As Prepared

STATE OF NASA REMARKS

ACTING ADMINISTRATOR ROBERT LIGHTFOOT

Feb. 12, 2017

Thank you Todd. It is always great to be back here at Marshall. I appreciate your leadership of Marshall and the continued engagement by you and the rest of the Agency leadership team, who have been so valuable to me during this past year in helping lead this great Agency.

To everyone here in the room and tuned in at the Centers, I thank YOU for being here today. I remain truly amazed at what you

accomplish each day, and it is simply humbling to lead this team – AND the best place to work in government for large agencies for SIX STRAIGHT YEARS!

Today, I am pleased to present the highlights of the proposed 2019 budget for NASA. The President's budget request for Fiscal Year 2019 released today provides $19.9 billion for NASA. It reflects the Administration's confidence that America will lead the way back to the Moon and take the next giant leap from where we made that first small step for humanity nearly 50 years ago.

This budget focuses NASA on its core exploration mission and reinforces the many ways that we return value to the American people through knowledge and discoveries, strengthening our economy and security, deepening partnerships with other nations, providing solutions to tough problems and inspiring the next generation. This budget places NASA and the U.S. once again at the forefront of leading a global effort to advance humanity's future in space, and draws on our nation's great industrial base and capacity for innovation and exploration to raise the bar of human potential and improve life across the globe.

This proposal provides a renewed focus to our human spaceflight activities and expands our commercial and international partnerships, and continues our pursuit of cutting edge science and aeronautics breakthroughs at the core of our mission.

In addition to providing continuity in most of our mission areas, there are two new distinct areas of focus specifically around exploration – establishment of a lunar exploration campaign and an innovative approach to accelerate the growth of a low Earth economy.

But before I go into the details of the budget proposal, I want to share how we got to this point, specifically related to these exploration efforts and the overall implications to the Agency going forward.

This budget is the culmination of a lot of work over roughly the past two years by the NASA team establishing key components of NASA's role, not only in the government, but in the world.

I want to thank Andrew Hunter and the CFO/RMO team in the Agency for the tremendous effort on this complex budget.

Andrew has been “acting” just as long as I have, and I can tell you he has been doing a whole lot more than “acting” during this past year. Thank you, Andrew!

Now to how we reached this point. We spent a year getting ready for the transition to a new Administration asking the fundamental question of “why” NASA and what does that “N” or National in our name really mean? We looked at law, policy, and history that capture and define our enduring purpose to Discover, Explore, and Develop.

That effort created the following tenets that we shared with the new Administration, and as you will see, these tenets are woven throughout this budget. Those tenets are:

- Maintaining and expanding U.S. global leadership in space and aeronautics to support national interests, the industrial base, and global influence
- Expanding human knowledge through new scientific discoveries
- Extending continuous U.S. presence deeper into space
- Addressing societal challenges and catalyzing economic growth

- And inspiring a Nation with what we can do, not dwelling on what we can't

We used these tenets working with the Administration to shape NASA's important thread in the fabric of this Nation.

The next big step was the re-establishment of the National Space Council chaired by Vice President Mike Pence. In the first meeting of the council in over 25 years, I was given 45 days to develop a Nationally focused study to have NASA lead:

“An innovative and sustainable campaign of exploration that will lead the return of humans to the Moon for long-term exploration and use followed by human missions to Mars and other destinations.”

This study would become the backbone for the Exploration Campaign called out in Space Policy Directive 1 signed by the President and, as I will explain, codified in the 2019 budget.

While this directive created a renewed focused on a return to the Moon, we had to address many familiar areas.

As most of you know, we've used the International Space Station as the jumping off point or cornerstone for pushing human presence further into space, with a horizon goal of humans to Mars. This includes learning about the human physiology of spaceflight and demonstrating new technologies for systems we will need for further transportation and enabling new industry partners to bring to bear their capabilities and emerge as leaders in their own right to help us on this journey.

You also may remember we have been saying we needed to establish a presence in the area around Moon to prepare for such

a journey. This became our central focus for planning what we are going to do around the Moon in the decade of the 2020's.

