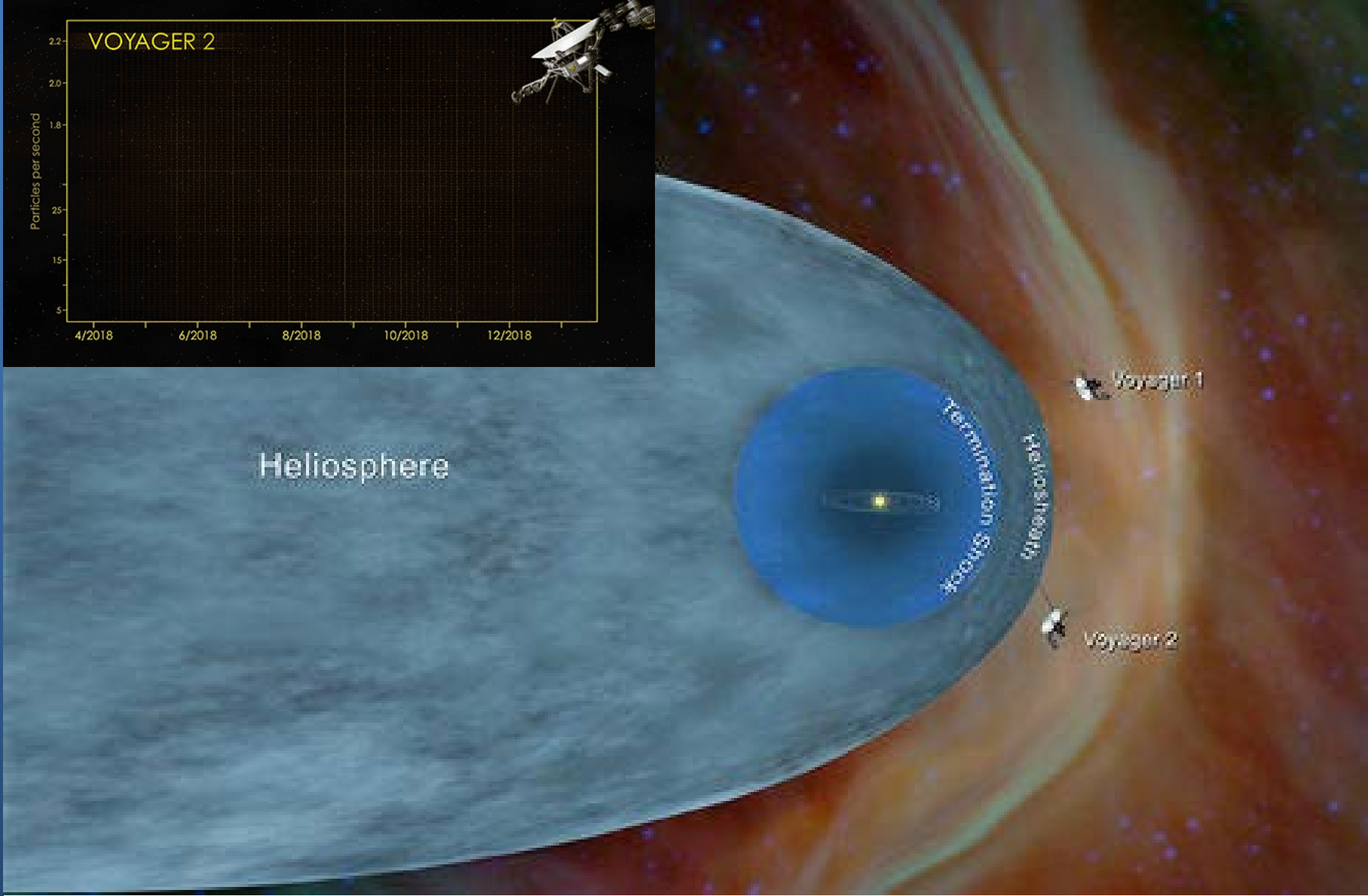
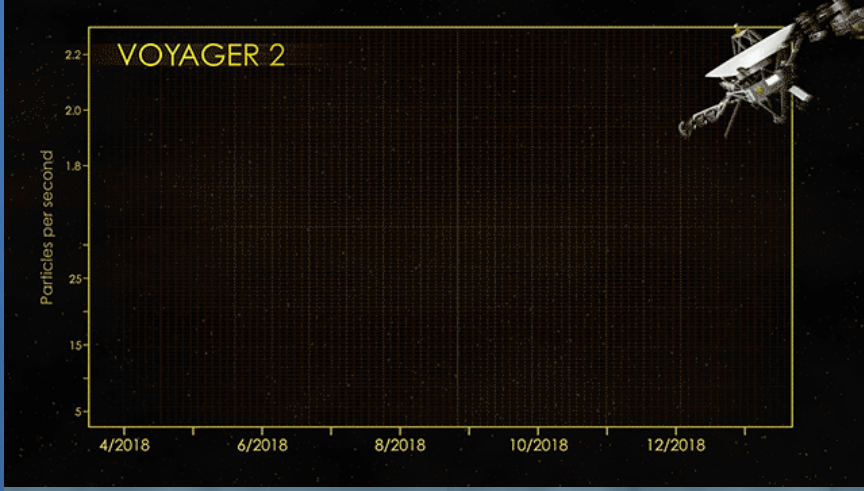
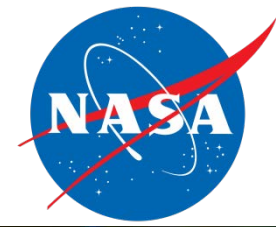
Saturn / Cassini



