

IV. International

How Biden's Sanctions Against Russia Hurt U.S. and European Space Programs

by Karel Vereycken

March 9—The Anglo-American global showdown with Russia over Ukraine and the waves of sanctions and counter sanctions are hurting a very future-oriented domain of human international cooperation that until now somehow had escaped such folly: space exploration.

According to the [transcript](#) posted by the White House, of remarks made by U.S. President Joe Biden during a press conference on Feb. 24 announcing new sanctions against Russia, including financial and others, Biden said:

Between our actions and those of our Allies and partners, we estimate that we'll cut off more than half of Russia's high-tech imports. It will strike a blow to their ability to continue to modernize their military. It'll degrade their aerospace industry, including their space program.

In response, Moscow announced that it will no longer sell rocket engines to U.S. companies. Russia's space agency, Roscosmos chief Dmitry Rogozin, himself still under sanctions since the 2014 accession of the Republic of Crimea to Russia, said, "Let them fly on something else, their broomsticks." Rogozin blamed the U.S. and Europe for the breakdown in space cooperation, saying:

The blame for the collapse of cooperation in space ... lies entirely on the shoulders of the United States, Great Britain, France, and Germany. These countries have destroyed what was

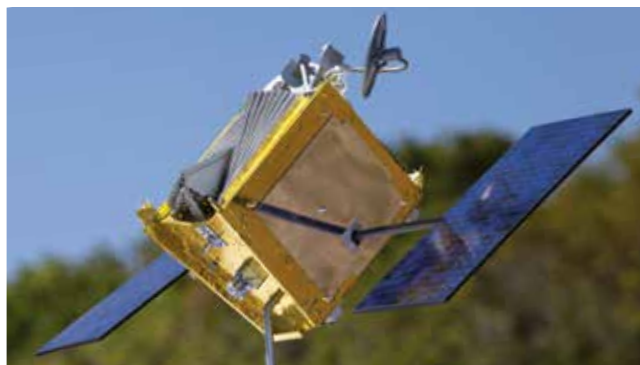


Dmitry Rogozin, Director General of Roscosmos. NATO

created by mankind with such difficulty, what was created by the blood and sweat of those people who mastered space.

As a first counter measure, the Soyuz-2 rocket that was to launch 36 of the UK's OneWeb satellites into orbit has been removed from the launchpad. Russia removed the satellites from the pad after the UK refused to accept its demand that the satellites not be used for military purposes and to withdraw from OneWeb. Since 2006, Soyuz-2 rockets accumulated a total of 137 launches, 130 of which were successful, yielding a 94.9% success rate.

A statement released by Roscosmos said that Director General Rogozin issued instructions "to stop all launches of Russian rockets in the interests of OneWeb from all spaceports, due to the lack of a guarantee from the OneWeb company that the satellites of the system will



A model of the UK's OneWeb satellite.

NASA/Kim Shiflett

not be used for military purposes.”

Some claim that the Russian rocket engine sales ban will not hurt the U.S. much, since private agencies like SpaceX and Blue Origin are building their own engines; that the only effect will be on Northrop Grumman, which uses Russian-made RD-181 engines in its Antares rocket.

Europe Hit the Most

Far more devastating will be the impact on the European space industry and programs. On March 4, the French daily, *Le Monde*, published an article saying:

The war in Ukraine is taking place on Earth, but it is also having a ripple effect in space and, in a way, on the planet Mars. The sanctions taken against Moscow have had a cascade of repercussions for the space sector—industrial, scientific,



ESA/ATG medialab

An artist's conception—not to scale—of the ExoMars entry, descent and landing demonstrator module, Schiaparelli (the orange cone), separating from its mother ship, the Trace Gas Orbiter (upper left), and the ExoMars rover, renamed the Rosalind-Franklin (lower right).

and purely operational consequences—which primarily affect Europe and France because of the cessation of numerous collaborations with Russia.

On Feb. 26, Roscosmos suspended its Soyuz-ST rocket launches from the Guiana Space Center in Kourou—flights commercialized by Arianespace—and repatriated all of its 87 personnel.

As an immediate consequence, the two satellites that were to complete the European Galileo geopositioning constellation (a total of 30 satellites), as well as the French military satellite CSO-3, no longer have launch

vehicles. The financial losses incurred by Arianespace could drive this top French aerospace company into bankruptcy.