In many ways, the work in the decade of the 2020's, in the area around the moon, needed clearer goals and objectives. We also needed to look at how we are going to do this with a good balance of NASA, Industry, and International partners participating in this effort. The Administration's direction ties to a growing recognition of the strategic and economic opportunities that the expansion beyond the Earth's orbit represents.

In short, we are once again on a path to return to the Moon with an eye toward Mars. This time we are leveraging the multiple partners both here at home and internationally in developing a sustainable approach where the Moon is simply one step on our truly ambitious long term journey to reach out farther into the Solar System to reap the economic, societal, and expanding knowledge benefits such an endeavor will bring.

That's where the 45 day study for the NSpC provided us with a platform to clarify and coordinate our plans for exploration at the Moon with the Administration. I believe you will see the

clarification of those objectives in the details of this budget as I lay them out.

I must add here that the seamless alignment across technology, human exploration, science, aeronautics, and mission support between Steve Jurczyk, Thomas Zurbuchen, Bill Gerstenmaier, Jaiwon Shin and Dan Tenney is simply unprecedented and is what has made the details in this budget possible. With Tom Cremins helping pull all of that together, their leadership and commitment to develop a very integrated set of mission objectives TOGETHER has been impressive. As the chair of the Agency Executive Council where these budget decisions ultimately reside,

I am very fortunate to have the advice and counsel of fellow council members Gale Allen, Douglas Terrier, and of course my deputy Krista Paquin.

So, let's dive in to the details.

I will start with Exploration since the direction and priority is clear:

"to refocus existing NASA activities towards exploration, by redirecting funding to innovative new programs and support for new public-private initiatives."

Exploration

For exploration, NASA's budget proposes $10.5B with a primary focus on three areas for our Exploration Campaign – Lunar and Deep Space, Low Earth Orbit Commercialization, and Exploration Research and Technology.

LUNAR CAMPAIGN

Drawing on the interests and capabilities of our industry and international partners, we'll develop progressively complex robotic missions to the surface of the Moon with scientific and exploration objectives in advance of human return there.

The Space Launch System and Orion spacecraft are critical backbone elements of our future in deep space. Their momentum continues this year toward the first integrated launch of the system in fiscal year 2020 around the Moon and a mission with crew in 2023.

SLS core stage hardware is completing manufacturing and preparing to be structurally tested here at MSFC. The large test facilities now dot the horizon as you head into the center and the teams here are ready to go!

Orion, led by the team at Johnson Space Center, continues to make great progress at Kennedy Space Center as it really hits its stride with the large amounts of testing over the next year.

The test team at Stennis is preparing for the integrated test of the SLS core with fours RS-25's. And, the ground systems team at Kennedy is preparing to receive all the hardware while preparing the mobile launcher, VAB, and launch control software. It's an exciting time, with the most development and testing since we've seen since before the first Space Shuttle flight.

In orbit around the Moon, we also will begin to build the in-space infrastructure for long-term exploration development of our

nearest neighbor by launching the power and propulsion element in 2022 to orbit the Moon as the foundation of a Lunar Orbital Platform-Gateway.

This will give us a strategic presence in the lunar vicinity that will drive our activity with commercial and international partners and help us further explore the Moon and its resources and translate that experience toward human missions to Mars.

We are seeing an expanding set of investments and capabilities that can complement, leverage, and build greater opportunities as we pursue our exploration objectives. There is no greater

evidence of that than the Falcon Heavy launch last week and the progress being made by many industry partners that will become part of this journey.

LEO COMMERCIALIZATION

The next area of focus in exploration will be the activities in Low Earth Orbit. While we head to moon and ultimately to Mars, we need to be able to look back and see a vibrant low Earth orbit economy spurred by the work we have done and enabled to date on the ISS.

As such, this budget proposes to stimulate commercial industry opportunities in low earth orbit, providing an off ramp for government led operations.

We'll ramp up efforts to transition low-Earth activities to the commercial sector and end direct federal government support of the International Space Station in 2025 and begin relying on commercial partners for our low Earth orbit research and technology demonstration requirements.

