

## INTERNATIONAL COOPERATION SOUGHT

# Russia Escalates Effort for 'Strategic Defense of Earth'

by Susan Welsh

March 18—If a televised meeting of experts and leading officials were held in the chambers of the U.S. Senate on the topic of “Risks and Threats from Space: How To Defend the Planet,” do you think you would have heard about it? What if the participants included the Senate Majority Leader and the chairman of the Senate Subcommittee on Science and Space; the NASA Administrator and the head of the Jet Propulsion Laboratory (JPL); the Secretary of Homeland Security; a representative from the Department of Defense who specializes in missile/space defense; the heads of the National Academy of Sciences sections for astronomy and applied mathematics; the heads of the Lawrence Livermore and Los Alamos National Laboratories; the deputy head of the nuclear power section of the Department of Energy, and the CEOs of the principal aerospace companies? Would the media have paid attention?

That is an approximate equivalent of who attended the March 12 “round table” held under the auspices of Russia’s Federation Council, the upper house of parliament. The two-hour meeting received no coverage in the leading U.S. press (the next day’s *Washington Post* coverage of Russia featured articles on “Pskov, the would-

be pancake capital” and the attack against the Bolshoi Ballet’s artistic director). An AFP wire on the round table appeared, and there were short reports in London’s *Daily Telegraph* and *Guardian*, some press in Australia, and a few websites. None mentioned that the Russians were calling for international collaboration. There has been no known response from any U.S. official.

Yet this Moscow meeting, which took place on the 150th birthday of Academician Vladimir I. Vernadsky, the great biogeochemist whose work is celebrated elsewhere in this issue (see *Science*), conveyed two vital



Russian TV First Channel

*Russian scientists, political leaders, government officials, and business leaders, meeting at the Federation Council on March 12, urged rapid development of anti-asteroid planetary defense, both nationally and internationally.*

messages to the international community:

- There is currently no way, in any country, to prevent a catastrophic asteroid strike against the Earth, even if it were possible to detect one in good time, which it is not.
- International cooperation is essential to solve this problem, and Russia is open to such cooperation.

Lyndon LaRouche also underlined these points in his March 15 Friday [webcast](#): “The problem is,” he said, “we do not have any assured ability at this time to actually defend Earth against these kinds of threats—not assured or even reasonably assured. We are not prepared. We have not done the work needed to prepare for this kind of problem. Furthermore, there’s a deeper problem. It’s a psychological problem of great depth. We do not have scientific teams in quantity and quality needed to understand what the problem is.” LaRouche said that a crash international program for defense of Earth has to be based on putting instrumentation on Mars, and a large number of systems elsewhere as well. “Because as of now, if something could hit the Earth within one year, I don’t think a damned thing could be done about it.”

### Keynote Speeches

The Moscow round table was moderated by **Sen. Viktor Kosourov**, first deputy chairman of the Federation Council Committee on Science, Education, Culture, and Information Policy.

**Sen. Yuri Vorobyov**, the deputy chairman of the Federation Council, introduced the subject as one of pressing concern, especially since the explosion of a meteorite over Chelyabinsk, Russia, on Feb. 15.<sup>1</sup> The complex topic has to be discussed from the political, technical, as well as planetary standpoint, he said.



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*Sen. Viktor Kosourov*

The main speakers were **Boris Shustov**, director of the Astronomy Institute of

the Russian Academy of Sciences (RAS), president of the Academy’s Expert Working Group on Space Threats, and **Vladimir Popovkin**, director of Roscosmos, the Russian space agency, equivalent to NASA.

**Shustov** gave an overview of the subjects to be discussed by the panel: the threat from asteroids and comets; from “space garbage”—debris from man-made satellites in Earth orbit; and from “cosmic weather,” notably, solar activity. In this article, we discuss mainly the first of these.

He reported that the RAS set up within the last few years an Expert Working Group on Space Threats, which includes experts from the RAS, Roscosmos, the Ministry of Education and Science, Moscow State University, the Emergencies Ministry, the nuclear company Rosatom, the Ministry of Defense, and other interested agencies and organizations. The group’s main assignment is to work out a concept for a national system to counter space threats. In June 2010, the RAS and Roscosmos were delegated to continue this work, and an outline was prepared. If it is accepted, it will provide the basis for a future detailed program and a legal mandate.

