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International Cooperation Mechanisms Used by the United States in the Peaceful Exploration and Use of Outer Space

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Abstract

This paper will examine the range of cooperation mechanisms the United States utilizes with international partners in a diverse portfolio of civil and commercial space activities. These activities include space exploration, earth and space science, and in-space operations. The paper will discuss the 1998 Intergovernmental Agreement on Space Station Cooperation (IGA) among the United States, Russia, Japan, Canada, and eleven participating Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom) which established the essential governmental level of commitment to the International Space Station (ISS) and created binding international obligations with respect to key government-level obligations. It will also consider the 1998 Memoranda of Understanding that NASA entered into with the Canadian Space Agency (CSA), the European Space Agency (ESA), the Russian Space Agency and the Government of Japan to establish a working basis for cooperation at the space agency level in designing, developing, operating, and utilizing the ISS, as well as subordinate implementing arrangements.

The paper will also survey Framework Agreements that facilitate specific bilateral cooperative endeavors. These agreements contain key legal provisions, such as a cross-waiver of liability, and treatment of sensitive goods and data.

Furthermore, the paper looks at the Global Learning and Observation to Benefit the Environment (GLOBE) program created through bilateral agreements between NASA and foreign entities.

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Finally, the paper will also discuss multilateral mechanisms that are not created through legally binding agreements in which the US participates.

I. Introduction

The National Aeronautics and Space Administration of the Government of the United States utilizes diverse mechanisms to cooperate with foreign governments and agencies to facilitate the peaceful exploration and use of outer space.

II. International Space Station Agreements

The International Space Station (ISS) is the most politically and operationally complex space exploration program undertaken to date.[1] Its greatest accomplishment is as much a human achievement as it is a technological one. That is, how to best plan, coordinate, and monitor the varied activities of the ISS program.[2] The ISS is the most ambitious and costly human exploration, scientific, and space research project ever undertaken.[3]

The agreements establishing the ISS program are all binding under international law. The Agreement among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station (the Intergovernmental Agreement or IGA) was signed in Washington, DC on January 29, 1998. A governmental-level commitment to this program, at both the political[4] and legal[5] levels, has been key to the ISS's

1 Aoki, Setsuko, IAC-14-E7.32 (IAC 2014, Toronto, Canada) (Aoki).

2 Committee on the Peaceful Uses of Outer Space Legal Subcommittee. "Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space: Information Received from Member States." Reply Received from the U.S. Apr. 8, 2013, A/AC.105/C.2/2013/CRP.17 (2013). (2013 LSC US Reply).

3 Ferrazzani, Marco & Farand, Andre, IAC-14-E7.3.1 (IAC 2014, Toronto, Canada).

4 In 1984, President Reagan initiated intergovernmental cooperation on Space Station Freedom, the predecessor initiative to the ISS. In 1992, at President Clinton's initiative, Russia was invited to join the program, which became the ISS. Presentation Statement of Mr. William H. Gerstenmaier, Associate Administrator, Human Exploration and Operations Mission Directorate, National Aeronautics and Space Administration United States of America and Chairman, International Space Station Multilateral Coordination Board. Committee on the Peaceful Uses of Outer Space, Legal Subcommittee (LSC). April 12, 2013) www.unoosa.org/pdf/pres/lsc2013/tech-02E.pdf. (last visited September 24, 2015) (2013 Gerstenmaier LSC Presentation). See also, Aoki at p. 7 regarding political ramifications in international space cooperation.

5 Agreement among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning

success. The IGA establishes key government-level obligations such as cross-waiver of liability, protection of sensitive data and hardware, the concept that each Partner would seek to minimize the exchange of funds in implementation of cooperation and treatment of intellectual property rights[6] for items invented on the ISS.[7] The IGA is the foundational document governing the ISS although the initial formalization of the process required the implementation of several different agreements[8] and Memoranda of Understanding.

Following the signing of the IGA in 1998, NASA also entered into Memoranda of Understanding (MOUs) with the Canadian Space Agency (CSA), the European Space Agency (ESA), the Russian Space Agency, and the Government of Japan in January and February of 1998. The MOUs establish a working basis for cooperation at the agency level, including developing in detail the responsibilities of the agencies and creating a number of governing boards at the operational level.

