Did Star Wars Help End the Cold War? Soviet Response to the SDI Program

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The Strategic Defense Initiative (SDI), also known as the Star Wars program, is most likely the most controversial project of the cold war. Initiated by the United States in 1983, at the height of the cold war tensions, as a research program aimed at development of a range of advanced missile defense technologies, SDI had significant impact on the U.S.-Soviet relations and undeniably played a significant role in the events that led to the end of the cold war nuclear confrontation.[1] The exact nature of that role, however, is still open to a debate.

According to one point of view, SDI was a key element in the U.S. strategy to curb the Soviet military buildup of the 1970s, which eventually led to the Soviet Union defeat in the cold war.[2] It is often stated that the Star Wars program confronted the Soviet Union with the prospect of a strategic competition in a new area, a one that would concentrate on the technologies in which the United States had advantage. In a variation of this argument, the SDI program made the Soviet Union realize that its economic and social system can not sustain the technological arms race with the United States, forcing the Soviet leadership to seek concessions that eventually accept defeat.

A different view suggests that the influence of the Star Wars program on the Soviet policies was much more limited and the developments that resulted in the end of the cold war and subsequent collapse of the Soviet system were results of its internal evolution. Even though U.S. policies influenced the developments in the Soviet Union, they did not cause them.[3]

Statements and recollections of the Soviet participants of the events of that time have been quite contradictory, complicating the matter. On the one hand, the Soviet officials usually insist that they realized the limited potential of the Star Wars program very early on and that SDI never forced the Soviet Union to change its policies or negotiating positions. At the same time, they admit that the program caused serious concerns to the Soviet leadership.[4]

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[1] There is extensive literature devoted to the SDI program. For a recent overview with a summary of the arguments, see Mira Duric, *The Strategic Defence Initiative: US Policy and the Soviet Union* (London: Ashgate,

[2] See, for example, Peter Schweizer, *Victory: The Reagan Administration's Secret Strategy That Hastened the Collapse of the Soviet Union* (Atlantic Monthly Press, 1994); Andrew E. Bush, "Ronald Reagan and the Defeat of the Soviet Empire", *Presidential Studies Quarterly*, Vol. 27, No. 3 (Summer), 1997, pp. 451-466; Thomas C. Reed, *At the Abyss: An Insider's History of the Cold War* (New York: Presidio Press, 2004).

[3] See, for example, Celeste Wallander, "Western Policy and the Demise of the Soviet Union", *Journal of Cold War Studies*, Vol. 5, No. 4 (Fall 2003), pp. 137–177; Raymond L Garthoff, "The US Role in Winding Down the Cold War, 1980-1990", in Olav Njølstad, ed., *The Last Decade of the Cold War* (New York: Frank Cass, 2004), pp. 179-195; Matthew Evangelista, "Explaining the End of the Cold War: Turning Points in Soviet Security Policy", in Njølstad, ed., *The Last Decade of the Cold War*, pp. 118-134.

[4] S. F. Akhromeyev, G. M. Korniyenko, *Glazami marshala i diplomata* (Moscow: Mezhdunarodnye otnosheniya, 1992), Wohlforth , *Witnesses to the End of the Cold War.*

The policies of the Soviet Union at the time also indicate that it was concerned about the SDI program. For most of the 1980s missile defense and space remained among the most contentious issues at the U.S.-Soviet arms control negotiations. The Soviet Union made the SDI program one of the central issues at the summit meetings in Geneva in 1985 and in Reykjavik in 1986. In Reykjavik, the Soviet Union offered far reaching concessions on offensive weapons, but then withdrew them when the United States refused to limit its SDI program. This move has been often interpreted as a Soviet attempt to trade its offensive weapons for the SDI program, indicating the very high value that the Soviet Union assigned to it. Overall, the Soviet behavior was not inconsistent with that of a country concerned about technological superiority of its adversary, lending support to the theories that claim that SDI was a political success.

One of the reasons this controversy persists is that until very recently there has been little reliable information about the nature of the Soviet response to the Star Wars program. While most indicators strongly suggested that "as a measure to stress the Soviet economy and affect Soviet policy, SDI never got off the ground," in the absence of documentary evidence it was not entirely clear why the Soviet Union paid so much attention to the U.S. missile defense efforts and what was the mechanism that led the Soviet Union to drop its objections to SDI.[5]

The documents that have become available recently allow to reconstruct the Soviet response to the Star Wars program in more detail.[6] The goal of this paper is to introduce these documents and to discuss the implications that the new information has on the discussion of the role of the SDI program. As can be expected, the documents present a complex picture of the Soviet response. Just as in the United States, there has never been a uniform and consistent view of the Star Wars program in the Soviet Union. The negotiation positions and policies of the Soviet state were a result of a complex process of interaction between various institutions involved in the decision-making – from the military to the defense industry and to the political leadership. On the balance, however, the documents support the view that the SDI program, while affecting Soviet policies, did not help bring the cold war closer to the end. Instead of facilitating the arms control process, SDI seriously complicated it, creating an unnecessary obstacle that the Soviet leadership, eager to move to arms reductions, had to deal with. Finally, the evidence suggests that one of the basic premises behind the SDI program – that it would be able to shift the arms race to the areas of advanced technologies, dissuade the Soviet Union from competition, and eventually provide a more stable defense-dominated environment – did not work. While the SDI program had failed to produce any result, the Soviet Union had developed and was ready to deploy a range of weapon systems that would have brought the U.S.-Soviet confrontation to a more dangerous new level.

First reaction to SDI and return to negotiations

The first reaction of the Soviet Union to the President Reagan's address of March 23, 1983, in which he announced the program that would later become known as the Strategic Defense Initiative, was resolutely negative. The Soviet leadership immediately accused the United

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5 The quote is from Garthoff, "The US Role in Winding Down the Cold War", p. 188.

6 The main source of the new data is the archival collection of Vitalii Kataev at the Hoover Institution Archive: Kataev, Vitalii Leonidovich, Papers, 10 ms. boxes. The collection contains copies of official documents and notes taken at that time that describe various aspects of a number of Soviet strategic programs. Vitalii Kataev was a senior advisor to the Secretary for the Defense Industry of the Central Committee of the Communist Party in 1974-1990.

States of attempting to undermine the existing strategic balance. The missile defense plan, the Soviet Union argued, aimed at giving the United States a first-strike capability and denying the Soviet strategic forces their retaliatory potential.[7]

This assessment of the potential role of the defense was in line with the understanding of the link between offense and defense that was predominant in the Soviet Union as well as in the United States at the time. For example, in a National Intelligence Estimate issued in 1983, the U.S. intelligence community, estimating potential role of the Soviet missile defense system, argued that

> "the Soviets probably would not have high confidence in how well [their missile defense] systems would perform against a large-scale, undegraded U.S. missile attack […]. However, the Soviets would probably view their ballistic missile defenses as having considerable value in reducing the impact of a degraded U.S. retaliatory attack […]"[8]

Applying exactly the same logic to the U.S. missile defense plan, the Soviet Union could only conclude that the goal of the defense system proposed by Reagan was to weaken the deterrence potential of the Soviet forces. In addition to this, the Soviet Union apparently considered the U.S. strategic force modernization program, initiated in the late 1970s-early 1980s, as leading to a substantial increase in the counterforce potential of the U.S. forces. Even more ominous was the upcoming deployment of U.S. missiles in Europe, which would theoretically give the United States the capability to attack targets on the Soviet territory on a very short notice.[9] From the Soviet point of view, all these steps, taken together, clearly amounted to a coordinated effort on the part of the United States to unilaterally change the existing strategic balance. The fact that the new defense system was supposed to rely heavily on space-based components certainly convinced the Soviet leadership that the concerns about the military potential of the U.S. space program were fully justified.

In terms of practical steps, the most visible part of the Soviet response was the diplomatic and propaganda measures that it undertook at the time. The Soviet Union tried to seize the opportunity presented by the discussion of space-based systems to draw attention to the attempts to limit weapons in space and anti-satellite weapons in particular. In a major initiative in this area, in August 1983 the Soviet Union introduced a new draft treaty that would ban space-weapons and announced a unilateral moratorium on further tests of its ASAT systems.[10] Although the proposed ban on weapons in space would have certainly affected SDI-related programs, the Soviet initiative did not appear to be a direct response to the U.S. program. Rather, it was an extension of its earlier efforts to reach a ban on space weapons as well as a reaction to the efforts of the international scientific community to

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[7] John F. Burns, "Andropov Says U.S. Is Spurring a Race in Strategic Arms", *The New York Times*, March 27, 1983, p. 1; "Excerpts From the Interview With Andropov", *Ibid.*, p. 14.

