

# The Soviet space program

While maintaining a strong space program, the Soviets are being increasingly cooperative with the U.S.

by Everly Driscoll

We can conquer the Solar system with quite accessible tactics. Let us first solve the easiest problem of establishing space settlements near the Earth. . . .  
(Dr. Konstantin Tsiolkovsky, Russia, 1910.)

The launching of Sputnik on Oct. 4, 1957, ushered in the Space Age, with the Soviet Union as its leader, and initiated one of the most suspenseful engineering and scientific races of all time. Since that day, the Soviet and American space programs have been the national barometers of technological expertise and been used as political ploys and pawns by both Premiers and Presidents.

The first 12 years were characterized largely by competition. From the beginning of planning in 1955 for the International Geophysical Year to 1969 when the two nations were clearly on a competitive, parallel course to the moon, there was much duplication and little cooperation. This was true in spite of the more than 25 formal invitations for cooperation issued to the Soviet Union by the United States. Only two bilateral agreements resulted, one in 1962 and one in 1965, and they were described as "very limited in character." They covered four projects in satellite meteorology, communications, geomagnetic surveying and space biology and medicine. Only the one in space biology and medicine has produced any significant exchange of data and that did not essentially begin until late January 1970. (A three-volume book is due to be published jointly with contributions from both Soviet and American scientists.)

Now there is some indication that a new era—one of cooperation or coordination between the two space giants—may be in its embryonic stage. Last month during the Soviet's 24th Party Congress and on "Cosmonaut Day," April 12, the 10th anniversary of the first man in space (Yuri Gagarin) several public statements were made. In addition to disclosing the trend of future Soviet space plans, they endorsed cooperation with the United States.

At a Kremlin celebration attended by 6,000, the president of the Academy

of Sciences of the U.S.S.R., Mstislav V. Keldysh, praised both countries. "Tremendous potentialities in the study of earth's natural satellite were uncovered by the flights of American astronauts to the moon and the development in our own country of new types of automatic lunar stations," he noted. A statement from 19 of the Russian cosmonauts also stressed cooperation. "We think," they said, "that in the interest of peace and friendship between the peoples of our planet, business cooperation between space explorers of different countries including the Soviet Union and the United States should develop and grow stronger."

The public statements bode well for two recent agreements concerning space cooperation. The most recent one, reached in January but not signed until late March, outlines results of discussions between the Academy of Sciences of the U.S.S.R. and the National Aeronautics and Space Administration. It covers areas for "increased cooperation between the Soviet Union and the United States in the exploration and use of outer space for peaceful purposes." Topics listed for discussion by working groups included:

- Meteorological satellites. "To work jointly to make improvements in the current exchange of data and to consider alternative possibilities for coordinating satellite systems of both countries . . ."

- Natural environment. "To study the possibility of conducting coordinated surface, air and space research over specified international waters and to exchange results of measurements made by each country over similar land sites in their respective territories. . . ."

- Exploration of near-earth space, the moon and the planets. "To work jointly to define the most important scientific objectives in each area; to exchange information of scientific objectives and results of their national programs in these fields; to consider the possibilities for coordination of certain lunar explorations, and in particular, to initiate an exchange of lunar surface samples. . . ." (The agreement calls for an exchange of about three grams of regolith brought back

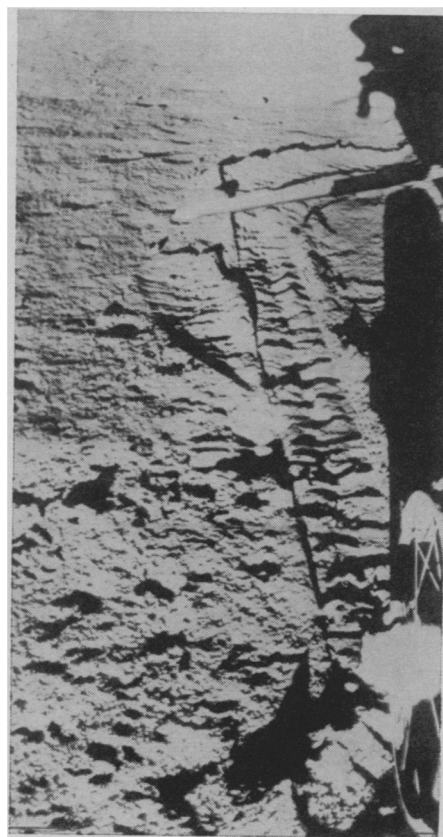
by Luna 16 [a core sample] for three grams of the Apollo 12 and three grams of the Apollo 11 core samples.)

