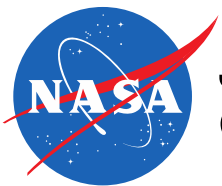




Exploring our Solar System and Beyond

AFCEA



Jet Propulsion Laboratory
California Institute of Technology

Larry James, Deputy Director

February 18, 2016

Jason 3 Launch

January 17, 2016

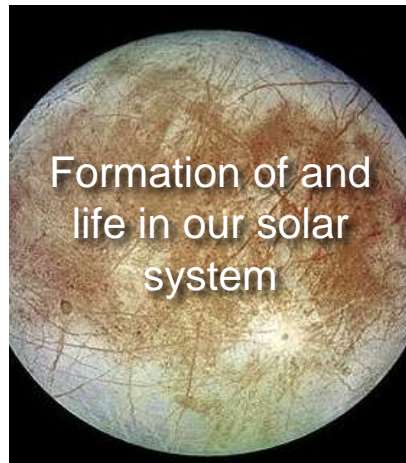


JPL Science and Exploration Thrusts

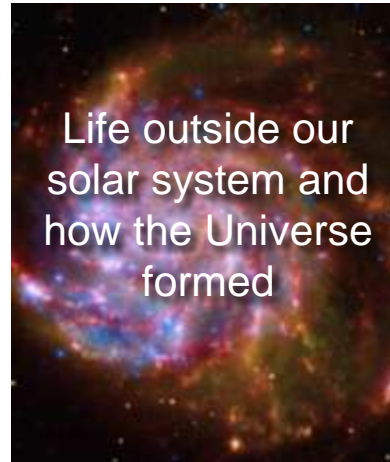
1



2



3



4



Curiosity's Selfie



Strata at Base of Mt Sharp

Indicates the flow of water before the mountain formed



Curiosity Near Large Sand Dunes



Mars Exploration Program

Operational
2001-2007



2009



2011



2013



2018



2020 & Beyond



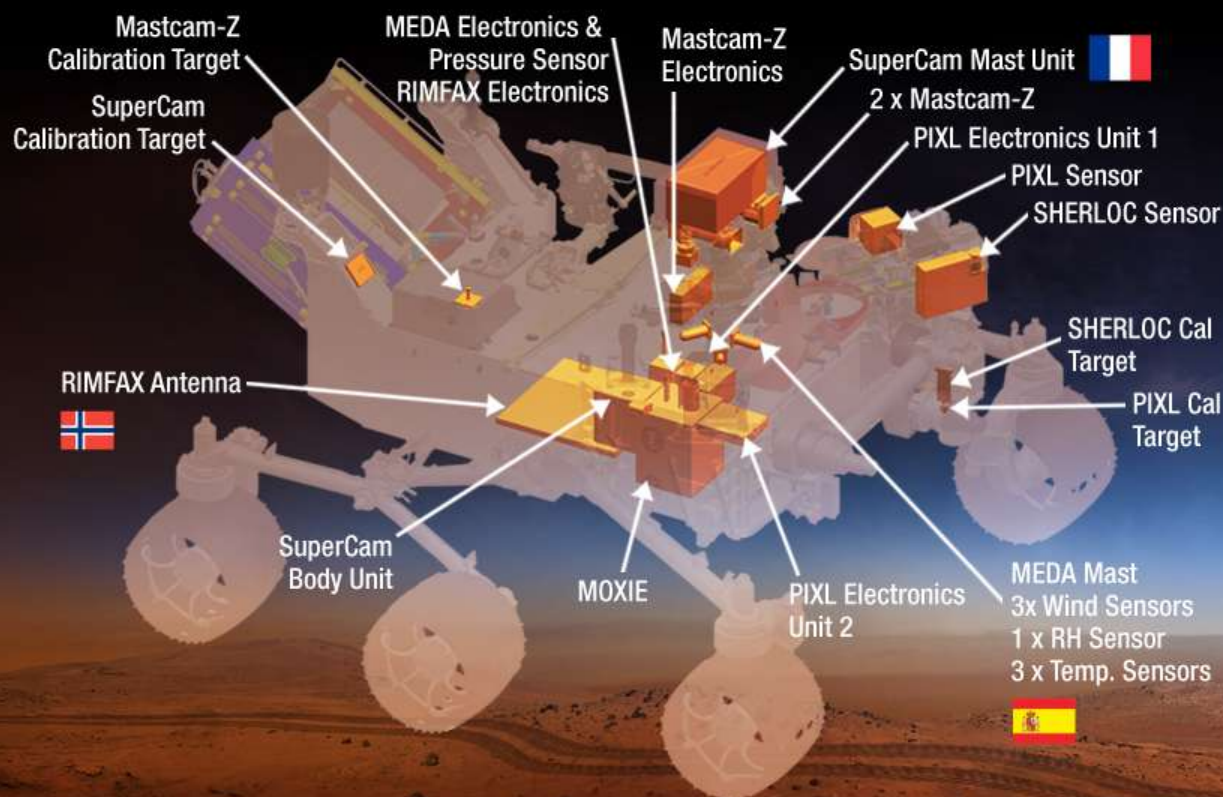


InSight

Launch: 2018 (?)