[8] *Soviet Capabilities for Strategic Nuclear Conflict, 1983-1993, Volume I – Key Judgments and Summary*, National Intelligence Estimate NIE 11-3/8-83, 6 March 1984, p. 10.

[9] The Soviet Union took the threat of intermediate-range missile in Europe extremely seriously. It went into great length to make sure that the Moscow missile defense system can detect and intercept Pershing II missiles. Yu. V. Votintsev, "Neizvestnye voiska ischeznuvshei sverhderzhavy", *Voyenno-istoricheskii zhurnal*, No. 9, 1993, p. 34; O. V. Golubev, Yu. A. Kamenskiy et al., *Rossiyskaya sistema protivoraketnoy oborony* (Moscow: Tekhnoconsult, 1994), p. 67.

[10] Dusko Doder, "Andropov Urges Ban on Weapons To Attack Satellites; U.S. Senators Told Of Space Moratorium", *The Washington Post*, August 19, 1983, p. A1. "Treaty on the Prohibition of the Use of Force in Outer Space and From Space Against the Earth", U.N. Doc. A/38/194, 26 August 1983.

prohibit development of anti-satellite systems.[11] These efforts, however, proved unsuccessful, mainly because of the sharp deterioration of the U.S.-Soviet relations in the fall of 1983 and the Soviet walkout from arms control negotiations that followed beginning of deployment of U.S. intermediate-range missiles in Europe in November 1983.

The Soviet documents of the time strongly support the conclusion that the Soviet initiatives of 1983 were not a direct response to the Star Wars program. Neither the Soviet political leadership nor the military or the defense industry showed any appreciation of the scale of the program or its technologies, let alone take it into account in their deliberations about diplomatic initiatives or development of the Soviet strategic forces.[12] This is hardly surprising, though, for the Strategic Defense Initiative had not been formally established until 1984, when the scale of the program became clearer.[13]

Following the crisis of the 1983 the Soviet Union and the United States spent most of 1984 trying to break the deadlock that followed the deployment of U.S. missiles in Europe and the Soviet walkout from the arms control negotiations. In November 1984 these efforts resulted in an agreement to resume the talks, in a new format that included parallel talks on space weapons, strategic offensive forces, and intermediate-range nuclear forces.

This period of time is very important for understanding the role that the U.S. Strategic Defense Initiative may have played in the U.S.-Soviet arms control negotiations. SDI has sometimes been credited for the success in resuming the negotiations, primarily on the basis of the fact that the Soviet Union insisted that the negotiations cover space weapons.[14] The facts, however, do not support this interpretation, suggesting instead that SDI played a much more limited role and most likely made the return to the talks more difficult.

While it is true that the Soviet Union insisted on negotiating a ban on weapons in space before beginning any discussion of offensive force reductions, this position was a result of the belief that the reductions are impossible without limits on missile defenses, rather than of any specific concerns about the SDI program. Eventually, it was the U.S. administration that had to accept this position and agree to include space weapons into negotiations.[15] This opened the

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[11] Thomas O'Toole, "Scientists Ask Ban On Space Weapons", *The Washington Post*, March 27, 1983, p. 14. It should be noted that the scientists' initiative was not related to the SDI – their letter was drafted before Reagan's speech of 23 March 1983. Richard Garwin, Carl Sagan, "Space Weapons: Andropov and the American Petitioners," Letter to the Editor, *The New York Times*, 18 May 1983. On the role of scientists in the Soviet ASAT moratorium, see also Evangelista, *Unarmed Forces*, p. 237-238.

[12] For a description of the Politburo meeting of 31 May 1983, at which the Politburo discussed various arms control proposals, see Evangelista, *Unarmed Forces*, p. 241-242. The Kataev Archive contains notes with details of the agenda of the Military Industrial Commission for the third quarter of 1983. None of the about 20 meetings of the commission were devoted to issues that could be linked to the U.S. initiative. Kataev Archive, Box 9, Doc. [14.4].

[13] The Presidential National Security Decision Directive 119 that established the Strategic Defense Initiative was issued on 6 January 1984. "Missile Defense Timeline, 1944 – 2004", MDA Historian's Office, http://www.mda.mil/mdalink/html/milstone.html (accessed July on 17, 2006). The Strategic Defense Initiative Organization had not been created until March 1984.

[14] George P. Shultz, *Turmoil and Triumph: My Years as Secretary of State* (New York: Macmillan, 1993), p. 475.

[15] In July 1984, in response to the Soviet proposal to begin discussion of a space-weapons ban, the United States agreed to open negotiations without preconditions, suggesting that the talks would be expanded to include offensive weapons. The Soviet Union, however, did not agree to this format. Shultz, *Turmoil and Triumph,* p. 477. The offer to discuss "defensive and offensive forces and what has been called the militarization of space" was then repeated in Reagan's address to the United Nations on 24 September 1984. Raymond L. Garthoff, *The*

way for the Soviet Union to reconsider its position on linkage, although it still insisted that reductions would not be possible without limiting the defense first. It was even suggested that if an agreement on offensive forces reductions were achieved before the one on space weapons its implementation should be postponed until the space part of the negotiations is concluded.[16]

In the end, there is no evidence that would suggest that the ban on space-based weapons or limits on SDI was the primary goal that the Soviet Union set for the negotiations. On the contrary, the Soviet side considered the issue of space weapons and SDI as an obstacle that had to be removed before the discussion of reduction of offensive forces could begin. Had this not been the case and the limit on SDI were of a higher priority for the Soviet Union, one would expect it to adjust its position on strategic forces and intermediate-range missiles in Europe. This, however, did not happen and the Soviet had not made any significant adjustments of its negotiating positions compared to the ones it had in 1983.[17]

Another, much less visible part of the Soviet response to the Strategic Defense Initiative proposal was a series of decisions that accelerated development of its own defense programs. Unlike the political and military leadership, the defense industry was quite enthusiastic about the U.S. initiative, seizing the opportunity to advance its projects.[18] The initial steps in this area, however, strongly indicate that the industry did not consider the U.S. program as something radically new or separate from the efforts in space-related research and development that the United States had already carried out. The programs that were considered by the Soviet Union at the time were either continuation of old development efforts or a direct response to the U.S. programs that were outside of SDI. Two examples of this pattern are the overview of the "Skif" space-based laser program and the decisions to begin development of the "Kontakt" air-based anti-satellite system.

The "Skif" program falls into the category of old development efforts that received an apparent boost from the U.S. Strategic Defense Initiative. The goal of the "Skif" program, initiated in 1976, was to build a space-based anti-satellite laser that would take advantage of the capabilities provided by the Buran launcher, the Soviet version of the U.S. Space Shuttle.[19] By 1984, however, the program had still to produce any hardware, being held back

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Great Transition: American-Soviet Relations and the End of the Cold War (Washington, DC: Brookings Institution, 1994), p. 161.

[16] This idea was suggested at the meeting at the General Staff on 27 October 1984, which was instrumental for the decision to return to the negotiations. Yulii Kvitsinsky, *Vremya i sluchai: zametki professionala* (Moscow: Olma-Press), p. 413-414.

[17] On the Soviet positions, see Kvitsinsky, *Vremya i sluchai*, p. 415-416; N. F. Chervov, *Yadernyy krogovorot: cto bylo, chto budet* (Moscow: Olma-Press, 2001) p. 82, 91-93; Aleksandr G. Savel'ev and Nikolay N. Detinov, *The Big Five. Arms Control Decision-Making in the Soviet Union* (Praeger, 1995), p. 87-88, 170-171.

[18] B. P. Vinogradov, Chief Designer, Research Institute of Radio Instruments, Interview, 25 April 2002. A. I. Savin, Director and Chief Designer, NPO Komyeta (1960-1999), 20 November 2002.

