Presentation Statement of Mr. William H. Gerstenmaier

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Committee on the Peaceful Uses of Outer Space
Legal Subcommittee
United Nations Vienna International Center
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When I learned recently that the UN COPUOS Legal Subcommittee would be starting a comprehensive review of the international legal agreements and other mechanisms for space cooperation, I wanted to come to Vienna myself to speak with you about it. I consider this to be a very important topic: More important than perhaps you may realize.

I know the delegates in this room focus much of your attention on the treaties and principles that govern the exploration and use of outer space, and how well nations are fulfilling their commitments. I am not a lawyer. And a lot of people tell me I'm not always very diplomatic. I'm an engineer. But from my perspective, we are fulfilling our commitments very well. And many of the reasons we are able to do so relate to the words behind me.

In four years we will be celebrating the 50th anniversary of the Outer Space Treaty. The very first sentence of the very first Article of this treaty states that space exploration and use "shall be carried out for the benefit and in the interests of all

countries, irrespective of their degree of economic or scientific development." While these words may seem clear, it took a lot of us – the teams of engineers and scientists who run actual space programs – many years to appreciate what the words really mean: and how important they are. Over time, we learned that international space cooperation is indispensible. We also learned how it really works.

These lessons were reflected in a UN Declaration that COPUOS adopted nearly 30 years later. The 1996 Declaration on International Space Cooperation begins by repeating the words from Article 1 of the Outer Space Treaty that I just quoted. But the next two paragraphs – which you see on the above slide -- provide some very clear and practical explanations of what those words mean:

- States are free to enter into space cooperation agreements on terms they *themselves* consider fair and reasonable.
- States with relatively advanced space programs should seeks ways to cooperate with states whose programs are less advanced.
- They should also seek ways to cooperate with developing states.

At NASA, we take these words very seriously.

NASA is currently conducting cooperative activities under 556 agreements with 120 countries and 4 international organizations.

Why is international cooperation so important to NASA? The demands of spaceflight – especially human spaceflight – require that we work as a team and use innovative and creative technology to allow us to operate in the harsh environment of space. We've learned that nations with less advanced space capabilities can find ingenious ways of using technology that we may have overlooked. For example, NASA may take a particular approach to a technical challenge that we've used for a long time. A developing nation could find a more innovative approach because they are not wedded to past practice and they can take a fresh look at the challenge. This

can result in what I like to call "disruptive innovation." It's often a very good thing. The challenges we face in space exploration every day require us to collaborate in order to succeed.

While NASA cooperates with other countries across the entire range of civil space activities – including earth observation, space telecommunications, space science (like the Hubble Space Telescope and the Curiosity Rover now exploring the surface of Mars) – I want to focus our attention today on one of NASA's best known missions: human spaceflight.

NASA secured its place in world history with the Apollo program and its success in placing twelve astronauts on the surface of the moon over the course of six landings.

However, what's significant about Apollo for our discussion today is that it represented one of the last times NASA conducted a human spaceflight program ***without*** significant international cooperation.

In March 1970, only nine months after Neil Armstrong set foot on the Sea of Tranquility, President Nixon declared that the future direction of the US space program would include six specific objectives. One of these was the following:

Statement About the Future
of the United States Space Program
March 7, 1970

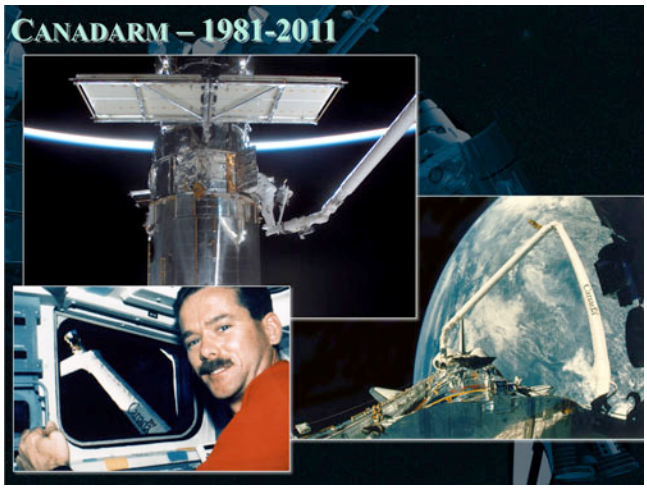
We should encourage greater international cooperation in space. …. I believe that both the adventures and the applications of space missions should be shared by all peoples. Our progress will be faster and our accomplishments will be greater if nations will join together in this effort, both in contributing the resources and in enjoying the benefits. (March 7, 1970)]