A key problem, Shustov said, is the detection of dangerous space objects. There are perhaps 200-300,000 of them that pose a potential threat to Earth within a reasonable interval (100-200 years), but only 2% of these have been identified. Special wide-angle telescopes, with a diameter of about 2 meters, will be needed, but so far only one of these exists, in the United States. Special programs are under way to build powerful telescopes in the U.S. and Europe. Russia has none, he emphasized, making a plea for financial support, at the very least for the observatory that is being built in the Lake Baikal region. “The RAS and Roscosmos have some financial support, but not enough,” he said. In interviews given just after the Chelyabinsk meteorite explosion, Lidiya Rykhlova, a senior scientist at Shustov’s Institute of Astronomy, had cited the Academy’s estimated price tag of 58 billion rubles (almost \$2 bil-



Russian TV First Channel

*Boris Shustov, director of the Institute of Astronomy, addresses the round table on March 12: “The problem of the asteroid-comet danger is global in nature and requires effective international cooperation to solve it.”*

1. That asteroid was estimated to weigh 7,000 tons, and to be traveling at 40,000 km per hour; the shockwave of the 500-kiloton explosion scattered debris throughout the region, injuring about 1,500 people, but with no deaths reported.

lion) for an adequate Russian 10-year asteroid-comet defense program, including ground- and space-based components.

But space-based telescopes, which are much more expensive, are essential, Shustov said. On Feb. 25, he reported, the Canadian NEOSat satellite was launched, for observation of large asteroids in the daytime sky. There are only a few projects of this nature in the world, and international cooperation is needed. The main problem in detecting dangerous space objects is to develop coordination among both domestic and international institutions.

“The problem of the asteroid-comet danger,” Shustov said, “is global in nature and requires effective international cooperation to solve it.” There will be an international conference on planetary defense in the United States (Arizona) in April, which will hopefully yield new information.

Another issue is the potential military aspect of such work. Russia should only participate in international programs on the basis of protecting its own interests, he said. “It should not be forgotten that the technologies required for solving the problems of countering threats from space have a dual nature.”

**Vladimir Popovkin** of Roscosmos then spoke, with an emphasis on better coordination among the various Russian agencies. He said that officials of the Defense Ministry and the RAS have formed a working group to develop a unified system to defend against asteroids and other space threats. We have sufficient means in our country, he said, but people are working within their own agencies. Therefore, the time has come to create one inter-agency center to coordinate these systems and prevent duplication.

He reported that the design for a program against threats in and from space will be ready by the end of 2013. There are three plans underway, he said: one for developing optical instruments by the RAS; the second for combating space threats, by Roscosmos; and a third by the Ministry of Defense.



Russia Today

*Vladimir Popovkin, the head of the Russian space agency Roscosmos, warned that results of current work will not be apparent until the end of the decade.*

Like Shustov, Popovkin mentioned the dual-use character of this research, and called for international agreements “excluding the testing and deployment of weapons in space under the cover of countering the asteroid-comet danger and developing technologies to eliminate space garbage.”

He noted that Russia is closely monitoring the asteroid Apophis, which is due to fly close to the Earth in 2036. “We want to put a beacon on Apophis to ascertain its exact orbit and work out what further actions to take,” he said.

Popovkin said that Russia is developing a telescope network that will expand throughout the country, but that the first results of this will not be visible until 2018-20.

## Further Dimensions

Other speakers elaborated various aspects of the situation facing Russia and the world.

**Vladimir Puchkov**, Minister for Civil Defense, Emergencies, and Disaster Relief, described the work of federal, regional, and local agencies to cope with the Chelyabinsk meteorite impact, and said that “international cooperation in the field of early warning systems must be expanded. It makes sense to form an international space task force which includes orbital satellites with special equipment.” He added that collisions between Earth and asteroids can only be forecast in time to act, if the international potentials of space- and ground-based systems are pooled. He called for research “on the implementation of the International Global Monitoring Aero-Space System (IGMASS) and the subsequent development of a comprehensive project design. We at the Russian Emergencies Ministry have already started to work on this outline.”

**Anatoli Kornilov**, deputy director of the Department of New Challenges and Threats at the Ministry of Foreign Affairs, spoke about Russia’s participation in UN discussions of space threats.

**Oleg Aksyonov**, chief of the National Research



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*Civil Defense Minister Vladimir Puchkov: “International cooperation in the field of early warning systems must be expanded.”*

Center on Space and Missile Defense at the Ministry of Defense's 4th Central Science and Innovation Institute, said that since the Chelyabinsk event, many people have been asking why the Russian military did not detect the incoming asteroid. He explained that "our monitoring system and the American one can detect and track man-made objects in near-Earth space at distances of up to 50,000 km, but generally not farther. . . . Asteroids and comets, orbiting through the galaxy and periodically approaching the Earth, are objects of a totally different type and require corresponding methods of observation, astronomical instruments and astronomical methods for detecting and tracking them. The Defense Ministry does not have such equipment and does not plan to build or commission any." But he did say that they were willing to help evaluate the threat, and are doing so in cooperation with other agencies.

## No Way To Stop Asteroids For at Least 3-4 Years

Dr. Natan Eismont is a senior researcher of the Russian Academy of Sciences at the Research Laboratory of Space Research, Technologies, Systems, and Processes in Moscow. In an interview to ITAR-TASS on March 6 on the threat from near-Earth asteroids and comets, he commented on a number of key aspects of this problem.

Asked whether there is international cooperation to develop ways of monitoring and acting upon asteroids, he replied, "There are discussions and some efforts to establish contacts, but nothing has happened beyond talks."

