Other Countries' Space Cooperation with Russia

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This chapter reviews the experience some other countries have had in space cooperation with the Soviet Union, and later Russia. It considers what lessons might be learned by the United States from their experience and addresses how the intensification of U.S. interactions with Russia in civil space efforts has affected and might in the future affect cooperative relations between the United States and its traditional partners in Europe, Canada, and Japan.

OTHER COUNTRIES' EXPERIENCE

Before the collapse of the Soviet Union in 1991, most of the other spacefaring nations had only very limited cooperative experience with the Soviet civil space program. The principal exception to this general rule is France, which opened space science cooperation with the Soviet Union under President Charles de Gaulle in 1966 and managed to maintain an active program in both robotic and, later, human spaceflight through the political vicissitudes of the 1970s and 1980s.[1] Since 1992, the European Space Agency (ESA) has joined France and the United States as Russia's main bilateral partners in civil space cooperation.

France and the Soviet Union

On June 30, 1966, French President de Gaulle and Soviet General Secretary Leonid Brezhnev signed the open-ended Intergovernmental Accord on Scientific/Technical and Economic Coopera-

[1] See appendix D for a French review of French-Soviet (later Russian) space cooperation. A thorough discussion of French-Soviet cooperation before 1985 can be found in U.S. Congress, Office of Technology Assessment, *U.S.-Soviet Cooperation in Space: A Technical Memorandum*, OTA-TM-STI-27 (Washington, DC :U.S. Government Printing Office, July 1985).

tion, which emphasized cooperation in the exploration and peaceful uses of outer space. Although it was intended as an assertion of French independence of action within the Western alliance, the agreement, and particularly its space component, soon acquired considerable substantive content. By the early 1980s, about one-third of the more than 2,000 space researchers and technicians in France were working in some way with French-Soviet cooperation in space, and the level of French funding for cooperation with the U.S.S.R. was not far below that for cooperation with the United States. This balance was an apparent, and relatively explicit, objective of the French program.[2]

Since those early days, French bilateral space cooperation with the U.S.S.R. has remained concentrated in a few areas, notably:

- astronomy and astrophysics,
- space plasma physics,
- planetary exploration,
- materials processing in space, and
- life sciences.

The French have invested significant resources in cooperation with the Soviet Union in planetary exploration. The Vega mission, launched in 1984 to explore Venus and Halley's Comet, featured French-built atmospheric balloons that were successfully released and tracked in the Venusian atmosphere in 1985. Similar—but more sophisticated—French balloons are intended as part of the next Russian Mars mission, recently postponed to 1996. Major French instruments also flew on the Soviet Granat and Gamma missions in 1989 and 1990.

In addition, in 1982, France and the Soviet Union began a series of cooperative human-spaceflight activities with the flight of Jean-Loup Chretien on Salyut-7. After the flight of Patrick Baudry, Chretien's backup, on the U.S. Space Shuttle in June 1985 (both the United States and France were apparently seeking balance in this high-profile field), Chretien flew again in 1988 aboard Mir and conducted the first French EVA (extra-vehicular activity, or "spacewalk"). Another French "spationaut" flew on Mir in 1992.

In December 1989, the French and Soviets signed a long-term agreement on human-spaceflight cooperation, calling for a series of flights on a reimbursable basis, in 1993, 1996, 1998, and 2000. Most recently, plans to shut down Mir in late 1997 or early 1998 appear to put the later flights in jeopardy, but negotiations continue, with the price for the 1996 flight quoted as $13.7 million.[3]

From a U.S. policy perspective, the most interesting aspect of the conduct of French-Soviet space cooperation is the difference between the U.S. and French responses to past changes in the political environment. While the United States allowed its intergovernmental space agreement with the Soviet Union to lapse in the wake of the Soviet invasion of Afghanistan and the imposition of martial law in Poland, the French decided to continue relations. Indeed, Chretien's Salyut-7 flight in 1982 was the subject of considerable controversy in France, but the issue appears to have been resolved in favor of continuing cooperation at a higher or lower profile, depending on the political environment, rather than suspending ties.[4]

Since the French lacked a crewed spacecraft of their own, as well as the resources for an extensive flight program in space science, a decision to terminate cooperation with the Soviet Union would have been comparatively costly. Moreover, as noted above, independence and balance between the United States and the U.S.S.R. were important tenets of French foreign policy in the 1980s. The French also saw space cooperation as important in working toward broader objectives such as im-

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[2] Ibid., p. 54.