RICHARD NIXON
XXXVII *President of the United States: 1969-1974*

President Nixon was only the first of many Presidents who set NASA on a course of sharing space exploration and space applications through international cooperation. His statement said: "Our progress will be faster and our accomplishments will be great if nations will join together in this effort, both in contributing the resources and in enjoying the benefits."

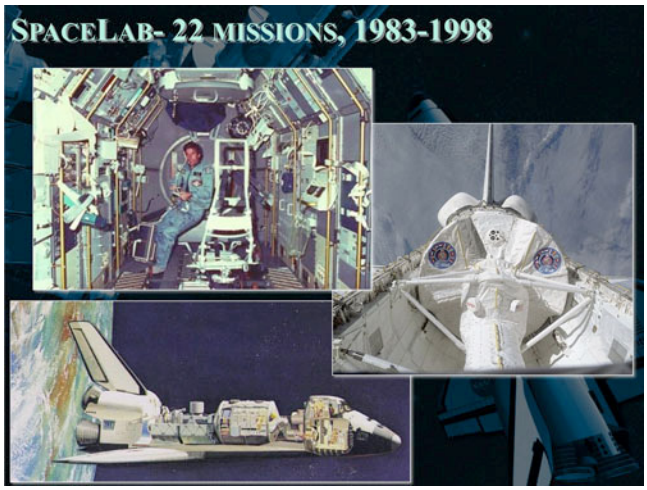
Since the end of the Apollo program, NASA has sought increasingly to involve other countries in human spaceflight activities. One of the best-known early examples occurred in 1975 with Apollo-Soyuz, the docking of two spacecraft in earth orbit.

The Space Shuttle Program was NASA's first human spaceflight program to involve extensive international cooperation, not only in the activities conducted on orbit but in the design of the vehicle itself. A prime example of such cooperation was the Shuttle's robotic arm – built and contributed by Canada. The Shuttle needed a robotic arm to move cargo in and out of its cargo bay.



The original Canadarm was capable of deploying or retrieving payloads weighing up to 332.5 kg (733 lb) in space. In the mid-1990s the arm control system was redesigned to increase the payload capability up to 3,293 kg (7,260 lb) in order to support space station assembly operations.

Another critically important contribution to the Space Shuttle was designed and developed by the European Space Research Agency, ESA's predecessor. It was an orbital research laboratory placed in the Shuttle cargo bay, called Spacelab.

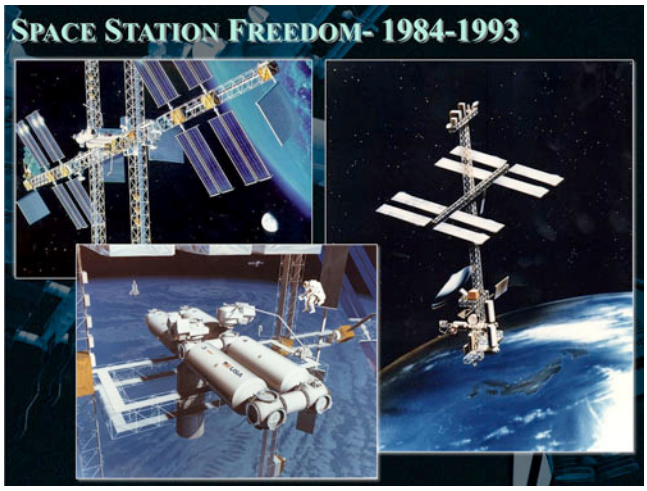


Spacelab represented cooperation among 18 nations that developed hardware, conducted research, and provided flight crewmembers.[1] It enabled scientists to perform experiments in microgravity in Earth orbit. The laboratory comprised multiple components, including a pressurized module, an unpressurized carrier and