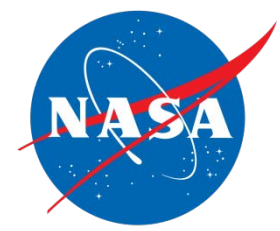
Pluto, MU69 / NEW HORIZONS



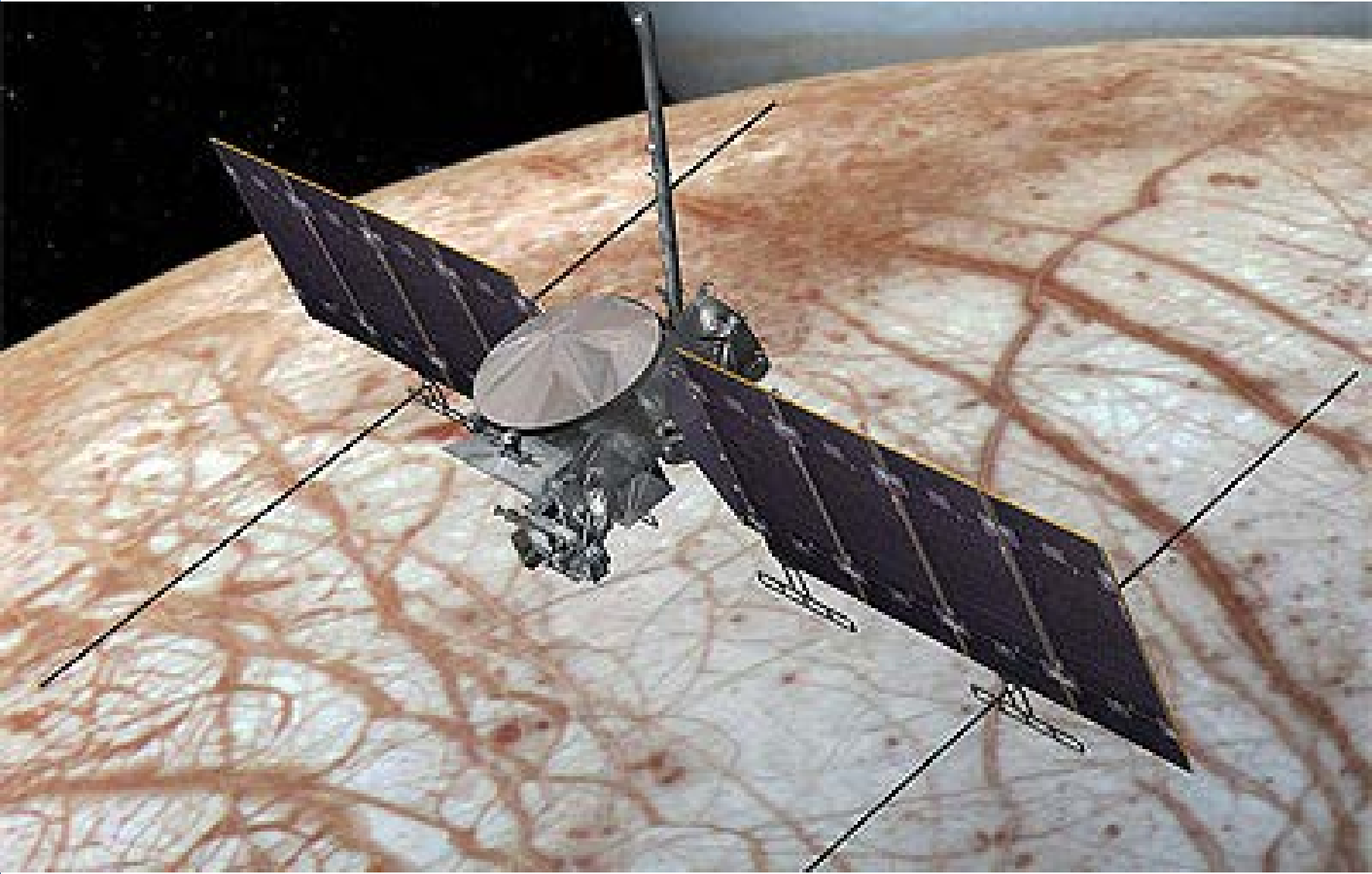
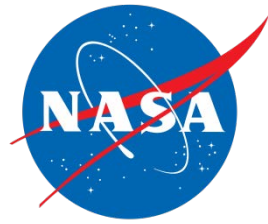
Heliopause / Voyagers I, II



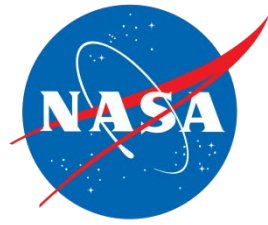
What's Next??



