NASA’s Planetary Science Missions Present and Future Plans

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Planetary Science missions have revolutionized our understanding of the origin and evolution of the solar system. Planetary scientists are also enabling human space exploration by studying and characterizing planetary environments beyond Earth and identifying possible resources that will enable safe and effective human missions to destinations beyond low Earth orbit. Robotic explorers are gathering data to help us understand how the planets formed, what triggered different evolutionary paths among planets, what processes are active, and how the Earth formed, evolved, and became habitable. To search for evidence of life beyond Earth, we’ve used this data to map zones of habitability, studied the chemistry of unfamiliar worlds, and revealed the processes that lead to conditions necessary for life. In addition, we have significantly increased our ability to detect, track, catalog, and characterize near-Earth objects that may either pose hazards to Earth or provide destinations and resources for future exploration.

NASA’s Planetary Science Division (PSD) and space agencies around the world are collaborating on an extensive array of missions exploring our solar system. NASA has always encouraged international participation on our missions both strategic and competitive and other Space Agencies have reciprocated and invited NASA investigators to participate in their missions.

NASA PSD has a fleet of assets and partnerships that are focused on the exploration and understanding of the Solar System. Indeed, we are living in a golden age of discovery with a large number of operating missions ranging from orbiting Mercury to heading for beyond Pluto.

In my talk I will present an overview of current and possible future PSD missions. As we have we just launched OSIRIS-Rex, and announced the Discovery Program selections, we continue the implementation of the New Frontiers mission and the InSight mission. As our present fleet of missions continue to provide immense amounts of data from the Moon, Mars, and all the way to Pluto, we continue work to deliver NASA's contributions to fly on international missions such as ESA's JUICE mission consisting of one U.S.-led science instrument and hardware for two European instruments: the radar, ultraviolet spectrometer, and the particle environment package.

Future NASA Mars missions include NASA’s InSight lander designed to study the Mars interior and the Mars 2020 rover that will produce rock cores from a geologically diverse sight for potential future return. In addition to the strong international scientific program at Mars, NASA is developing the capabilities needed to send humans to Mars in the 2030s and beyond.

The exploration of the outer Solar System has recently revealed remarkable information regarding “ocean worlds” such as Europa and Enceladus, which have oceans or seas of liquid water beneath their icy surfaces. The Cassini mission has discovered vast oceans of liquid hydrocarbons on Saturn’s moon Titan and a submerged salt-water sea on Saturn’s moon Enceladus. Titan also has seas and lakes of liquid methane/ethane on its surface. With these new discoveries, small worlds have become a primary focus in the search for possible life elsewhere in the Solar System.

But regardless of the destination, international partnerships are an excellent, proven way of amplifying the

scope and sharing the science results of a mission otherwise implemented by an individual space agency. The exploration of the Solar System is uniquely poised to bring planetary scientists, worldwide, together under the common theme of understanding the origin, evolution, and bodies of our solar neighborhood. In the past decade we have witnessed great examples of international partnerships that made various missions the success they are known for today. As Director of Planetary Science at NASA I will continue to seek cooperation with our strong international partners in support of planetary missions.

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