[1] The countries were: Australia, Belgium, Canada, Denmark, France, Germany, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

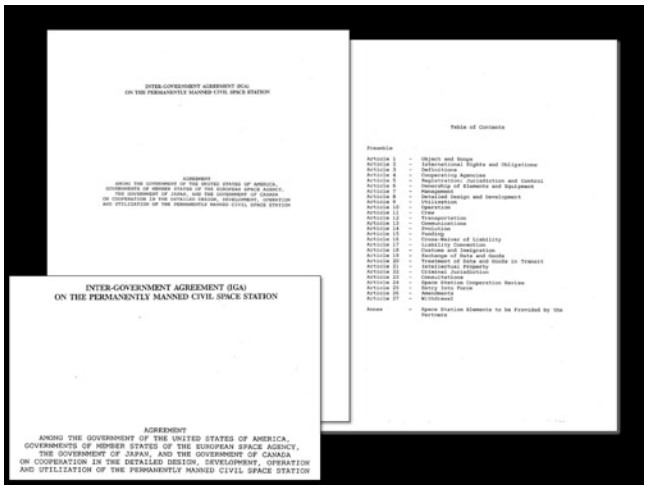
other related hardware housed in the Shuttle's cargo bay. Spacelab components flew on 22 Shuttle missions between November 1983 and April 1998.

In 1984, international cooperation in human spaceflight was taken to an entirely new level – one that was not possible without these previous cooperative activities.



That year, in his annual address to Congress, President Reagan announced that the U.S. would build and launch a space station with participation from Europe, Japan and Canada. For the first time, NASA would cooperate with international partners in designing, developing, and especially operating an orbiting spacecraft. Space Station Freedom did not come to fruition as originally envisioned, but in designing and developing it we learned many important lessons that made possible the vehicle and the program that we have today: the International Space Station.

Most of these lessons involved engineering challenges. But an equally difficult challenge was to develop a firm, but flexible *legal* foundation on which a space station program could be built. And in this respect, Space Station Freedom was an important pathfinder. In 1988, the U.S. and 11 other states signed an intergovernmental agreement containing the legal arrangements for the space station. NASA also signed bilateral agreements with ESA, Japan, and the Canadian Space Agency detailing how the program would be run.



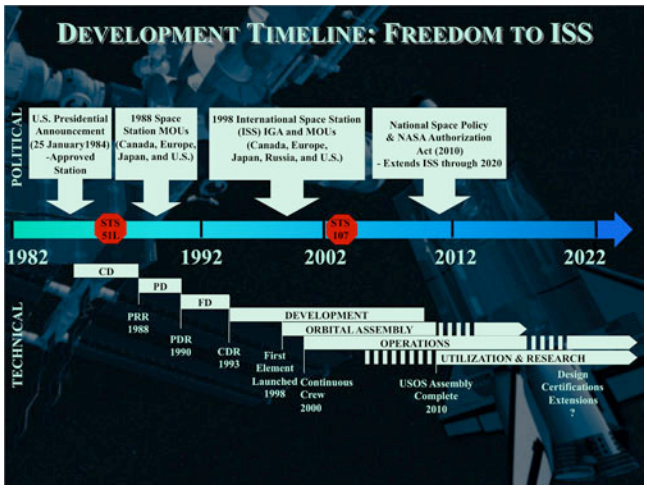
What I found most striking about the 1988 agreements was that the rules and mechanisms they provided were so encompassing and flexible, they could be transferred — with surprisingly few changes — to the new agreements for ISS. This was true even though the partnership had been expanded to include Russia. Thus, just as the ISS used much of the existing hardware designs of Space Station Freedom, it could also embrace the same legal framework.

As my career evolved from designing space*craft* to designing space *programs*, I began increasingly to appreciate the need to get not only the engineering right, but also to get the legal framework right. So I was impressed by the fact that the United States and its Freedom partners could transition to developing a completely different space station under entirely new agreements with an entirely new major partner – Russia – yet retain most of the provisions of the earlier legal framework.