In a laconic press release, the European Space Agency (ESA) and the French Centre National d'Études Spatiales (CNES) said they were counting on “the imminent arrival of the new Vega-C and Ariane-6 launchers on the market” so as to be able to “work out a reprogramming of [these] launches,” without specifying whether the now-grounded satellites could take off this year. The problem is that Ariane-6 is not ready and that the last stage of the small European Vega launchers is manufactured ... in Ukraine.

Since the fall of the Berlin Wall, the political will to maintain a space industry in the former Soviet republics and to use the know-how of Russian and Ukrainian engineers has resulted in the integration of many components from the East into several Western rockets. Hence, in addition to Vega, the Atlas V launcher of the United Launch Alliance, widely used in the United States, is currently powered by Russian RD-180 engines. Another example is the Antares rocket, from the American company Orbital Sciences Corporation, which sends the Cygnus supply ship to the International Space Station (ISS): its first stage is built in Ukraine ... and also with Russian engines.

The freezing of the collaboration with Moscow in space signifies a deathly blow to the European mission ExoMars which, after many postponements, was finally supposed to take off this year.

The central component of ExoMars is the European rover, *Rosalind-Franklin*, which will have the task of drilling the Martian soil to a depth of 2 meters to look for traces of life in the distant past. But before that, this mobile robot will have to take off aboard a Russian Proton rocket and land on Mars in a lander ... also Russian.

It is clear, from where things stand today, that ExoMars, a fabulous €2 billion mission involving a vast scientific community, has neither rocket nor lander. The ESA now recognizes that a launch in 2022 has become “very unlikely.” “It’s an atomic bomb that has fallen on our heads,” one of the people involved in the project confessed to *Le Monde*, speaking on condition of anonymity. “Until February 25, we were hoping to get through all the restrictions, but that’s now over.”

In the long obstacle course preparing its mission, ExoMars was days away from its “flight qualification and acceptance review,” which would have given the green light to send the *Rosalind-Franklin* rover, currently in Turin, Italy, to the Baikonur Cosmodrome in Kazakhstan.

Frances Westall, director emeritus of research at the French National Center for Scientific Research (CNRS), was part of the group of scientists who conceived the project in the late 1990s:

I ended my career at the CNRS on the evening of February 28 with this news, and I didn’t sleep a wink. I am saddened for my scientific and engineering colleagues who have done so much work over the years. In the last few days, tests were conducted with Russian colleagues who were equally devastated. I had feared that possible technical problems would postpone the mission, but I had never thought of a war.

The Fate of the ISS

Finally, of course, the International Space Station (ISS) has, from its start, been a joint U.S.-Russian effort. Originally born from a foreign policy plan to improve relations between the Cold War foes after the fall of the Berlin Wall and the conclusion of the Space Race, the ISS would not exist but for Russia’s collaboration. Soyuz rockets helped bring ISS modules into orbit and, following the Space Shuttle’s retirement in 2011, served as the only means of getting astronauts into orbit and back, at least until SpaceX came along. Of the station’s 16 habitable modules, six were provided by Russia and eight by the U.S. (with the rest sent up by Japan and ESA). Just last summer, Russia successfully launched its largest ISS component to date, the 813-cubic meter *Nauka* Multipurpose Laboratory Module.

Built and run by the U.S., Russia, Europe, Japan and Canada, the ISS represents a high point of cooperation.



NASA

Russia’s Nauka Multipurpose Laboratory Module, pictured shortly after docking to the Zvezda service module on the International Space Station, July 29, 2021.

The station has been continuously occupied for over 20 years and has hosted more than 250 people from 19 countries, showing how they can cooperate. The ISS has often stayed above the fray of geopolitics, but that position is under threat. For the current crew of two Russians, four Americans and one German, things may be getting worrisome as tensions rise between the U.S. and Russia.

In a series of Tweets on Feb. 26, reacting to Biden’s statement, Rogozin pointedly asked:

Do you want to manage the ISS yourself? Maybe President Biden is off topic, so explain to him that the correction of the station’s orbit, its avoidance of dangerous rendezvous with space garbage with which your talented businessmen have polluted

the near-Earth orbit, is produced exclusively by the engines of the Russian Progress MS cargo ships.... If you block cooperation with us, who will save the ISS from an uncontrolled deorbit and fall into the United States or Europe? There is also the option of dropping the 500-ton structure on India or China. Do you want to threaten them with such a prospect? The ISS does not fly over Russia, so all the risks are yours. Are you ready for them?

