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Congress of the United States
House of Representatives
Washington, DC 20515

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House Committee on Appropriations
Subcommittee on Commerce, Justice, Science, and Related Agencies
H-310 The Capitol
Washington, DC 20515

Chairman Culberson, Ranking Member Serrano, and Members of the Committee,

Thank you for considering my testimony in strong support of the National Aeronautics and Space Administration (NASA). Specifically, I request $2,234,700,000 in funding for the Planetary Science Mission Directorate and support for all ongoing and upcoming missions taking place at the Jet Propulsion Laboratory (JPL). JPL, operated by the California Institute of Technology (Caltech), has represented the vanguard of American space exploration and research since 1958 – the first time an American craft reached space – and continues to make groundbreaking discoveries that pave the way for mankind's exploration of our solar system and beyond.

This year marks the 60th anniversary of Explorer 1, America's first entry into space, built by JPL/Caltech before the establishment of NASA. The satellite carried history's first science experiment to occur in space, confirming the existence of the Van Allen radiation belt around Earth. Since then, JPL has been responsible for many of mankind's most impactful achievements in space exploration. The Voyager Mission – humanity's deepest venture into the universe – continues to provide data from interstellar space over forty years after its launch. Galileo, which plunged into Jupiter's crushing atmosphere on Sept. 21, 2003, changed our

understanding of the solar system when it discovered the possibility of a vast ocean beneath the icy crust of the moon Europa – a body JPL will explore in the next decade. In September 2017, we witnessed the "grand finale" of the Cassini mission to Saturn and its moons. The spacecraft discovered seven moons, measured Saturn's rotation, and became the first craft to orbit the planet.

Robust federal funding is critical to JPL's mission of continuing their groundbreaking Mars exploration missions. When JPL's Pathfinder rover landed on the surface of Mars in 1997 as part of NASA's Mars Exploration Program, the United States became the first country to successfully navigate the surface of the red planet. Since then, JPL has conducted over twenty years of uninterrupted Mars exploration. Mars exploration missions study the planet's climate and geology, and have even found evidence that water once flowed abundantly. These discoveries lay the groundwork for a manned mission to Mars in the future. In May 2018, the InSight spacecraft will take the pulse of Mars, drilling below the planet's surface to measure heat flow and listening for quakes with the first seismometer to travel beyond Earth. Mars 2020, NASA's next Mars rover mission, will collect surface samples to cache in advance of the future Mars Sample Return mission.

JPL's discoveries are not limited to our planetary neighbors. The Gravity Recovery and Climate Experiment (GRACE) mission tracks water flows from Earth's orbit by measuring gravitational pull of water. Its data was instrumental in helping California monitor subsidence and water usage during one of the state's worst droughts in history. The twin spacecraft gathered precise data about glaciers, aquifers, and other water sources by measuring how the water's fluctuating mass affected passing satellites. GRACE's data increased the accuracy of

environmental forecasting and monitoring worldwide, and its successor, GRACE-FO, promises to continue and deepen that legacy.

Federal investment in space exploration results in wide-reaching impacts far beyond NASA. Technologies developed at JPL have applications here on Earth, spurring development through spinoffs and technology transfers. Here are some examples:

1. The complementary metal oxide semiconductor (CMOS) image sensor, developed by JPL scientist Eric Fossum, would become NASA's most used spinoff technology. The technology now dominates the digital imaging industry and is responsible for cell phone cameras and high-definition video.
2. JPL's Airborne Snow Observatory (ASO) provides accurate estimates of the amount of water in California's Sierra Nevada snowpack, and measures the rate of water runoff using remote sensing technology. The technology provides real-time, high resolution maps to complement manual measurements.
3. JPL's FINDER, or Finding Individuals for Disaster and Emergency Response, enables first responders to rescue victims trapped beneath rubble after disasters like earthquakes. The suitcase-size device uses low-power microwave radar to detect breathing and heartbeats, even beneath several feet of debris and rubble. FINDER can even distinguish between humans, animals, and mechanical movement.
4. JPL's development of precise GPS measurements enabled John Deere to build the first autonomous tractors for consumers. Self-guiding tractors now work an estimated one-third of all farmland in North America.

5. JPL developed the technology behind the infrared thermometer while building the Infrared Astronomical Satellite (IRAS). The thermometer technology resulting from that mission is now ubiquitous in doctors' offices and households worldwide.

Your continued support for NASA science missions will ensure American leadership in space, science, and exploration. The next generation of discoveries depends on strong funding, so I urge you to recognize the important work being done at JPL and NASA space centers across the country by appropriating the funds they need to carry out their work.

Sincerely,

Judy Chu

Judy Chu

Member of Congress