Statement before the

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Subcommittee on Space

"Are we Losing the Space Race to China?"

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I would like to thank the Committee for the opportunity to testify on a topic of great importance to this nation. This topic is whether we are in a space race with China, but it is also useful to ask whether we have the right strategy for our own space exploration program.

A comparison of the U.S. and Chinese space programs suggests it is better to think of the space activities of each nation as reflecting different political goals rather than as an overt "race." China's space budget is a tenth of NASA's, but Chinese budget figures are opaque, disguise some sources of funding, and do not reflect difference in purchasing power. The U.S. and China are roughly tied in the annual number of launches. The U.S. operates almost three times as many satellites of all types as China, but the number of Chinese satellites is steadily increasing. The U.S. participates with its partners and with the support of Russia, in operating the International Space Station, providing America with a presence in low earth orbit. China has its smaller Tiangong space station program. There is a degree of parallelism in the U.S. and Chinese programs, but with the exception of human space exploration, the two programs are not really comparable.

In fact, it is best in some ways to think of American as having several space programs, including space exploration, human flight, earth observation and, although it is not our topic today, military space programs. In some of these areas, areas, the U.S. remains unmatched in its space capabilities. Unmanned American spacecraft have gone beyond the edge of the solar system. We have launched satellites that have reached speeds no other nation can duplicate, and have robotic spacecraft exploring distant planets in a series of scientific triumphs. No other nation can yet land multiple robots on Mars and operate them for years. Our unmanned space exploration program is unparalleled in its successes.

Things are different when you look at America's human spaceflight program. It is embarrassing that the U.S. has not for years had the ability to put a human in orbit and must rely on Russia. The International Space Station still provides both political and experiential benefits, but the value of the ISS as a platform for research and science has steadily decreased over time and its low earth orbit means it cannot really be considered exploration. The Cold War space race focused on human space flight as the primary metric for success, and the same metric applies to competition with China, so when we talk about a space race, we are talking about human flight, the area of activity where U.S. performance is weakest.

Then there is the issue of Mars. NASA hopes to transfer much of the responsibility for low-earth orbit activities to commercial entities – what some call "entrepreneurial space" - in order to focus its efforts on the exploration of Mars. NASA has settled on human exploration of Mars as the centerpiece of its human exploratory missions. Landing humans on Mars is an impressive goal, but it is beyond our current technological capabilities. If all engineering, propulsion and life support problems that currently prevent a survivable flight to Mars can be solved, the U.S. will probably be able to land humans on mars in fifteen to twenty years (China optimistically hopes to land humans on Mars in the late 2030s). The American timeline assumes steady progress in

resolving the operational problems of a voyage to Mars, but there is no guarantee of success. More importantly, what do we do while we wait?

What we do while we wait is important for answering the question on whether we are in a Space Race with China. The classic space race between the U.S. and the Soviets centered on human spaceflight and, ultimately, landing on the Moon. Each side tried to match and surpass the exploits of the other. Now, it is safe to say that the U.S. does not consider itself in a space race with China. The U.S. may no longer even think of space exploration in competitive terms.

China does not talk of a space race, but there is an unavoidable degree of comparison and competition with the U.S. China's focus in space exploration is on human spaceflight, and its leaders have great interest in this space exploration leading to a lunar landing. The attitude of the American space community towards lunar exploration often seem to reflect a "been there, done that" attitude, that it is not worth repeating the successes of the 1970s. This underestimates the strategic implications of China becoming the only nation with a presence on the Moon. The implications are not military but political. China would gain political advantage on earth by landing on the Moon while we wait to go to Mars.

A disinclination by the U.S. to resume lunar exploration also overlooks the practical consideration that the Moon is much easier to reach with current technology, to explore, and even to establish a permanent presence. Human lunar missions do not face the technical difficulties of a flight to Mars and the creation of a permanent human lunar facility, while difficult, is not impossible and could avoid an outcome where the U.S. has no human presence in space after the ISS is deorbited. The Moon could be an useful test bed for human exploration of Mars, part of a staged campaign of exploration, but there is a concern that lunar missions would divert resources away from the Mars programs. From a scientific perspective, going to Mars is a sensible choice, but the same is not true from a strategic perspective, or from the perspective of getting results from our national investment in space and dealing with China's challenge to the U.S.