On whether the threat from asteroids is increasing, he stressed that we don't know, because we don't know how many of them there are or where they are. Optimistic estimations say that 10% of those that might pose a danger to Earth have been identified, and pessimistic evaluations say 2%.

Asked whether it would be possible to prevent Earth impact by a dangerous asteroid, he said flatly, "No, there is not. I would say that it will take a minimum of 3-4 years from today to be able to do anything whatsoever."

**Oleg Shubin**, the deputy director of the Department of Nuclear Munitions and Military Power Units of the state-owned nuclear monopoly Rosatom, said that once a dangerous space object is detected, there is only about a year to take measures to intercept it. "Interception of an asteroid bigger than 1 km in diameter would mean the use of a nuclear warhead considerably more powerful than the existing megaton class of nuclear devices," he said. "This is a separate scientific challenge that could be solved." He mentioned that the construction of international or national systems for defense of Earth from asteroids raises a number of questions related to international treaties, such as the Nuclear Non-Proliferation Treaty and the Nuclear Test Ban Treaty. Shubin added that "exotic" methods of destroying dangerous asteroids would not be effective, and only nuclear explosions would work.

"In the foreseeable future, I cannot see any other danger that would lead—at minimum—to a profound deterioration of human civilization," he concluded.

**Vitali Lopota**, president of the S.P. Korolyov Rocket and Space Corporation Energia, which builds the world's largest currently operating launch vehicle, said that super-heavy launch vehicles will be required for defense against asteroids. He said that the U.S. is planning to have one with a capacity of 70 tons by 2017, and a successor with a 130-ton capacity.



St. Petersburg Polytechnic  
Vitaly Lopota

Russia should produce such larger rockets as well, he said. By building one with a 70-ton capacity by 2020, and 150 tons by 2030, Russia would get much closer to solving the problem of asteroid-comet defense.

**Vladimir Kuznetsov**, director of the Academy of Sciences' N.V. Pushkov Institute of Terrestrial Magnetism, the Ionosphere, and Radio Wave Propagation, spoke about space weather, citing the solar storms which can destroy communications satellites, and which knocked out Quebec's electricity grid on March 13-14, 1989, costing millions of dollars.

**Anatoli Zaitsev**, general director of the Center for Planetary Defense, gave a briefing on the 20-year Citadel program for international defense of the planet.

**Vladislav Panchenko**, president of the Council of the Russian Basic Research Foundation, talked about how to finance these projects.



**Boris Chetverushkin**, director of the M.V. Keldysh Institute of Applied Mathematics of the RAS, brought up the issue of international cooperation, but from “a position of strength,” using Russia’s own observations and analytic capacities. “Otherwise, we will receive information on the leftover principle: You will find out only what we think you should know.”

**Aleksandr Ipatov**, director of the Institute of Applied Astronomy of the RAS, emphasized that Russia needs an improved asteroid observation system, and particularly an ability to catalog all of them. “Our institute is working to catalog all the small bodies in the Solar System. But Russia’s observations are lagging behind. For example, the U.S. has registered all asteroids that are bigger than a kilometer in diameter, and that is 800,000 objects,” he said.

Finally, a report on the meeting from the *Parliamentary Gazette* of March 12 quotes Academician **Anatoli Cherepashchuk**, whose name is not on the program, and who presumably spoke from the floor, saying that an additional key factor is education of the youth. He expressed regret that the course in astronomy is no longer required at many colleges and universities. As a result, he said, the population’s basic scientific literacy

is falling, as shown by a recent survey: About a third of respondents were sure that the Earth does not move around the Sun, but rather the other way around. Also apparently speaking from the floor, **Lev Zelyony**, the director of the Institute for Space Research, was quoted on the need for mass education in civil defense: “Fifteen hundred people were wounded in Chelyabinsk because of their own curiosity, being hurt by glass. The graduates of Soviet schools and universities could have told them that in case of a nuclear explosion, you shouldn’t go near the windows.”

## Strategic Defense of Earth

For those who may have doubted it, this round table makes clear that the Russians take the asteroid threat very seriously and are mobilizing to put the scientific apparatus in place to be able to monitor it and prevent a disaster. They have also made clear that they cannot do it alone. That is why then-Russian Ambassador to NATO Dmitri Rogozin, who is now deputy prime minister, called in October 2011 for international cooperation for the Strategic Defense of Earth (SDE). See below for a chronology of this and other appeals by Russian leaders.

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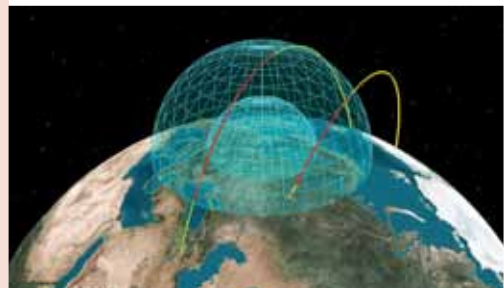
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