[19] Kataev Archive, Box 8, Doc. 13.8, pp. 70-75. "Skif" was to use a space-based laser. Another space-based ASAT system initiated at the same time, "Kaskad", was to employ interceptors. According to the initial plan, both systems were to use the Salyut orbital station as their platform. Both projects anticipated the possibility of refueling and maintenance visits that would be provided by the Buran spacecraft. Konstantin Lantratov, "Zvezdnye voiny, kotorykh ne bylo", January 2005, <http://www.buran.ru/other/skif-lan.pdf> (accessed on July 20, 2006). The Central Committee and Council of Ministers decision of 1976 was titled "On exploring the possibility of development weapons for combat actions in space and from space." Vadim Lukashevich, "Sovetskiye zvezdnye voiny", *Rossiiskii kosmos*, No. 6, 2006, p. 43. For the analysis of the origins

by the lack of a dedicated laser that would be suitable for deployment in space. In the summer of 1984, the Ministry of General Machine Building, which was overseeing the program, ordered development of a demonstration spacecraft, "Skif-D", which was supposed to carry on board the gas-dynamic laser developed for the "Dreif" airborne laser program.[20] In the end of 1984 the new direction of the "Skif" program was approved by the government. The research on lasers was expected to continue with the type of laser to be eventually deployed on "Skif" to be determined in 1986.[21] There is no direct evidence that would link the decision to accelerate the "Skif" program to the Strategic Defense Initiative. The most likely reason the "Skif" program got an overhaul in 1984 was the approaching start of operations of the Energia launcher. At the same time, it is reasonable to assume that the U.S. SDI proposal created the atmosphere that made it easier for the Soviet industry to lobby for development of its own similar systems.

Unlike with the case of "Skif", there is virtually no uncertainty about roots of the decision to launch the "Kontakt" program – development of an air-based ASAT system. This program was clearly a direct response to the similar U.S. system that was under active development at the time and had been tested twice in 1984.[22] As it happened, the decision to begin the Soviet program was made two weeks after the second U.S. test. Like its U.S. counterpart, the Soviet system was to use a rocket launched from an aircraft to target satellites on low-earth orbits. Flight tests of the new ASAT system were expected to begin in 1989.[23] These plans did not materialized and there is no evidence that the system has ever reached the stage of flight tests. However, it had been in active development until at least 1989-1990 and was not suspended when the U.S. Congress imposed a moratorium on further U.S. ASAT tests in 1985.

The example of the "Kontakt" program shows that although SDI appeared to be dominating the agenda, it was not a major factor in the decisions that were being made by the Soviet Union at that time. The industry did not try to frame the "Kontakt" program as an anti-SDI effort, relying instead on a proven argument that it has to develop systems similar to those of the United States. Even later, when a number of anti-satellite programs were indeed promoted as "anti-SDI", the "Kontakt" system was still considered in a separate category.[24]

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of the Buran program see Dmitri Pieson, "Resheniye na Buran", *Rossiiskii kosmos*, No. 5, 2006, pp. 62-65, No. 6, 2006, p. 40-43.

[20] The laser developed for the "Dreif" program was a gas-dynamic laser that was tested on board of Il-76 aircraft. It was reported to provide about 1 MW of output power. "Memo on the actual situation prepared in response to the U.S. questioning the Soviet Union's compliance with its arms control obligations", [1985], Kataev Archive, Box 5 [Memo on the actual situation]. The "Skif-D" program was approved by a MOM decision of 27 August 1984. The same decision approved additional efforts on development of "heavy military spacecraft". Lantratov, "Zvezdnye voiny".

[21] The Central Committee and Council of Minister decision of 24 December 1984. "Memo on the actual situation", Kataev Archive, Box 5.

[22] The tests, which did not include satellite intercept, took place on January 21, 1984 and November 13, 1984. "USAF Flight Tests Asat Weapon", *Aviation Week & Space Technology*, January 30, 1984, p. 19; "Air Force Tests Antisatellite Payload", *Aviation Week & Space Technology*, November 19, 1984, p. 28. The first satellite intercept was performed in the third test, on 13 September 1985. "Test Asat Launched Autonomously From USAF F-15 Carrier Aircraft", *Aviation Week & Space Technology*, October 7, 1985, p. 18.

[23] The Central Committee and the Council of Ministers decision was approved on 27 November 1984. The system was expected to target satellite at altitudes of up to 600 km. "Memo on the actual situation", Kataev Archive, Box 5.

[24] Kataev Archive, Box 8, Doc. 13.8, p. 68.

Although the industry's initial response to the SDI program was rather constrained, it does not mean that the U.S. initiative was not taken seriously. By the early 1980s the Soviet industry had had some experience with the directed-energy weapon technologies that were supposed to became the key element of the future U.S. defense system. That experience was apparently mixed, raising a legitimate question as to what extent the United States would be more successful in making working weapons based on these technologies.[25] Shortly after the U.S. announcement, the industry initiated an effort to evaluate the status of directed energy weapons technologies. The Military Industrial Commission set up a commission that included scientists as well as representatives of the military and the defense industry. The main conclusion of the commission, chaired by Evgeny Velikhov, was that deployment of prototypes of weapon systems based on directed energy technologies would be unlikely before about 2000.[26]

The Velikhov commission set up by the Military Industrial Commission was not the only effort to evaluate the U.S. SDI program. The most well known of these is a study group organized by Evgeny Velikhov and his colleagues at the Committee of Soviet Scientists. That group, working in close cooperation with scientists from the United States, issued a number of public reports on SDI technology and its potential effect on strategic stability, which were well known in the United States and in the Soviet Union.[27] It is almost certain that the conclusions of the report commissioned by the defense industry were very close to those of the public reports.

The military also launched their own studies to evaluate the Strategic Defense Initiative. These were done at various levels – from the defense minister to departments at the research institutes of armed forces services.[28]

Despite their overall skeptical assessment of the prospects of SDI technologies, neither of these reports was able to prevent the Soviet industry from pushing for a broad development effort that would emulate the U.S. SDI program. In fact, internal reports called for continuing research in the area of directed energy technologies, which may have helped the industry to make its case.[29] The concerns of the political and military leadership about potential

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[25] In the 1970s, the Soviet Union carried an extensive program of development of high-power lasers for missile defense applications. The program, known as Terra-3, was terminated in 1978 after it failed to demonstrat the performance required for warhead intercept. P. V. Zarubin, "Academician Basov, high-powered lasers and the antimissile defence problem," *Quantum Electronics*, 32 (12) 1048-1064 (2002), p. 1051-1052; "Memo on the actual situation", Kataev Archive, Box 5. Other missile defense or anti-satellite projects that would use directed energy weapons were discussed during the 1970s, but they all were rejected. A. I. Savin, Interview, 20 November 2002; Evgeny P. Velikhkov, "Science and Scientists for a Nuclear-Weapon-Free World", *Physics Today*, November 1989, p. 33; V. I. Markov, "Razrabotka i sozdaniye tekhnicheckikh sredstv RKO predpriyatiyami TsNPO Vympel," in *Rubezi oborony – v kosmose i na zemle*, N. G. Zavalii, ed., 2nd edition (Moscow: Veche, 2004), p. 418.

[26] N. N. Detinov, Interview, 16 May 2002. "Memo on the information presented by the CIA Director R. Gates on 25 November", [December 1986], Kataev Archive, Box 5.

[27] First drafts of the report were circulating in Moscow in 1983. It was eventually published as a book, E. P. Velikhov, R. Z. Sagdeev, A. A. Kokoshin, eds., *Weaponry in Space: The Dilemma of Security* (Moscow: Mir, 1986). For the discussion of Velikhov's efforts to set up the group and issue the report, see Evangelista, *Unarmed Forces*, p. 236, 238-240.

[28] Akhromeyev mentions a series of meetings between Dmitry F. Ustinov, the minister of defense, and A. P. Aleksandrov, President of the Soviet Academy of Sciences, which probably took place in 1983. Akhromeyev, Korniyenko, *Glazami marshala i diplomata*, pp. 19-20. Kataev describes a briefing presented by an "SDI study group" of the Air Defense Forces in December 1985. Kataev Archive, Box 9, Doc. 14.5.

[29] Detinov, Interview, 16 May 2002.

destabilizing effects of new missile defenses played essentially no role, mostly because the decision-making process in the industry normally did not take these considerations into account. As a result, by the summer of 1985, the Soviet defense industry had prepared its own program that was supposed to become the Soviet response to SDI. This program is described in the next section.

Symmetric response

The series of decisions made in the summer of 1985 was arguably the high point of the Soviet response to the U.S. Strategic Defense Initiative program. By that time the defense industry had consolidated its proposals and presented the Soviet leadership with a large-scale program that was intended to significantly expand the work on missile defense, military systems in space, and a range of other programs as well.