How was this possible? The answer lies in understanding that legal framework agreements for space cooperation, like the Intergovernmental Agreement and the space agency MOUs for the Space Station Freedom and the International Space Station, are most effective when they serve two purposes:

> First, remove legal uncertainties. Agreements need to resolve difficult questions about legal authority, funding, exchange of technical data and goods, intellectual property protections, and so on. Program officials need assurance that such issues have been taken care of so they can focus on conducting space missions.
>
> Second, agreements need to give programs the flexibility to make decisions based on data and experience – and to respond quickly to challenges. In other words, do not establish a rigid, overly prescriptive legal framework.

Let me explain what I mean, by returning to the story of how the ISS came into being.



At the beginning of this presentation, I noted the language from the 1996 Declaration urging states with varying capabilities to cooperate with each other, and to negotiate agreements on fair, reasonable and mutually acceptable terms.

This is what NASA sought to achieve with Space Station Freedom. Initial work on Freedom began in 1982. By 1992, when it became clear that Space Station Freedom could not be completed as planned, President Clinton directed that the station be redesigned and Russia included as a new partner.

But even political direction and the will to make it happen cannot change the laws of physics. The truth is that neither Russia, nor the U.S. and its Space Station Freedom partners knew exactly how to design, operate and resupply a space station of this size and complexity – with 15 partner states. However, Russia knew how to conduct long duration spaceflights on its space station Mir; NASA knew how to conduct shorter duration, highly complex space activities using our Space Shuttle to launch very large structural elements into low earth orbit. And as Apollo-Soyuz proved, both of us knew how to dock with each other in space. So we were confident that together we could launch and assemble a very large space station, and that this cooperation would yield tangible benefits for the U.S, Russia, Japan, Europe, Canada – and ultimately humankind itself.

So NASA and Rocosmos initiated a complex new phase of international cooperation: the Shuttle-Mir program.

The program involved nine Space Shuttle flights that docked with Mir, eight Russian cosmonauts flying on the shuttle, and seven NASA astronauts living on board Mir for long-duration increments.

As NASA and Roscosmos gained experience working together in space, a new *International* Space Station was being designed, using Russian-built modules to provide the initial foundation for power and communications. On this foundation, the partners added the laboratories, robotics, and support systems originally designed by NASA, Europe, Japan, and Canada for Space Station Freedom.

We also had to develop totally new ways of operating. Control centers around the globe need to cooperate seamlessly in order for the ISS to function.

The robotics arm design of the Canadian Space Agency was modified and expanded to service the ISS. The Canadian arm was in the "critical path" for ISS assembly. All partners were dependent on using the Canadarm to assemble the ISS. Indeed, this same device now captures commercial spacecraft and docks them to ISS today. The

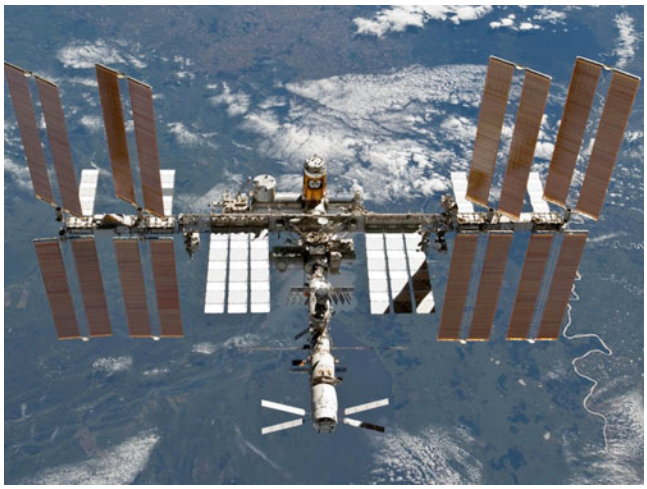
ISS agreements were not drafted with this capability in mind; yet they proved to be sufficiently adaptable to encompass these operations.

In this way, the Space Station Freedom and Shuttle-Mir programs paved the way for ISS. But there was a crucially important difference between these cooperative programs and the ISS program. Freedom and Shuttle-Mir were considered to be national programs with international participation. *In ISS, each of our national space station programs is dependent on the others.* For example, the partners currently rely on the Soyuz for crew rotation, while the station could not have been assembled without the Space Shuttle.

