Soviets refine space cooperation overtures

Last month's Space Future Forum was the venue for the broadest overtures to the West yet by Soviet officials who advocate international cooperation on large projects in space. Leading participants in the Soviet space program refined earlier thinking on joint space missions by shifting the emphasis to practical, near-term projects. For example, they showed a willingness to join an international consortium charged with operating a global satellite network dedicated to remote sensing of Earth resources.

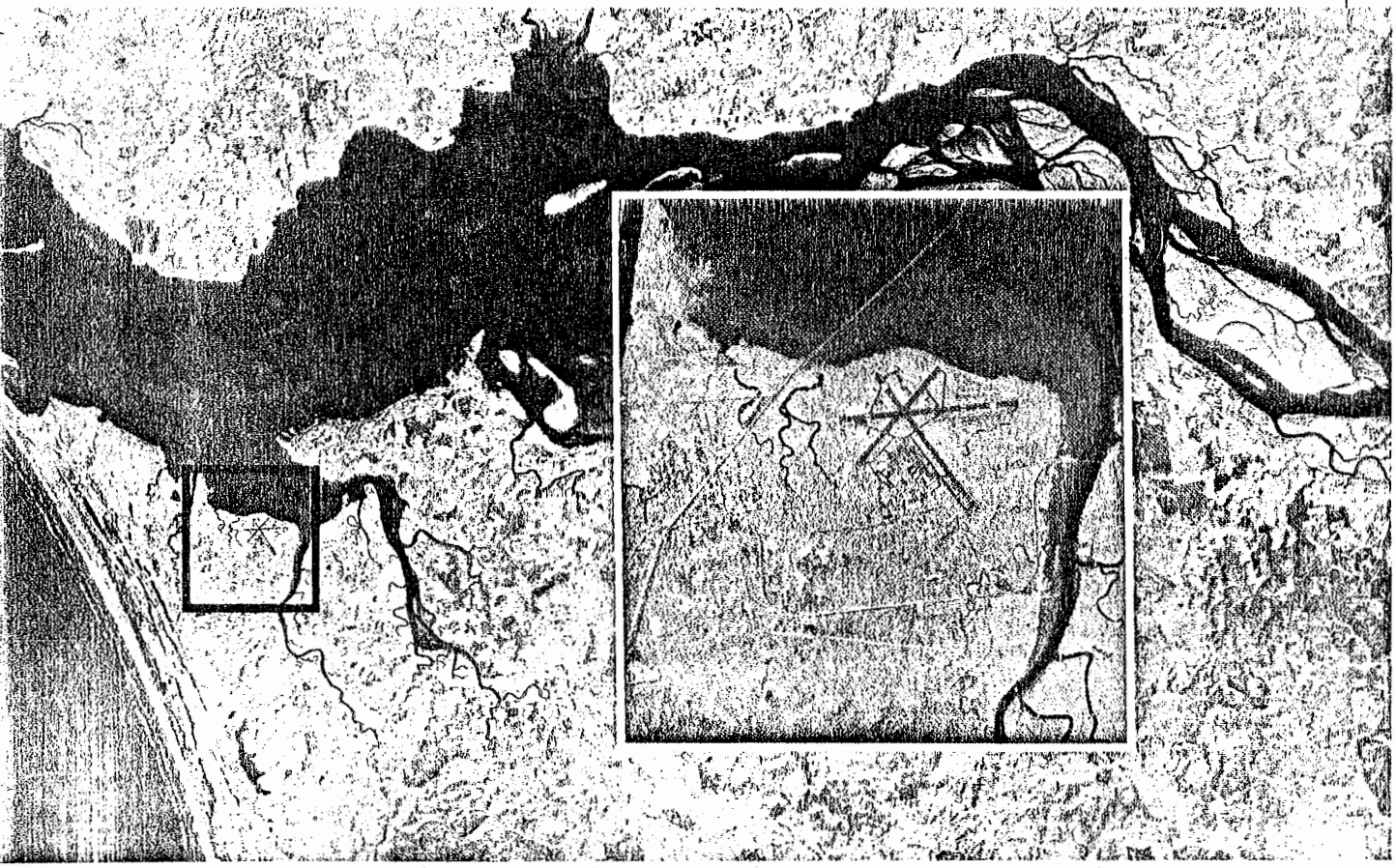
Ironically, the principal obstacle to greater cooperation involves technology transfer issues that can only be resolved within the U.S. Soviet promotion of East/West cooperation is unlikely to quicken the pace of reaching a definitive agreement but serves to keep things moving.