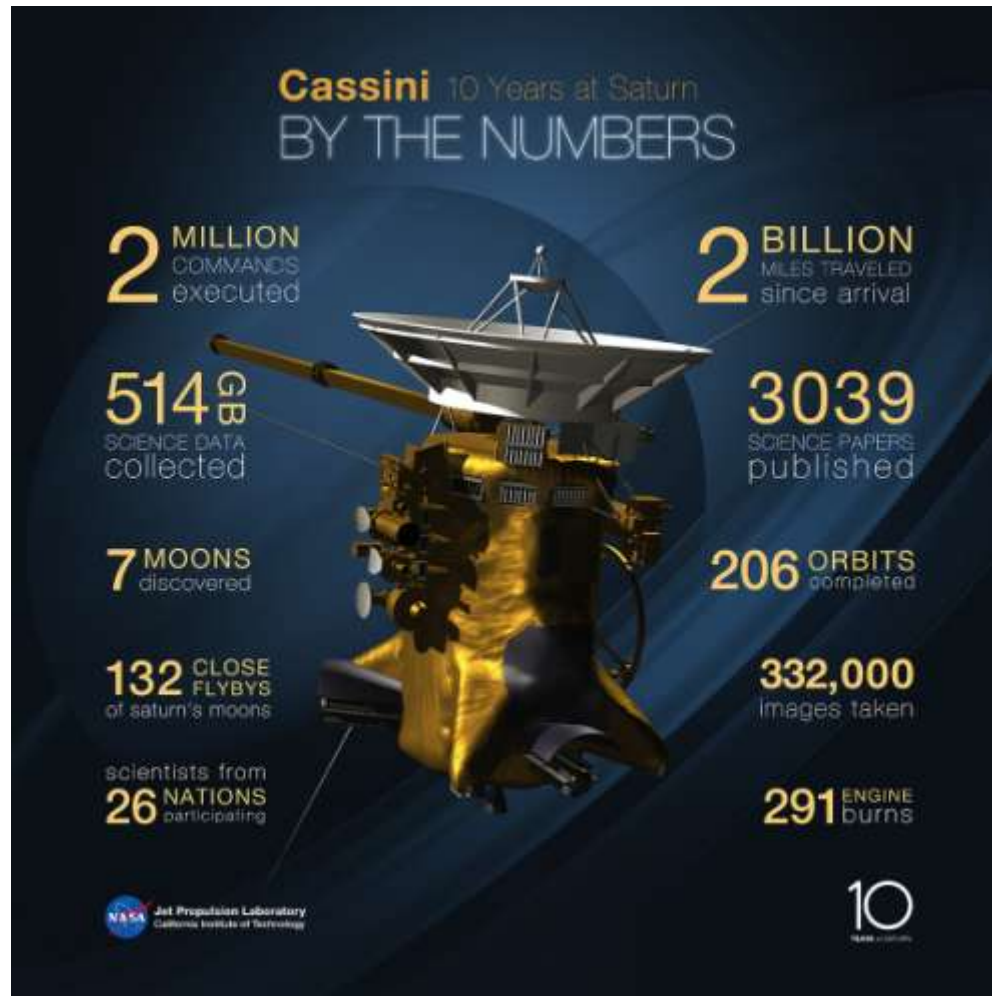
Mars 2020

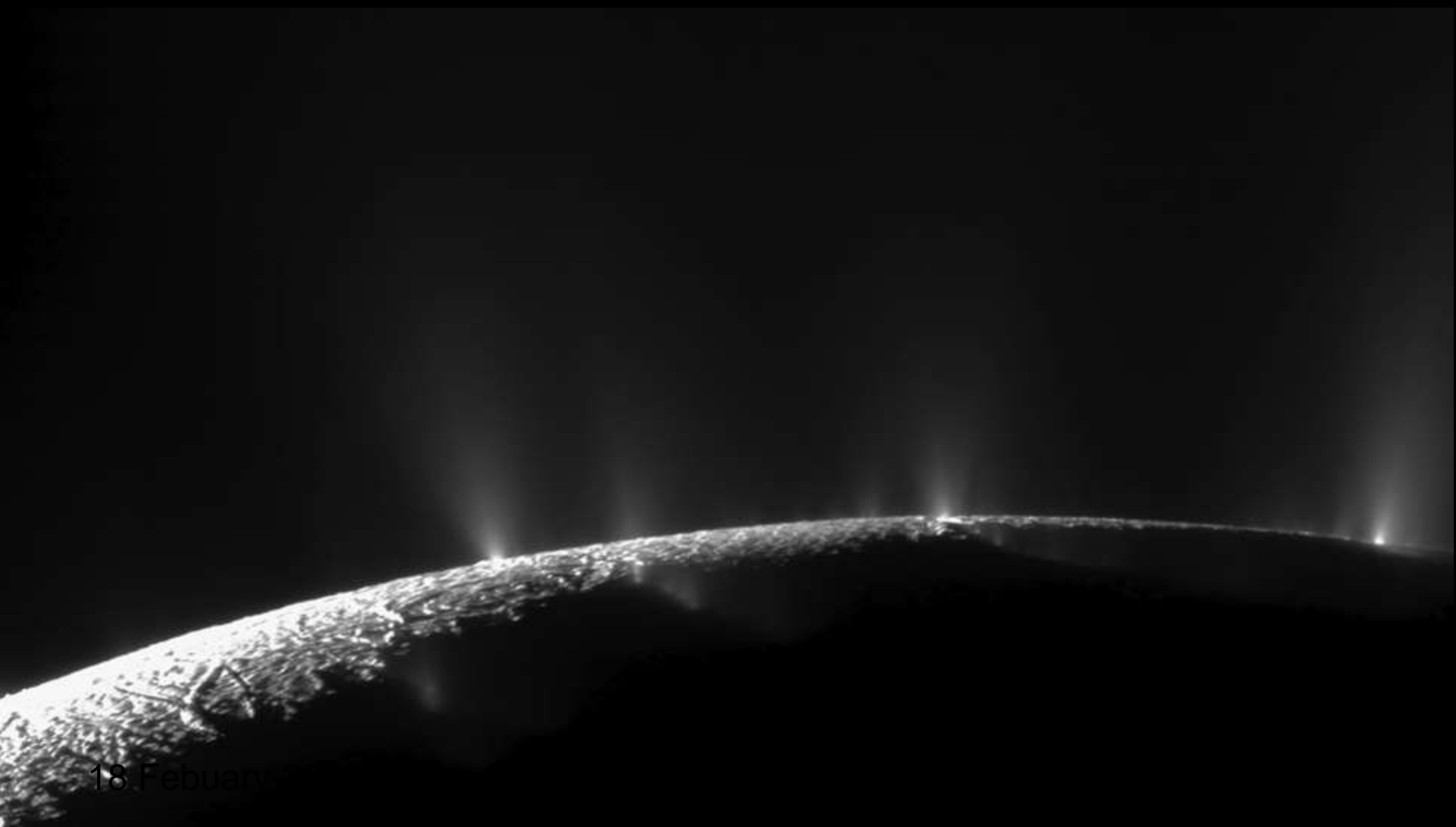
Mars 2020 Rover



Cassini

10 Years at Saturn

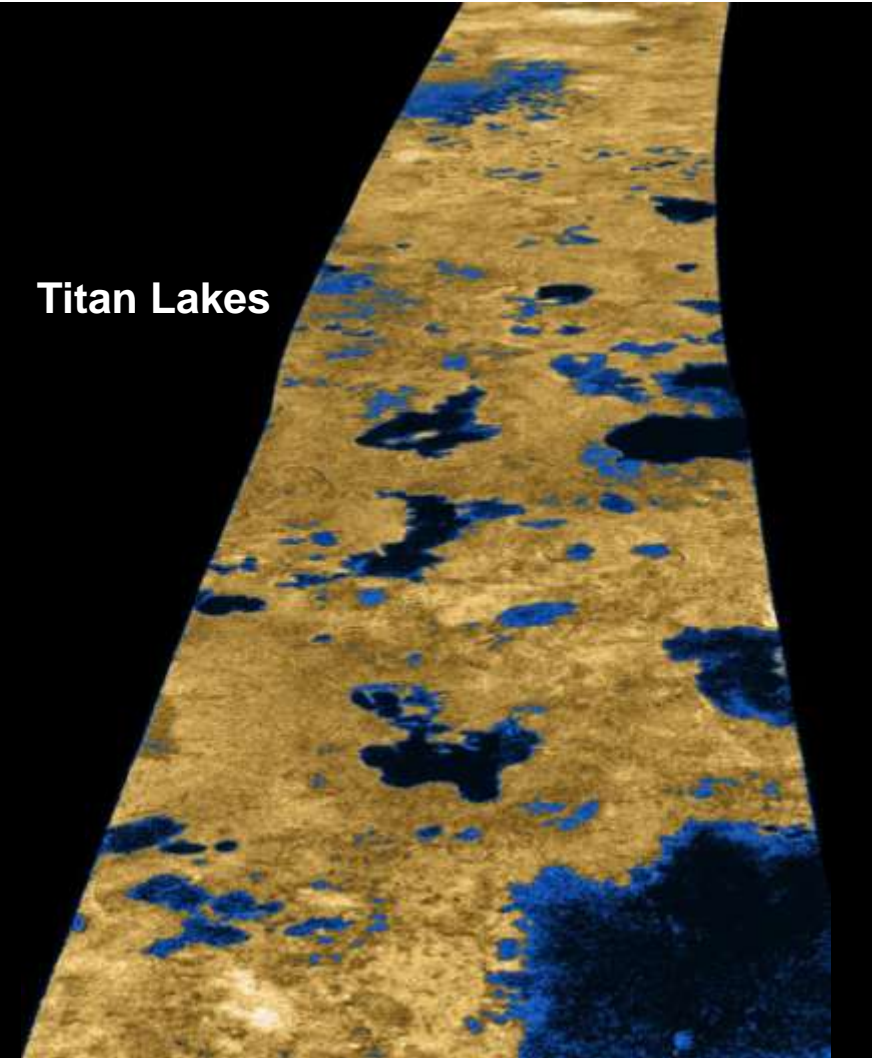




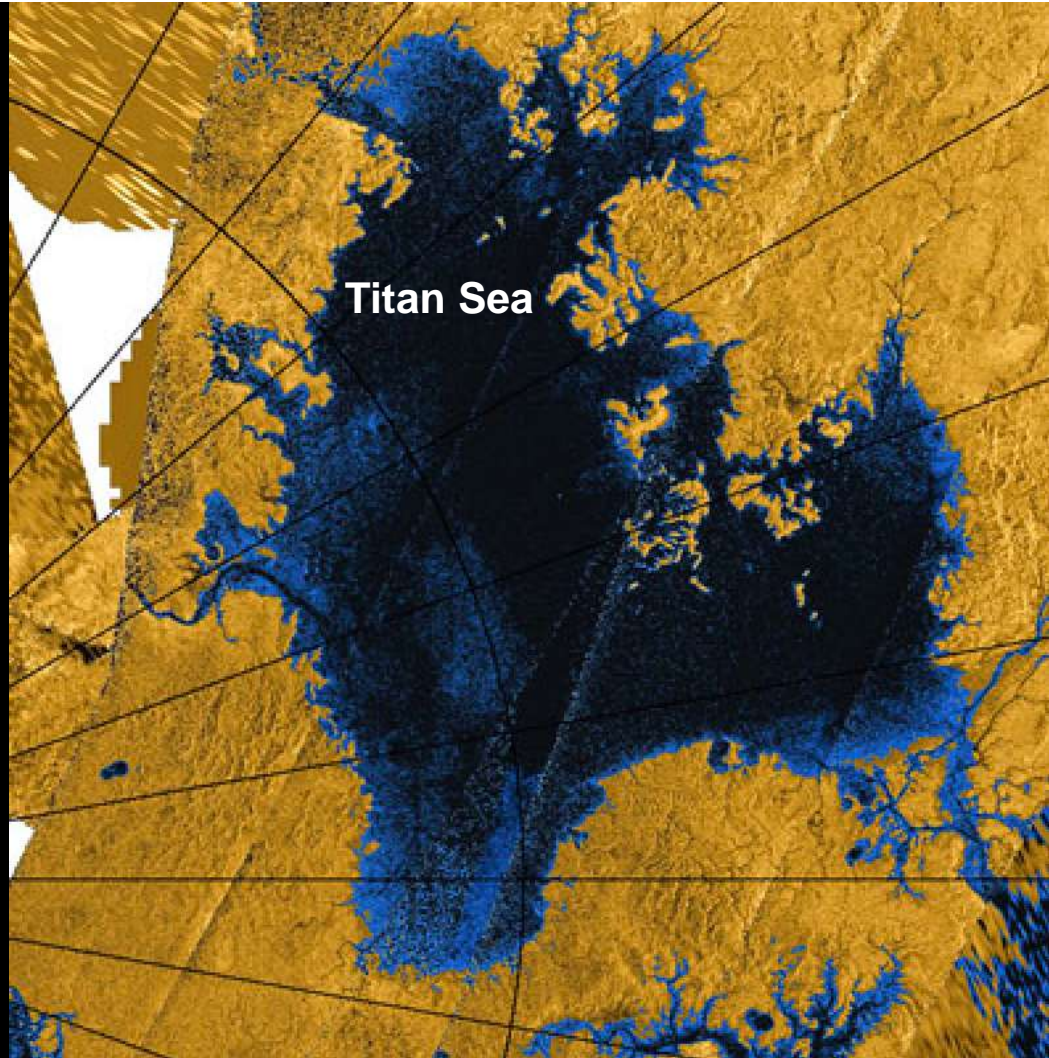
18 February

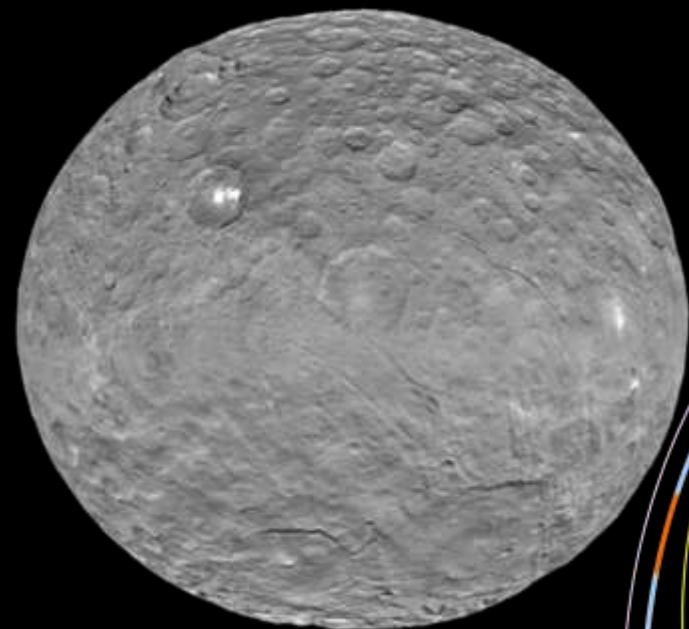
Saturn's Moon Titan

Titan Lakes

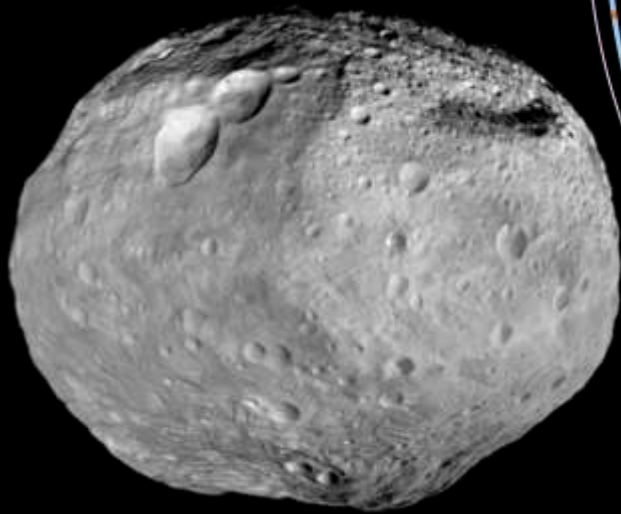


Titan Sea

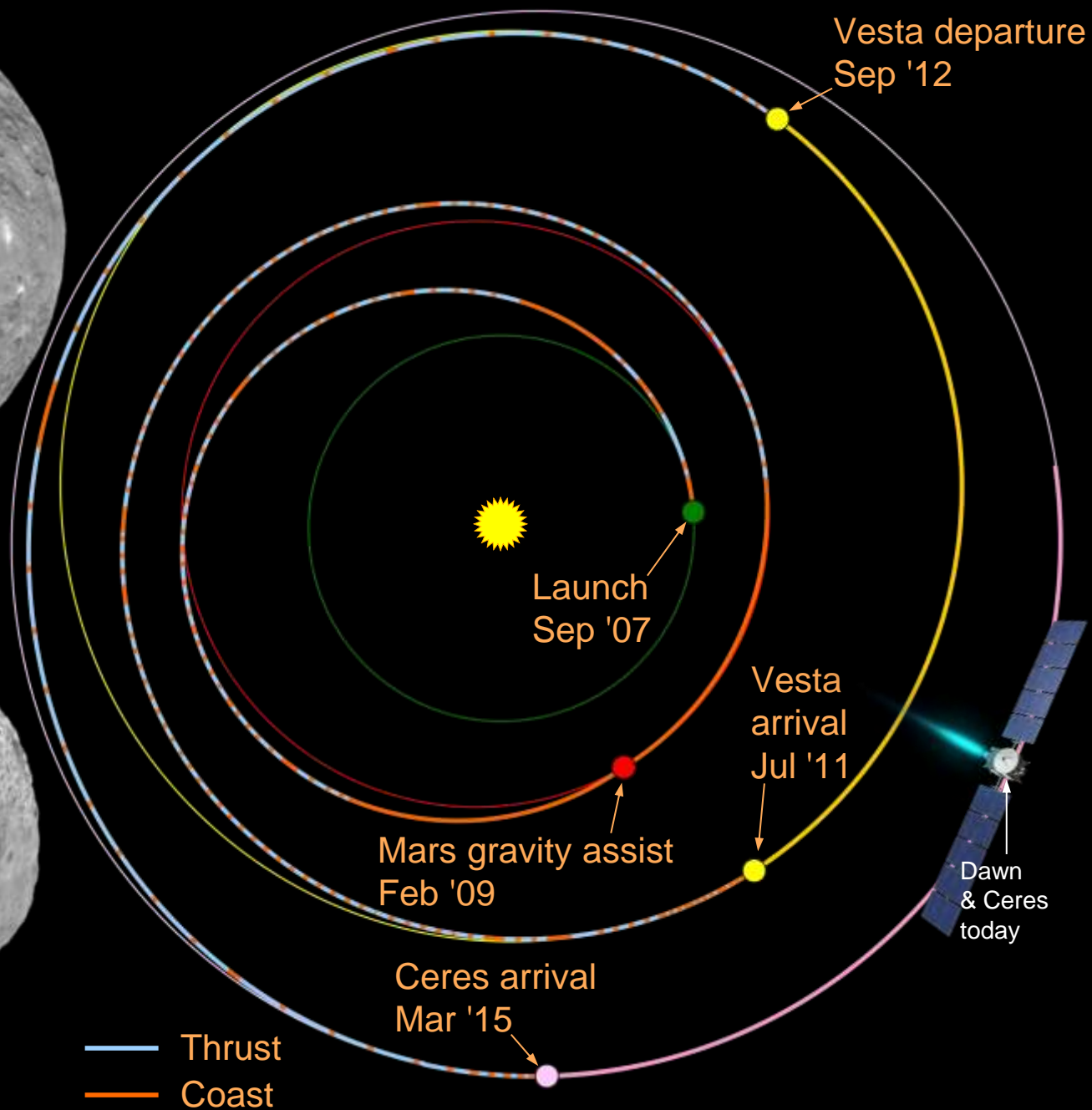




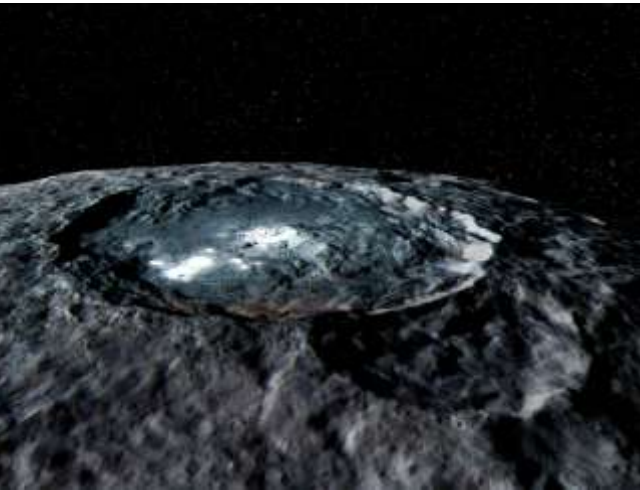