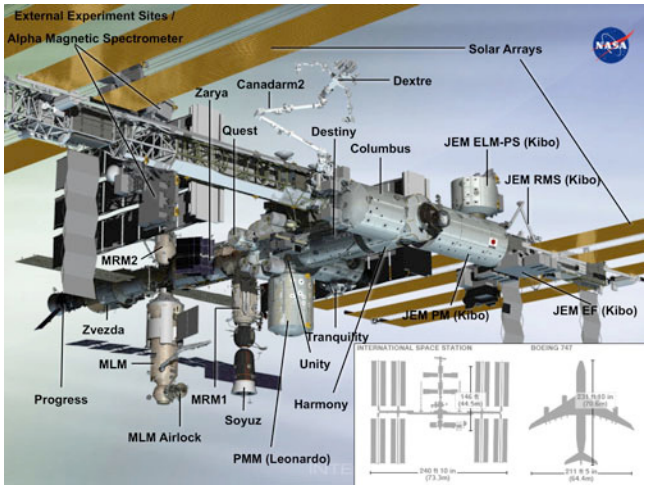
Operating ISS is like running a small city in the harsh environment of outer space. Multiple countries are involved in operational decisions on a daily basis. Let me take a moment to show you the magnificent achievements in space cooperation that ISS represents.

Here's what the ISS looks like today. First, to give you an idea of its size:

Space Shuttle astronauts took a spectacular on-orbit picture of the ISS on the STS-133 mission. It's an especially unique picture because it captures the only time when all partner vehicles – Russia's Soyuz, Europe's Automated Transfer Vehicle, and Japan's Hope Transfer Vehicle – were docked at the station simultaneously.

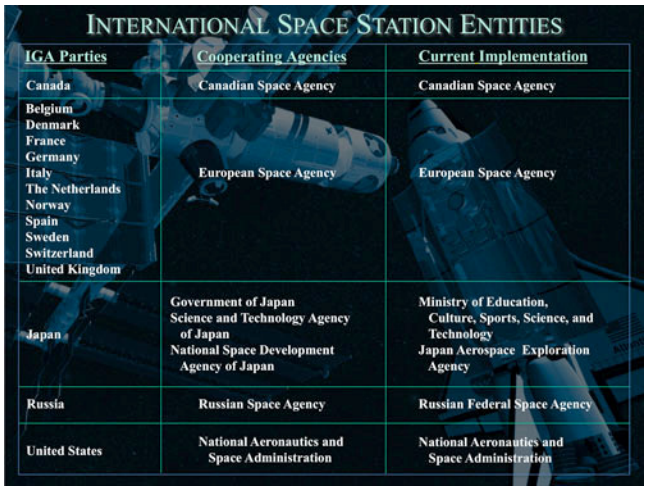


The following diagram illustrates individual station elements and components, showing the complexity of assembly:



Some important aspects of living and working in space are shown in the following pictures: extra-vehicular activities (EVA) , cargo vehicle docking, maintenance, and research activities.

And these are the countries that made it possible:

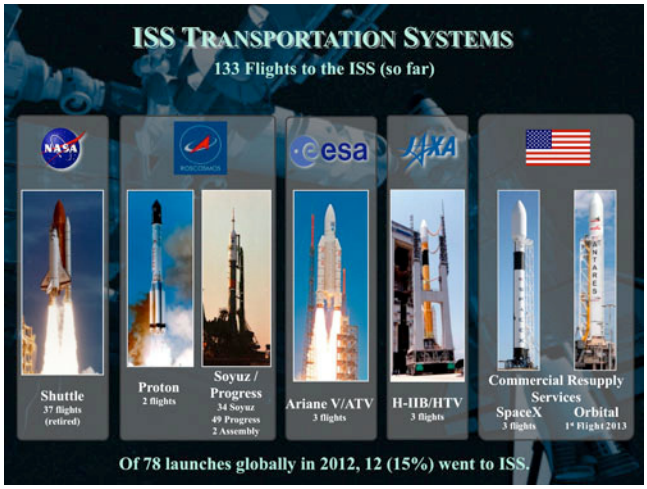


Foreign Ministries signed the IGA but space agencies and other government ministries are charged with implementing the cooperation. As the slide indicates, implementation of responsibilities is handled differently in each country.

