Human Space Exploration Update ***(September 6-23, 2016)***

2016 Election

- **Clinton and Trump on Space:** Clinton supports human Mars exploration Presidential contender Hillary Clinton pledged support for the human exploration of Mars in response to a questionnaire from ScienceDebate.org. Clinton did not elaborate on possible changes to current strategy that calls for a human presence in the Martian environs by the mid-2030s. Rival Donald Trump expressed support for a strong space program, but did not elaborate on Mars as a goal.

- **Stay the Course on Space:** Bill Nye to Trump, Clinton: Stay the Course in Space Bill Nye, CEO of the Planetary Society and widely known as the Science Guy, urges presidential candidates Hilliary Clinton and Donald Trump to stay the course with NASA and space hardware developments that enable future human deep space exploration and other planetary science missions.

Congress

- **NASA Authorization Bill:** Senate panel authorizes money for Mars mission, shuttle replacement In a bid to stabilize the nation's civil space endeavors across a transition in U.S. presidential administrations, the Senate Commerce Committee has passed a bipartisan measure that authorizes a $19.5 billion 2017 budget to continue work on a human Mars mission and efforts to send astronauts on private rockets launched from U.S. soil to the International Space Station. The measure, the NASA Transition Authorization Act of 2016, is expected to pass once it reaches the full Senate.

- **Rep. Bridenstine on Commercial Space:** Bridenstine: Legislation Necessary to Regulate New Types of Commercial Space Activities Rep. Jim Bridenstine urges compliance with the 1967 Outer Space Treaty as part of U.S. regulation of future commercial space activities, including asteroid mining activities.

- **Rep. Babin on Commercial Space:** Babin Wants Regulatory Rethink for Commercial Space Rep. Brian Babin, chair of the U.S. House space subcommittee, urged a re-thinking of efforts among policy makers to regulate commercial space ventures. Babin, who spoke to a gathering of the Commercial Space Flight Federation, expressed concerns excessive regulation could stifle innovation or smother creativity.

International Space Station

- **Tool Competition for ISS:** Design a 3-D Printed Tool for Astronauts to Use Aboard the Space Station The ISS Design Challenge, sponsored by Mouser Electronics, offers an opportunity for college students to suggest tools for International Space Station astronauts. Top concepts could be manufactured with 3-D printing hardware aboard the six person orbiting science laboratory. Canadian astronaut Chris Hadfield, a previous space station commander, will be among the judges.

- **Health Care Research in Space:** What are the long-term health effects of living in space? NASA is studying twins Mark and Scott Kelly to find out NASA's twins study could reveal changes to humans working in a low gravity space environment that were too subtle to recognize previously. The subjects are retired NASA astronaut twins Scott and Mark Kelly. Scott returned to Earth on Mar. 1, after a U.S. record-setting 340 days in space. Scientists are comparing Scott and Mark down to the genetic level in order to help prepare future astronauts for month's to year's long missions to deep space destinations.

- **Astronaut Speaks to Young Cancer Patients:** It's An Amazing World Of Discovery Up Here: NASA Kate Rubins To MD Anderson Children NASA's Kate Rubins, an astronaut aboard the International Space Station and a biologist, spoke with young patients at the University of Texas MD Anderson Cancer Center. Rubins wore a special space suit for the occasion, one painted in bright colors by several of the patients. Asked by one of the patients what it takes to become an astronaut, Rubins replied, "You need to be curious and motivated for discovery and for research. There's so much to discover up here."

- **Kelly Speaks on Space:** Kelly shares his perspectives on space, environment during Trinity speech Astronaut Scott Kelly, who holds the U.S. record for the longest spaceflight, 340 days, was a guest at Trinity University. In a talk with students, Kelly said the record-setting flight that ended Mar. 1 offered him a new appreciation for gravity and the Earth's beauty. "We take care of our Space Station in space because it keeps us alive," Kelly told his audience. "I think we need to do that on Earth, too." (See also: Astronaut Scott Kelly's year in space to be developed as movie)

Orion and Space Launch System

- **Orion Heat Shield at KSC:** Orion heat shield arrives at Kennedy Space Center The heat shield for the late 2018 test flight of NASA's Orion crew exploration capsule is now at NASA's Kennedy Space Center launch site for integration. The upcoming uncrewed test flight, Exploration Mission-1, will send Orion around the moon and back to Earth for a Pacific Ocean recovery. Orion is under development to start U.S. explorers on future deep space missions. (See also: Orion heat shield for next space flight arrives at Kennedy and NASA's Orion Space Capsule on Course for 2018 Trip Around the Moon)

- **Orion Abort Motor Test:** Aerojet Rocketdyne tests Orion abort system jettison motor The powerful jettison motor Aerojet is developing for the NASA/Lockheed Martin Orion capsule generated 45,000 pounds of thrust during an Aug. 31 ground test in Rancho Cordova, Calif. Orion is in development to launch astronauts on future missions of deep space exploration. During the launch phase, the spacecraft ascends under an abort motor designed to propel the capsule and its crew away from a launch vehicle emergency. The jettison motor lifts the abort motor and a protective shell from Orion after first stage separation during nominal flight.