Ceres



Vesta



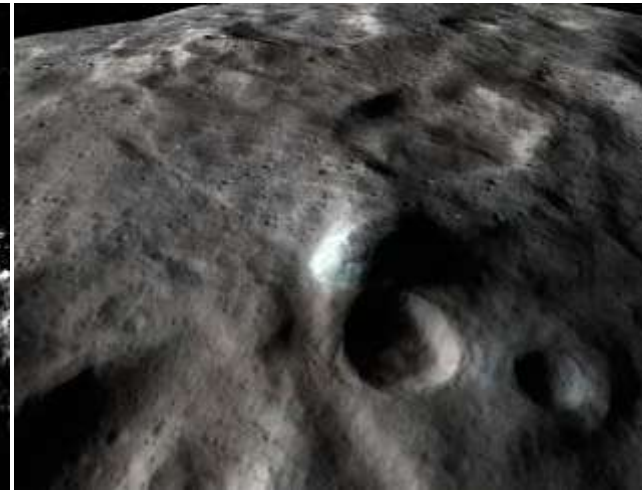
Ceres



Occator Crater



Yalode Crater



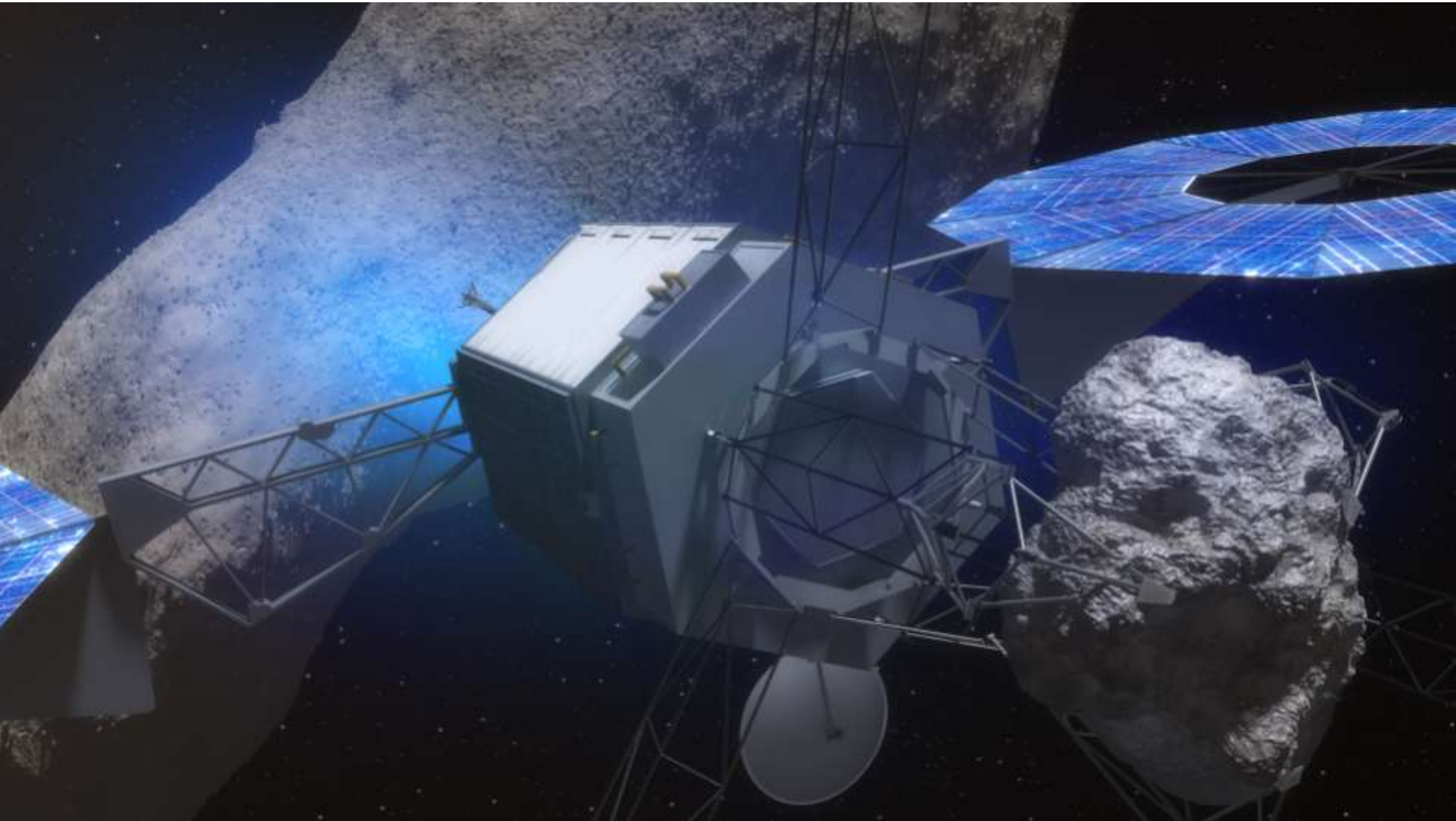
Ahuna Crater

Juno

Arriving July 4, 2016



Asteroid Retrieval Mission



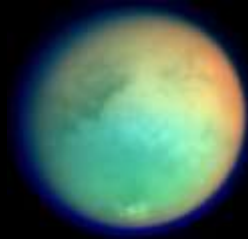
2 Search for Life in the Oceans of Icy Satellites



Enceladus



Europa



Titan



Callisto

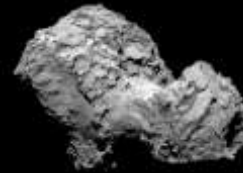
... and, learn how planetary systems formed