Sixty-eight countries have participated in research activities on Station.

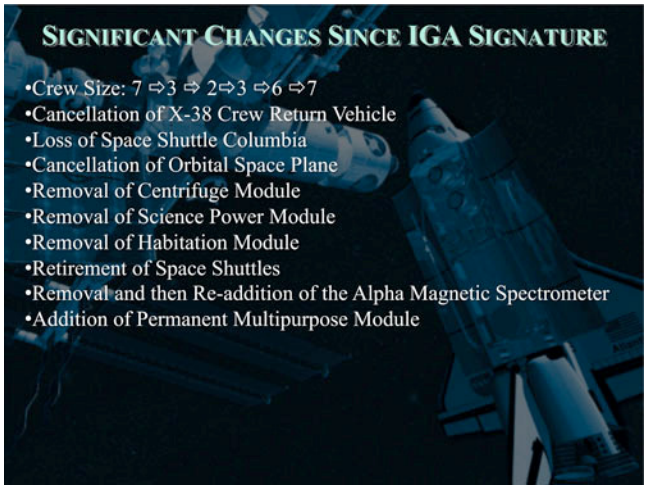
This illustrates how the ISS Partners have made the station available for the benefit of developing countries and developed countries with limited space programs. They gain access to ISS through separate cooperative or commercial agreements with one or more partners – on mutually agreeable terms.

Finally, I want to show you the transportation systems that launched ISS and keep it operating:



As of today, government and commercial vehicles have flown to the ISS 133 times for construction, research, and crew rotation. Moreover, flights to ISS represent a significant portion of the global space transportation marketplace. While flight rates vary by year, in 2012, of the 78 launches worldwide, 12 of these – or 15% – went to ISS.

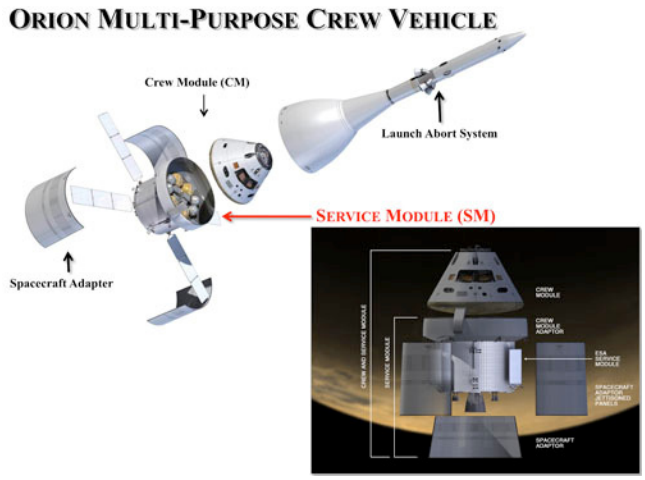
As you can see, the ISS represents an achievement of international space cooperation that is unmatched in terms of complexity and interdependence. However, the ISS that orbits earth today has changed considerably from the facility we envisioned when the agreements were signed in 1998.



This slide notes some of the key changes. For example, NASA did not provide the Habitation Module listed in the IGA. Instead, crew living quarters were positioned at locations in other modules. We and other partners altered the design and sometimes the number of elements originally intended to be provided. The Space Shuttle Columbia was lost, and for three years only Soyuz crew vehicles could reach the station. Thus, to enable the partnership to work, we had to develop legal agreements that gave us the flexibility to make nearly continuous adjustments – sometimes on very short notice – to the station's design, launch sequence, operation, resupply, crew rotation and rescue, and in many other areas.

But to me, from the perspective of a former NASA ISS program manager and today as the Chair of the Multilateral Coordination Board that must accommodate and integrate these changes, here's one of the most impressive things: *the partners made all these changes without changing a single word of the IGA or MOUs.* Instead, we work to negotiate further arrangements among ourselves to adjust for program challenges. We can do this because the ISS legal framework agreements gave us the authority to do it: and recognized that we would need to use it.