[3] Peter B. DeSelding, "French Try for Mir Swan Song," *Space News*, p. 21, Jan. 9-15, 1995.

[4] U.S. Congress, Office of Technology Assessment, op. cit., pp. 61-66.

proved communications and reduced tensions between the U.S.S.R. and the outside world. Finally, they appear to have judged that their systems for controlling and monitoring technology transfers in the course of cooperative projects were sufficiently effective to obviate any concern about unwarranted transfers of militarily significant items.[5]

The European Space Agency

Although there was some scientist-to-scientist contact between European and Russian space scientists during the 1980s, for all practical purposes, ESA's engagement with the Russian Space Agency (RSA) began in 1991, when, at an ESA ministerial meeting in Munich, ESA decided to explore the potential for expanded cooperation in support of its human-spaceflight objectives. This decision was confirmed during the subsequent ministerial meeting in Granada, Spain, in November 1992.

During 1993, ESA and RSA established working groups to focus on five areas of human spaceflight:

1. European astronaut missions on Mir,
2. in-orbit infrastructure,
3. crew and freight transportation vehicles,
4. space-transport-systems technology, and
5. in-orbit servicing.

In addition, in mid-1993, ESA and the Russian enterprise NPO Energia signed a contract, later confirmed by an ESA-RSA agreement in October 1994, covering paid flight of European astronauts on Mir. The first flight, a 31-day mission, took place in October-November 1994, and a 135-day flight (Euromir '95) is scheduled to begin in August. The latter flight will include a spacewalk.

Early technical exchanges concerning reusable spacecraft for human spaceflight and space suit design have not been pursued, but with the decision to involve the Russians in the International Space Station, ESA has begun negotiations with RSA in two areas directly related to that project: providing a data-management system for the Russian service module and providing the European Robotic Arm (ERA) for installation on the exterior of the module (see figure 3-8). Terms of the Memoranda of Understanding governing these activities have not yet been finalized, but in return for providing the ERA, ESA will benefit from its qualification for and use in space, while the quid pro quo for the data-management system will probably be in the form of Russian space hardware, reportedly including the docking mechanism Russia currently uses to attach its station modules to the Mir core.

ESA is dedicating significant resources to this cooperative initiative. Its budget for the European astronaut flights on Mir is $82 million. Within Europe, ESA is spending approximately $60 million on the data-management system, and it decided in September 1994 to spend $180 million for the ERA.[6]

From November 1992 through the end of 1994, ESA committed to pay a total of about $81 million to Russian entities.[7] Of this amount, $56.4 million funds the contract with NPO (now Russian Space Corporation (RSC)) Energia, which is responsible for Russian implementation of the astronaut flights on Mir and payment of any subcontractors. Another $6 million was approved to reimburse RSA for the flight of ESA payloads on Russian Foton recoverable spacecraft.

European budgetary difficulties are putting strong constraints on ESA's ability to expand work with Russia, however. During 1994, ESA was considering proposals for cooperative development with Russia of a crew-return vehicle (CRV) for the space station (which could evolve into a crew-transfer vehicle to carry crews to and from orbit) and an automated transfer vehicle

[5] Ibid., p. 66.

[6] Peter B. deSelding, "Ventures with Russia Starting To Bear Fruit," *Space News*, pp. 10, 17, Oct. 31-Nov. 6, 1994.

[7] Figure provided by Karin Barbance, Russian Desk Officer in the International Affairs Department, ESA Headquarters, Mar. 2, 1995.

(ATV) upper stage to deliver Ariane 5 payloads to the station. ESA was reportedly also considering options for joint development of the CRV with the National Aeronautics and Space Administration (NASA). Recent news reports suggest that ESA may scale back its contribution significantly and is not actively pursuing the Russian option.[8]

EFFECTS OF U.S.-RUSSIAN PACTS ON OTHER U.S. PARTNERSHIPS

The dramatic expansion in U.S.-Russian space cooperation since 1992 has taken place in the broader context of space relations between the United States and traditional partners. Those relationships have concurrently been undergoing fairly significant change in their own right, as the United States and the partners all reassess their space plans in the face of tight budgets and shifting national priorities.[9] This section briefly examines the impact of U.S.-Russian developments in various areas on the United States' cooperative relations with other nations and international organizations.