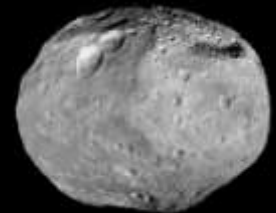
Venus



Uranus



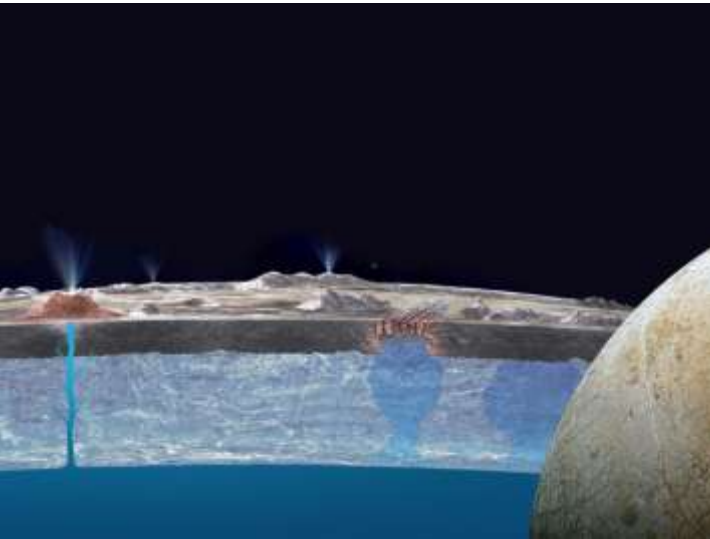
67P/Churyumov-Gerasimenko



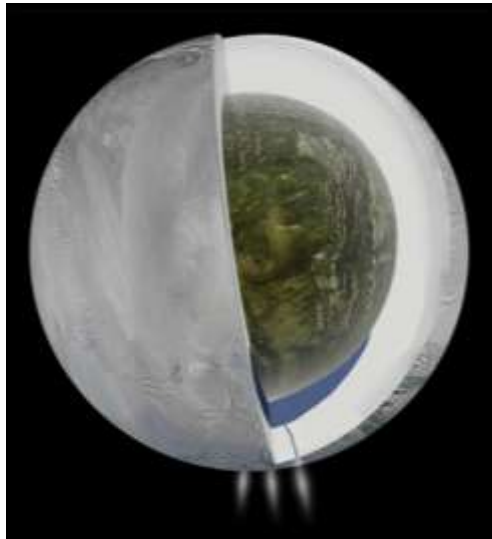
Vesta

Sampling and Exploring

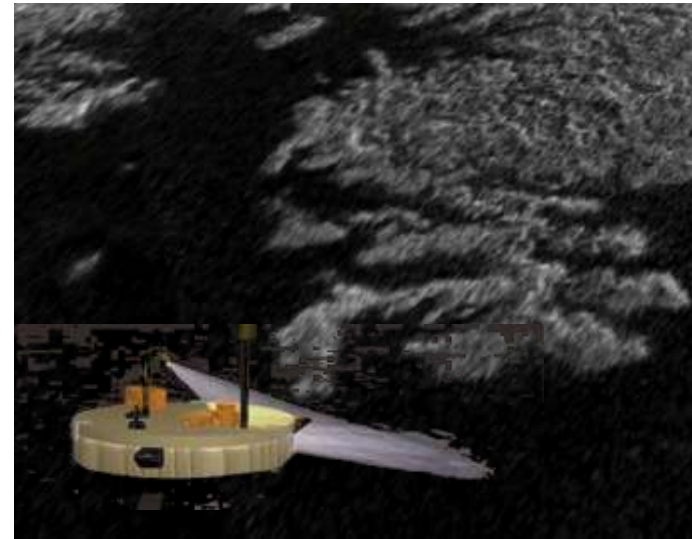
Ocean of Europa



Enceladus
Ice Particles

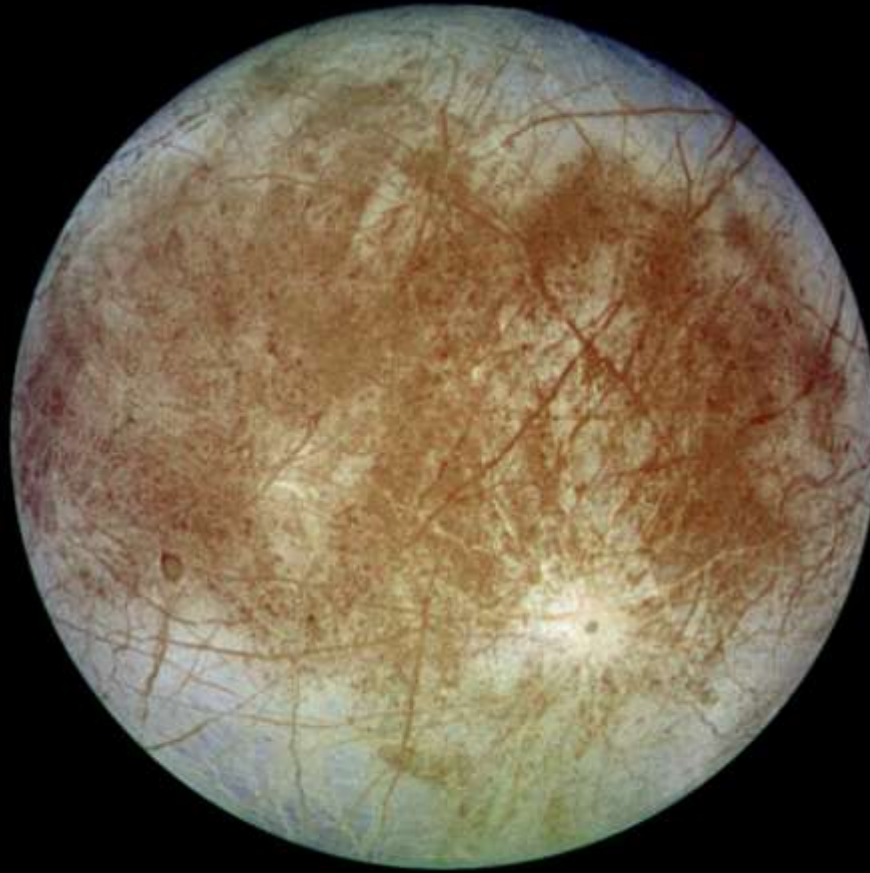


Exotic Titan Lakes

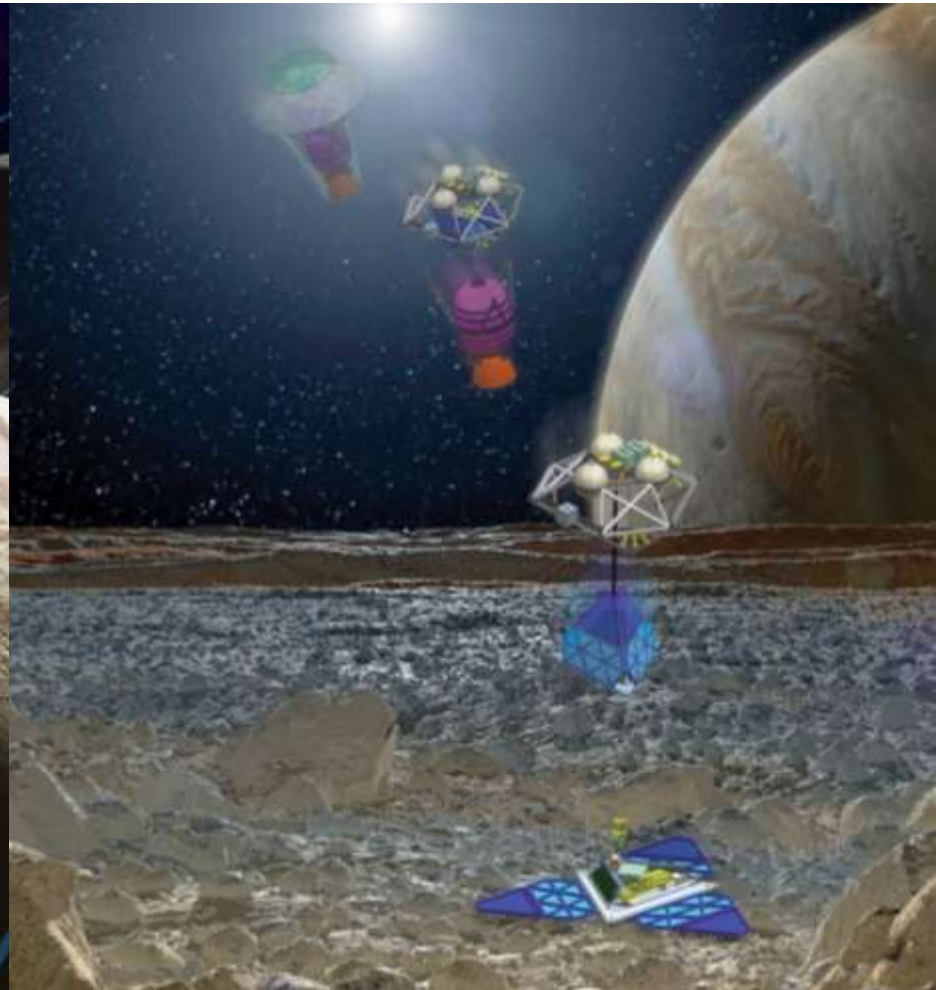
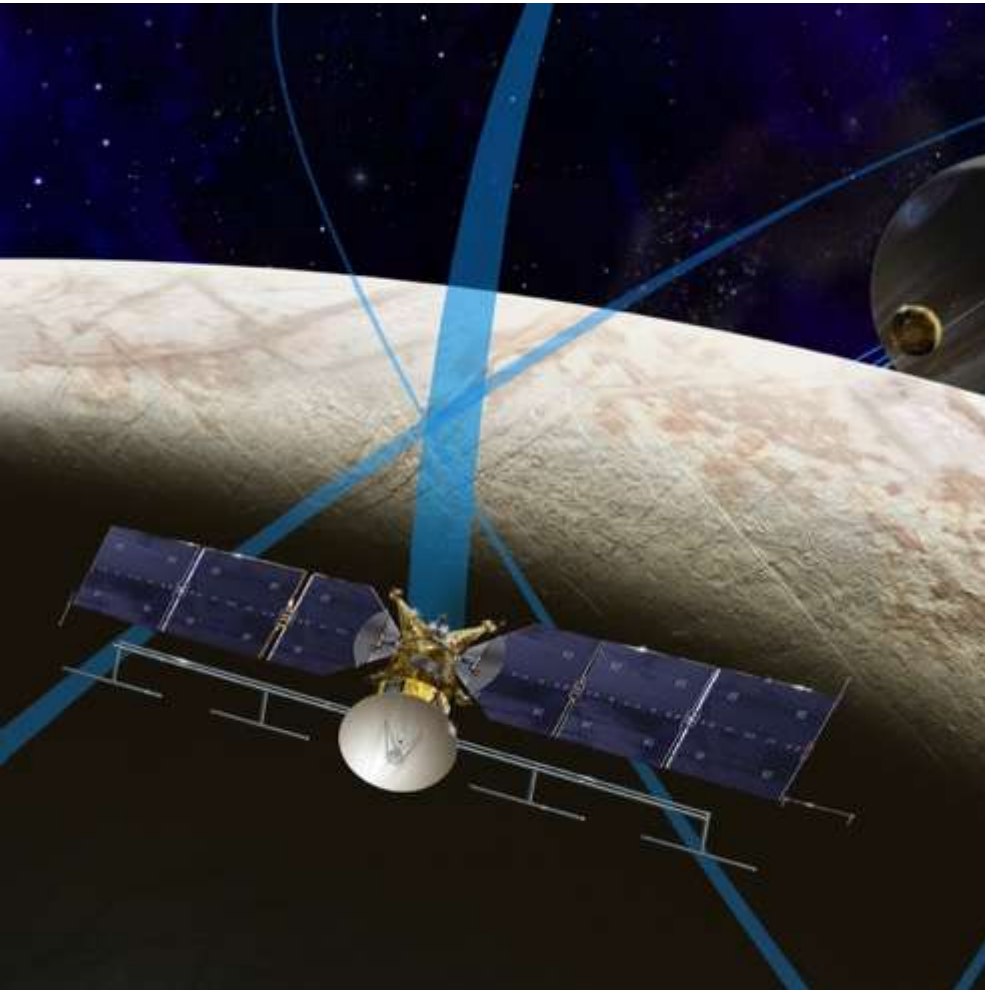


Europa

Next Outer Planet Flagship Mission



Europa Orbiter & Lander

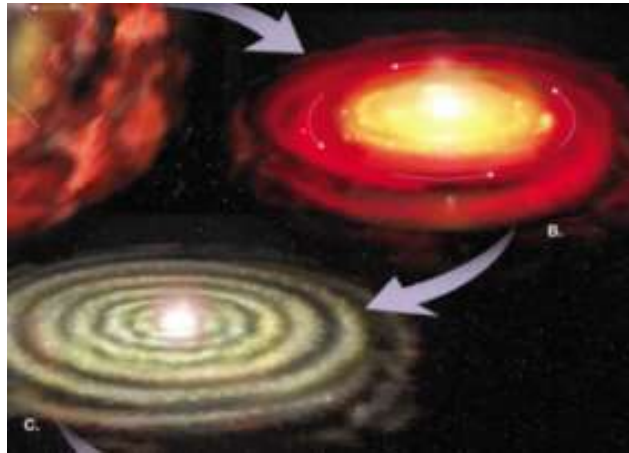


3 Exoplanets & Origins of the Universe

Understanding our Universe and our place in it



How did our
universe begin
and evolve?



How did galaxies,
stars, and planets
come to be?



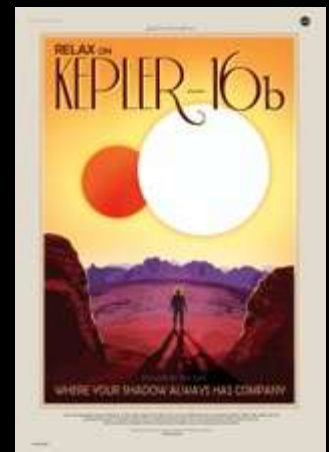
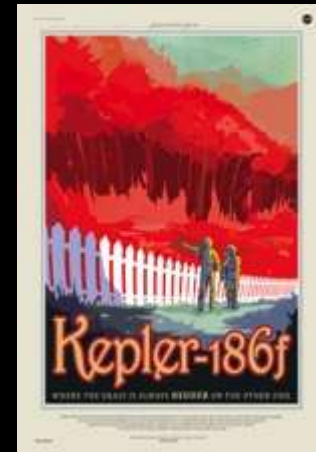
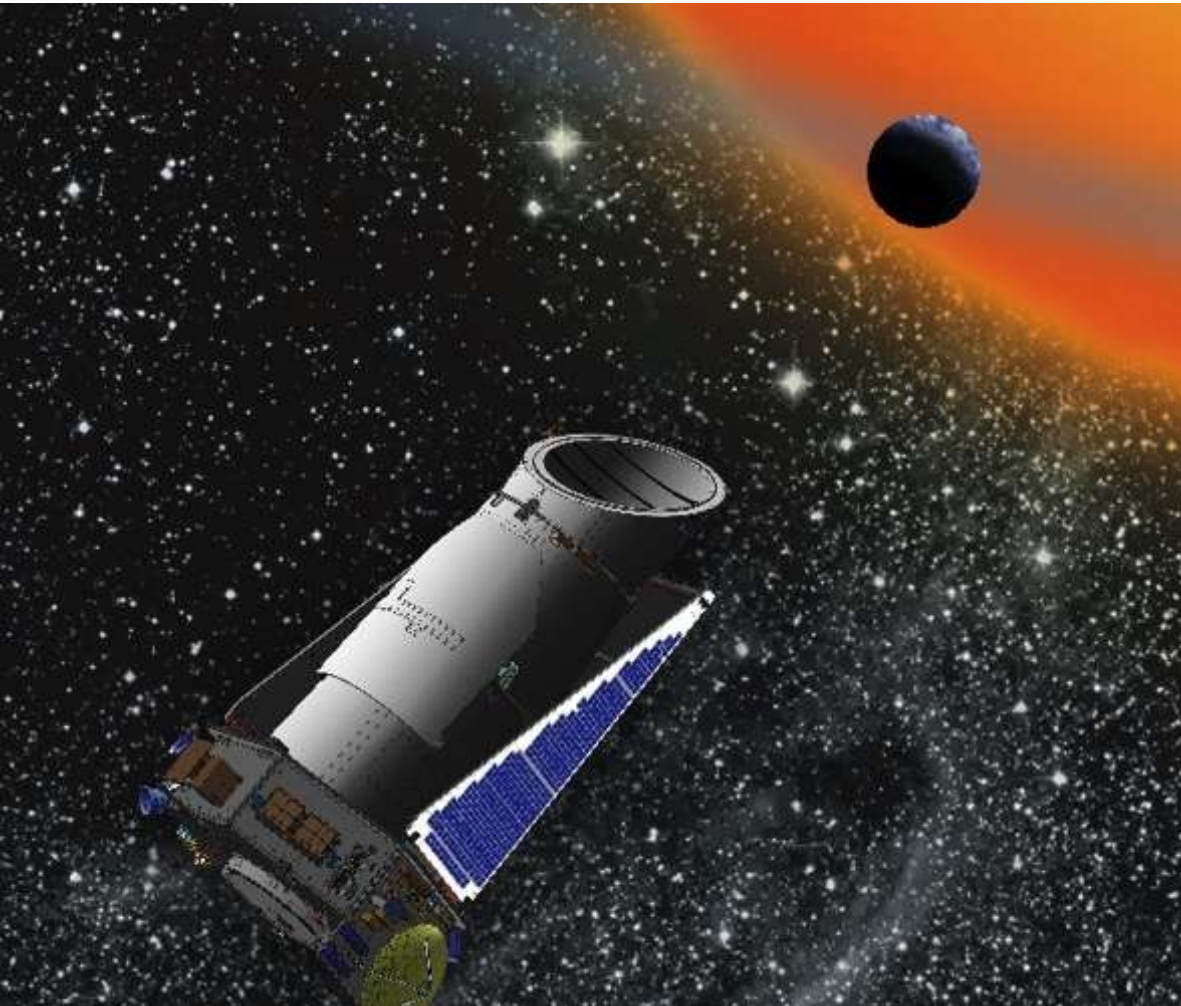
Are We Alone?

Are there Earth-like planets elsewhere?