Heretofore, Soviet overtures took the shotgun approach by raising the possibility of cooperation on everything from a manned Mars mission to unmanned probes in the asteroid belt (*Aerospace America*, July 1987, p. 6). And clearly the centerpiece of the Soviet Union's cooperation strategy has been the manned mission to the planet nearest Earth. However, at the forum sponsored October 2-4 in Moscow by the Soviet Academy of Science, discussion included numerous space science missions as well as such things as the remote-sensing consortium, using the U.S. Space Shuttle for Soyuz and Mir rescue, and human crews returning to the Moon.

Vladimir Shatalov, chief of cosmonaut training, broached the topic of a settlement on the Moon. Working together on such a settlement seems "more interesting in the closer future" than a manned Mars expedition, according to Shatalov, who nevertheless called the Mars mission noble and spectacular. "We must take into account practical aspects and public opinion on the cost of such a project," Shatalov said.

Agreeing with Shatalov was James van Hoften, a former U.S. astronaut. "Perhaps we should go back to the Moon," van Hoften said. "But why not discuss Mir-Soyuz Shuttle rescue using the manned maneuvering unit to

The Soviet KFA-1000 camera took this photo of the Columbia River delta with 5-m resolution from an orbital altitude of 273.8 km. Inset is a false-color enlargment showing the 5,796-ft east/west runway at the Astoria Flight Center, a fixed-based operator across Youngs Bay from Astoria, Ore.



Soviets capitalizing on camera in orbit

Soyuz Carta, an organization formed within the Soviet Union to market photographs taken of the Earth's surface from orbit, is taking full advantage of 5-m resolution offered by the Soviet KFA-1000 camera.

"There are not other materials of such quality available," Vyacheslav Pisulkin, Soyuz Carta director, said. "Our system is stereoscopic, it provides 60% overlap so we have a great advantage over Spot and Landsat." The camera has flown on the Salyut and Mir space stations and on certain of the Cosmos series of low altitude reconnaissance and Earth resources satellites.

Soyuz Carta's parent organization is the State Scientific Center for Nature called Priroda, which comprises 10,000 people with expertise in such fields as geodesy, map making, and hydrology. "We have hundreds of specialists working abroad," Pisulkin said. "For example, we have had teams of specialists working in the Peoples Republic of Angola for 10 years. They trained 700 nature specialists, have done aircraft surveys of 100 km^2 to provide a basis for developing transport and helicopter facilities."

Soyuz Carta does not offer to the West photography of the Soviet Union or of what Pisulkin describes as other Socialist countries.

During the Space Future Forum held in Moscow October 2-4, several Americans visited Soyuz Carta's new headquarters in Moscow's outskirts. John L. McLucas, chairman of the U.S. Commission for the International Space Year and a former U.S. Air Force secretary, asked whether a picture of the U.S. that includes military installations could be sold.

"We'll sell it to you," Yuri Kienko, head of Priroda said. "But we don't know where your military installations are and we don't care."

As a result of this discussion, *Aerospace America* took delivery on what Pisulkin claims is the first 5-m imagery sold to a U.S. customer. The multispectral survey was conducted on May 29, 1986, at 2108 Moscow time from an altitude of 273.8 km. The focal length of the KFA-1000 camera is 1,012.77 mm and lens speed is 1/143 sec. The spectral bands are in the visible region from 570-800 nanometers and from 680-810 nanometers.

The KFA-1000 compares favorably with the Large Format Camera capable of 10-m resolution when flown on the U.S. Space Shuttle at an altitude of 125 mi or so. Since the camera is not a digital sensor, computer manipulation of the image to determine the composition of mineral deposits is impossible. But the spectral bands can be printed in different colors to enhance surface features for such applications as mapping and controlling disasters such as floods and fires.

Quick delivery was possible because the image—of the Columbia River delta in Oregon—had already been processed. Multi-spectral positive film plus prints in both natural and false color, including one enlargement, were delivered, along with an invoice for the catalog price—$1,147—to the Hotel Rossiya in Moscow four days after the visit to Soyuz Carta. No discount could be negotiated for an image previously selected by a Soviet user, and the marketing organization charges a 50% royalty on resales.

"We can make photos in three days, three weeks, or three months, depending on if photos are available," Pisulkin said. "For a good customer we can even arrange a satellite launch and camera."

