

Testimony  
of  
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Enhancing the Relevance of Space to Address National Needs  
Subcommittee on Space and Aeronautics  
of the House Committee on Science and Technology

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Madam Chair and members of the Subcommittee, I appreciate the opportunity to appear before you today. My name is Lester Lyles, I am a retired USAF four-star general and during my 35 years with the U.S. Air Force, I served as commander of the Space and Missile Systems Center at Los Angeles AFB in California, director of the Ballistic Missile Defense Organization, vice chief of staff at USAF/HQ, and commander of the U.S. Air Force Materiel Command.

Today, I speak to you as the chair of the National Research Council's Committee on the Rationale and Goals of the U.S. Civil Space Program, which recently released the report *America's Future in Space: Aligning the Civil Space Program with National Needs*. The committee's 14 members included distinguished experts in science, engineering, economics, political science and public policy, national security, and of course, space systems and space exploration.

With your permission, I would like to submit my prepared testimony for the record and summarize my views for you here this morning, leaving sufficient time to answer any questions you may have.

Before addressing the questions posed by the subcommittee, let me summarize our report.

## **CONTEXT OF THE REPORT**

Without a doubt, the first 50 years of the space age have transformed the nation and the world. Astronauts have stood on Earth's moon while millions watched. Commercial communications and remote sensing satellites have become part of the basic infrastructure of the world. Satellites support worldwide communications, providing a critical backbone for daily commerce—carrying billions of global financial transactions daily, for example. Our understanding of every aspect of the cosmos has been profoundly altered, and in the view of many, we stand once again at the brink of a new era. We have discovered that the expansion of the universe continues to accelerate, driven by a force that we do not yet understand and that there are large amounts of matter in the universe that we cannot yet observe. We have discovered planets around other stars, so many that it is ever more likely that there are other Earths comparable to our own.

The next 50 years of civil space will occur in a globalized world of societies and nations characterized by intertwined economies, trade commitments, and international security agreements. Mutual dependencies are much more pervasive and important than ever before. Many of the pressing problems that now require our best efforts to understand and resolve—from terrorism to climate change to demand for energy—are also global in nature and must be addressed through mutual worldwide action.

In the judgment of the Committee on the Rationale and Goals of the U.S. Civil Space Program, the ability to operate from, through, and in space will be a key component of potential solutions to 21st century challenges. As it has before, with the necessary alignment to achieve clearly articulated national priorities, the U.S. civil space<sup>1</sup> program can serve the nation effectively in this new and demanding environment.

In the committee's view, our study needed to address the top-level goals of the civil space program and the connection between those goals and broad national priorities. These connections form a foundation on which the nation, both now and in the future, can devise sustainable solutions to nearer-term issues in the implementation of the civil space program. Therefore, the committee focused on the long-term, strategic value of a U.S. civil space program, and our report does not address nearer-term issues that affect the conduct of U.S. space activities other than to provide a context in which more tactical decisions might be made.

The national priorities that informed the committee's thinking include ensuring national security, providing clean and affordable energy, protecting the environment now and for future generations, educating an engaged citizenry and a capable workforce for the 21st century, sustaining global economic competitiveness, and working internationally to build a safer, more sustainable world. A common element across all these urgent priorities is the significant part that research and development can play in solving problems and advancing the national enterprise in each area. Instruments in space have documented an accelerating decline in arctic sea ice, mapped the circulation of the world's oceans, enabled the creation of quantitative three-dimensional data sets to improve the quality of hurricane forecasting, and created new tools to address a host of agricultural, coastal, and urban resource management problems, to cite only a few examples. Such capabilities demonstrate what can be achieved when technologically challenging space problems stimulate innovation that leads to long-term advances with applications beyond the space sector. Civil space activities are central to the R&D enterprise of the nation, often in a transformational way, and thus present powerful opportunities to help address major national objectives.

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<sup>1</sup> The committee considered "civil space" to include all government, commercial, academic, and private space activities not directly intended for military or intelligence use.