- **SLS Engine Tests:** Educating the SLS engines Brains for the RS-25s undergoing certification NASA and its contractors are approaching a critical moment in the qualification of the first stage engines assigned to the Space Launch System exploration rocket. The engines are based on those that launched the space shuttle. They are undergoing ground tests at NASA's Stennis Space Center in Mississippi. The ground tests are qualifying an advanced engine controller for the SLS. The first test flight of the SLS, NASA's Exploration Mission-1, will pair the rocket with an uncrewed Orion capsule. Liftoff is planned for late 2018.

Commercial Space Transportation

- **ISS Resupply:** Company sets October launch date to resupply space station NASA and Orbital ATK have set Oct. 9-13 as the launch period for the Dulles, Va.-based company's next NASA-contracted re-supply mission to the International Space Station. The mission will mark Orbital

ATK's return to NASA's Wallops Island Facility on Virginia's Eastern Shore as a launch site. It will re-introduce the company's Antares launch vehicle with a new Russian manufactured main engine as well.

- **Emphasis on Crew Safety:** Commercial crew companies emphasize safety over schedule Representatives from Boeing, SpaceX and NASA's Commercial Crew Program pledge safety over schedule in their efforts to develop U.S. commercial launch services for astronauts assigned to the International Space Station.

Space Budgets, Policy, Missions, Benefits, International …

- **Asteroid Redirect Mission:** NASA provides update on Asteroid Redirect Mission While the U.S. Congress doubts the value of NASA's Asteroid Redirect Mission, some policymakers and planners remain steadfast to the contributions it could make to human deep space exploration, science and fending off near-Earth asteroids with the potential to impact the Earth. ARM would visit an asteroid, robotically extract a boulder and maneuver the big rock into orbit around the moon. Astronauts launched in an Orion spacecraft atop a Space Launch System rocket would visit the boulder and gather samples for return to Earth.

- **Exploring Mars:** Path to Mars Should Be Flexible, Experts Agree In remarks before a recent AIAA gathering in Long Beach, Calif., Bill Gerstenmaier, NASA's associate administrator for Human Exploration and Operations, and others involved in the planning, called for flexibility in the space agency's efforts to reach the Martian environs with humans. The flexibility will enable them to best deal with health risks, establish the best propulsion strategies and overcome other obstacles, said Gerstenmaier and others involved in a panel discussion. (See also: How We Can Finally Get to Mars and The best reason to go to Mars)

- **Red Mars Initiative:** NASA to have limited role in SpaceX's planned Mars campaign NASA intends to serve as a consultant to SpaceX's ambitious "Red Mars" initiative, a private sector attempt to land an unmanned spacecraft on the Martian surface as soon as 2018. In return, NASA hopes for data on supersonic retro propulsion, a technique for slowing a spacecraft as it enters the Martian atmosphere ahead of the descent and landing phases. NASA hopes to use supersonic retropropulsion to land U.S. explorers on Mars in the future.

- **China's Space Program:** Chinese space station sighted China's Tiangong-2 Earth-orbiting space lab has been sighted by ground observers. China plans to launch astronauts to the orbiting science lab next month. (See also: China's race to space domination and China Exclusive: China to begin building space station in 2017: chief engineer)

- **Blue Origin Rocket:** Jeff Bezos unveils details of new Blue Origin rocket Blue Origin's New Glenn rocket, named in tribute to the first American to orbit the Earth, Mercury astronaut John Glenn, will feature two and three stage versions powered by natural gas and liquid oxygen fueled rocket engines, the BE-4. Both version are intended to boost humans as well as payloads on orbital missions. (See also: Why Bezos' rocket is unprecedented and worth taking seriously)

- **Mars Exhibit at KSC Visitors Complex:** Moon-walker Aldrin hopes exhibit will inspire future on Mars Destination Mars, a new exhibit at the Kennedy Space Center Visitor Complex in Central Florida, opens to the public. Apollo 11's Buzz Aldrin joined a preview this weekend to express his support for the exhibit developed with help from Microsoft and NASA's Jet Propulsion Laboratory. The exhibit includes Martian vistas obtained by NASA's Curiosity rover.

***Citizens for Space Exploration** – a pro-space, taxpayer, grassroots advocacy group (www.citizensforspace.org) – has travelled to Washington, D.C. the past 24 years to meet face-to-face with Members/staff of Congress to discuss the value of America's investment in space exploration. In*

order to sustain that dialogue on a regular basis, Citizens distributes "Space Exploration Update" to Congressional offices on a weekly basis. The intent is to provide an easy, quick way to stay abreast of key human space exploration program and policy developments.