



Planetary Science Vision 2050 Workshop

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NASA Headquarters, Washington DC

Workings of the solar systems

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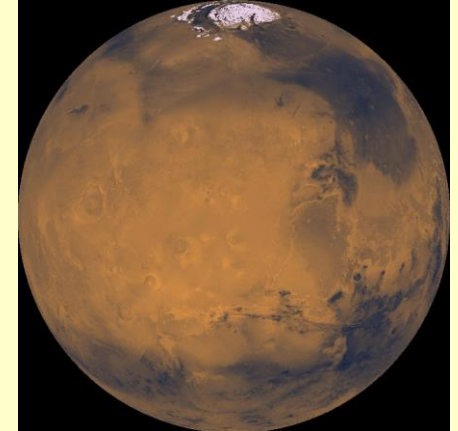
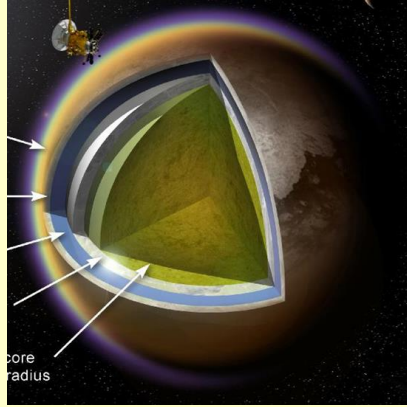
- Presentations
- Panel discussion: Larry Paxton, Jim Garvin, Louise Prockter, Carol Raymond
- Posters
- Print only abstracts

Where will we be in 2050?

- Discovery program
- New Frontiers program:
 - Discoveries from Pluto, Jupiter, and 101955 Bennu
 - 7 targets after VV → 35 years of planned missions
 - Responsive to discoveries → 8 targets (OW added)
- Flagship mission:
 - Mars2020 – Europa MFM
 - SDT reports out for Ice giants and Europa lander
 - MSR post Mars2020
- Discoveries of 1,000s of exoplanets, and exoplanetary systems
- New workforce – train and mentor the future workforce
- International cooperation
- New technologies applicable to robotic exploration

Comparative planetary science

Compare climates on different planets



Rocky planets, gas giants, and ice giants

**Study a planet as an integrated system:
magnetosphere - atmosphere – surface – interior**

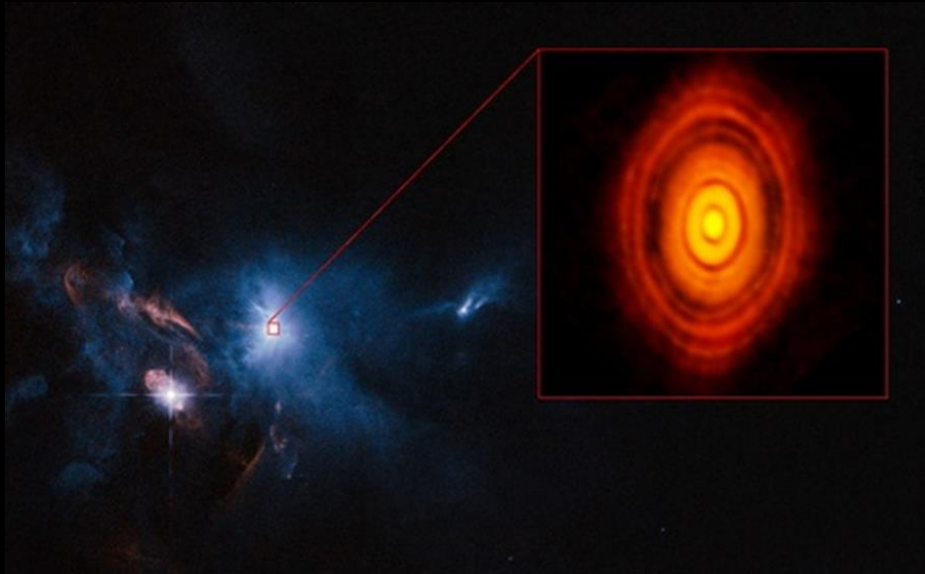
Some points (not exhaustive)