A decision of the Central Committee and the Council of Ministers of 15 July 1985 approved a number of "long-term research and development programs aimed at exploring the ways to create a multi-layered defense system with ground-based and space-based elements." It should be noted that no commitment to deployment of any of these systems was made at the time. The goal of the research and development effort was "to create by 1995 a technical and technological base in case the deployment of a multi-layered missile defense system would be necessary."[30]

The July 1985 decision approved two major "umbrella" programs, each of which encompassed an array of projects that ranged from fundamental exploratory research to development of specific systems ready for flight tests. The first of these two, known as "D-20" included research and development in the area of ground-based missile defenses. The responsibility for this program was assigned to the Ministry of Radio Industry, which traditionally worked on missile defense, early warning, and command and control. The second program, "SK-1000", was a product of design bureaus of the Ministry of General Machine Building, which was responsible for the missile and space-related research, development and production. This program concentrated on space-based missile defenses and on anti-satellite systems, both ground-based and space-based. Most of the projects included that were concentrated in these two large "umbrella" programs existed before 1985, but some were either significantly upgraded or entirely new efforts.[31]

At the core of the "D-20" program were the projects associated with the Moscow missile defense. The mainstay of the program, the A-135 system, was to be prepared for tests in 1987. In addition to that, the schedule approved in 1985 directed the industry to complete a draft design of the A-235 and a preliminary design of the A-1035 follow-on systems by 1988.[32] These two systems had been in development for some time – the government first approved them in 1978. They were expected to provide defense of the "Moscow industrial region" and "main administrative centers and military objects" respectively.[33] The systems were expected

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30 "Memo on the actual situation", Kataev Archive, Box 5

31 Unless specified otherwise, descriptions of the programs initiated by the July 15, 1985 decision is based primarily on Kataev Archive, Box 8, Doc. 13.8, pp. 68, 70-75 and "Memo on the actual situation", Kataev Archive, Box 5.

32 Kataev Archive, Box 8, Doc. 13.8, p. 68

33 The work on the A-235 system began in 1975. Mikhail Pervov, *Sistemy raketno-kosmicheskoi oborony sozdavalis tak* (Moscow: Aviarus-XXI, 2003), p. 245. Also Vinogradov, Interview, 25 April 2002; Kataev Archive, Box 8, Doc. 13.8, pp. 70-75.

to include a number of advanced components, beyond what was designed for its predecessor.[34] At least two of these components – an airborne sensor and an advanced discrimination radar – were included into the "D-20" program.

In addition to the line of missile defense systems that were oriented toward protection of Moscow and other population centers, the "D-20" program included another line of defenses – "close-range" systems, designed to protect military objects and missile silos in particular.

The first of these projects, the S-550 system, was essentially a continuation of an earlier effort to develop a short-range endoatmospheric intercept system, known as S-225, which goes all the way back to the early 1960s. The S-225 system had been usually considered a contender for the endoatmospheric intercept in the A-135 and similar systems discussed in the 1960s and 1970s.[35] The project was terminated in the early 1980s and what was left of it was folded into the A-135 program.[36] From the history of the S-225 it appears that the S-550 program may have begun before 1985.[37] In any event, the July 1985 decision, which included it into the "D-20" program, gave this project an additional boost.[38] S-550 was expected to be a mobile or at least relocatable missile defense system that would protect "objects of special importance". It was scheduled to begin flight tests in 1990 and be ready for deployment in 1992.[39]

Another system, "Sambo", was developed specifically for defense of ICBM silos. Details about this system are scarce, but it appears to be a version of the Swarmjet idea that was discussed in the United States at the time.[40] According to this concept, incoming warheads would be intercepted at a very close range above a silo, which made intercept easier, but required a hardened silo that would still have to withstand a nuclear blast. The "Sambo" system appeared to rely on rods to destroy incoming warheads.[41] The "Sambo" program was expected to produce a prototype in 1987 and reach the stage of tests in 1989.[42] A year or so later, "Sambo" was either absorbed or replaced by another program of this type, known as "Mozyr". This system was described as an "active two-tier" defense and it was supposed to use short-range interceptors with conventional explosive warheads. It was expected to reach the deployment stage by 1991.[43]

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34 Pervov, *Systemy RKO*, p. 324.

35 Pervov, *Systemy RKO*, p. 143-144, 242, 252; "Memo on the information presented by the CIA Director", Kataev Archive, Box 5. The S-225 system included relocatable radars, known as Flat Twin in the United States, which at some point figured in U.S. accusations of Soviet noncompliance with the ABM Treaty. See, for example, "Soviet noncompliance with arms control agreements," *U.S. Department of State Bulletin*, March 1988.

36 "Memo on the information presented by the CIA Director", Kataev Archive, Box 5.

37 Pervov, *Systemy RKO*, p. 480.

38 Kataev Archive, Box 8, Doc. 13.8, p. 68.

39 Kataev Archive, Box 8, Doc. 13.8, p. 68, 70-75.

40 U.S. Congress, Office of Technology Assessment, *Ballistic Missile Defense Technologies*, OTA-ISC-254 (Washington, DC: U.S. Government Printing Office, September 1985), p. 157. See also Richard Garwin, "How Well Do We Look at Alternatives?", in Kenneth W. Thompson, ed., *Richard Garwin on Arms Control* (Lanham, MD: University Press of America, 1989), p. 151.

41 Kataev Archive, Box 8, Doc. 13.8, p. 56. "Memo on the actual situation", Kataev Archive, Box 5.

42 Kataev Archive, Box 8, Doc. 13.8, p. 70-75.

43 Kataev Archive, Box 8, Doc. 13.8, p. 68. "Memo on some prospects for development of strategic weapons of the Rocket Forces and the Navy", [27 January 1987], Kataev Archive, Box 5. The "Mozyr" system was developed at the KB Mashinostroyenoya design bureau in Kolomna. This design bureau was part of the Ministry of Defense Industry. "Memo on START negotiations", Kataev Archive, Box 1.

In addition to the projects described above, the "D-20" program included a number of research and development projects in areas of system integration, large computers, warhead and decoy discrimination sensors and systems, new interceptors and their warheads, and study of ground-based directed-energy weapons. Most of the programs were research projects that were expected to produce initial reports in the 1988-1989 time frame.

The second program approved by the July 1985 decision, "SK-1000", was more in line with the Strategic Defense Initiative vision. It included a variety of projects that explored a possibility of developing space-based missile defenses, anti-satellite systems, and of what the Soviet Union traditionally called "space-strike weapons" – systems designed to attack targets on earth from space. Like its more conventional counterpart, "SK-1000" was a combination of projects that began in the 1970s and of some new ones. The majority of "SK-1000" programs were devoted to fundamental and applied research, but there were some prominent development projects as well.

The most advanced part of "SK-1000" was the series of anti-satellite programs that were intended to attack "combat and information support satellites, in particular those that are part of the space-based tier of the U.S. missile defense system."[44] The development programs approved by the July 1985 decision included the "Skif" and "Kaskad" space-based systems, which had been in development since the 1970s, and two new anti-satellite programs – "Kamin" to develop space mines and "Naryad-V" to create a ground-based ASAT system. There were also two research projects that explored weapons based on "other physical principles".[45]

The concept of "Naryad-V" was similar to that of the "IS" anti-satellite system that the Soviet Union deployed in the early 1970s. The new project, however, was completely under control of the Ministry of General Machine Building, unlike "IS", where a design bureau of the Ministry of Radio Industry was the primary developer.[46] The "Naryad-V" system was expected to use missiles of the UR-100NUTTH/SS-19 type or their modifications to launch its interceptors to satellites on orbits ranging from low-earth to geosynchronous. In 1985 it was projected that the system would be ready for flight tests in 1987. The "Kamin" development program had a much more distant goal – it was not expected to produce a draft project until 1989. Flight tests of the system were not expected to begin until 1992.[47]

Other weapon-related components of the "SK-1000" program were a series of research projects to investigate a possibility of using directed energy weapons for boost-phase and exoatmospheric intercept of ballistic missiles and their warheads, studies of "space-strike weapons", and a number of development projects to improve hardness of military satellites and protect them from an attack. Most of these were research projects that were expected to produce preliminary reports in 1987-1989.

"SK-1000" also in included virtually all space launcher and satellite programs that were underway in the Soviet Union at that time – from the Energiya-Buran heavy launcher and the Mir orbital station to optical and electronic reconnaissance, communication and navigation satellites. A number of development programs were dedicated to improving the command and control system of the space forces. Although most of these projects clearly had existed before

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44 Kataev Archive, Box 8, Doc. 13.8, p. 70-75.