- Space biology and medicine. "To develop appropriate procedures and recommendations to assure a more detailed and regular exchange of information including biomedical data obtained in manned space flights. . . ."

One expedient item is the agreement that when communication through existing international scientific channels, such as COSPAR (Committee on Space Research of the International Council of Scientific Unions), is too slow or inadequate, "direct channels" should be used.

Underlying the latest accord is an emphasis on "coordination" and "joint planning" rather than on "cooperation," which would possibly mean NASA experiments on Soviet spacecraft, or astronauts and cosmonauts working together in the same earth-orbital lab. But the agreement does support an "understanding" reached last fall in Moscow (SN: 10/17/70, p. 315) concerning the "question of providing compatible rendezvous and docking systems of the manned spacecraft and space stations of both nations." The January agreement is in no way unrelated or incidental to the progress being made on the rendezvous and docking exchange.

The "October understanding" established the guidelines for further technical exchanges by correspondence and



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Lunokhod tracks: A mobile moon lab.

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by alternate visits between countries. Three major working groups were set up to study the guidance systems of the spacecraft, the hardware and operational approaches of docking spacecraft of both nations. The next meeting, originally scheduled for March-April, will probably now be in May at Houston's Manned Spacecraft Center. NASA officials were pleased with the progress of the meetings, described as "straightforward, open and forthright." Some observers believe this reflects a definite change in the Soviet attitude, but NASA officials were more cautious. "We find [this] very encouraging and . . . we hope [this] will lead to productive results in time," said Arnold W. Frutkin, assistant administrator for International Affairs at NASA.

The implications of having means to dock an Apollo-like and a Soyuz-like craft in earth orbit are apparent, however. "If you achieve common docking procedures and hardware," says Frutkin, "this requires a rather broad coordination of effort and understanding of mutual techniques and procedures . . . and therefore establishes a basis for a lot of things." Some of these "things" could include earth-orbit rescue if needed, or joint experiments in earth orbit, although none of this is mentioned in the agreement.

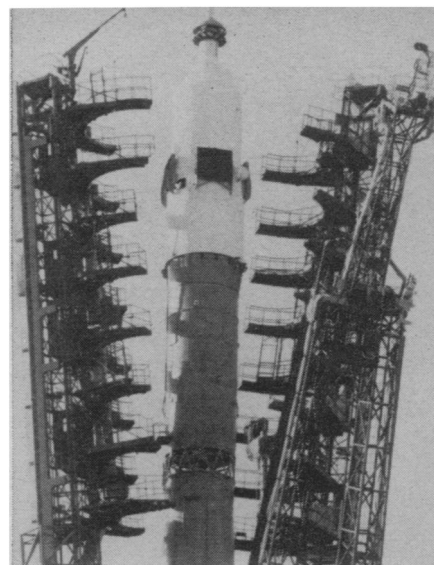
The two recent agreements stressing more coordination and communication do not necessarily augur an end to competition. But they are likely to speed up and improve the quality and quantity of scientific data coming out

of both space programs and perhaps eliminate some of the duplication, although not in the immediate future.

The continuation of some competition in the total space program is evidenced by the fact that the compatible docking agreement was only one of many proposals made officially and informally to the Soviets by NASA officials, members of the scientific community and by the astronauts themselves on visits to Moscow. Other suggestions for cooperation have not had such a positive response. They included the Soviet's use of the Apollo laser reflectors left on the moon, coordination of the planetary programs to avoid duplications, and opportunities for Soviet experiments on NASA spacecraft. (As for more direct types of cooperation, such as Soviet use of the space shuttle, it is not clear that even the American political establishment would lend its support.)

Diverse factors may be involved in the subtle shift toward an attitude of cooperation by the Soviets. Some of the progress can be attributed to the personal initiative of former NASA Administrator Dr. Thomas O. Paine (SN: 8/1/70, p. 93); some, to the recent and numerous successes of the Soviet space ventures; some, to the burden of space costs; some, to the rapport that has existed for years between Soviet and American scientists; and, probably most important, some, to a slight change in the political arena.