The committee's overall conclusion is that a preeminent U.S. civil space program with strengths and capabilities aligned for tackling widely acknowledged national challenges—environmental, economic, and strategic—is a national imperative today, and will continue to grow in importance in the future

## **GOALS FOR THE CIVIL SPACE PROGRAM**

For the United States to be a strategic leader in a globalized world, its civil space program must be of a breadth, competence, and accomplishment so that U.S. leadership is demonstrated, accepted, and welcomed. The committee identified six strategic goals that it regards as basic for guiding program choices and resources planning for U.S. civil space activities. The goals all serve the national interest, and steady progress in achieving each of them is necessary. These goals address such issues as U.S. leadership in science and technology, understanding climate change and protecting Earth's environment, providing economic and societal benefits, inspiration of future generations, strategic leadership in space, and human spaceflight, and they are articulated in more detail in the written report.

## **FOUNDATIONAL ELEMENTS**

While the breadth of the civil space program has grown, there is also a sense that the program has been unfocused, sometimes at the expense of the effectiveness of the organizations and institutions that support it. The United States can no longer pursue space activities on the assumption of its unchallengeable dominance—as evidenced by the view of other nations that the United States is not the only, or in some cases even the best, option for space partnerships. U.S. leadership in space activities and their capacity to serve urgent national needs must be based on preeminent technical capabilities; ingenuity, entrepreneurialism, and a willingness to take risk; and recognition of mutual interdependencies. The time has come to reassess, and in some cases reinvent, the institutions, workforce, infrastructure, and technology base for U.S. space activities.

The committee identified four foundational elements critical to a purposeful, effective, strategic U.S. space program, without which U.S. space efforts will lack robustness, realism, sustainability, and affordability. Those elements (which are described in greater detail in the written report) are coordinated national strategies, a competent technical workforce, an effectively sized and structured infrastructure, and a priority investment in technology and innovation.

## **RECOMMENDATIONS**

The committee found that, in spite of their promise and utility, components of the civil space program are not always aligned to fully capitalize on opportunities to

serve the larger national interest. Decisions about civil space priorities, strategies, and programs, and the resources to achieve them, are not always made with a conscious view toward their linkages to broader national interests. The committee made recommendations addressing a broad variety of civil space issues, from Earth stewardship to human space exploration to scientific and technological innovation. For the purposes of today's hearing, I would like to highlight two recommendations.

Recommendation 1 states that emphasis should be placed on aligning space program capabilities with current high-priority national imperatives, including those where space is not traditionally considered. The U.S. civil space program has long demonstrated a capacity to effectively serve U.S. national interests. This recommendation provides a broad policy basis on which the committee's subsequent recommendations rest.

Recommendation 7 uses a broader perspective on civil space to highlight that the success of all of the recommendations in the report relies upon the alignment of the various elements of the civil space program.

National space policy too often has been implemented in a stovepipe fashion that obscures the connection between space activities and other pressing needs of the nation. Consequently, senior policymakers with broad portfolios have not been able to take the time to consider the space program in the broader national context. Rather, policies have been translated into programs by setting budget levels and then expecting agencies to manage to those budgets. This has resulted in the much-repeated assertion, with which the committee agrees, that agencies like NASA are being asked to do too much with too little. The committee believes that the process of aligning roles and responsibilities for space activities, making resource commitments, and coordinating across departments and agencies needs to be carried out at a sufficiently high level that decisions are made from the perspective of the larger national issues regarding which space activities play roles. How this process is accomplished might change from administration to administration, but the need for an approach that will elevate attention to the proper level remains essential.

Therefore, the committee's recommendation is that the President of the United States should task senior executive-branch officials to align agency and department strategies; identify gaps or shortfalls in policy coverage, policy implementation, and resource allocation; and identify new opportunities for space-based endeavors that will help to address critical issues now confronting the United States and, to a considerable extent, the world as well.

The effort should include the Assistant to the President for National Security Affairs and the Assistant to the President for Science and Technology, and should consider such elements as budgetary guidance, resource allocation, the space industrial base, the aerospace workforce, long-range technological needs,

international space relationships, elimination of unnecessary duplication of space efforts, and regular coordination of national space strategies and their success in implementing overall national space policy.

U.S. space activities—both national security and civil—are not isolated elements of the national enterprise. They interact with the broader aspects of our nation's commerce, transportation, education, and international relations. Civil space activities always have been, and will continue to be, excellent vehicles for educating future scientists and engineers, promoting positive international relations, and supporting the nation's foreign policy objectives.

At this time, I would like to address the subcommittee's questions.