Proceedings at the forum in Moscow could improve the prospects of international collaboration on global remote-sensing capability. McLucas proposed the formation of an international consortium patterned after the International Telecommunications Satellite Organization (Intelsat) and the International Maritime Satellite Organization (Inmarsat). McLucas has been pushing this concept for some time in the West (*Aerospace America* July 1987, p. 5).

Alexander Dunayev, head of the Soviet Glavcosmos civil space organization, was cautious but interested. McLucas said: "It makes no sense for Eosat, Spot Image, Soyuz Carta, or future European, Chinese, and Japanese Earth resources organizations to lose money—as they are bound to—when a cooperative group could come closer to breakeven and perform a useful service for global customers."

McLucas favors the name Envirosat for the consortium, although Inersat for International Earth Resources Satellite consortium has been widely promulgated in the West. Approaches to forming the consortium under discussion include finding a broker organization that would provide an initial base of operations.

This pattern was established by the International Maritime Organization based in London, which fostered development of Inmarsat. Examples of possible brokers for Envirosat include the Landsat Ground Station Operators Working Group and the International Polar-Orbiting Meteorological Satellite Organization.

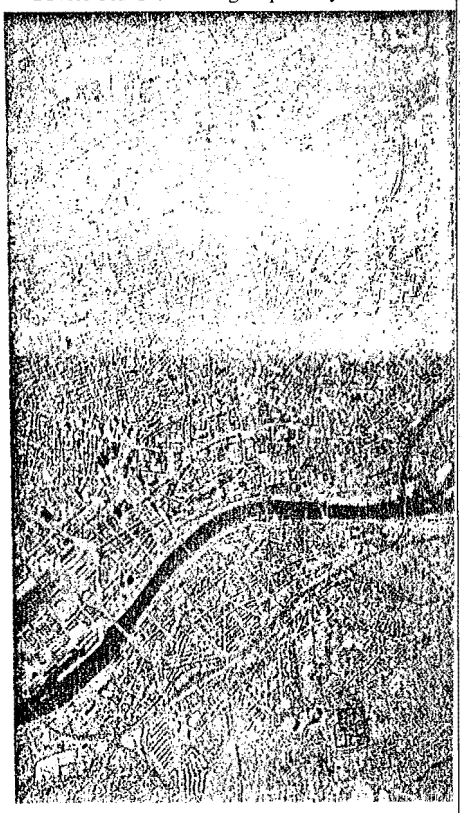
Another approach gaining favor is raising funds to establish a nonprofit center with a three-year charter to build a consensus among users on how to run the consortium.

fly over to the Mir?" Subsequent discussion showed substantial Soviet agreement with van Hoften's proposal on space rescue.

Not so restrained in advocacy of the manned Mars mission were eminent Mars evangelists Carl Sagan, Bruce Murray, and Louis Friedman of the Planetary Society, who worked closely with Roald Sagdeyev, chief of Moscow's Institute of Space Research, on organizing a large part of the U.S. contingent at the meeting. They too, however, acknowledged that massive public education must precede support for a joint manned Mars venture, which some cost out to $100-150 billion.

Sagdeyev was circumspect, encouraging discussion of a possible joint U.S.-Soviet manned mission to Mars but emphasizing the need for cooperation on closer projects as building blocks—Phobos, the Mars Observer, and a possible rover and sample return mission. Evidence of movement by the Soviets toward near-term objectives was Sagdeyev's summation of space

This image of Frankfurt am Main, FRG, illustrates the global scope of Soviet remote-sensing capability.



Burton Edelson of Johns Hopkins Foreign Policy Institute (left) and several other Americans negotiated purchase of 5-m imagery from Vyacheslav Pisulkin (right), director of Soyuz Carta.

science proceedings at the forum. Although much attention surrounded the manned Mars mission during early sessions, Sagdeyev omitted that subject from the summation.

Samuel W. Keller, NASA's deputy administrator for space science and applications, was emphatic on the need for greatly increased public and presidential support "if government is to commit to such multidecade programs." The official U.S. government delegation was headed by Keller and Thomas Rona, deputy director of the White House Office of Science and Technology Policy.

Not far from the minds of most participants was speculation on how fast official cooperation between the governments of the U.S. and the Soviet Union will progress. On April 15, the two countries signed an agreement to agree on specific cooperative projects. As a result, working groups were formed for further discussion of life sciences, planetary exploration, astronomy and astrophysics, Earth sciences, and space physics.