Groundwork for the agreements of October and January began in April

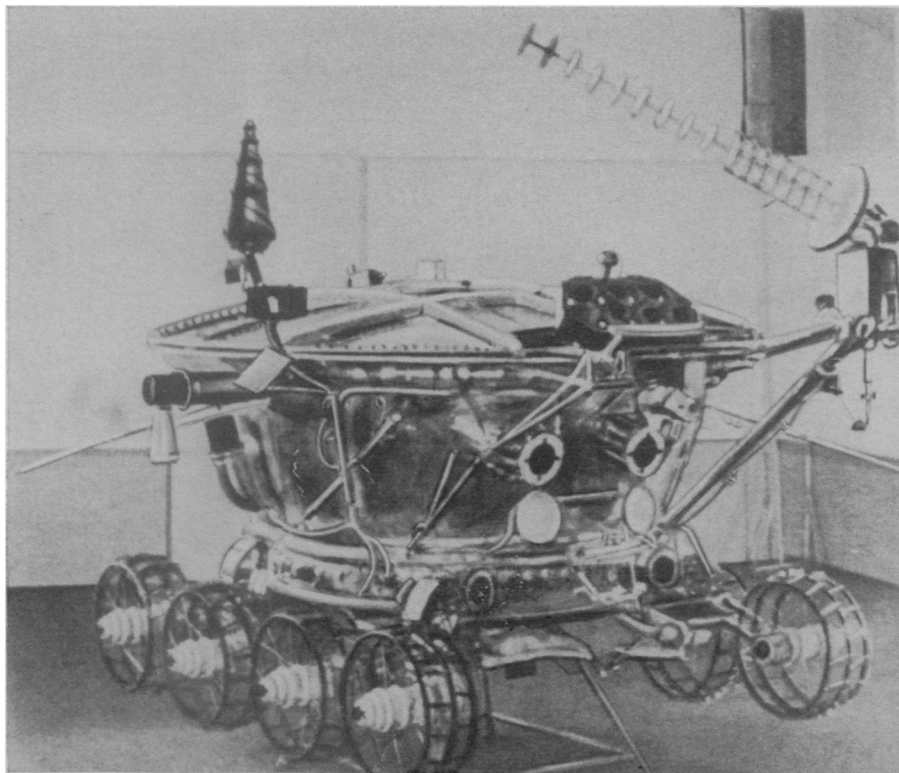


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*Soyuz 9 on pad: A strong program.*

1969, after more than a two-year-lapse in official communications between the Soviet Academy and NASA. At that time Dr. Paine sent Academician Anatoly A. Blagonravov a copy of the NASA publication "Opportunities for Participation in Space Flight Investigations" and assured him that proposals by Soviet scientists would be welcome. This was followed by an invitation to the launch of Apollo 11 (which was not accepted), and an invitation in August to Academician Keldysh to send Soviet scientists to a briefing concerning proposals for the Viking Mars lander flights. The delicate wooing continued, and on Dec. 12, 1969, Keldysh agreed that the Soviet-American cooperation in space "bears a limited character at the present time and that there is a need for its further development." He accepted the suggestion to meet on the question, but deferred further discussion of the time and place for "three or four months." In April 1970, Dr. Paine mentioned the docking proposal to Blagonravov at an informal dinner in New York. A formal letter written in July to the Soviets was answered Sept. 11, and Acting Administrator Dr. George M. Low then responded. The result was the October docking meeting.

During this same time period, the Soviet program was flourishing. The full extent and diversity was evidenced by more than 88 Soviet launches of eight kinds of spacecraft in 1970 alone (compared with 34 by the United States). The 88 launches included 72 Cosmos (a multi-purpose spacecraft), five Molnias (a communications satellite), four Meteors (a meteorological satellite), one Soyuz (a manned spacecraft), one Venus shot (which made the first soft landing on that planet), two Lunas (one returned lunar soil and the other carried the automated lunar rover, Lunokhod 1), two spacecraft called Intercosmos, and one Zond. The Zond spacecraft are capable of carry-



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*Lunokhod has been exploring lunar seas and craters for the past five months.*



NASA

*Sevastyanov and Nikolayev are escorted by astronauts during Houston visit.*

ing men; they usually circle the moon and return to earth, but they have been used for other missions as well.

The one manned launch in 1970, Soyuz 9, in which Cosmonauts Andrian G. Nikolayev and Vitali I. Sevastyanov set a record of 18 days in space, climaxed nine years of orbital flights that included the only scientist and only woman in space. Soyuz 4, piloted by Vladimir Shatalov was launched January 1969, followed the next day by Soyuz 5 with Cosmonauts Boris Volynov, Alexei Yeliseyev and Yevgeni Khrunov. The two spacecraft rendezvoused and achieved a hard docking. Soyuz 6, 7 and 8 were launched in October 1969, with Cosmonauts Georgi Shonin, Valeri Kubasov, Anatoli Filipchenko, Victor Gorbatko, Vladimir Shatalov, Alexei Yeliseyev and Vladislav Volkov. Says Volkov: "During our flight we executed the first welding of metals in space orbit. We performed . . . a large program of maneuvering and approach of three spacecraft with the use of a system of manual orienting. . . ." This, he says, "is quite important, because during flight there may well be a situation when one craft has to help another." (The Soviets have achieved a highly sophisticated automated system for docking as well.)