There is one other benefit to lunar exploration that is often unremarked. We can land on the Moon and with its light gravity, take off again. If we land on Mars, we have no way with current technology to achieve escape velocity and regain orbit. Perhaps this will change in twenty years, but escaping Martian gravity for a return flight to earth is impossible with current technologies and it would seem impolitic to send explorers to Mars without any chance of bringing them back.

In the U.S.-Soviet space race, the objectives were prestige and global influence. Having "won" the race to the Moon and ended the Cold War, the U.S. lost interest in space as a tool for political influence. In contrast, China's human space program is political. China uses space to gain political advantage and while there are clearly activities related to science and research, the primary purpose for China is to demonstrate power and to show that it has reclaimed its place among the major powers of the world.

President' Xi's support for China's human program will likely continue because the exploratory programs, human and robotic, are important for the image of the Party, which has been damaged by rampant corruption and various public policy failures in environment, investment, and urban planning. The human space program serves an important domestic political purpose as the Party uses it to reinforce its legitimacy as the only institution capable of modernizing China and restoring its greatness.

We should not overlook the symbolism in China's human spaceflights. The Shenzhou 5 space capsule carried seeds from Taiwan in a symbolic assertion of China's sovereignty. The date for the return of China's first manned Shenzhou capsule in 2003 was October 16, the anniversary of when China exploded its first nuclear weapon. This was not a coincidence, but an indicator of how important China sees manned spaceflight for its status and strategy. China's successes in space also reinforce its claims to regional dominance by demonstrating that it is the most advanced Asian nation, with the technology and resources that others cannot match.

China hopes that human spaceflight confirms to its neighbors the validity of China's claim to regional leadership and makes the point to both domestic and global audiences that under the Party's leadership, China has become a world leader with a claim to equal status with the U.S.

Space programs are one way China to assert itself. In this, we should note that China is better at asserting power than leadership. The strategic effect of China's space program on its regional neighbors is unclear, in part because their perceptions of China are shaped more by its assertive foreign policy and its various maritime and border adventures. If there are any countries that believe they are in a space race with China, it is Japan and India, the two other regional space powers. These countries see space as an area of competition with China, with India in particular trying to match Chinese accomplishments. In these regional space races, however, China has a clear lead.

The U.S.-Soviet space race was a competition between two very different systems – communism and democracy. Human spaceflight was an important part of the Cold War contest, proving that market democracies could surpass scientific socialism. The assumption was that the system that won the space race would have showed its superiority. The competition between the U.S. and Chinese systems is in no way as clear cut, but the rest of the world thinks we are in competition. Media attention to the rise of China and the decline of the U.S. is cyclical and usually based on bad data or wishful thinking by those who dislike the U.S., but the differing pace of human exploration in each country forms a part of this narrative of competition and decline.

We could argue that China may be following an outdated recipe for superpower status, but this assumes that space activities have lost their political salience. What is more worrisome than China "winning" any race is the U.S. "losing" from indifference, and what this says about our national capabilities. If human space flight is an assertion by China of its growing power, what does the absence of a human program say about the U.S.? Human spaceflight is one of the

trappings of superpower status. China currently lacks the technological capability to match the U.S. in space, but we lack the ability to put humans in orbit. If China "wins," it will not be because of better technology. It will be because of a better strategy and greater commitment. What we do not want is a tortoise and hare scenario. China is good at setting goals, supporting them with resources, and pursuing them for years. In contrast, there is reasonable concern that the U.S. may have lost its ability to manage large-scale national projects.

We should be clear that Chinese space program is laboriously duplicating U.S. and Soviet exploits in the 1970s and 1980s. It is not breaking new ground and in that sense, this is not a race. But it is also not a race, or not much of a contest, if one country sits on the sidelines for fifteen years while the other makes progress, however plodding. The Chinese say they will land on the Moon, before the U.S. reaches Mars, and while they face serious technical obstacles, their steady pursuit of spaceflight suggests it is very likely they will eventually get there. We tend to dismiss the global political implications of China landing on the Moon while we wait to go to Mars, but Americans may be overconfident in this. If nothing else, when we watch China land on the Moon, we can expect another spate of stories about the U.S. in decline.