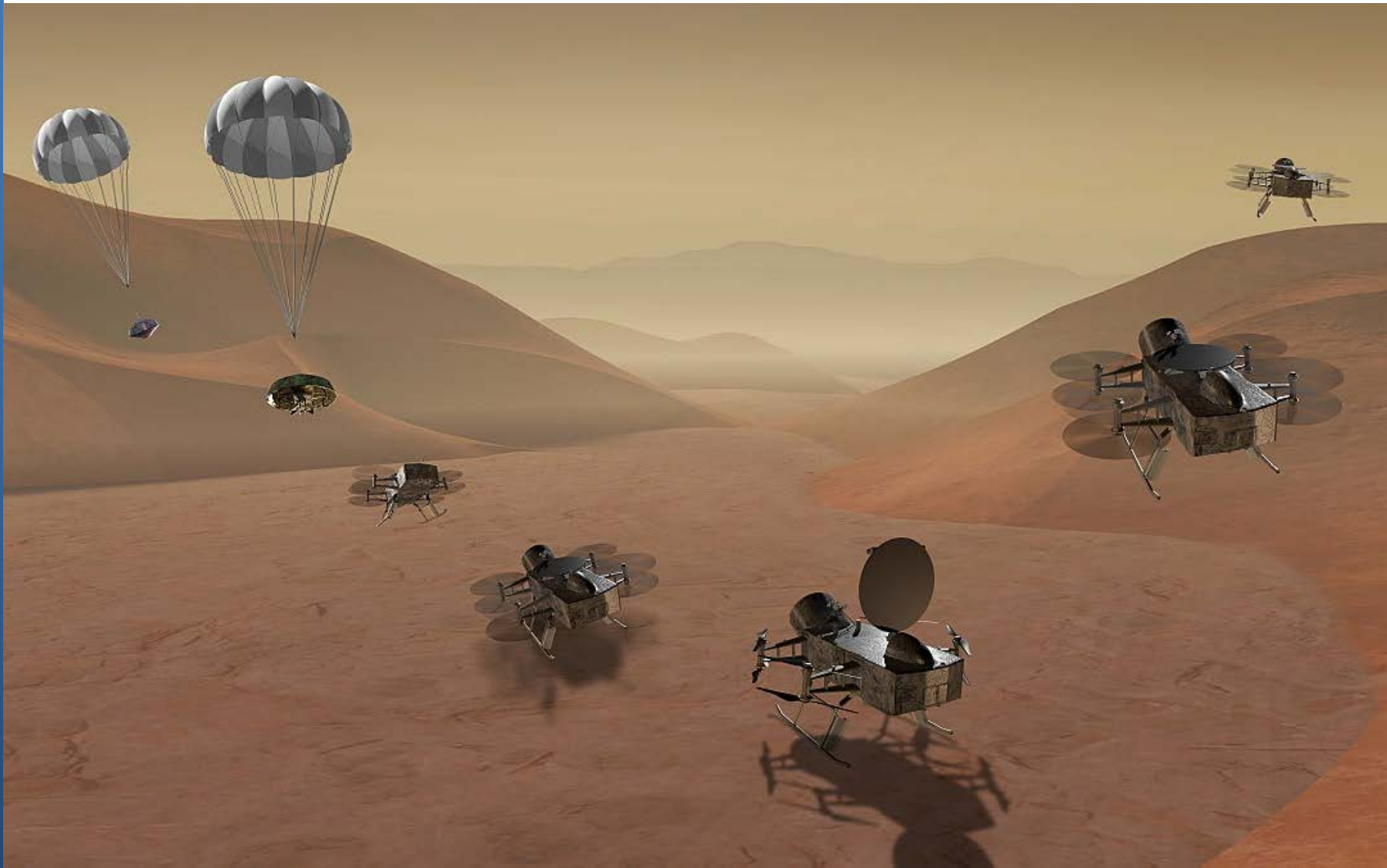
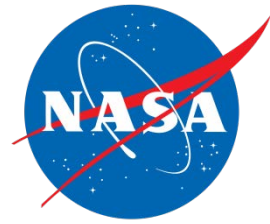
Europa / Europa Clipper



Comet 67P C-G / CAESAR



Titan / Dragonfly





Animation of Dragonfly in flight over Titan

<http://dragonfly.jhuapl.edu/Gallery/#Gallery>