Earth Size Planets in Habitable Zone: 13

Confirmed Planets: 1,937

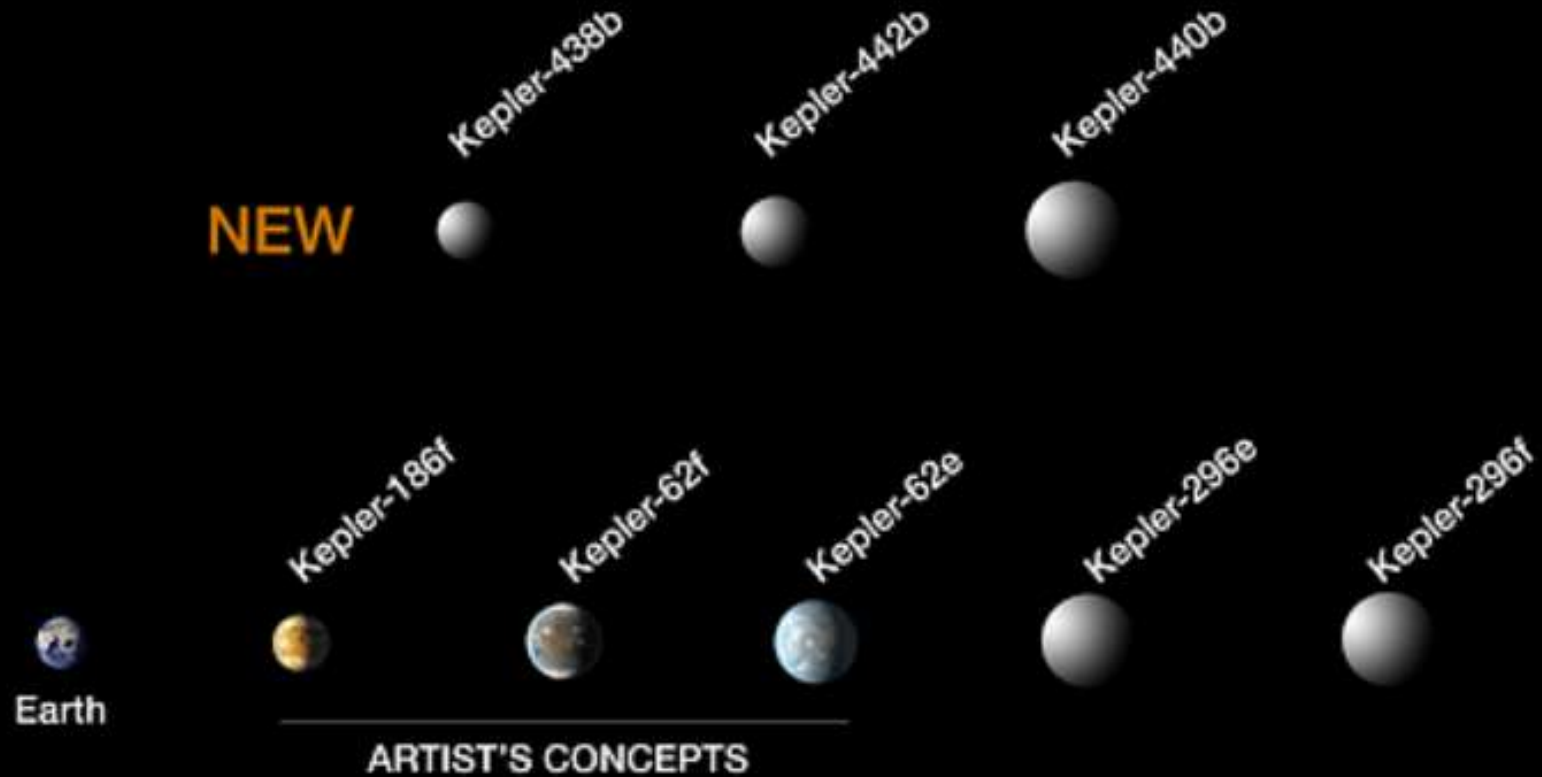
Planet Candidates: 3,701



NASA Kepler's Hall of Fame:

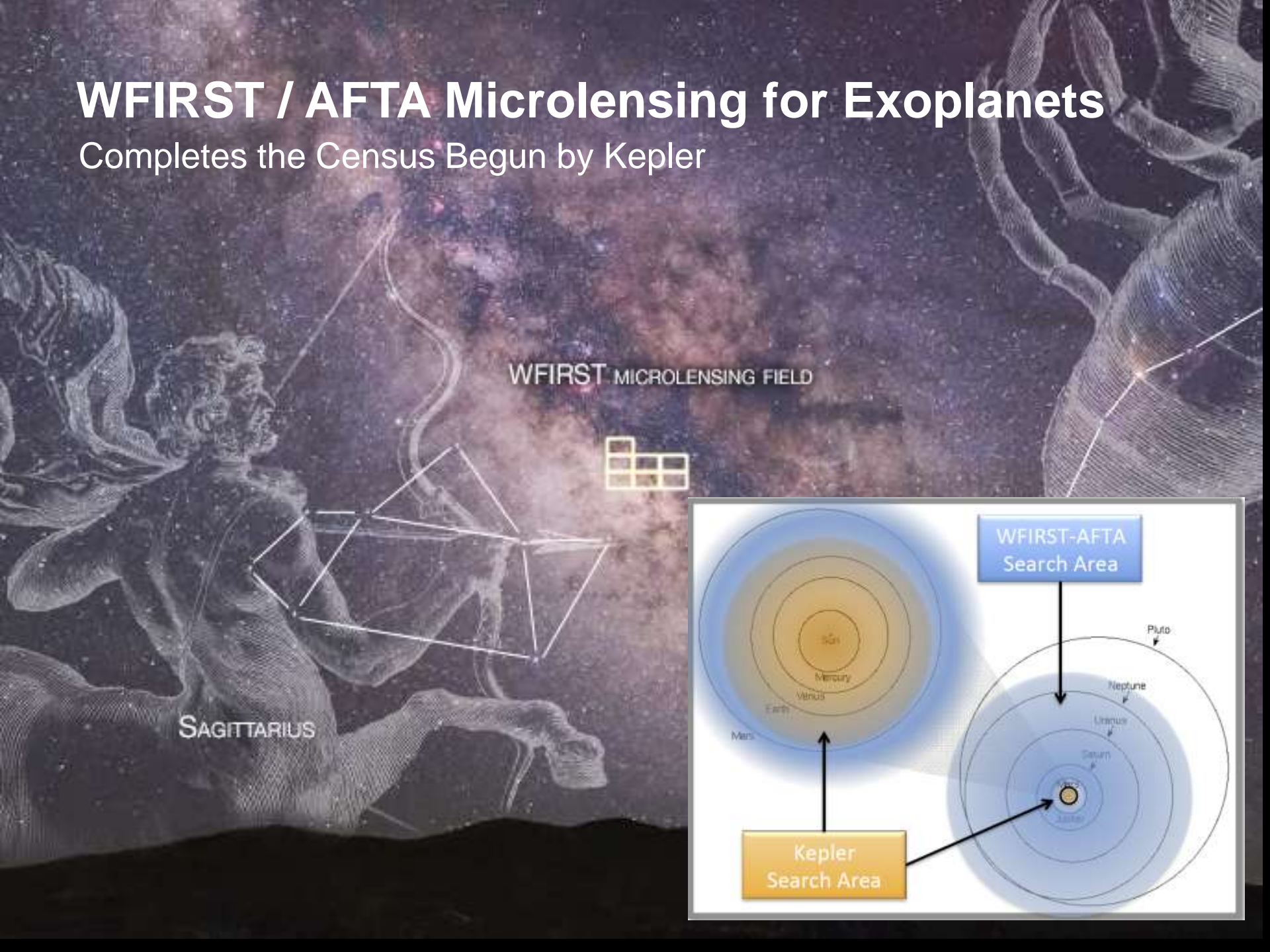
Small Habitable Zone Planets

As of January 2015



WFIRST / AFTA Microlensing for Exoplanets

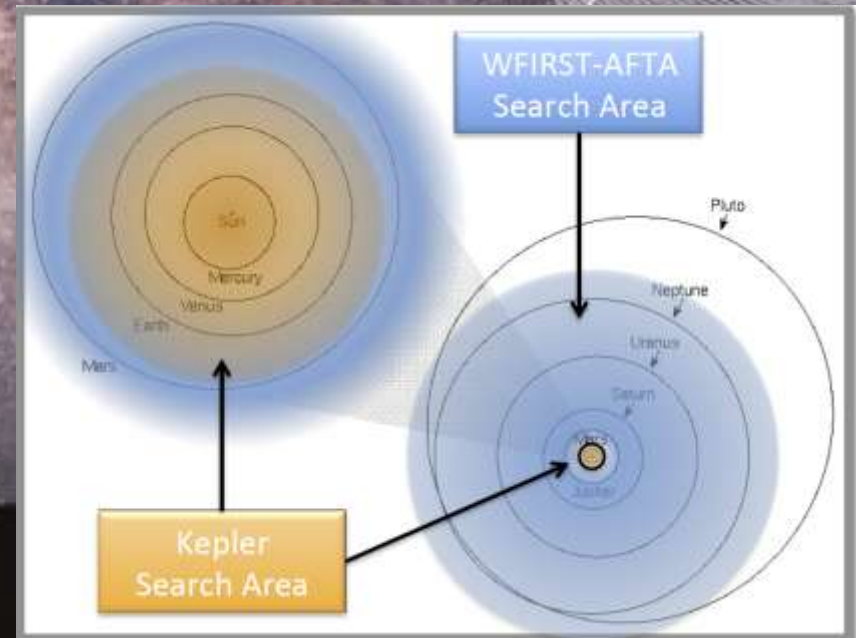
Completes the Census Begun by Kepler



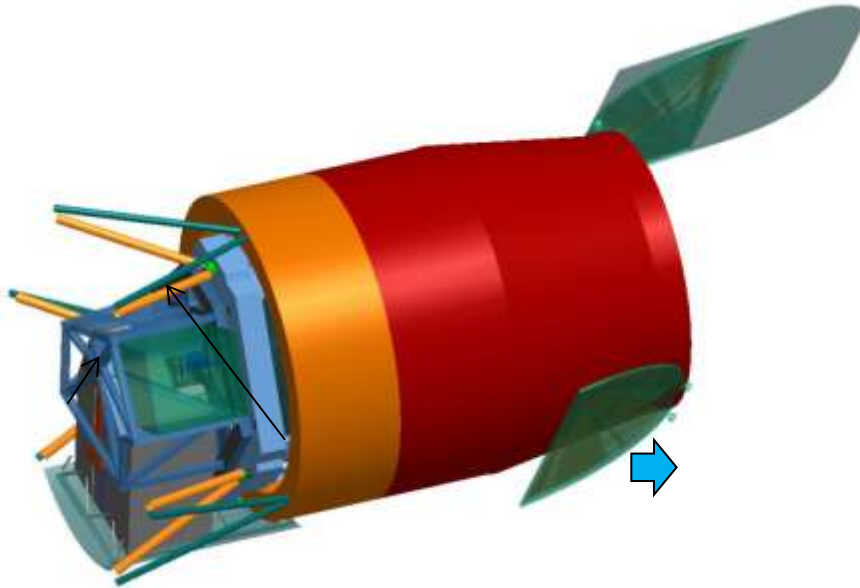
WFIRST MICROLENSING FIELD



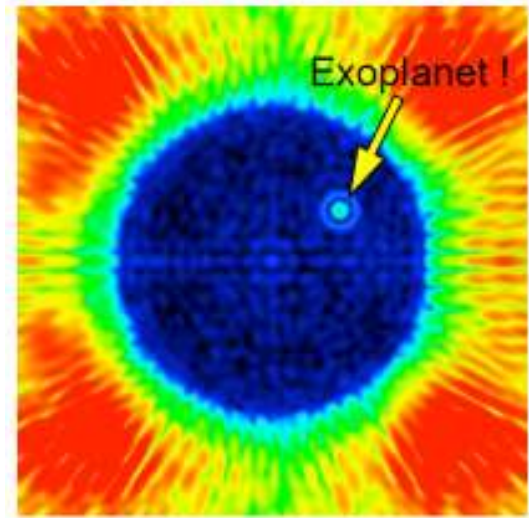
SAGITTARIUS



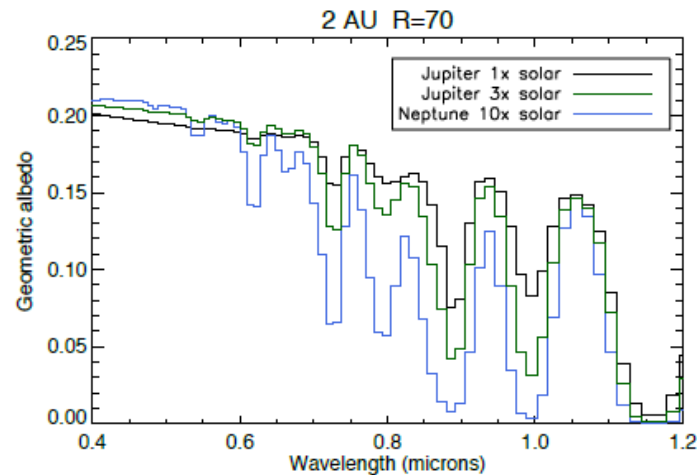
WFIRST-AFTA Coronagraph



WFIRST Coronagraph
Instrument

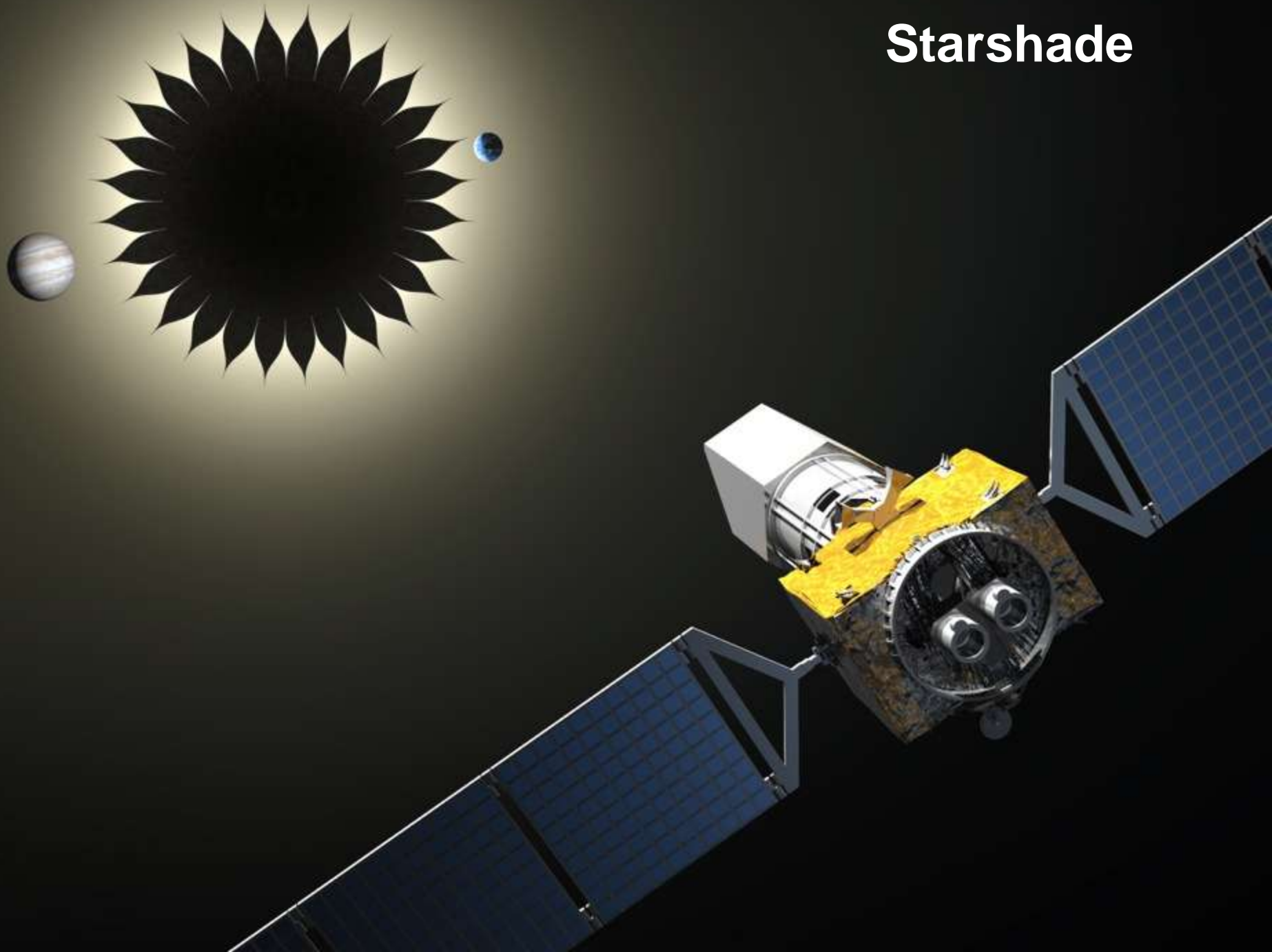


Exoplanet
Direct imaging



Exoplanet
Spectroscopy

Starshade



4 Understanding our Planet



Will sea level continue to rise at the current rate?



Will water availability change in the future?



How are carbon storage and biodiversity changing?

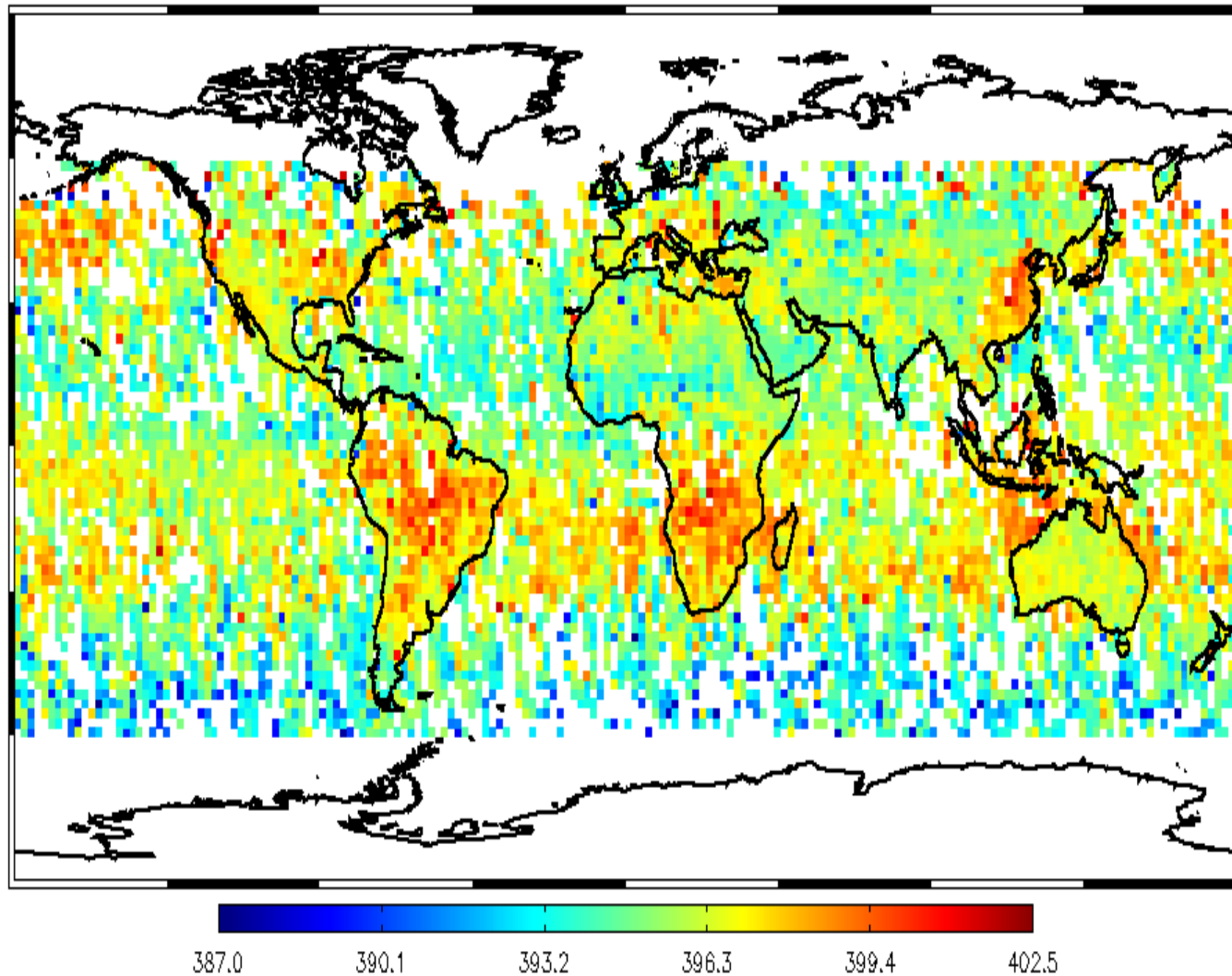


How can we better prepare for extreme events such as earthquakes, floods and hurricanes?

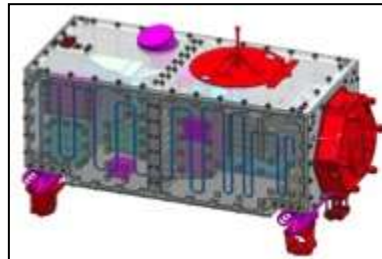
Orbiting Carbon Observatory (OCO-2)