China is without doubt challenging the international order that the U.S. and its allies created after 1945. It seeks greater influence and control in Asia and in international institutions. This challenge need not end in confrontation or conflict, but those outcomes cannot be dismissed. Although the U.S. and China are in a quiet competition for military advantage in space, space exploration is so far only a peripheral element in this challenge. However, our performance in space is an important element in how China will judge the value of confrontation or cooperation. What we do not want is a situation where China's leaders decide, as a PLA General allegedly said last year, that the U.S. has "great capability, no will."

This is not a race, but the current state of the U.S. human space exploration program reflects the absence of strategic vision and a strategic imperative for space. The political and diplomatic motives of the Cold War are gone and a focus on space as a purely scientific endeavor cannot replace them. Space has been an area of disinterest by American leaders and this helps to explain the disconnect between exploration and strategic goals and why in any discussion of a space race, the U.S. appears to be lagging.

A good example of this lack of strategic vision is the constant flirting with the idea of cooperating with China in space, a discussion often accompanied by some bromide about how we could cooperate with the Soviets at the height of the Cold War, so why can't we cooperate now with China. This is a frivolous comparison, as the state of relations is completely different. Cooperation with the Soviets came as part of a long series of negotiations on arms limitations and stability. We have no similar negotiations with China, it may not be in our interest to accord China peer status as a negotiating partner, and China evinces no interest in serious negotiation on

strategic issues. Technology transfer in the between the U.S. and Soviets was tightly constrained; in any cooperative effort now, China would gain valuable technology and the U.S. would not. U.S.-Soviet relations had found an uneasy stability when agreement to cooperate in space was reached, but our relations with China have entered a period of deterioration. In any case, the level of cooperation in space with the Soviets rose or fell depending on the state of the political relationship. Cooperation was a tool of diplomacy, not pure science or an end in itself. We may eventually want to cooperate with China, but only when the larger relationship improves and China is more amenable to partnership.

The future of space exploration requires the U.S. to make some difficult choices, including decisions on the targets of human exploration beyond low earth orbit (LEO), the ultimate fate of the ISS, setting the balance between human and robotic exploration programs, and redefining cooperation in space with current partners and perhaps new ones, including China. The larger bilateral relationship with China also requires difficult choices, where we will need to identify areas where cooperation remains possible and can be strengthened and areas where China's behavior must be challenged and changed.

How the U.S. answers these questions will decide not only the pace and the direction of American exploration in space, but the outcome of any space "race" with China. A strong case can be made, however, that in the new and challenging environment for international security, the U.S. would be better served from a strategic perspective by human programs that focused on incremental, pragmatic and achievable goals rather than relying only on a long game that involves huge technological risk and long periods without visible progress.

One question I sometimes ask myself is that if our early space pioneers, people like Werner von Braun, were in charge, what would they do differently in our space program today? The question isn't entirely fair, since the objectives for the pioneers were straightforward – to get things into orbit. Having a clear, achievable, objective was a real benefit to the early space programs. But I wonder if they would be concerned with a lack of vision and even staleness in America's human space efforts. What the space pioneers also might notice is that American space exploration has become a largely scientific enterprise without the political or strategic motives that drove space programs in their time. The same is not true of China. Its space programs, and especially its human program, have both political and strategic objectives.

Since the 1950s, the U.S. has been committed to the peaceful use of space and to promoting the global benefits of space for science and research. These remain central goals for the space program, but not the only goal. A commitment to research and peaceful use does not mean that we can continue to safely ignore the implications and effects of space programs for security and international stability. Space is a tool of national power. China knows this, but it appears that we may have forgotten.

The U.S. had the luxury after 1989 of not facing challenges from major powers. We did not

need to think strategically as we enjoyed a period of strategic stability where the U.S. could without risk pursue foreign adventures or diplomatic agendas that assumed America's global leadership was permanent. This is no longer the world we live in. The last few years have seen challenges to the post-Cold War order and efforts by Russia, China, Iran and North Korea to engage in coercive acts against U.S. interests and even in the U.S. itself. This is not the return of the Cold War, but we are in a period of change and conflict, where a more assertive and directed U.S. foreign policy will be necessary to protect our interests and our nation. Space exploration is part of this. It was a tool of diplomacy and national power used to protect democracy during the first space race. It is time to use this tool again.

I thank the Committee again for the opportunity to testify on whether we are in a space race with China and the right strategy for our own space exploration program and I look forward to our questions.