To that end, this budget proposes a $150 million investment in 2019 to encourage the U.S. space industry development of

capabilities for Low Earth Orbit either at the ISS or stand-alone that both the private sector and NASA can use.

This budget also continues to support the Commercial Crew Program – with both providers continuing to make progress toward launching astronauts once again from the United States. This is a critical part of our LEO strategy going forward, and we are pleased to see the support continuing for this effort.

Finally, the budget maintains the space operations support associated with areas like Space Communications, Rocket

Propulsion Test, and Launch Services. All of this is part of our space operations and exploration infrastructure and necessary to conduct all our missions in Exploration and Science – further supporting the burgeoning growth in the Nation's commercial space capabilities.

EXPLORATION TECHNOLOGY

Finally, Agency technology efforts will be combined and refocused toward this Exploration Campaign. A healthy budget line of $1002.7M proposed for Exploration Research and Technology will integrate STMD and technology portions of the Advanced

Exploration Systems. Our investments in technology lay the groundwork for future human and robotic exploration. We're going to invest in a lot of things, from habitat systems to in space propulsion to entry descent and landing technology to name a few.

The Agency will also realign our organizational structure to best meet this new exploration focus. I've asked Steve Jurczyk to lead an effort to design the new organizational approach. Today, we are looking at two options – a single mission directorate that includes LEO/Space Operations, Deep Space Exploration, and Exploration Research and Technology and, a second option that

includes any variation of those lines split into two mission directorates. Steve will report back to me on the proposed organizational structure alignment in the spring.

Science

Now let's move to NASA's critical science portfolio. This budget proposes $5.895B for science.

NASA's incredible science portfolio will continue to increase understanding of our planet and our place in the universe, pursue civilization-level discoveries such as whether or not there is life

elsewhere in the universe, and scout for knowledge to inform future human advancement into space. There will be Mars rover, lander, and sample return missions; diverse Earth and planetary missions; and spacecraft to study the Sun and how it influences the very nature of space. Powerful observatories will study other solar systems and their planets and peer back to the dawn of time through other galaxies.

Our wide ranging science work is enabled on many fronts in this budget, and it will continue to lead the world in its size, scope, and scientific output.

Robotic exploration of the solar system continues strongly, with funding in this budget for the next Mars rover launch in 2020, funding to explore possibilities of returning samples from Mars, and a Europa Clipper mission to fly repeatedly by Jupiter's icy ocean moon Europa.

We'll support a focused Earth science program while still proposing termination of five missions, the same as from last year's budget.

As stated earlier, the Science Mission Directorate will lead the initial lunar exploration efforts in close coordination with the

Human Exploration folks. The budget proposes $200M in 2019 to jump start scientific and lunar resource characterization efforts with small landers as our scouts followed by larger landers that can begin lunar surface mobility and sample return of lunar resources soon thereafter -- potentially through the Lunar Orbital Platform-Gateway.

The budget also continues to fund the work of scientists across the country to research and analyze the data coming from our many spacecraft we have flying today and look ahead to the next missions we need to accomplish to meet the many science objectives in front of us.

We had to make some hard decisions as well in Science, and this budget proposes cancelling the WFIRST mission in astrophysics and redirects those resources to other Agency priorities.

Aeronautics

NASA's work has always strengthened our national security and the economy, and our ongoing research and testing of new aeronautics technologies is critical in these areas. It will help us lead the world in a global aviation economy with increasing benefits worldwide.

This budget maintains a robust investment of $633.9M to improve air traffic management, make progress integrating unmanned systems into the airspace, and fund an experimental supersonic airplane and increase hypersonics research.

Education

Another hard choice we had to make is in Education. The budget redirects funding for a formal Education office to other priorities. However, through our amazing missions, we will maintain a high level of engagement to inspire the next generation to pursue STEM studies and join us on our journey of discovery for many years to come.

I want to thank Mike Kincaid and the Education team for their efforts in this budget cycle.

SSMS and CECR

This budget funds the ongoing operations and restoration of NASA centers, ensures core services are optimized to achieve a safe and healthy workplace, and maintains funding for the independent technical authorities required to reduce risk to human and robotic missions.