OCO-2 Continues the CO₂ Record



Orbiting Carbon Observatory-3 Launch Possible as Early as 2018



OCO-3 Payload

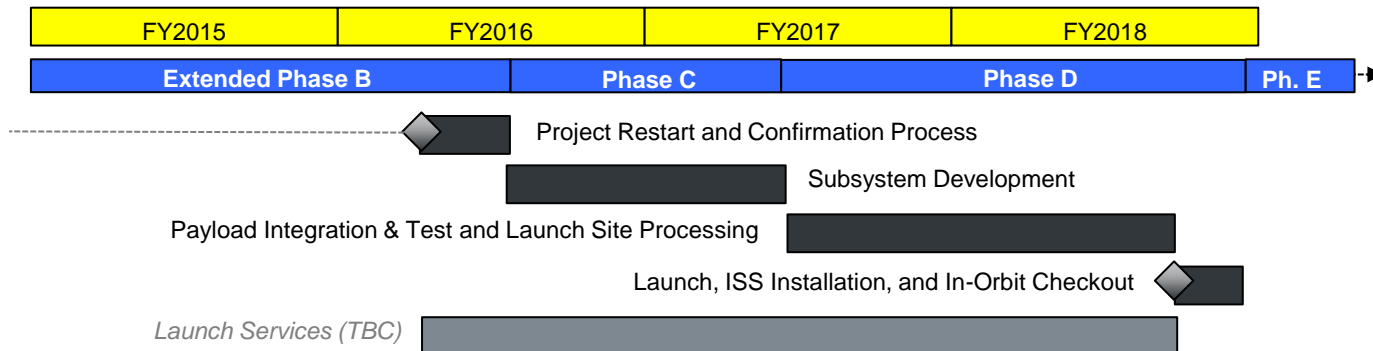


OCO-3 to operate on the ISS

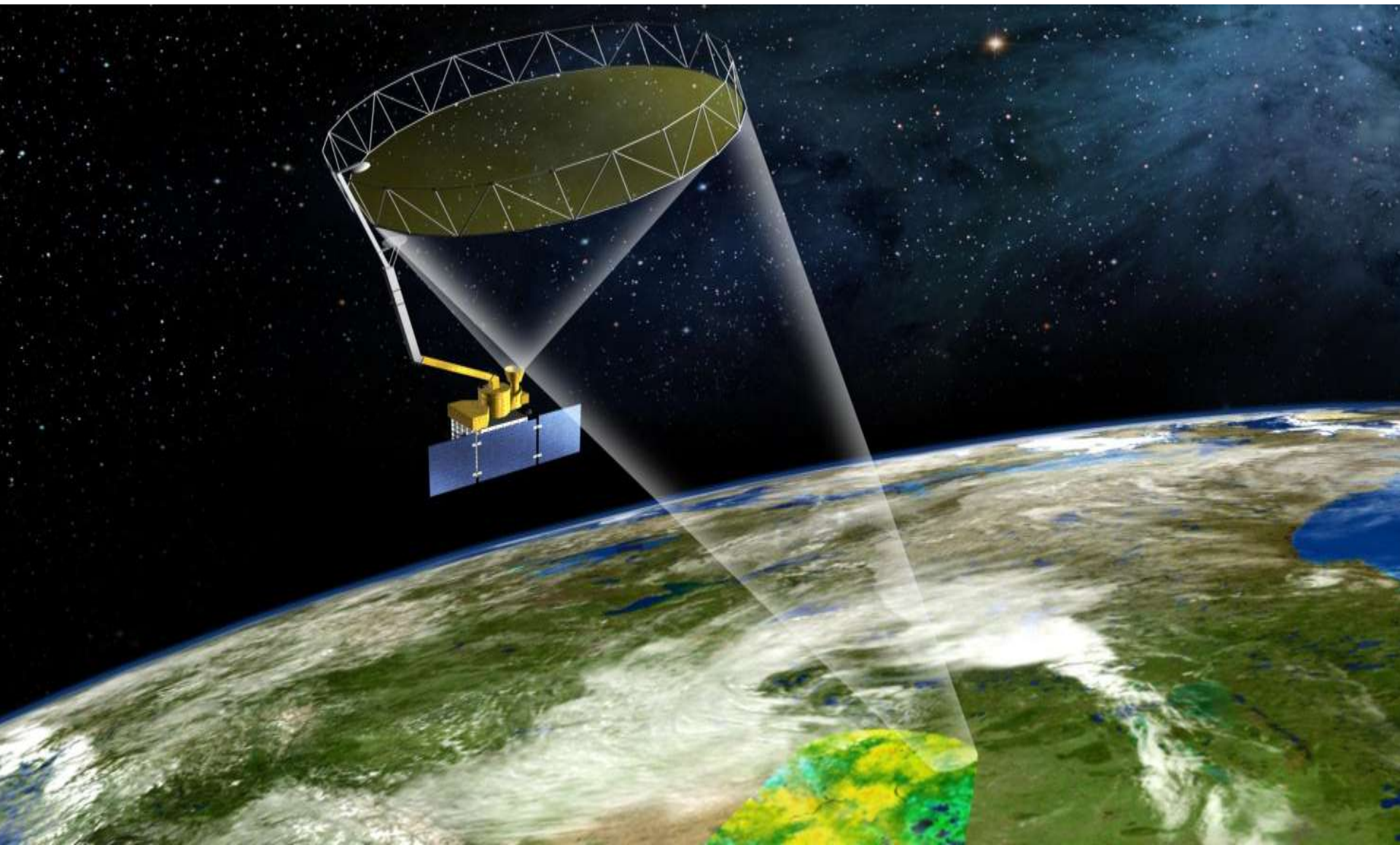


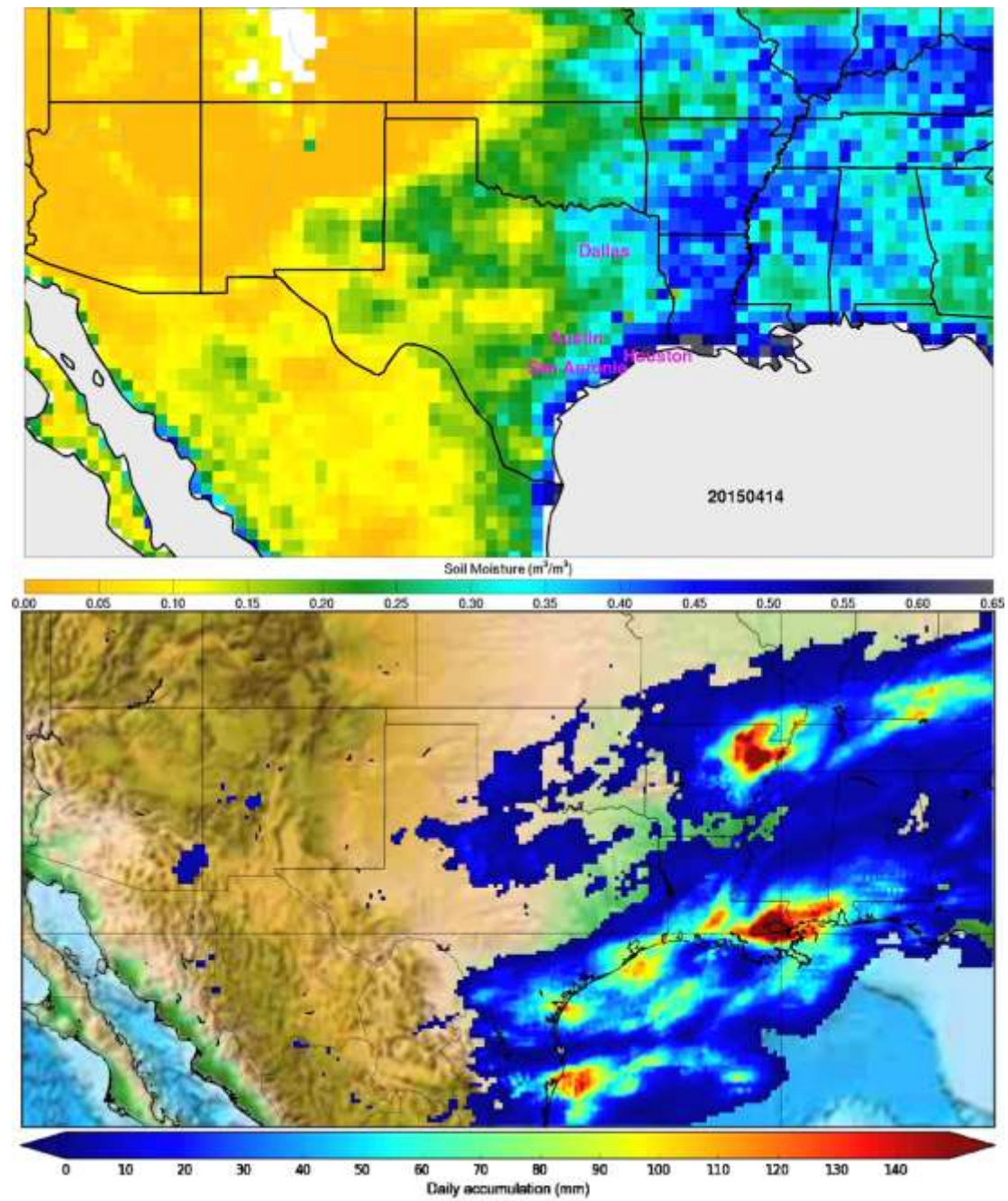
Mapping the LA Basin

Notional Schedule

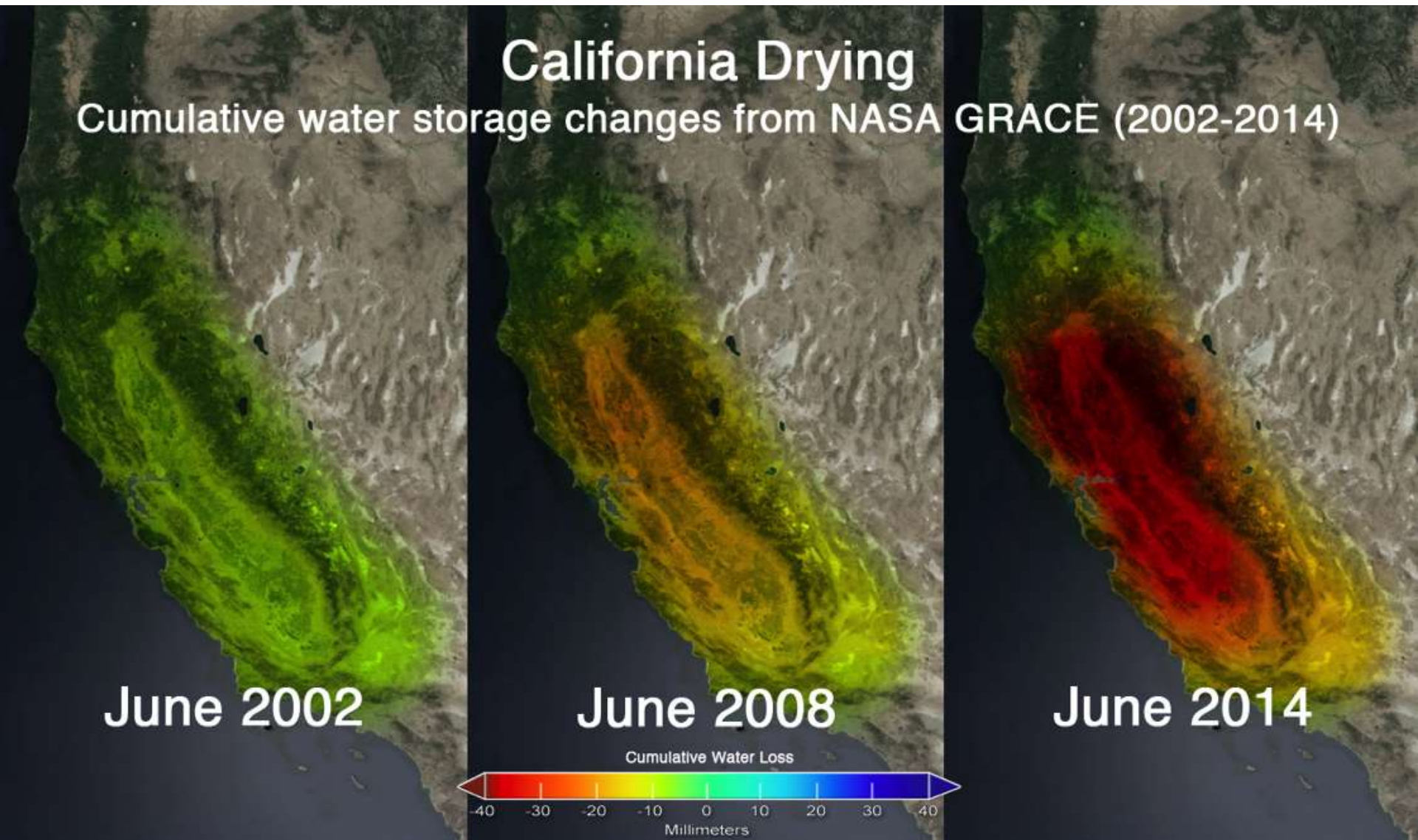


Soil Moisture Active Passive (SMAP)

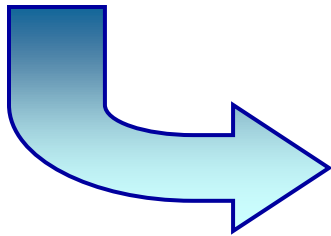
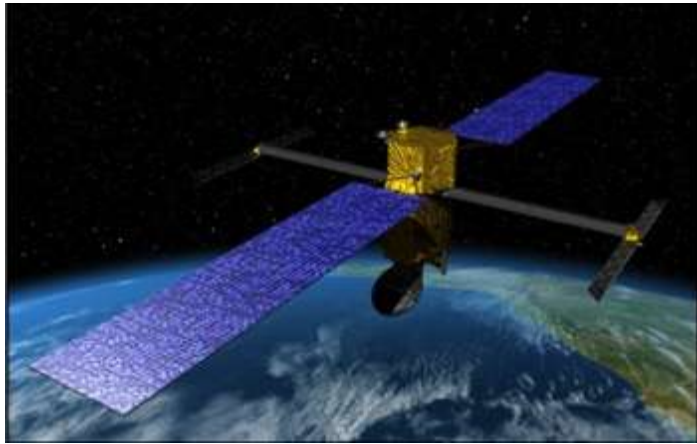




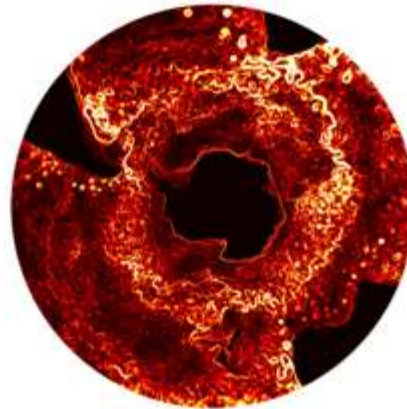
Data from GRACE



Surface Water and Ocean Topography (SWOT)



SWOT will use a Ka-band interferometric SAR with 2 swaths, 60 km each to characterize the ocean circulation at a spatial resolution of 10 km and provide a global inventory of terrestrial water bodies.