- Understand the role of giant planet migration on the formation of the inner planets
- Origin of water on Earth
- Diversity of asteroids-comets
- Chemical heterogeneity of the solar nebula
- Lunar science with robotic missions and human exploration
- Information on the interior structure of planets is required to understand their formation and evolution
- Compare tectonics of rocky planets – why plate tectonics on Earth?
- Sample returns to terrestrial labs (Asteroid, comet, Mars, Moon, OW, ...)
- Understand planets in our solar system to understand the exoplanets (Venus versus Earth 2.0, Ice giants versus mini Neptunes, ...)
-
- Cost of missions – how much is labor compared to process ?
- What science questions can be answered with cube-sat class missions?
- Telescopes
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Is there life somewhere else in the Universe?

← Extra-solar habitable planets

→ Life in icy moons



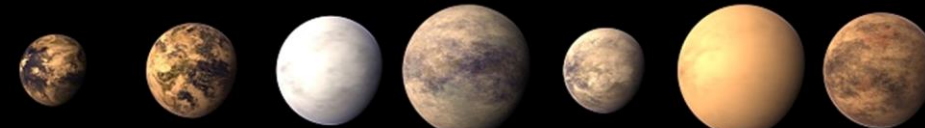
Current Potential Habitable Exoplanets

Compared with Earth and Mars and Ranked in Order of Similarity to Earth



#1	#2	#3	#4	#5	#6	#7
0.92	0.85	0.81	0.79	0.77	0.73	0.72

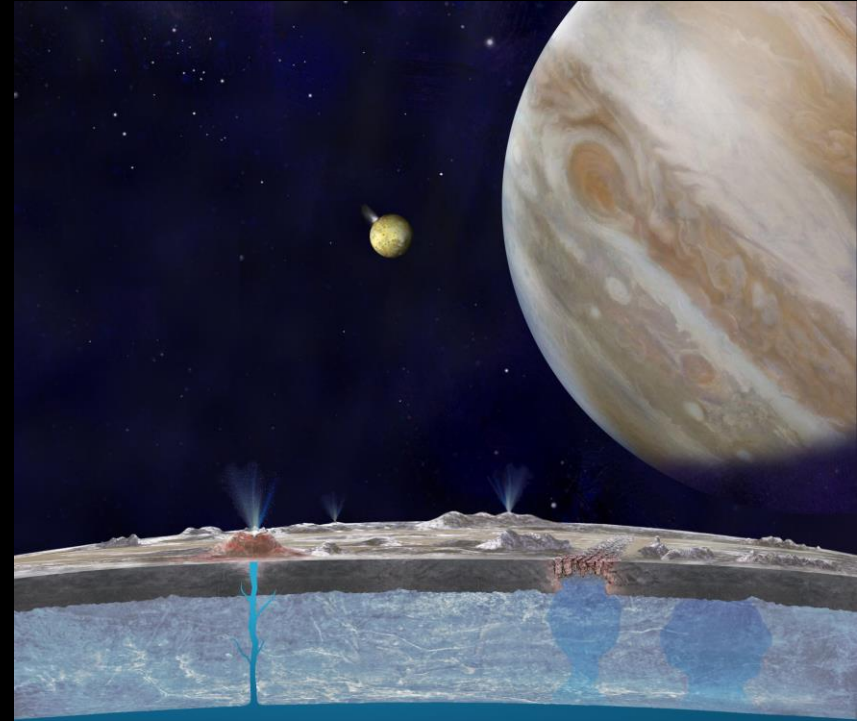
Earth Similarity Index



Gliese 581 g* Gliese 667C c Kepler-22 b HD 40307 g* HD 85512 b Gliese 163 c Gliese 581 d

Discovery Date

Sep 2010 Nov 2011 Dec 2011 Nov 2012 Sep 2011 Sep 2012 Apr 2007



vision 2050

Integrate solar system observations
our understanding of the formation
evolution of planetary



Wo