45 *Ibid.*

46 Savin, Interview, 20 November 2002.

47 Kataev Archive, Box 8, Doc. 13.8, p. 68.

the July 1985 decision, bundling them together with the anti-SDI program was probably the way for the industry to get more reliable access to resources.

Arms control takes over

The decisions made by the Soviet government in July 1985 indicated a major commitment to development of a broad range of missile defense and space weapons technologies. The defense industry was clearly taking advantage of the situation created by the U.S. initiative to increase the levels of funding and get access to additional resources for its programs. Another factor that contributed to the decision to approve this kind of confrontational response was the actively discussed in the United States possibility of ending its compliance with the SALT II Treaty.[48] Although the United States eventually decided to stay within the treaty limits, that discussion clearly added to the impression, already dominant in the Soviet Union, that the existing structure of arms control treaties was falling apart.[49] In this situation, those in the political and military leadership who had serious reservations about potential destabilizing effects of missile defenses could not present a viable alternative to the course of actions proposed by the industry. That alternative to the industry push would eventually emerge with the changes in the U.S.-Soviet relationships, through a complex process of trial and error that involved decisions regarding specific weapon programs, development of negotiating positions and initiatives, and evaluation of technical perspectives of missile defenses.

Evolution of one of the programs, the "Skif" space-based anti-satellite laser system, can serve as a good illustration of this process.[50] As described in previous sections, in 1984 a delay with the laser caused the program to be reoriented toward producing a demonstrator spacecraft, "Skif-D". That spacecraft would still have a laser on board, although not of the kind that could be used in anti-satellite missions. It was expected to be ready for its first flight by the end of 1987. The decisions of July 1985, however, called for an accelerated deployment schedule. The industry was ordered to produce a spacecraft that would be flown as early as 1986, even though that meant that it would be only a mockup and would not have much of functioning equipment on board. The new spacecraft was designated "Skif-DM".

The acceleration of the "Skif" program was matched by a decision to move forward the first launch of the "Energiya" heavy launcher, which was expected to deliver "Skif-DM" into orbit.[51] The defense industry considered the "Energiya" and "Skif-DM" among its highest-priority projects, for they could demonstrate that the industry is capable of building complex space-based systems, justifying and legitimizing the "symmetric" programs developed in response to SDI.

The "Skif-DM" program proceeded at accelerated pace and by the fall of 1986 the work on the spacecraft was largely completed. The test flight of the "Energiya" launcher with "Skif-DM" spacecraft was scheduled to take place in the spring of 1987. The spacecraft, which was initially conceived as a mockup, now incorporated some elements that made it somewhat more than a simple weight imitation payload. Among these were a cueing and targeting system that included a radar and a low-power laser and a set of sophisticated targets to be

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48 Shultz, *Turmoil and Triumph*, p. 569.

49 Kvitsinsky, *Vremya i sluchai*, p. 424-425. V. Z. Dvorkin, Director of the Central Research Institute of the Strategic Rocket Forces, NII-4 (1993-2001), Interview 31 October 2002.

50 The description of the program follows Lantratov, "Zvezdnye voiny".

51 B. I. Gubanov, *Triumf i tragediya Energii. Tom 3: Energiya-Buran* (Niznii Novgorod, NIER, 1998), Ch. 31.

separated from the spacecraft during a test of the cueing and targeting mechanism. The spacecraft was also supposed to test a recoilless exhaust system for a gas-dynamic laser that was to be installed in subsequent flights.

If the decision to build a spacecraft that would perform a variety of weapon-related experiments in orbit seemed natural in 1985, it appeared much less so in the end of 1986. The summit meeting in Reykjavik in October 1986, where the issue of testing of missile defense systems in space played a very prominent role, apparently forced the Soviet leadership to pay closer attention to the effect that its programs in space may have on the Soviet position at the negotiations.[52] This change was probably responsible for the decision taken by the state commission, which gave the final approval to the "Skif-DM" flight, to exclude everything that could resemble tests of space-based weapon systems. In February 1987, the experiments that included separating of targets and tracking them with a radar and laser were cancelled. Also cancelled was the experiment that would emulate work of a gas-dynamic laser in space.[53]

By the time the "Energiya" system was ready for launch in May 1987, the mission was very close to being cancelled. The Politburo gave its approval to the launch at the very last moment.[54] The launch itself, which took place on May 15, 1987, was only partially successful – the "Energiya" launcher performed well, while the "Skif-DM" spacecraft failed to reach orbit because of a software error in its guidance system. This probably helped the Soviet Union to avoid a major diplomatic setback. Even though most of the experiments on board of the spacecraft had been cancelled, it is likely that a success of the "Skif-DM" mission would have complicated the efforts to limit development of space-based weapon systems.

The apparent controversy that surrounded the test flight of "Skif-DM" in May 1987 reflected the fundamental shift in priorities that happened since the program was approved in 1985. If in 1985 the program was seen as one of the central elements of a strategy that would preserve strategic balance, in 1987 the Soviet political leadership considered this program an impediment to its efforts to reach an arms control agreement with the United States. Without the political support the program quickly ground to a halt. Although no formal decision to terminate the "Skif-D" project was made, by September 1987 all work on the new spacecraft had stopped.[55]

Other components of the "SK-1000" program that involved research and development of directed energy weapons also suffered a setback. There is no evidence that would indicate that work on these projects continued after 1987.

Development of traditional missile defenses, which was at the center of the "D-20" program, also reached a major turning point in 1987. The flagship project in this area, the A-135 Moscow missile defense system, was a much less controversial undertaking than the directed energy projects of the "SK-1000" program. The system was compliant with the ABM Treaty and was compatible with the Soviet negotiating positions. Deployment of the A-135 system had all the signs of a high-priority project. In February 1987 Mikhail Gorbachev visited the

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[52] A Central Committee decision of February 1987 on the U.S.-Soviet arms control negotiations discussed, among other things, the need to reach an agreement on the kind of tests that would be allowed in space. K2.3. These issues apparently were discussed at earlier meetings as well. K9-14.6. Zavalishin quotes Gorbachev during his May visit to Baykonur, who said that tests should be conducted on the ground and not in space. A. P. Zavalishin, *Baykonurskiye universitety*, Moscow, Mashinostroyeniye, 1999.

[53] Lantratov, "Zvezdnye voiny".

[54] Gubanov, *Triumph i tragediya*.

[55] Lantratov, "Zvezdnye voiny".

construction site of the Don-2N battle management radar in Pushkino.[56] Later that month the management of the program was consolidated and strengthened to ensure that construction of the radar will be completed by November 1987. In March 1987 the developers of the A-135 system conducted first flight tests of interceptors at the prototype system at Sary-Shagan.[57]

The construction of the Don-2N battle-management radar of the Moscow missile defense was indeed completed in October 1987, but the military insisted that the system needs additional work and is not ready for service. Work on the system continued with tests of radars and interceptors conducted in 1988-1989. The system was finally accepted "for experimental service" in December 1989.[58]

Despite the delays, the A-135 program was generally successful by the Soviet standards. It was fairly common for new weapon systems to begin service in "experimental mode", while the designers worked on addressing the problems discovered during tests. However, starting in 1987 the work on the A-135 system and its successors, A-235 and A-1035, slowed down quite significantly. This development reflected the changes in the assessment of the role that these systems could play. In contrast with the optimistic assessments of missile defense performance that were characteristic for the days when the "D-20" program was approved, estimates of 1987 showed that the role that systems like A-135 or its successors could play is much more limited. As part of the studies conducted within the "D-20" program, the military had developed technical specifications for missile defenses, which required the kind of performance that was technically unrealistic.[59] In another important development, the upcoming agreement on elimination of intermediate-range missiles in Europe removed a key part of the mission of these missile defense systems.[60] As a result, while the work on the A-135 system continued, it apparently was no longer a high-priority project. Deployment of interceptors around Moscow began only in 1990 and was not completed until 1992.[61]

Asymmetric response

The decline of interest in active missile defenses was accompanied by growing confidence in the capabilities of countermeasures that were supposed to defeat U.S. missile defense systems. Although some programs in these areas can be traced back to at least 1984, the coordinated effort in this area began after the Reykjavik summit. On October 14, 1986, two days after the end of the Reykjavik meeting, the Politburo asked the Ministry of Defense to present its proposals on the structure of the strategic offensive forces should the United States and the Soviet Union reach an agreement on arms reductions. Politburo also asked the military and the industry to prepare proposals that would "accelerate the work on countermeasures against a possible deployment by the United States of a multilayered national defense system and against its space-based component in particular."[62] The result of this effort – the "Protivodeystviye" and "Kontseptsiya-R" programs – was presented to the Defense Council

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56 Golubev, *Rossiyskaya sistema,* p. 68.