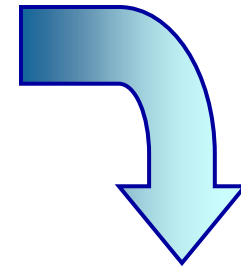


Mesoscale Ocean Circulation

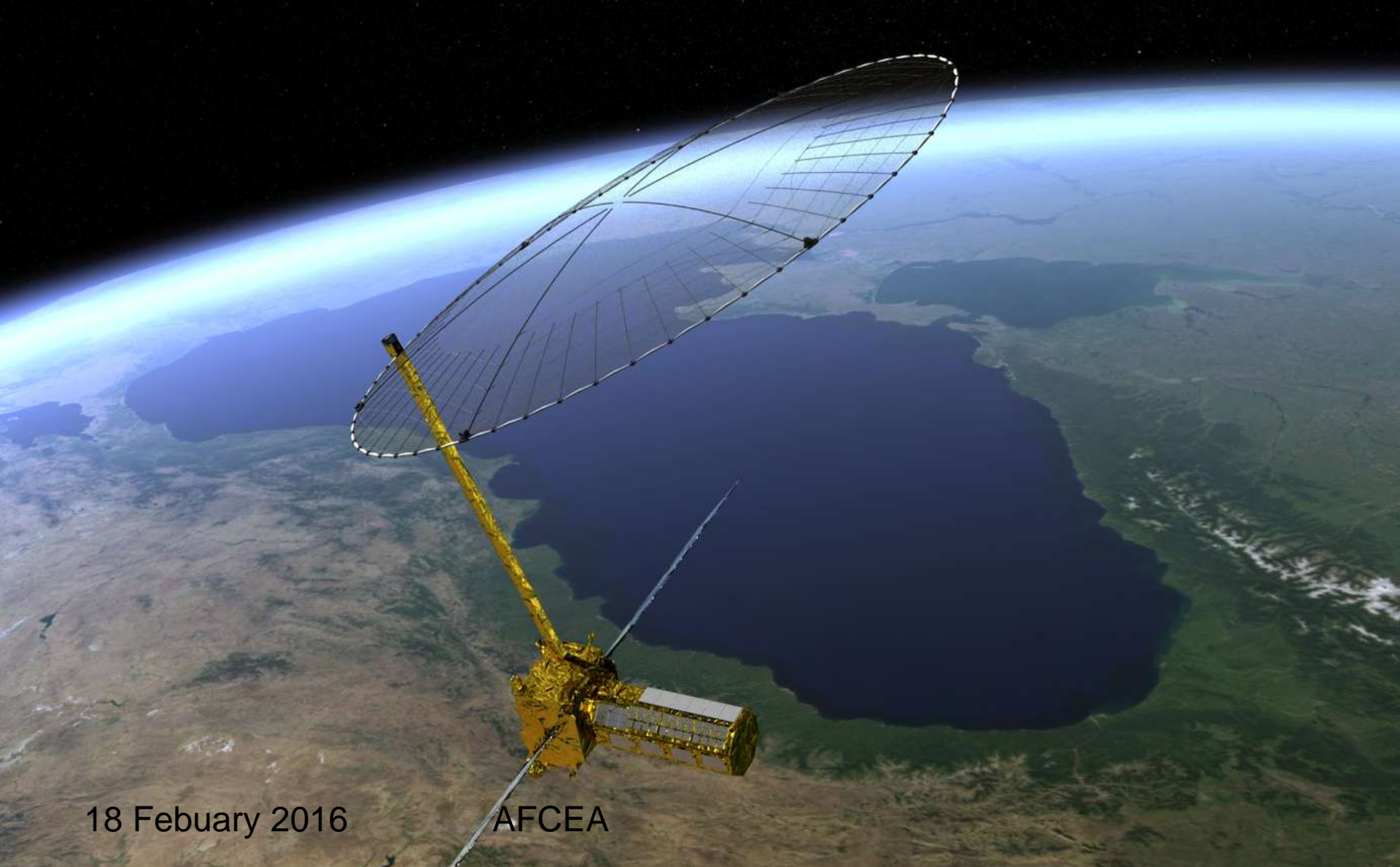


Fresh Water Storage
And Discharge

SWOT measurements will be critical to determining surface water availability, flooding potential, and the ocean's capacity to absorb heat and carbon from the atmosphere.



NASA India Synthetic Aperture Radar (NISAR)

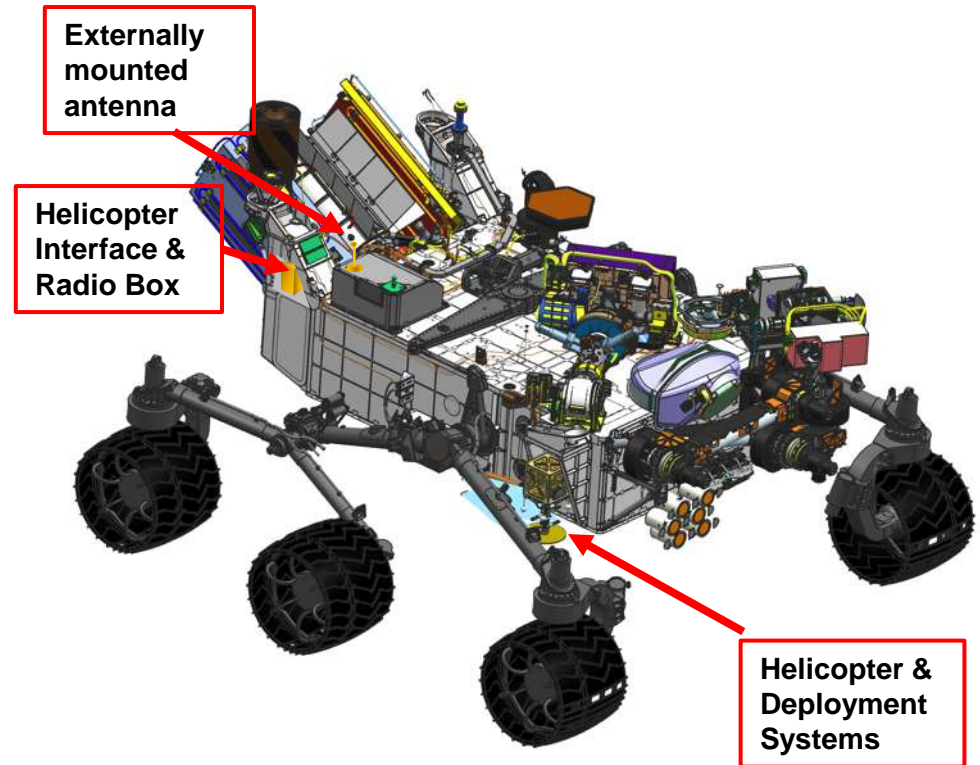


18 Febuary 2016

AFCEA

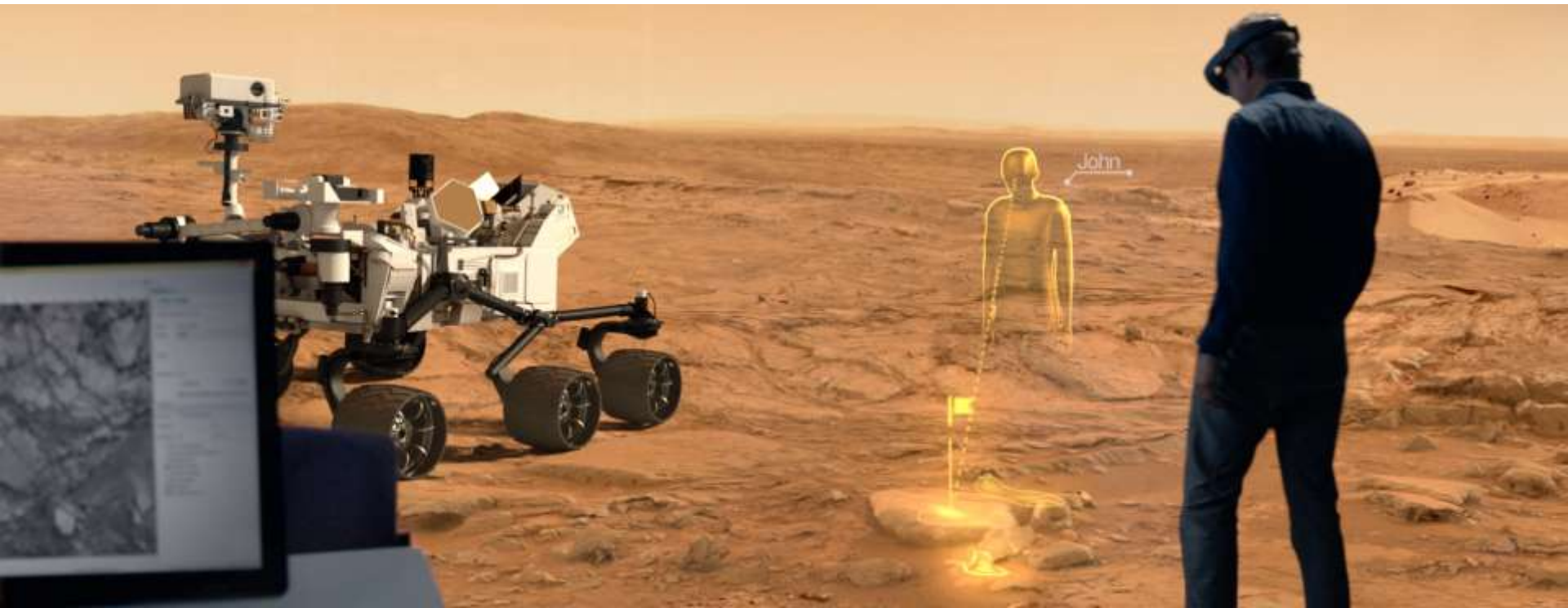
Mars Helicopter

Under consideration for the Mars 2020 payload



Virtual Mars

JPL scientists working collaboratively





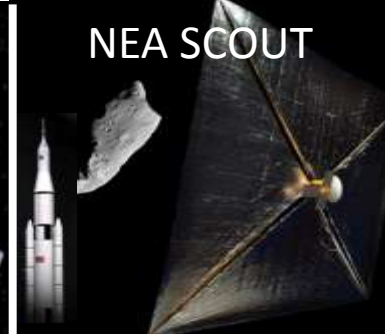
INSPIRE



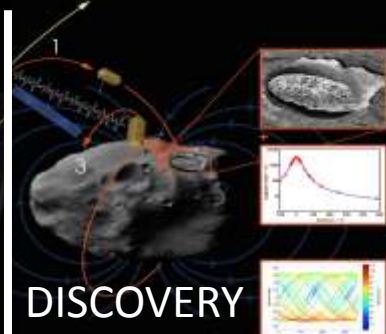
LUNAR
FLASHLIGHT



MARCO



NEA SCOUT



DISCOVERY



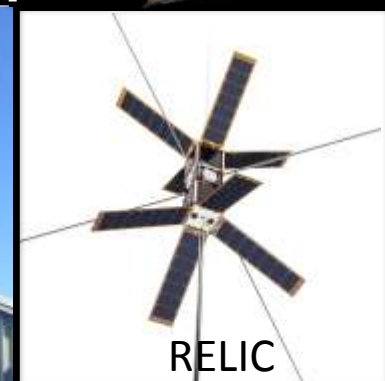
DISCOVERY TDO



MCUBED/COVE2



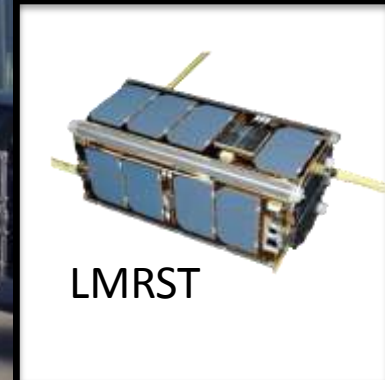
CubeSat Development Lab



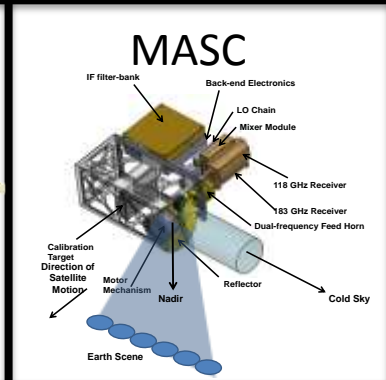
RELIC



NEA DETECTION



LMRST



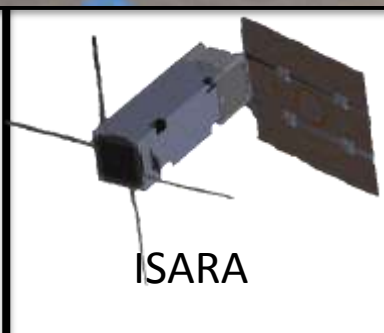
MASC



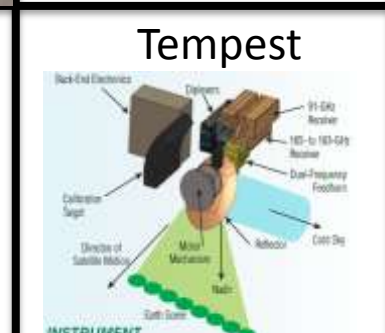
GRIFEX



IPEX



ISARA

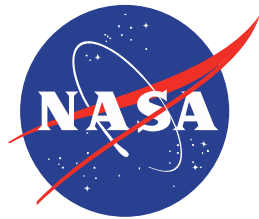


Tempest



RainCube

The Quest



JPL Caltech

Dare Mighty Things