Space Station

Since the signing of the Intergovernmental Agreement on Cooperation in the Detailed Design, Development, Operation, and Utilisation of the Permanently Manned Civil Space Station and its companion Memoranda of Understanding in September 1988, the partners have preserved their cooperation and made significant progress, though the course has not been smooth.[10] As negotiated, those agreements provide for NASA's clear preeminence in the program, commensurate with its provision of the core space station and supporting infrastructure for all of the partners' contributions. For their part, the partners had sought equality in the program's decisionmaking process but settled for a commitment by all parties to seek consensus; final authority, in the absence of consensus, was reserved to NASA.

Through a series of design reviews and redesigns driven by U.S. budgetary and political forces, NASA tried, with varying success, to balance its domestic needs with consideration for those of the partners. In 1989, an internal NASA design review was initially concealed from the partners, leading to a stormy consultative meeting at the governmental level in September of that year. In subsequent restructuring and redesign exercises, NASA made considerably more effort to involve and consult with the partners. For their part, the partners generally accommodated the resulting design changes, but at a price, in terms of schedule changes and increased costs.

The Clinton Administration's 1993 decisions to redesign the space station dramatically and involve Russia in a key role sharply increased tensions in the partnership. From the partners' perspective, throughout the 1993 redesign and transition process, the United States failed adequately to consult its partners. When President Clinton went "over the heads" of the space agencies and wrote to his counterparts in Europe, Canada, and Japan in October 1993, seeking their support for inviting Russia to join the project, he further exacerbated the resentment of partner space agencies. However, if he had not interceded, it is by no means clear that the space agencies would have reached agreement on Russian partici-

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[8] See Craig Covault, "Europe Faces Critical Decisions on Station Role," *Aviation Week & Space Technology*, pp. 22-23, Jan. 16, 1995; and Peter B. deSelding, "European Outlook Cloudy," *Space News*, pp. 8, 10, Feb. 13-19, 1995.

[9] A forthcoming OTA background paper, *International Collaboration in Large Science and Technology Projects*, examines trends in this and other key areas of large-scale international science and technology cooperation.

[10] See Marcia S. Smith, "Space Stations," Congressional Research Service Issue Brief 93017, Washington, DC, October 1994 (updated periodically). Also see Graham J. Gibbs, *Expanding the International Space Station Program Partnership—An International Partner's Perspective* (presented at the 45th Congress of the International Astronautical Federation, Jerusalem, Israel, Oct. 9-14, 1994).

pation, at least in time for the December 1993 announcement that the United States desired.[11]

NASA now believes that equilibrium has been restored in the relationship. Cooperative activities are proceeding well, relations with partner representatives are cordial in Washington and Houston, and the negotiations for revised Memoranda of Understanding and an amended Intergovernmental Agreement, although substantively difficult, are proceeding relatively smoothly.[12]

After a series of difficult, ministerial-level decision meetings, ESA announced in 1993 that it was reviewing the scope and character of its contribution to the International Space Station and set a decision point in early 1995. Although the ESA Executive has produced a series of detailed and varyingly ambitious plans for a redefined space station commitment, it has not yet decided how to proceed. France has declared that it will be unable to reach a decision at the ministerial level until October 1995, seven months after NASA says it must have ESA's decision.[13] At French and German insistence, the ESA Executive (the administrative staff in Paris) circulated an "alternative scenario" to member states early in February that seeks to reduce spending between 1996 and 2000.[14]

In early 1994, Canada informed the United States that it would have to withdraw from the space station program unless a means could be found to reduce the cost of its contribution. Detailed and painstaking negotiations resulted in an acceptable restructuring, reducing Canadian costs by approximately U.S.$550 million and securing a Canadian recommitment.[15]

Some of the difficulties in Europe and Canada result from a general decline in support for space spending, particularly spending on human spaceflight. There is no doubt, however, that partner resentment over the U.S. management of Russia's entry into the program did political harm. More broadly, the space station experience appears to have convinced the partners that they should not enter into such an asymmetrical arrangement again.[16] It is not yet clear whether, or to what extent, this determination will hamper efforts to renegotiate the space station agreements by the end of 1995, as NASA now plans.