Since the ISS became fully operational in 2011, a high priority for all of the partner agencies is ISS utilization in support of human and robotic exploration. This utilization fall into four categories: exploration technology demonstrations, demonstrating maturity and readiness of critical exploration systems, human health management for long-duration space travel, and operations simulations and techniques for missions beyond low-earth orbit. Each partner agency selects its own priorities for utilization activities.[9]

Cooperation on the Civil International Space Station. (IGA). The Member States of the European Space Agency are: Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

6 Article 21 of the IGA establishes a territorial approach with respect to assertion of patent rights for items invented on the ISS. 35 U.S.C. 105 addresses how the United States implements this provision. For a discussion of how the IGA provision will be implemented and potential future developments as commercial actors become more involved in outer space activities, See Ro, Theodore U., Kleiman, Matthew J. & Hammerle, Kurt G, "Patent Infringement in Outer Space in Light of 35 U.S.C 105: Following the White Rabbit Down the Rabbit Loophole." 17 B.U J. Sci. & Tech. L. 202 (2011). For an earlier discussion of U.S. law, See Hammerle, Kurt G. & Ro, Theodore U., "The Extra-Territorial Reach of U.S. Patent Law on Space-Related Activities: Does the "International Shoe" Fit as We Reach for the Stars?" 34 Journal of Space Law 241 (2008).
On the other hand, if an act of the infringement of Japan's Patent is conducted on the JEM/KIBO, it is outside Japan and is not the subject of punishment under Japanese law. (Aoki at p. 7).

7 IGA.

8 For example, 1998 US-Russia Balance of Contributions agreement.

9 "The Legal Framework for the International Space Station," United Nations Committee on the Peaceful Uses of Outer Space, Legal Subcommittee, St-Arnaud, CSA, Farand, ESA, Uchitomi, JAXA, Frank, NASA & Porohkin for Roscosmos, (April 17, 2013. www.unoosa.org/pdf/pres/lsc2013/tech-05E.pdf. (2013 UNCOPUOS LSC presentation).

The implementation of ISS cooperation over more than twenty years has shown that, including from the legal standpoint, the partnership has been able to adapt to different situations – even when difficult situations, such as the loss of the Columbia Shuttle mission in 2003, arose. The IGA and the four MOUs have proven flexible enough to provide a legal framework for the functioning of the partnership, without the need for amendment. Implementing Arrangements and program instruments have been developed as needed.[10] The Partners agreed to extend ISS operations through 2020. In January 2014, Dr. John Holdren, President Obama's Science Advisor and head of the Office of Science and Technology Policy, announced the Obama Administration's commitment to extend the ISS program to at least the year 2024.[11] Early this year, Canada announced its agreement to extend until 2024. Roscosmos's Head announced its intention to extend until 2024 in August. Japan and ESA are going through their own governmental processes seeking a commitment to extend until 2024.

III. Bilateral Framework Agreements for Civil Space Cooperation

The U.S. Government has successfully used bilateral Framework Agreements to facilitate peaceful international cooperation in the use of space for almost 25 years.

Other governments and space agencies are also using Framework Agreements to facilitate space agency cooperation. Examples of such Argentine agreements include the 2002 Framework Agreement on Cooperation in Space Activities between the Government of the Argentine Republic and the Government of Algeria, the 2006 Framework Agreement between the Government of the Argentine Republic and the Government of Ukraine on Cooperation in the Peaceful Uses of Outer Space, the 2007 Framework Agreement on Cooperation in Space Activities between the Argentine Republic and the Republic of Ukraine.[12] Examples of such Canadian Space Agency (CSA) agreements

10 2013 Gerstenmaier presentation to LSC.

11 Frank, "Current International Cooperation Mechanisms: the International Space Station and the 2014 International Space Exploration Forum." International Mechanisms for Cooperation in Space Exploration: A Discussion of Current and Future Mechanisms Seminar. Hosted by the Ministry of Foreign Affairs of Japan and the Delegations of Canada and the United States to the Legal Subcommittee of the United Nations Committee on Peaceful Uses of Outer Space (COPUOS). (Vienna, Austria, April 2024). The USG has not yet completed our governmental procedures to finalize the Obama's commitment to this extension. The Administration is consulting with the U.S. Congress to obtain its policy commitment to and funding for this extension.