It also strengthens cybersecurity capabilities by safeguarding critical data and systems.

At a funding level of $2.749B, our efforts to reform and optimize our agency mission support services will continue to be critical to the long term health of our center capabilities.

It is essential that we continue to make progress in reducing our facilities footprint with the goal of replacing old, obsolete and costly facilities with fewer, more efficient facilities. I applaud the work of our center and agency facilities master planners, who have embraced this vision and developed aggressive, innovative and strategically aligned master plans.

Thanks as well to all of you who have been contributing to the Business Services Assessments and more recently to the Mission Support Architecture Program, which is looking at all the mission support functions to modernize, regionalize, and eliminate duplication across geographic boundaries where possible.

While these efforts are not often as exciting and obvious to those outside the agency as a launch or a new discovery or breakthrough, they are critical to us ensuring the mission support areas are operating efficiently and effectively so maximum resources can go towards our missions.

Summary

In summary, I believe this budget has strong engagement for all of NASA, Academia, Industry, and our International Partners. It is truly the AND scenario that I often discuss, not the OR.

While we had to make some tough decisions, as we always have to do, this 2019 budget sets the stage for an exciting decade of the 2020's where we take our next giant leaps.

To demonstrate that, I believe it is useful to look forward to the end of the decade and see what we can accomplish with this budget. So fast forward with me to 2030…..

In Exploration, we will have crews and a growing number of people from all walks of life working around the Moon and on commercial platforms in low Earth orbit.

We will be leveraging our industry partners to provide services to both lunar vicinity and low earth orbit.

SLS and Orion will be transporting crews routinely to the Lunar Orbital Platform-Gateway, and they will be transiting to and from the lunar surface and preparing to move even further into deep space.

In Science, we will have utilized our lunar scouting missions, and prospecting of lunar resources will be well under way. Samples will be collected on Mars and planning to bring them back to Earth is well underway.

We also have determined if we can generate oxygen from the Martian atmosphere in preparation for future human missions. We will have found countless exoplanets from JWST and TESS. JWST will have provided new insights into the formation of the universe. We will have explored Europa and be well on our way to landing a probe there and possibly found biological evidence of life elsewhere in our Universe.

The science from the Parker Solar Probe will have provided the best understanding ever of our Sun and how space weather impacts us each day.

Our continuous understanding of the Earth has evolved thanks to many satellites and aircraft campaigns feeding our knowledge and helps us manage our increasingly interconnected home planet,

And, finally, OSIRIS-Rex will have returned its sample from Bennu providing us untold insight into another planetary body.

In Aeronautics, drones will be fully integrated into the Nation's airspace based on the system's developed by NASA researchers for our FAA partners. Urban Air Mobility is a common mode of

transportation. And, a new fleet of supersonic passenger planes has hit the skies.

And, NASA, as an institution, has a more integrated and efficient footprint and has transformed its operating model to allow reinvestment of resources back into the mission and mission support areas.

THIS is what we can accomplish with this budget proposal – none of this is out of our reach! It will take all of us – NASA, academia, industry, and international partners -- but we CAN do this. The

Administration has provided us that vote of confidence –

entrusting us with this vision for the Nation's growth and future.

I want the entire workforce to know how much your efforts have

meant to NASA, and to see yourselves in our vision for the future,

and to keep us moving steadily forward.

You always come through. We have one mission success after

another, and we keep moving toward the next challenges.

Together.

AND, because of that, I say the STATE OF NASA IS STRONG!

In closing, what we do is generational AND aspirational. It makes us reach higher than we thought we ever could. It makes us push the limits of our knowledge and ignore those sometimes false boundaries between possible and impossible.

For all of that, what do we get in return? Simply an opportunity to change the world. How cool is that?!?!

It's truly an honor to lead this incredible team, and I look forward to accomplishing these amazing missions. With the confidence

this budget places in NASA and the capabilities of our U.S.

industry, we will solidify American leadership on space.

Thank you all for your service to NASA mission and our Nation!