Space Science and Applications

The situation for collaboration in space science and applications is considerably different from that for space station collaboration. Reasons for this difference include:

- There has been a strong tendency toward increasing multilateralism in space science since the founding of the Inter-Agency Consultative Group for Halley's Comet (IACG) in the early 1980s. Russian scientists and managers were involved from the group's inception. In remote sensing, a variety of multilateral mechanisms has existed since the 1960s and 1970s to coordinate remote-sensing-program plans and policies. In 1993, NASA and the National Oceanic and Atmospheric Administration (NOAA) were successful in securing Administration approval for a U.S. initiative to invite Russia to become a member of the Committee on Earth

[11] Gibbs, op. cit., pp. 3-6; Gibbs notes, in particular, that although NASA involved its existing partners in the 1993 redesign and transition processes, leading to adoption of a redesigned space station, that process did not explicitly anticipate Russian participation. Instead, the United States and NASA negotiated with the Russians on a bilateral basis, only informing the partners on the eve of the September 1993 meeting of the Gore-Chernomyrdin Commission meeting.

[12] Interview with Lynn F. H. Cline, Director, Space Flight Division, Office of External Relations, NASA Headquarters, Feb. 14, 1994.

[13] Peter B. deSelding, "Europe, U.S. Scramble for Station Funds," *Space News*, pp. 3, 20, Jan. 16-22, 1995.

[14] Peter B. deSelding, "ESA Makes Cuts, Delays to Space Station Pledge," *Space News*, p. 3, Feb. 6-12, 1995.

[15] Canadian Space Agency press release, June 3, 1994.

[16] Gibbs, op. cit., footnote 10, p. 3. In particular, the partners believe that decisionmaking mechanisms that give the United States the last word are inconsistent with true partnerships.

Observation Satellites (CEOS), a key international body in the field. Current U.S. policy, in both space science and earth science, is to encourage further Russian integration into worldwide, coordinated activities.

- Russian emergence as a significant player has not undone existing arrangements, as happened in the space station program. Indeed, the Russians pioneered, in some respects, the beginnings of multilateral space cooperation through the science working groups established in the 1980s for their planetary and astrophysics missions, which relied heavily on foreign instruments.
- Programs in these areas generally have a lower political profile than those in human spaceflight. Although they are no less vulnerable to the annual budget process, they are less obvious captives to linkage with the overall political climate.

Commercial Relations

In general, business relationships among U.S. and Russian firms have developed without unduly affecting either side's relations with third parties in Europe, Japan, and elsewhere. The one potential exception to this rule is trade in launch services. In 1989 and 1993, respectively, the United States agreed to the entry of China and Russia into the world market for commercial launch services.[17] To guard against market disruption caused by the entry of nonmarket launch-service providers, the United States negotiated launch trade agreements with each country that provided quantitative limits on the number of launches each could provide and specified pricing controls intended to prevent artificially low bids.

Recently, the United States has renegotiated its launch trade agreement with the People's Republic of China, giving the Chinese a significantly larger quota and more leeway on price than that afforded the Russians in the 1993 commercial space-launch agreement with them.[18] There have been hints that the United States may consider lifting the quantitative restriction on commercial sales of Russian launch services altogether.[19] Such an action, in response to Russian and U.S. urging, could have a major impact in Europe. The European firm Arianespace is already critical of what it sees as the United States' failure to enforce the price requirements of the 1993 agreement.[20] Liberalization or elimination of the U.S.-Russian agreement might be seen in Europe as a blatantly anti-Arianespace move by the United States, particularly if NASA and Department of Defense launches continued to be reserved for U.S. launchers only.

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[17] Previously, the United States had been able to block such entry by denying export licenses for satellites or satellite components; all commercial satellites built outside the United States included U.S. components, so this restriction was effective.

[18] Warren Ferster, "China Wins Big In Launch Deal," *Space News*, pp. 1, 20, Feb. 6-12, 1995.

[19] "Russia and US May Scrap Commercial Russian Rocket Launch Quota," *Interfax*, Moscow, Jan. 27, 1995 (translated by the Foreign Broadcast Information Service).

[20] Warren Ferster, "Russia: Relax Launch Limits," *Space News*, Dec. 19-25, 1994, p. 1; Andrew Lawler, "Industry Criticizes U.S. Launch Agreements," *Space News*, p. 3, Oct. 3-9, 1994.