But the U.S. and Soviet governments have yet to negotiate on new missions already discussed by leading scientists and engineers from both countries. An indication of the current stance of government-to-government cooperation was the U.S. keeping their first team at home. Absent were such top officials as William R. Graham, science advisor to President Reagan, James C. Fletcher, NASA administrator, and Keller's boss, Lennard A. Fisk, NASA associate administrator for space science and applications.

Soviet overtures toward the West are unlikely to accelerate agreement on specifics because the primary obstacle can only be removed by an agreement on technology transfer between the U.S. government and Western scientists. Keller said that transfer of militarily critical or commercially proprietary technology can only be controlled by limiting the number of Western payloads flying on Soviet spacecraft to one or two at a time. He said that 500 non-Soviet participants at the forum means there are at least as many principal investigators who want to fly an experiment. "Everybody wants them all," Keller said.

Scientists are not likely to spontaneously agree on who will be first, and Keller said specific measures by the government to resolve the question must wait for negotiations under the April 15 agreement to move ahead. Keller did make some progress during the forum by reaching agreement with his Soviet counterparts on December 7 as the date for the first meeting of the planetary working group. The life sciences group met last summer, and the rest are expected next year. In the meantime, Soviet pressure can be expected to keep the U.S. on the spot.

Published reports in the U.S. about the forum suggested that the purpose of the meeting was to build support within the Soviet Union for space programs and that some top Soviet officials think Sagdeyev's space institute, which is part of the Soviet Academy of Sciences, gets a disproportionate share of funding.

Clearly, Sagdeyev's intention in organizing the forum was to promote cooperation on projects that promise to be too expensive for one nation to undertake—not to consolidate his base of influence within his own country. Top Soviet officials expressed opinions off the cuff in the context of ongoing discussions without evidence of prior orchestration by the government. Orchestrating pronouncements by Soviet officials would be prudent during a show for internal consumption but too risky for promoting cooperation with a skeptical West. And evidence of the leverage that Sagdeyev already has on his government included the cost of the meeting, estimates of which ran as high as 2 million rubles.

Whatever Sagdeyev's intentions, turnout at the meeting did demonstrate

At the forum, Roald Sagdeyev stood to applaud Gherman Titov, the second man in space (far right). Joining in recognizing Titov are (left to right) Thomas Paine, former NASA administrator, Vladimir Kotelnikov, head of Intercosmos, and Carl Sagan of the Planetary Society.

Yuri Kienko, head of Soyuz Carta's parent organization, presented 5-m imagery at the forum.

the public relations and foreign policy dividends from an aggressive space program. The forum drew 500 space professionals from some 35 countries to Moscow as well as 400 Soviets to celebrate the 30th anniversary of the first Sputnik launch. The Soviets are the biggest game in town for members of the space community. The French, for example, have their most active year of Soviet cooperation coming up in 1988 with Gamma 1, Granat, Phobos, and a manned flight on Mir. U.S. astronauts spent several hours trading stories with cosmonauts training at Star City, including Jean-Loup Chretien, a French citizen who was Patrick Beaudry's backup on his U.S. Shuttle flight. Chretien is expected to spend 45 days with a Soviet crew on Mir toward the end of 1988.

The forum's effect on U.S. space veterans is an example of how *glasnost* or the new openness in the Soviet Union is easing the U.S. toward cooperation. Two former U.S. Shuttle astronauts, Owen Garriott and Charles Walker, went to the Kaliningrad flight control center where Garriott conversed with Mir incumbents Yuri Romanenko and Alexander Alexandrov during a 20-minute communication linkup. Romanenko was on his 240th day in orbit, and is expected to stay up until early in 1988. Understandably, American veterans of Gemini, Apollo, Skylab, and the Shuttle appeared wistful as they watched a half-dozen cosmonaut trainees practice extravehicular activity in the impressive neutral-buoyancy tank at the Star City training center.

Underscoring the meeting's cooperative mood was a unanimous resolution backing the designation of 1992 as the International Space Year, a concept by Sen. Spark Matsunaga (D-Hawaii) aimed at galvanizing global support for cooperative space projects designed to improve the quality of life on Earth. And at the end of the meeting, Rona of OSTP issued a blanket invitation to a meeting similar to the Soviet forum that the U.S. is planning for mid-1988. **James J. Harford**

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At a gathering of astronauts and cosmonauts during the forum, Owen Garriott, a consultant and former astronaut, raised the issue of weightlessness vs. artificial gravity on long duration manned missions.