57 Pervov, *Systemy RKO,* p. 324.

58 Pervov, *Systemy RKO,* p. 324-325. Golubev, *Rossiyskaya sistema,* p. 68.

59 Vinogradov, Interview, 25 April 2002.

60 A-135 was supposed to intercept up to 35 Pershing II missiles, A-235 – up to 80. Kataev Archive, Box 8, Doc. 13.8, p. 68.

61 Pervov, *Systemy RKO,* p. 325.

62 "Excerpts from the protocol No. 66 of a Politburo meeting of 19 May 1987", Kataev Archive, Box 5.

in July 1987.[63] Shortly after that the programs were approved by a decision of the Central Committee and the Council of Ministers.[64]

As it was the case with the "symmetric response" programs, "D-20" and "SK-1000", the countermeasure efforts were managed by two different ministries. "Protivodeystviye" was managed by the Ministry of General Machine Building, and "Kontseptsiya-R" – by the Ministry of Radio Industry.[65] Although these programs did not seem to take final shape until the end of 1986, some of their core projects began in 1984 or earlier.[66]

"Protivodeystviye" appears to be a follow-on to an earlier research and development program, known as "SP-2000", which was a broad effort aimed at modernization of the strategic offensive forces. It included subprograms that were dealing with each component of the strategic triad as well as research in the area of strategic command and control.

Most of the efforts in "SP-2000" predictably went into the projects that explored the ways to increase survivability of land-based ballistic missiles and development of countermeasures specifically designed to counter space-based missile defenses. The "SP-2000" program included modernization of the strategic missiles that were expected to remain in service through the 1980s and 1990s – R-36M2/SS-18, RT-23UTTH/SS-24, Topol/SS-25, and Kurier/SS-X-26. The intermediate-range Pioner/SS-20 missile was also expected to undergo modernization to improve its ability to penetrate missile defenses. All projects of this kind involved two stages – a short-term improvements in survivability and a longer-term research that aimed at exploring additional measures that would increase the effectiveness of missile defense penetration. But none of these were crush programs – they were expected to produce draft technical projects by 1988-1989 and none of the programs had a set date for flight tests.

Specific measures that were supposed to improve effectiveness were subject of separate research programs that were also part of the "SP-2000" program. Most of these were widely discussed in the context of SDI countermeasures at the time – shorter boost phase, rotation of missile bodies, reduced detection signature of warheads, penetration aids, methods of blinding missile defense sensors, etc. All these were relatively long-term research projects that were expected to produce preliminary results by the end of the 1980s.

At first, the "SP-2000" program apparently concentrated on incremental modernization of the existing ICBMs, avoiding any major new development projects. But the program eventually was taken advantage of to launch new projects as well. The NPO Mashinostroyeniya design bureau developed a concept of an intercontinental missile with a gliding reentry vehicle, presenting it as one more way to defeat the U.S. missile defense. This project, known as "Albatros", was added to the "SP-2000" program in 1987.[67]

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[63] Kataev Archive, Box 9, Doc. 14.6.

[64] The "Protivodeytsviye" program was approved on 8 August 1987. "Memo on START negotiations", Kataev Archive, Box 1.

[65] The other two ministries that took part in the "SP-2000" program were the Ministry of Aviation Industry and the Ministry of Defense Industry. Kataev Archive, Box 8, Doc. 13.8, p. 68.

[66] The description of the "SP-2000" and "Kontseptsiya-R" programs is based mostly on Kataev Archive, Box 8, Doc. 13.8, pp. 68, 70-75.

[67] The development of "Albatros" was approved by a Central Committee and the Council of Ministers decision on 9 February 1987. S. N. Konyukhov, ed., *Prizvany vremenem, Rakety i kosmicheskiye apparaty konstruktorskogo buro "Yuzhnoye"*, (ART-PRESS, Dnepropetrovsk, 2004), p. 328-331. Before that it may have existed as a smaller-scale development project approved by a decision of the Military Industrial Commission. It should be noted that NPO Mashinostroyeniya, the design bureau that built UR-100/SS-11 and UR-100N/SS-19

Regarding the strategic fleet, the "SP-2000" program mostly focused on modernization of the R-29 (SS-N-20) and R-29RM (SS-N-23) sea-launched ballistic missiles. It also included research on two new SLBMs – a small single-warhead "West" and a MIRVed "Ost". Both these projects existed before 1985, but they were apparently at the early stages – neither missile was expected to reach the stage of flight test until at least mid-1990.[68]

The part of the "SP-2000" program that addressed strategic aviation included research on improving hardness of cruise missiles and reducing their signature as well as a research on a new low-altitude long-range cruise missiles. The program also included an unusual project, "Podzol", that called for deployment of intermediate- and long-range cruise missiles carried by Mi-26 helicopters.

If the "SP-2000" program included projects that could be classified as "passive" countermeasures, the other "asymmetric response" program, "Kontseptsiya-R" was an effort that was designed to counter the SDI system by directly attacking its satellites. The main purpose of the "Kontseptsiya-R" program was to consolidate the anti-satellite efforts that were under control of the Ministry of Radio Industry, namely the "Kontakt" air-based system and the "IS-MU" upgrade of the "IS-M" ground-based ASAT. Both these systems had been under development since at least 1984. "IS-MU" was expected to begin flight tests in 1987-1988, "Kontakt" – in 1989. Another project that Minradioprom included under the "Kontseptsiya-R" umbrella appeared to be a new effort – development of a non-nuclear interceptor for the A-135 Moscow missile defense system that would give the system the capability to attack satellites on low earth orbits. A draft technical project of the ASAT interceptor for the A-135 system, "Amulet", was to be completed in 1989, which means that no flight tests of that system would be expected until about mid-1990s.

In addition to the anti-satellite projects, "Kontseptsiya-R" included all other space-related programs that were conducted by Minradioprom – development of the US-KMO early-warning satellite system that would provide coverage of oceans as well as of the U.S. territory, modernization of the space-surveillance network and its integration with the anti-satellite systems.

Although the concept of countermeasures or anti-satellite systems that could target SDI satellites had been known and discussed long before 1987, the approval of the "Protivodeystviye" and "Kontseptsiya-R" programs was a very important step. These programs offered a very detailed and specific set of measures that were within the reach of the Soviet defense industry – most projects used proven technology, did not require any technological breakthroughs, and were relatively inexpensive.[69] At the same time, technical assessment of the effectiveness of these measures was based on the detailed knowledge of projected capabilities of SDI systems that had been accumulated by that time.

All this gave the Soviet military and political leadership the necessary confidence to pursue arms reductions with the United States. Although technically the issue of missile defense and

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missiles, was the only missile design bureau that did not have a combat ICBM system under development at the time. The "Albatros" program was the way to get one.

[68] "West" was to be deployed on Project 955 strategic submarines. "Ost", known also as D-35 system, was to be deployed on Project 935 submarines. O. Belyakov, "On drawbacks in organization of work on increasing effectiveness of strategic weapons", 1985, Kataev Archive, Box 7; "Memo on some prospects", Kataev Archive, Box 5; Kataev Archive, Box 8, Doc. 13.8, p. 68.