Hints of the next project in manned space flight have been numerous. In April 1969, Academician Keldysh said: "the establishment of permanently operating orbital stations in near-earth orbits is an important state of the further development of astronautics, a new trend in it." At that time he noted that "every orbital station will do the job of dozens and perhaps hundreds of automatic satellites used for meteorological investigations, geological prospecting, communications, astronomical research and experiments in geophysics."

Last week (SN: 4/24/71, p. 278) the Soviet's launched what was believed to be the first component of an earth-

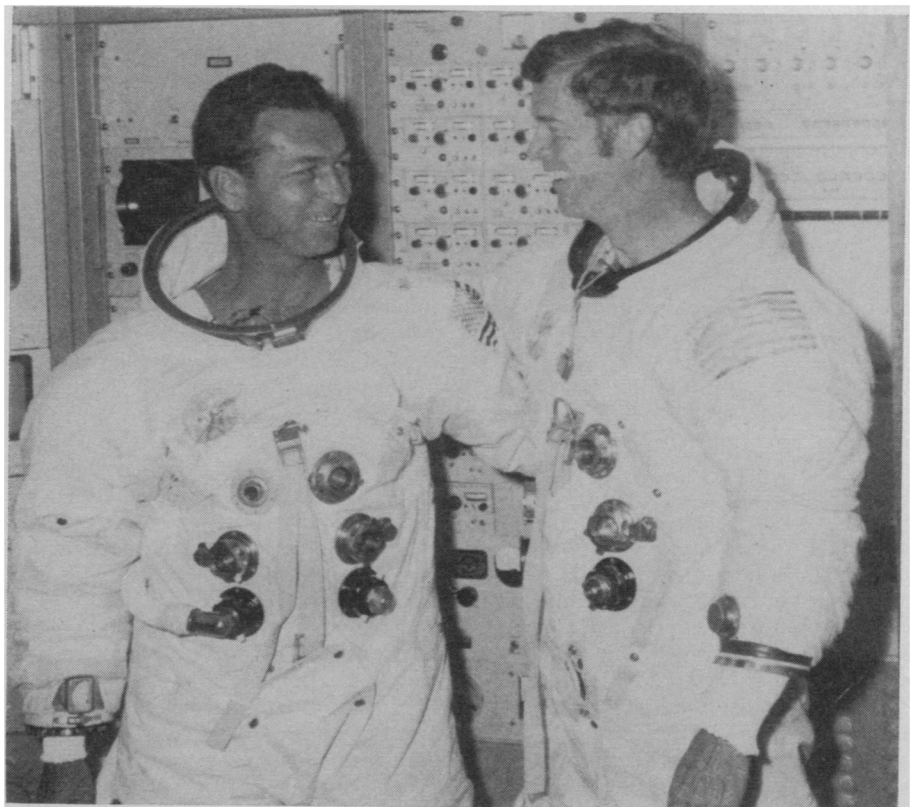
orbital station for the study of these disciplines. (See news story this issue.)

In addition to future earth-orbital manned laboratories, the Soviets are expected to continue exploration of the planets with both manned and unmanned spacecraft. During a recent visit to the Apollo 12 Lunar Science Conference in Houston (SN: 1/23/71, p. 61) Academician Alexander P. Vinogradov suggested that in order to foresee what his country would be doing in space in the future, one merely had to look at the 1970 record. Space observers predict that the Russians will follow their Venus landing last year with an unmanned Mars landing this year. At a recent international space

meeting in Constance, Germany, Cosmonauts Sevastyanov and Nikolayev also mentioned "good prospects" for an eventual Soviet manned Mars landing. But before that, few doubt that the Russians will do what they probably intended to do in 1969—land men on the moon. "People should be able to visit the planets, particularly the moon," said Vinogradov when asked about the Soviet's moon plans. "And I have no doubt that this will be continued despite that it's rather risky," he noted. Western officials have been reporting since 1968 that the Soviets are building a huge booster that could land men on the moon.

Whether or not the Soviet successes will supply enough leverage to compensate for the political considerations that have always been the major barrier to space cooperation is a central question. But officials at the Manned Spacecraft Center in Houston are optimistic. They reported last month that one of the options being considered by NASA was the use of the left-over Apollo hardware to dock with a Soyuz-type spacecraft between 1973 and 1978 when there would be a gap in United States manned space flights. (This has not been discussed yet with the Soviets, although visiting cosmonauts have had eager responses.)

In a world where political winds shift daily, where yesterday's dogma becomes today's myth, such an international space station is not unthinkable. □



NASA

*Cosmonaut Sevastyanov and Astronaut Schweickart in a mockup of the Skylab.*