12 Committee on the Peaceful Uses of Outer Space Legal Subcommittee. "Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space: Information Received from Member States." Reply Received from the Argentine Republic (January 7, 2014) A/AC.105/C.2/105/Add.1.

include: the 2010 CSA – Centre national d'etudes spatiales (CNES) Framework Agreement on the Use of Outer Space for Peaceful Purposes, and the 2013 CSA – German Space Agency (DLR) Framework Agreement on space science and technology cooperation.[13]

The United States has concluded Framework Agreements that are currently in force at the Government-to-Government level, with eight governments, including Canada, Ukraine and Sweden. NASA has entered into three space agency to space agency Framework Agreements – most recently with the Israeli Space Agency.

Each Framework Agreement sets forth the scope of cooperation that may be undertaken pursuant to its provisions. Typically, the agreement covers, among other areas, cooperation in earth science, observations and monitoring, space sciences, human space flight, and human and robotic exploration. Implementation may include activities on space and earth, exchanges of scientific data, earth and space applications, and education and public outreach activities.

These agreements establish legal frameworks for space cooperation (and occasionally aeronautics cooperation) with foreign space agencies and other governmental institutions by setting forth legal provisions that govern specific cooperation set forth in implementing arrangements. Addressing legal issues that typically arise when negotiating an international agreement for space cooperation in advance saves significant time and resources thereby allowing space agencies to focus on performing their underlying missions more efficiently and effectively.[14]

Specific cooperative activities are then undertaken through "Implementing Agreements" that establish the responsibilities of each of the Parties[15] with respect to such cooperation.

Key legal elements of Framework Agreements include, for example, cross-waiver of liability, transfer of sensitive goods and technical data, and intellectual property rights. These legal provisions are often similar to the parallel provisions in the IGA.

When crafting Framework Agreements, the Parties consider the potential liability and risk of loss that could occur. Therefore, Framework Agreements

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13 Committee on the Peaceful Uses of Outer Space Legal Subcommittee. "Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space: Information Received from Member States." Reply Received from Canada (March 25, 2014) A/AC.105/C.2/2014/CRP.25.

14 Wholley, Michael & Mirmina, Steven A, E8, Session 5, IAC, 2008 (Glasgow, Scotland).

15 Under Framework Agreements concluded at the Government-to-Government level, Implementing Agreements are concluded by the agency or agencies established as "Implementing Agencies" under the applicable Framework Agreement. For the United States, NASA, the National Oceanic and Atmospheric Administration (NOAA), and, more recently, the United States Geological Survey are the Implementing Agencies under such agreements.

include a cross-waiver of liability provision. The cross-waiver of liability serves as the standard of risk allocation for cooperative activity in space. The provision contains a mutual promise by both Parties not to sue each other for losses caused by any of the activities that take place under the agreement, subject to a few exceptions, such as claims by natural persons and claims caused by willful misconduct. The fundamental purpose of cross-waivers of liability is to encourage participation in the exploration, exploitation and use of outer space. Framework Agreements typically provide that that the cross-waivers be broadly construed to achieve this purpose.

The Parties negotiating a Framework Agreement also consider the transfer of sensitive goods and proprietary or export-controlled technical data.[16] The Parties work to craft a provision under which they are obligated to transfer only those goods and technical data (including software) necessary to fulfill their respective responsibilities under a particular Implementing Agreement and to follow all applicable laws and regulations, particularly those concerning export control. The provision also provides specific procedures to protect the goods and technical data, such as appropriated markings and return or destruction of the goods and technical data at the end of the cooperation.

When crafting Framework Agreements, Parties are also concerned about intellectual property issues that may arise in the course of cooperation.[17] Generally, any intellectual property created by one party or its related entities (for example, contractors, subcontractors, users, or customers) before or outside the scope of the Implementing Agreement belongs to that party. Allocation of intellectual property rights solely created by one Party or its related entities during the course of carrying out the Implementing Agreement is determined by that Party's national laws. And for any intellectual property jointly created during activities carried out pursuant to the Implementing Agreement, the Parties agree to consult to determine the allocation of rights to, or interest in, such joint inventions.[18]

IV. GLOBE

The Global Learning and Observation to Benefit the Environment (GLOBE) program is a multilateral program led by NASA.[19] NASA works in close partnership with the National Science Foundation and the National Oceanic and Atmospheric Administration on the program. The program is fully supported

16 Technical data may be proprietary data, export-controlled data or both.
17 The approach taken is fundamentally different than the approach used in the IGA. See footnote 7 above.
18 Mirmina, Steven, "International Framework Agreements Governing Civil Uses of Outer Space," 22 The Air & Space Lawyer 9 (2009).
19 www.globe.gov (last visited September 24, 2015). 2013 LSC US Reply.

by the U.S. Department of State. The GLOBE program uses bilateral agreements to establish partnerships between NASA and foreign entities.