[69] According to Soviet estimates at the time, the cost of the entire "Kontseptsiya-R" program was about five percent of that of "D-20" and less than one percent of the cost of the "SK-1000". K8-13.8, p. 70-75.

the ABM Treaty were still discussed at the negotiations, at the summit meeting in Washington in September 1987 the Soviet Union effectively dropped the issue.[70]

Specific measures that were included in the "Protivodeystviye" program concentrated on improving the capabilities of ballistic missiles to defeat or penetrate space-based defenses. Among those designed for the boost phase were development of new engines that would allow shortening it, protecting missile bodies with heat absorbing material and implementing rotation of missiles. The countermeasures that were supposed to work during midcourse flight included new penetration aids, maneuverable warheads, and gliding reentry vehicles.[71]

As part of the effort to defeat missile defenses during boost phase, the Soviet Union conducted a detailed study of a "modular missile" concept. This concept called for a modification of R-36M2/SS-18 and RT-23UTTH/SS-24 missiles that would equip them with multiple second stages – eight in the case of R-36M2 and from five to ten in the case of RT-23UTTH. As a result, the missile would create multiple targets much earlier in the powered flight, complicating the job of boost-phase missile defense. According to the estimates that were done for the project, the modification could have been made without significant loss of throw weight and would substantially increase the probability of penetrating the defense.[72]

A separate set of measures in the "Protivodeystviye" program addresses issues of vulnerability of silo-based missiles. The Soviet Union considered concepts that were very similar to the Multiple Protective Shelter (MPS) and "Densepack" basing modes suggested for the MX missile in the United States. The shelters were supposed to host RT-23UTTH/SS-24 missiles, "Densepack" silos – small single-warhead missiles.[73] In addition to that, silos of R-36M2 missiles were to be hardened to the level of 300 atm (4500 psi). In all these basing modes silos were to be protected by a close-range missile defense system, "Mozyr", which was developed as part of the "D-20" program.[74]

None of the "Protivodeystviye" countermeasures or deployment schemes have been implemented, mostly because they were created as contingency plans, designed to be employed only in the case the United States and the Soviet Union failed to reach an agreement on reductions of strategic offensive forces or in the case the United States withdrew from the ABM Treaty.[75] Another reason was that the Soviet offensive forces were caught in the middle of a modernization cycle, which began around 1983. Implementation of any new measures had to be incorporated into the next generation of strategic systems, which

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[70] Shultz, *Turmoil and Triumph*, p. 1014; Don Oberdorfer, *From the Cold War to a New Era. The United States and the Soviet Union , 1983-1991,* Updated edition (Baltimore: Johns Hopkins University Press, 1998), p. 267.

[71] "Memo on some prospects", Kataev Archive, Box 5.

[72] Posters on modular missiles, Kataev Archive, Box 5.

[73] These single-warhead missiles are referred to as "Dnepr". It was supposed to be a follow on to the UR-100K/SS-11 missile. "Memo on some prospects", Kataev Archive, Box 5. In the "Densepack" basing mode the distance between silos would be reduced to 0.5-1 km from the 6-10 km common for the Soviet ICBM regiments. K5.10.

[74] "Memo on some prospects", Kataev Archive, Box 5. This was essentially the LoAD idea, considered for the MX missile basing. *MX Missile Basing*, Office of Technology Assessment, September 1981, p. 118-126.

[75] The particular document, "Memo on some prospects", Kataev Archive, Box 5, contained an analysis of four scenarios – 1) the United States and the Soviet Union observe the SALT II and ABM treaties, 2) the United States withdraws from the ABM Treaty following by Soviet withdrawal from SALT II, 3) the United States and the Soviet Union observe the ABM Treaty and reduce their offensive forces by half, and 4) the United States and the Soviet Union complete 50 percent reductions of their forces, after which the United States withdraws from all treaties.

was not expected to be deployed until about mid 1990s. The "Protivodeystviye" program in effect reconciled the response to SDI with the modernization schedule, providing assurance that the countermeasures could be implemented in time and be effective.[76] In any event, the existence of these countermeasure plans was an extremely important element of the process that allowed the Soviet leadership to proceed with reductions of strategic offensive weapons.

Programs that were implemented

The ability of the defense industry and the military to come up with an assessment of the U.S. missile defense program and develop a set of specific programs to counter its possible deployment played a very important role in advancing the U.S.-Soviet arms control negotiations. The converse is true as well – the arms reduction dialogue was consistently undermining the case for the Soviet defense programs, diverting political support to disarmament, conversion of defense industry, and more efficient military spending.[77] This change of priorities resulted in suspension of a number of programs that were approved earlier.[78]

In this situation a number of projects that were included in the anti-SDI programs continued into 1989-1990 and beyond. As could be expected, the competition for resources and political support selected those projects that were considered most practical, effective, and inexpensive, eliminating most of the big-ticket exotic technologies like directed energy weapons.

Three projects emerged from the competition and managed to reach the stage of flight tests by 1990. These were the "Albatros" missile system, "Naryad-V" and "IS-MU" ground-based anti-satellite systems. A few others were still considered active at that point, even though there were doubts about their viability: the "Kontakt" air-based ASAT, two space-based systems – anti-satellite interceptors "Kaskad" and space mines "Kamin", as well as the "Amulet" project, that called for development of an anti-satellite interceptor for the Moscow missile system.[79]

Since its inception in February 1987, the "Albatros" missile project had undergone a very serious transformation. Initially, the program was expected to produce a new solid-propellant intercontinental ballistic missile that would be deployed in silos, on road-mobile launchers, and in "relocatable silo" mode, apparently similar to the Multiple Protective Shelters. The missile was supposed to carry a gliding reentry vehicle, which would use the atmosphere during most of its flight to avoid detection and to defeat missile defenses. However, the draft technical project of the missile failed to get an approval and this part of the program was cancelled in September 1989.[80] Development of the gliding reentry vehicle continued and it

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[76] Dvorkin, Interview, 31 October 2002.

[77] Efficiency of the defense spending appears as a constant theme of various meetings at the Central Committee Defense Industry department in the second half of 1987 and becomes especially prominent in 1988. Kataev Archive, Box 9, Doc. 14.6.

[78] According to the common Soviet practice, in most cases no formal decision to terminate a program would normally be made. The work on a project would slow down and eventually stop as it would be deprived of resources and of the political support necessary to obtain these resources.

[79] The meeting organized by Zaykov. 28 February 1990 and 3 March 1990. Kataev Archive, Box 8, Doc. 13.5.

[80] The NPO Mashinostroyeniya design bureau kept the reentry vehicle part of the program. Konyukhov, *Prizvany vremenem,* p. 328.

was tested in flight at least twice in 1990.[81] The flight test program was expected to continue, but it was eventually interrupted by the breakup of the Soviet Union in 1991. The project, however, was preserved and the reentry vehicle was tested again in February 2004, this time presented as part of Russia's response to the current U.S. missile defense deployment plans.

The missile part of the "Albatros" program continued as another project. In 1989 development of a new single-warhead solid-propellant missile, designated "Universal" was assigned to two design bureaus. The Yuzhoye design bureau got the order for a silo-based missile, and the Moscow Institute of Thermal Technology (MITT) – the road-mobile version. By 1991 the Yuzhnoye design bureau produced a prototype ready for flight tests, but because of the breakup of the Soviet Union that missile was never launched.[82] After the breakup, the project was transferred to MITT, where the development of the missile, now known as Topol-M/SS-27, was successfully completed. In 1997 the first two missiles of this type were deployed in silos and in 2006 the first regiment of road-mobile missiles was accepted for service.

Deployment of the "IS-MU" anti-satellite system was quite a controversial project. Although the earlier version of the system, "IS-M", was nominally still on combat duty, the technology that it used was outdated and the system required substantial modernization. In addition to that, the Soviet Union was still bound by its unilateral moratorium on ASAT test announced in 1983, which complicated the work on the modernization. During 1989-1990, there were several attempts to terminate the project, initiated by the Foreign Ministry, which sought to use this measure to strengthen the Soviet negotiating position. The industry, however, successfully fought off these attempts, arguing that the Soviet Union would need "IS-MU" to destroy satellites of the U.S. missile defense system or at the very least could use it as a leverage at the negotiations.[83] In the end, the "IS-MU" system had been deployed and was accepted for service in April 1991.[84] It was decommissioned in August 1993.

The other ground-based anti-satellite system, "Naryad-V", was very similar to "IS-MU" in basic architecture. It was designed to be a more capable system that would target satellites at all altitudes – from low-earth to geostationary orbits. Instead of relying on a dedicated launcher, like the "IS" systems did, "Naryad-V" interceptors were built to be deployed on regular silo-based UR-100NUTTH/SS-19 missiles.[85] That would allow for a massive deployment of interceptors – as many as one hundred were discussed at one point.[86] The designers were pushing for a flight test of the interceptor, which took place in a suborbital flight on 20 November 1990.[87] No further tests of the system appear to have been performed after that, but the program has been preserved and probably could be reinstated.[88]

As for the rest of the programs that were still active in 1990 – air-based ASAT, space-based interceptors, mines, and anti-satellite interceptor for the Moscow missile defense system,

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81 On 28 February 1990 and 5 March 1990. Kataev Archive, Box 8, Doc. 13.3.

82 Konyukhov, *Prizvany vremenem,* p. 328.

83 Zaykov's letter to Shevardnadze, March 1990. K7-6. Kataev Archive, Box 8, Doc. 13.4, p. 54; Kataev Archive, Box 8, Doc. 13.5.

84 V. P. Misnik, ed., *Tsentralnyy nauchno-issledovatelskii institute "Kometa": 30 let* (Moscow: Oruzhie i tekhnologii, 2003), p. 60.