### **THE RELEVANCE OF SPACE TO NATIONAL NEEDS**

As mentioned above, U.S. space activities are not isolated elements of the national enterprise. Civil space activities, within which the committee includes academic, commercial and private sector activities, are a central part of the nation's research and development portfolio and interact with the broader aspects of our nation's commerce, transportation, education, and international relations

Our report cites numerous examples of the importance of space in addressing important national needs. For example:

- Observations of the Earth from space provide scientists and policymakers with essential data on a wide variety of subjects, from the path and behavior of major storms to the regional consequences of global climate change.
- Space science missions have, among other discoveries, identified new effects that indicate our understanding of the basic laws of physics is incomplete. The impact of this discovery has stimulated research efforts across the country, supported by the National Science Foundation and the Department of Energy as well as by NASA directly.
- The construction of the International Space Station has provided significant experience in leading a large, international engineering project. Lessons learned in this endeavor have important implications in a future that is sure to include more frequent and complex international cooperative efforts.
- Communications satellites are a vital piece of the nation's telecommunications infrastructure.
- The GPS system, though built and operated by the US Air Force, has provided significant civilian benefits and has opened entirely new economic markets.

- Civil space efforts are an important part of the national system of innovation, which forms the basis of our economic strength and lays the foundation for our nation's continued prosperity.

## **MAXIMIZING THE BENEFITS FROM SPACE**

The committee's report provides seven detailed recommendations which, if implemented, will maximize the civil space program's ability to benefit the nation. In particular, I would like to take this opportunity to highlight those recommendations where Congressional leadership could have significant impact.

The committee recommends that NASA should continue its excellent program of scientific exploration and discovery, as a central component of the nation's research and development enterprise. Continued Congressional recognition of the civil space program's role in this area, alongside agencies such as the Department of Energy, the National Science Foundation, and the National Institutes of Health, will help to keep these programs aligned with national goals and objectives.

The committee recommends several areas where NASA and NOAA should work collectively to improve our understanding of the Earth and communicate this knowledge broadly, both domestically and internationally. The Congress could assist in these efforts by continuing to recognize that the two agencies each have vital, complementary roles to play and by providing the necessary resources, guidance and flexibility for the agencies to smoothly transition new capabilities from NASA's R&D environment to NOAA's operational responsibilities.

The committee recommends that NASA establish an independent technology development program, modeled after the Defense Advanced Research Project Agency. This program should be independent of the agency's flight programs and should focus on nascent technologies that could be broadly applicable to the space industry at large. It should support the best ideas and research, regardless of where the research team is found. In the near term, Congressional leadership in the establishment and support of this effort will be crucial for its initial success. Over the longer term, Congressional oversight will undoubtedly be necessary to ensure that the program remains true to these principles in the face of inevitable programmatic and budgetary pressures.

As part of its recommendation on how to use the civil space program to further U.S. strategic leadership, the committee highlights the need for reform of the International Traffic in Arms Regulations (ITAR), in order to prevent the inappropriate transfer of sensitive technologies to our adversaries while eliminating barriers to international cooperation and commerce that do not effectively contribute to national security. Congressional action is essential to this reform effort.

Finally, I would like to emphasize the necessity for the Executive Branch to align agency and department strategies. The committee recommends a broad outline for how this should be accomplished and the range of issues that should be covered. Congressional attention to, and oversight of, this effort will help to ensure that the goal of a maximally and efficiently beneficial civil space program is achieved.

### **DRAWING INSPIRATION FROM SPACE ACTIVITIES**

As the committee states in the report, a space program that achieves its programmatic goals but does not stimulate educational opportunities or inspirational moments would fail to achieve its full potential. The committee did not directly address the most effective ways to motivate future generations, but did point out that a successful space program demands advances in a wide range of activities, from biomedicine to the physical sciences to aerospace engineering.

### **COMMUNICATING THE RELEVANCE OF THE CIVIL SPACE PROGRAM**

The committee believes that the fundamental role that space programs play in daily life has often been overlooked. Discussions of the space program are generally focused on the accomplishments of the 1960's and not on the broad, relevant program that exists today. Though seldom explicitly stated, there seems to be a national consensus that to be successful the space program needs to replicate the Apollo Program, either literally or figuratively. Our report argues that the Apollo Program is inextricably tied to the Cold War environment. The nation needs to recognize that in our increasingly globalized world a broad, vigorous civil space program provides essential solutions to many of the challenges we face.

This completes my prepared remarks. Thank you for your attention to this report, and I would be pleased to take questions if you have them.