GLOBE is a hands-on, primary and secondary school-based science and education program uniting students, teachers, scientists, and community members around the world in studying and conducting research about the Earth's environment, connecting the local perspective to the view from space.[20] GLOBE students take important environmental measurements focusing on atmosphere and climate, hydrology, soils, land cover biology, and phenology. By involving students in scientific data collection and research, including taking measurements, analyzing data, and participating in research collaborations with other students, GLOBE provides students with a full and practical understanding of the scientific process.

International partners sponsor GLOBE activities in their countries, designing and funding their own implementation strategies to be compatible with their national and regional educational priorities.

There are approximately 110 participating countries in the GLOBE program including many counties in the Americas, Africa, Asia, and Europe.[21] Brazil is the most recent participant and NASA is looking forward to concluding agreements with Mauritius and Vietnam in the near future. Since its inception in 1995, more than 1.5 million students in more than 24,000 schools have participated in the program.

GLOBE agreements, like most US bilateral agreements, contain provisions for financial arrangements, exchange of data and goods, the release of information about the GLOBE program, customs and immigration, and consultations and settlement of disputes.[22] The following paragraphs will discuss several of these GLOBE agreement provisions and compare them to similar provisions found in other NASA bilateral agreements.

Financial arrangement provisions in GLOBE and other bilateral agreements are similar. The provisions under both types of agreements require that each Party will bear the costs of fulfilling its assigned responsibilities.[23] Further, under both types of agreements, all obligations of a Party are subject to its respective funding procedures and the availability of funds. One difference between GLOBE agreements and other NASA agreements is that GLOBE

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20 2013 LSC US Reply.

21 2013 LSC US Reply.

22 Agreement between the National Oceanic and Atmospheric Administration of the United States of America and the Ministry of Education of Chile for Cooperation in the GLOBE Program. Done in Santiago Chile on April, 16, 1998. (Chile GLOBE Agreement) Note that Under a Memorandum of Understanding between NASA and NOAA, NASA now signs all GLOBE agreements.

23 Chile GLOBE Agreement. NASA Advisory Implementing Instruction: Space Act Agreements Guide. NAII 1050-1C (August 11, 2014). (SAAG).

financial arrangement provisions require parties to abide by U.S. law.[24] Other NASA agreements create a separate provision to determine what law will govern the terms of the agreement.[25]

GLOBE agreements allow for the unrestricted use and distribution of GLOBE environmental measurement data, global environmental images, educational materials, and software.[26] In negotiating other NASA bilateral science agreements, the specific provisions chosen by the Parties when drafting a distribution of scientific data provision varies greatly depending on the nature of the international cooperation and program.[27] Like other NASA's bilateral agreements regarding Earth science data that generally provide for public dissemination of such data, GLOBE agreements usually involve Earth science data and provide for public dissemination of such data.

GLOBE agreements are also flexible regarding the release of information about the GLOBE program. GLOBE agreements allow Parties to freely release information on the GLOBE program as deemed appropriate without prior consultation with the other Party.[28] Bilateral agreements other than GLOBE provide that each Party retains the right to release public information regarding its own activities but they require advance coordination with the other party regarding release of information concerning the other Party's activities.[29] Like GLOBE agreements, other bilateral agreements do promote the release of nonproprietary information and results to the scientific community.[30]

V. International Space Exploration Coordination Group

In 2006, fourteen[31] space agencies began a series of discussions on global interests in space exploration that culminated in an articulated vision of peaceful robotic and human space exploration called "The Global Exploration Strategy:

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24 See, e.g., Chile GLOBE Agreement.

25 SAAG.

26 See, e.g., Chile GLOBE Agreement.

27 SAAG. In certain circumstances the Parties to agreements covering other types of scientific cooperation may agree that raw scientific data will be reserved to the Principal Investigators for a set time. Other circumstances require the raw data to be shared more broadly with all investigators to enhance the scientific return from the program. Parties to a bilateral agreement usually agree that following the exclusive use period, the data will be made available to the scientific community for further use.