The “uncontrolled deorbit” remark appears to be a direct reference to Russia’s threat to not provide one of its Progress MS cargo ships to assist in the space station’s retirement at the end of the decade.

Already in 2014, following the Crimea affair, as a response to the U.S. sanctions on Russia, Russian officials announced that they would no longer launch U.S. astronauts to and from the space station beginning in 2020. Since NASA retired the space shuttle in 2011, the U.S. became entirely dependent on Russian rockets to get astronauts to and from the ISS, and this threat could have meant the end of the American presence

aboard the space station entirely. While Russia did not follow through on its threat and continued to transport U.S. astronauts, the threat should have been taken seriously.

On Feb. 25, Elon Musk offered to have his company SpaceX step in and keep the ISS in orbit, should Russia refuse. The space station is currently where it is thanks to regular deliveries of propellant reactant by Roscosmos, but should those shipments stop, the ISS will be unable to counter the planet's atmospheric drag and eventually will slow down and slip into a capture orbit where it will fall to Earth. By taking over those delivery flights, SpaceX could keep the ISS aloft. Former NASA astronaut Garrett Reisman cautioned CNN:

The Russian segment can't function without the electricity on the American side, and the American side can't function without the propulsion systems that are on the Russian side. So, you can't do an amicable divorce. You can't do a conscious uncoupling.

Professor Wendy Whitman Cobb of the U.S. Air Force School of Advanced Air and Space Studies wrote:

In December 2021, the U.S. announced its intention to extend operation of ISS operations from its planned end date of 2024 to 2030. Most ISS partners expressed support for the plan, but Russia will also need to agree to keep the ISS operating beyond 2024. Without Russia's support, the station—and all of its scientific and cooperative achievements—may face an early end.

To make a point, RIA Novosti, Russia's official state news agency, on March 5, posted on its Telegram account, a 47-second video, which went viral, showing Russian cosmonauts detaching the Russian modules from the International Space Station, including *Zvezda*, which provides most of the life support and navigation systems for the orbital station! "The new propaganda video comes days after the U.S. imposed sanctions against Moscow following its invasion of Ukraine," complains the angry western press.

Russia Goes East

To limit the impact on Russia's own space industry, Rogozin announced:

Roscosmos will provide unprecedented support to private Russian space companies. They will be given access to new domestic developments in the field of space instrumentation, as well as the possibility of practically free delivery into orbit of spacecraft created by private design bureaus.

Rogozin added that Russia will be launching dozens of private spacecraft for communication, meteorological observation, and remote sensing of the Earth. The Russian space program has largely remained a state affair until now, which was based on global cooperation including with the U.S. and Europe.

Last weekend, Russia kicked the U.S. out of Venera-D, a proposed Venus mission to include an orbiter and a lander. Rogozin said that Russia would either execute Venera-D alone or bring in China. He also said China could help Russia source the microelectronics it needs for its space program, that it can no longer get elsewhere under the sanctions. China has so far shown little appetite for joining international sanctions on Russia. China and Russia already agreed in 2019 to co-develop an International Scientific Lunar Station to rival NASA's planned Gateway lunar station, in which Russia had previously considered signing up to participate.

The new sanctions will boost Russia's space cooperation with China. This comes as Russian President Vladimir Putin hailed "unprecedented" close ties with China at a meeting with Chinese leader Xi Jinping in Beijing on Feb. 4, ahead of the Winter Olympics opening ceremony.

Among the 16 deals confirmed during that meeting, the most notable were an agreement for 10 billion cubic meters (353 billion cubic feet) of Russian gas to be supplied to China per year via a new pipeline; and an agreement signed between the operators of the Russian high-altitude satellite system GLONASS and China's BeiDou, "on cooperation in the field of ensuring the complementarity of the global navigation satellite systems in terms of system timescales," according to the document list issued by the Kremlin. Such complementarity would represent a massive upgrade in terms of performance. For example, when a BeiDou satellite covers a Moscow area between 0700 to 0900 hrs, a GLONASS satellite could be spared to cover the St Petersburg area during

the same period or take over Moscow from 1000 to 1200 hrs.”