Indeed, the ISS legal framework has been so encompassing as to enable some of its partners to use it – again, by mutual agreement – to leverage their ISS cooperation into the realm of exploration beyond ISS. For example, this past January ESA and NASA announced a new implementing arrangement under their existing MOU by which ESA would meet its share of ISS operating costs in the 2016-2020 time frame by designing and providing a service module for our Orion crew vehicle, part of NASA's new exploration program now in development.



This new cooperation provides yet another illustration of how important international space cooperation has become as our world becomes ever more interdependent. It also underscores a central message I want to leave with you:

As NASA's experience with international cooperation has grown, and as my own career has evolved from an engineer who worked exclusively with U.S colleagues to one working with colleagues from around the world nearly every day, I have also grown to appreciate the importance of the legal structures that make space structures like the ISS possible. While I am no expert on the Outer Space Treaty or the other treaties, conventions and principles that all of you deal with, I recognize that these instruments provide the legal foundation for national achievements in outer space. But I also know that space cooperation has largely replaced space competition; and that space cooperation is pursued through the kinds of bilateral and multilateral arrangements recognized in the 1996 Declaration.

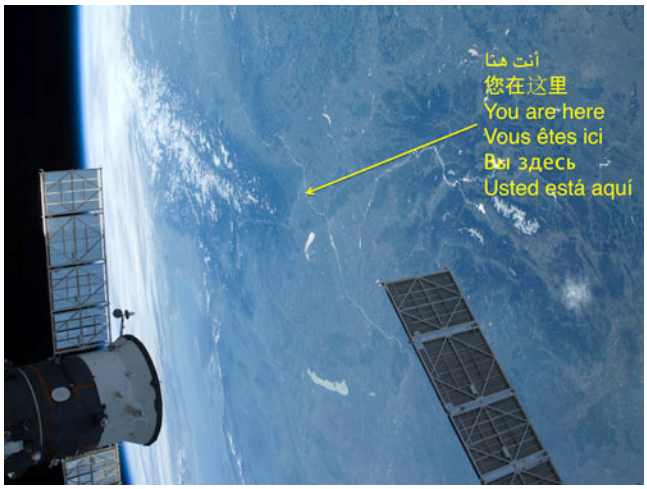
The National Space Policy issued by President Obama's Administration in June 2010 vigorously underscored the ongoing importance of international space cooperation by establishing as one of its principal goals the expansion of international cooperation "on mutually beneficial space activities to: broaden and extend the benefits of space; further the peaceful use of space; and enhance collection and partnership in sharing of space-derived information. The Policy also explicitly identified

> potential areas for international cooperation that may include, but are not limited to: space science; space exploration, including human space flight activities; space nuclear power to support space science and exploration; space transportation; space surveillance for debris monitoring and awareness; missile warning; Earth science and observation; environmental monitoring; satellite communications; GNSS; geospatial information products and services; disaster mitigation and relief; search and rescue; use of space for maritime domain awareness; and long-term preservation of the space environment for human activity and use.

I therefore want to underscore the increasing importance of space cooperation agreements within the larger context of international space law. Legal framework agreements like the IGA are so important in furthering the work being done by space agencies worldwide. To achieve this purpose, however, they need to be structured in ways that nurture and support this work rather than hinder it. We are learning that cooperation agreements work best when their primary aim is to remove obstacles and provide greater legal certainty for the conduct of space endeavors. They tend to fail when they intrude into technical issues, or prescribe how programs should be run, or worse, seek advantage for one party over another.

I am sure the ISS agreements represent only a few among many examples of successful international space cooperation agreements and mechanisms you will encounter in the course of your review. I hope you will gain increased appreciation, as I have, of their important role not only in anchoring the legal principles embedded in the Outer Space Treaty, but also in enabling programmatic and even technical solutions to difficult issues that can exist at the international level.

So I'll end these remarks with this ISS salute to the Legal Subcommittee:



I am grateful for this opportunity to share these perspectives with you and for your attention. I would be happy to answer any questions you may have.