28 See, e.g., Chile GLOBE Agreement.

29 SAAG.

30 SAAG.

31 In alphabetical order: ASI (Italy), BNSC (United Kingdom), CNES (France), CNSA (China), CSA (Canada), CSIRO (Australia), DLR (Germany), ESA (European Space Agency), ISRO (India), JAXA (Japan), KARI (Republic of Korea), NASA (United States of America), NSAU (Ukraine), Roscosmos (Russia). "Space Agencies" refers to government organizations responsible for space activities.

The Framework for Coordination." The release of this document in 2007 inspired the establishment of the International Space Exploration Coordination Group (ISECG) later that year, by fourteen space agencies, as a non-binding coordination forum for space agencies investing in space exploration.[32]
Participating agencies share information on space exploration plans and activities. They also pursue initiatives creating opportunities to strengthen individual agency efforts and future partnerships. ISECG is an open forum and invites the participation of agencies implementing space exploration programs. The European Space Agency (ESA) is the current ISECG chair; past chairs include the Canadian Space Agency (CSA) the Japanese Aerospace Exploration Agency (JAXA), and the National Aeronautics and Space Administration (NASA).
Twelve space agencies participated in the second version of the Global Exploration Roadmap (GER) ISECG released in August 2013,[33] to advance and update a long-range human exploration strategy.
The roadmap begins with the International Space Station and expands human presence throughout the solar system, leading to human missions to explore the surface of Mars. The first GER was released in September 2011.[34]
The 2013 Global Exploration Roadmap makes clear that the U.S. and its international space partners share a common interest in pursuing these goals.
The roadmap is the clearest signal yet that the global community is working together on a unified deep-space exploration strategic plan, with robotic and human missions, to destinations that include near-Earth asteroids, the moon and Mars. The roadmap also highlights the critical role of the International Space Station in preparing for deep-space exploration. The GER plan identifies a conceptual mission scenario that demonstrates how missions in the lunar vicinity, including the asteroid mission, prepare for international missions to Mars in the 2030 timeframe, while enabling important discoveries along the way.

VI. International Space Exploration Forum

The International Space Exploration Forum (ISEF) provides an opportunity for nations engaged in civil space activities around the world to share thoughts about how to further advance the exploration and use of space and to underscore the direct benefit to humankind of space exploration.
ISEF is an intergovernmental forum for discussion of key national-level space policies and coordination of such policies, as appropriate. It was not estab-

32 International Space Exploration Coordination Group Terms of Reference. www.globalspaceexploration.org (last visited September 22, 2015).
33 www.globalspaceexploration.org.
34 www.globalspaceexploration.org.

lished through a legally binding mechanism rather it is a Ministry-level forum to which participants are invited through diplomatic channels.
The ISEF met in Washington, D.C. in January 2014. Participants included representatives from Foreign Ministries, other Ministries with competence over space matters, Embassies, and space agencies. There were almost 200 representatives from over thirty nations from Africa, Asia, Europe, Latin America, the Middle East and North America.
Participants in that ISEF meeting highlighted that many of the spaceflight achievements of the past half-century would not have been possible without international cooperation. They emphasized the continuing need for international cooperation – no one nation can "do it alone." They discussed that innovation and knowledge derived from space exploration directly contributes to economic growth and societal well-being. There was recognition that human and robotic exploration is synergetic. Participants recognized that the ISS is a foundational bridge for future exploration.[35]
Participants also recognized the growth in commercial spaceflight activities and that any such private sector efforts expand economic growth, bring new vitality and ideas, and enhance space exploration. They emphasized the importance of such activities being done in accordance with existing national and international guidelines.[36]
The next ISEF will be hosted by Japan in 2016 or 2017.

VII. Conclusion

As the forgoing shows, the United States, including NASA, uses different mechanisms for different matters concerning international space cooperation.
The United States, including NASA, intends to continue to partner through legally binding international agreements. The United States, including NASA, also intends to participate fully in the many multilateral policy and technical fora, not established through binding international agreements, created to address various space cooperation matters.

35 International Space Exploration Forum "Forum Statement," January 9, 2014, Washington, D.C. (2014 ISEF Statement).
36 2014 ISEF Statement.