China launched its BeiDou, or Northern Dipper (the ancient Chinese name for the seven brightest stars of the *Ursa Major* constellation) program in the 1990s. This came amid concerns that its People’s Liberation Army (PLA) would be vulnerable without a satellite navigation system alternative to the GPS (Global Positioning System), owned by the U.S. government and operated by the U.S. Air Force. BeiDou’s third and current network of 30 satellites was completed and began offering global services in July 2020, when Beijing and Washington were going through bitter “decoupling” and rising military tensions.

Apart from its military applications, the BeiDou system, with a 1.2-meter accuracy of positioning that surpasses the GPS’ 5-to-10-meter range, and added services such as text messaging, also aims to draw the global civilian satellite navigation market worth billions of U.S. dollars.

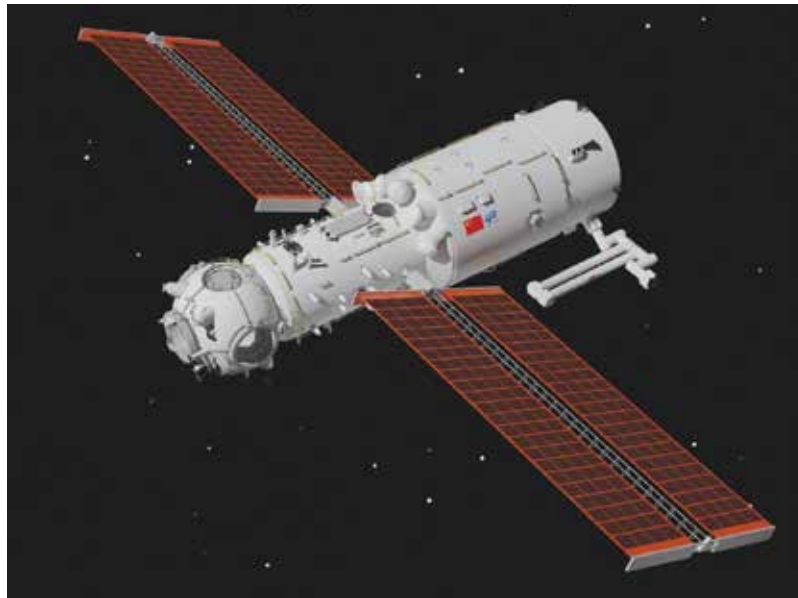
Russia’s GLONASS, or Global Navigation Satellite System, started as a Soviet program during the Cold War, and was restored in 2011. Now, with a constellation of 24 satellites in orbit, it has great advantages for military uses—thanks to its strong anti-jamming capability. Chinese military expert Qian Liyan told Russia’s Sputnik news agency:

BeiDou and GLONASS each have their own advantages. If they could be deeply linked or even interoperable, they could form an ideal navigation system, which would not only facilitate cross-border transport between the two sides in peacetime, but also improve the stability and survivability of the whole navigation system by relying on each other in wartime.

Operators in the two nations, the China Satellite Navigation System Committee and Russia’s Roscosmos, have over the past few years established a monitoring and evaluation service platform for both systems providing joint services to Beijing’s multinational Belt and Road Initiative, and together

developed satellite navigation applications in cross-border transport and satellite navigation chips, according to the Chinese committee.

Regarding cooperation with the Chinese space station, in June 2021, during a press conference at the Global Space Exploration Conference (GLEX) in St. Petersburg, Russia, Rogozin revealed that Russia was in discussions with China about crewed flights to the Chinese space station. Technically speaking, the best launch site to reach the Chinese space station is French



CC/Shujianyang

An artist's conception of the Tianhe core module, launched into orbit April 29, 2021, the first module of China's Tiangong space station.

Guiana, but it can also be reached from the Vostochny Cosmodrome located in the Amur Oblast in Russia’s Far East.

Rogozin’s remarks came only days after China launched its first crew to the *Tianhe* space station core module using a Long March 2F rocket from Jiuquan in the Gobi Desert. The Chinese Space Station (CSS) is expected to be completed in 2022 and be permanently crewed for at least 10 years. It could even become the only destination in Low Earth Orbit for international astronauts, since the future of the International Space Station (ISS) is unclear.

Also, last June, at the St. Petersburg GLEX, China and Russia presented their first version of a road-map for a joint International Lunar Research Station which at that time, representatives said, was open to all interested parties.