85 According to the estimates of that time, an intercept would take from 30 minutes to 7 hours. Kataev Archive, Box 8, Doc. 13.8, p. 67.

86 The meeting of 28 February 1990, 3 March 1990. Kataev Archive, Box 8, Doc. 13.5

87 "Pamyatnye daty", *Krasnaya zvezda*, 28 December 2004.

88 The system was described to President Putin during his visit to the Khrunichev Plant in January 2002. Andrey Garavskiy, "Kosmicheskiy sovet v Filyakh", *Krasnaya zvezda*, 23 January 2002.

there is no information on their progress after the breakup of the Soviet Union. It is most likely that they were terminated shortly after that.

Conclusions

As could be expected, the data on the Soviet strategic programs in the 1980s clearly show that the U.S. policies and actions and its strategic buildup and the Strategic Defense Initiative program in particular, had a significant impact on the choices made by the Soviet leadership at that time. However, the nature of this influence, its mechanisms and the effect of the U.S. actions strongly indicates that these actions did not help bring the end of the Cold War.

The new evidence on the Soviet response to SDI largely corroborates the prevailing view that the Soviet Union eventually realized that this program does not present a danger to its security, for it could be relatively easily countered with simple and effective countermeasures. The evidence also helps answer some important questions about the concerns that the Soviet Union had about the U.S. program, the reasoning behind the choices that the Soviet leadership made, and the process that led to those choices.

The Strategic Defense Initiative clearly emerges as an impediment to the disarmament process rather than a factor that helped compel the Soviet Union to engage in the arms reduction talks or agree on deeper reductions of its offensive forces. The documents show that internal estimates made by the Soviet military and by the defense industry did not specifically consider SDI and its potential effect until about 1985, which was after the Soviet Union and the United States resumed the negotiations broken off in November 1983. Neither did the Soviet Union seriously change its positions on key issues during that time. All this strongly suggests that SDI did not play a role in the decision to return to the disarmament talks.

When the negotiations began, the U.S. effort to build a missile defense system did become one of the points of disagreement. In particular, it was one of the central issues at the summit meetings in Geneva in November 1985 and in Reykjavik in October 1986, with the Soviet Union strongly insisting on curbing the program and the United States resisting the effort. That persistence, however, was not caused by any specific concerns about projected capabilities of SDI systems. Rather, it was an effort to deal with the issue of missile defense in a way that would allow moving on to the disarmament agenda in which the Soviet Union was clearly interested. This interest manifested itself in the extreme reluctance of the Soviet leadership to embrace a kind of response to SDI that would include freezing or building up its offensive forces. There are no signs in the documents of the time that would suggest that the Soviet Union in its international deliberations and assessments of the situation ever considered ‘trading in’ its strategic forces in exchange for limits on SDI. Quite the opposite, the Soviet Union was fully prepared to wait this situation out, postponing reductions of offensive forces until the United States reconsidered it position on missile defense. The effort to restrict defenses was also motivated by the fact that in the absence of restrictions Soviet political leadership was unable to counter the pressure from its own defense industry that insisted on keeping up with the U.S. effort and came up with its own large-scale SDI-type program. The Soviet Union was fairly close to deployment of a number of prototype systems and the prospect of the industry proceeding with deployment of some of its systems was very real. Moreover, the political leadership did not have confidence in its ability to control or influence this process. At the same time, the experience that the Soviet Union had at the time with complex technical systems, military and civilian alike, had demonstrated the uncertainties and dangers associated with them. Understanding of these dangers was one of

the reasons the Soviet Union was consistent in its effort to curb the U.S. missile defense. It was directed against the Soviet program as much as it was directed against SDI.

The issue of the Soviet own program that was produced in response to SDI brings a question of whether the burden that it imposed on the Soviet economy was a factor in the decision of the Soviet leadership to initiate reforms or even in accelerating the demise of the Soviet Union. The answer to this question is most certainly negative. While the package of anti-SDI programs was supposed to be a massive effort, comparable in scale to its U.S. counterpart, very few of these projects were actually new. The most expensive programs, such as the Moscow missile defense system or the "Energiya-Buran" heavy launcher, or the second-tier programs like the "Skif" space-based laser, existed long before SDI. When they became part of the "D-20" or "SK-1000" programs, they did not require any additional commitment of resources. Most of the projects included in the package never went beyond paper research and those that did were among the least expensive ones. Overall, while the military spending was certainly putting a heavy burden on the Soviet economy, there is no evidence that SDI or the Soviet response to it increased that burden in any substantial way.[89] Documents show that the issues of effectiveness of the military programs or shifting resources to the civilian sector had not became prominent in the internal discussions until about 1988, when the key decisions about SDI and the response programs had already been made.[90]

The history of the Soviet response to SDI presents an opportunity to test another argument, that suggests that a program like this can work to dissuade an adversary. At the time of the discussion about the Strategic Defense Initiative, one of the arguments in support of the program that were advanced by the U.S. administration was that the missile defense system would eventually devalue Soviet Union's investment in large ICBMs, which constituted the backbone of the Soviet strategic forces. According to this logic, the very prospect of being confronted with the defense would dissuade the Soviet Union from undertaking an effort in building up its offensive forces. SDI proponents tended to discount the effect that offensive countermeasures may have on the effectiveness of defense systems, usually pointing out at the tradeoffs in performance that the offense would have to make to penetrate defenses.[91]

The evolution of the Soviet programs in the 1980s strongly suggests that not only dissuasion did not work, but also that measures that would be considered as advancing this kind of policy had exactly the opposite effect. Far from being dissuaded from investing into its ballistic missiles, the Soviet Union launched several development programs that were aimed at giving them the capability to defeat defenses. There were, indeed, tradeoffs in performance, but they were so insignificant that they had virtually no effect on these programs. Neither did dissuasion work in a broader sense, failing to prevent the Soviet Union from developing a set of measures aimed to counter the missile defense deployment. The Soviet Union fairly quickly abandoned the attempts to replicate the U.S. program and moved to the area of its

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[89] Estimates of the cost of the Soviet military programs are very unreliable. Official Soviet data on military spending are presented in Yu. D. Maslyukov, E. S. Glubokov, "Planirovaniye i finansirovaniye voennoy promyshlennonsti v SSSR," in A. V. Minayev, ed., *Sovetskaya voyennaya moshch ot Stalina do Gorbacheva*, Moscow, Voyennyi parad, 1999. These, however, should be used with extreme caution, for it is unknown to what extent it is possible to compare cost data for different programs or for different periods of time. This article relies primarily on indicators like actual deployment of hardware, flight tests, etc. for assessment of the scale of Soviet programs.

[90] Meeting at Belyakov in June 1988

[91] See, for example, the Fletcher report: *The Strategic Defense Initiative: Defensive Technologies Study*, Department of Defense, March 1984, p. 20-21.

"core competency", coming up with simple and cheap anti-satellite systems to keep the space-based components of the defense in danger.

Finally, the evolution of the Soviet attitudes toward SDI suggests that the main factor that contributed to the ending the confrontation of the Cold War was the willingness of the United States and the Soviet Union to engage in a dialogue on reduction of their nuclear forces. The only result that the SDI program was able to achieve in the context of confrontation was to embolden those in the Soviet Union who defined security in confrontational terms and benefited from this kind of understanding. As the evidence clearly demonstrates, the Soviet defense industry had successfully managed to mount a response to the U.S. program, even after it was largely deprived of political attention and resources. Had the United States and the Soviet Union failed to begin practical steps toward disarmament they would have found themselves in a new round of arms race, regardless of whether or not the SDI technologies lived up to the early expectations. Economic constraints and technological realities would have scaled back the initial ambitious plans, as they in fact did, but the systems that the Soviet Union would have deployed would still make the strategic nuclear balance less stable than before. The dynamics of this process indicates that it is unlikely that the Soviet political leadership would have been able to contain this process even if it put an additional pressure on the economy and the society in general.

The dialogue with the United States, as difficult as it often was, provided the Soviet Union an opportunity to gradually move away from the confrontational understanding of its security. It did so by empowering and encouraging the institutions of the Soviet society that did not see confrontation as their inherent interest. Eventually they were able to create a framework that defined security in the terms that shifted emphasis toward cooperation, even though they still operated by categories of strategic balance and deterrence and stayed within the bounds of traditional arms control. The issues associated with SDI presented a very serious challenge to this effort, but in the end they had been successfully accommodated into this new framework as well.