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## **Putin's Science Fiction**



On 1 March 2018, President Putin [delivered](#) a message to the Russian parliament. Other representatives of Russia's ruling class were also sitting in the room, as is traditionally the case. Almost a half of the two-hour speech was devoted not to political and socio-economic proposals but, instead, exclusively to a story of Moscow's new military capabilities.

Militaristic rhetoric is being used yet again to claim superpower status to Russia's elites and the Russian public, no to mention the wider world. However, the political background of the message was ruined. Three weeks earlier, an indefinite but clearly large number of Russian mercenaries had been killed or wounded by the U.S. airforce. Moreover, one week earlier, news broke about an international cocaine scandal, involving Russian diplomats and, most probably, also its secret services.

The 'armament part' of the message was directly addressed to the United States. Since 2014, the Kremlin has been trying to impose a dialogue on America and it has no topics left except for nuclear weapons. However, the Russian authorities no longer want to routinely reduce their arsenals under yet another agreement. It seems they want to 're-invent' the whole regime of strategic arms reduction formed in the 1970s, linking missile and warhead issues with outer space and missile defence. By conducting negotiations with the Americans based on a comfortable agenda, the Kremlin dreams, among other things, of breaking out of the Ukrainian trap. Ironically, that trap itself turned out to be closely linked to nuclear disarmament.

## Science Fiction

Putin spent nearly an hour in his message to present, with a great deal of complacency, various new Russian military developments, involving seven different systems. Quite surprisingly, the line between the president's fantasies and reality was very difficult to draw.

**Rockets with a nuclear engine.** What classifies as total fiction are references to a rocket launcher with a nuclear power plant, as well as plans to develop a strategic missile with a similar installation. Allegedly, some tests of such a missile had been already conducted at the nuclear test site on Novaya Zemlya (Central Test Site). Overall, attempts to develop nuclear engines for aircraft were made already in the 1950s and 1970s in both the USSR and the USA. The most advanced Soviet design of such an engine was called RD-0410. It had a service life of up to one hour, and used liquid hydrogen as the working fluid. This engine was intended exclusively for spacecraft operating outside the Earth's orbit. The main principle was that the working fluid passed through a reactor, heated up to several thousand degrees and created the needed reactive traction. Of course, the ejected jet was highly radioactive, which means that such engines are simply unsuitable for use on Earth.

In late 1990s and early 2000s. the United States tried to revive the idea of developing an atomic source of energy that would be suitable for use in the Earth's atmosphere. At that time, studies were conducted to use [hafnium](#), irradiated with x-rays, as an energy source (for example, for military unmanned aircraft). With this approach, hafnium could theoretically produce energy without high radioactivity, as only a compact source of x-ray radiation would be involved.

In fact, that research produced no results and hafnium did not become a source of energy. Of course, this could have impressed and inspired Russia to make a similar attempt, or to at least simulate such efforts. However, one can say with certainty that any such efforts must have been futile.

Overall, more realistic contemporary research and development is focused on developing nuclear electric propulsion systems, based on a radio-isotope thermoelectric generator and an electrojet engine.

**Laser weapons.** The situation with the combat laser complexes mentioned by Putin is somewhat more complicated. Technologies for such lasers already exist. However, with the [high cost](#) of development and production, the effectiveness of combat lasers far from obvious: lasers are not efficient in any smoky or dusty atmosphere. The existing prototypes with a power of 30-60 kilowatts are produced by Lockheed-Martin, a U.S. company. There is [evidence](#) that Russia had similar prototypes, developed by Almaz-Antey. Such a laser, if placed on a large truck or ship, is [able](#) to hit a low-flying, remotely piloted vehicle or even a helicopter (at a distance of up to two kilometres). However, the advantage of lasers over conventional air defence weapons remains unclear.

Modern lasers have only one possible practical use: to blind the guiding head of a flying cruise missile. The only problem is that several laser installations located in the same place with other anti-ballistic missiles will be needed to combat the salvo launch of cruise missiles. For instance, let us recall the 59 cruise missiles launched in April 2017 at the [Syrian airbase](#). It turns out that modern lasers are an expensive toy in any case and they cannot really be called 'combat lasers' in the spirit of 'Star Wars'. At most, lasers can be viewed as auxiliary means of counteraction. The ability of Russian companies to successfully produce laser installations with a capacity of at least 30 kilowatts is a separate and yet unresolved issue.

## Old Favourites

In issues related to nuclear weapons Putin was somewhat closer to reality in his message. However, some clarification is needed.

**The 'Dagger' (Kindjal) system.** Judging by the external appearance of the project, the case in point is a supersonic cruise missile X-32, intended mostly to fight against large ships and ship formations, and can be suspended on a MiG-31 fighter. However, the X-32 is made for the Tu22M3 bomber, which is capable of carrying three such missiles. These bombers [need an upgrade](#), a replacement of engines and avionics, and their number will be reduced to 30. At the same time, modernisation of strategic Tu-160 bombers, which have the same engines as the Tu-22M3, is currently a priority for Moscow. At the same time, at least 75 aircraft of

the approximately 120 existing MiG-31s have already been upgraded. Some of them are owned by naval aviation and are based on Kamchatka. Moreover, it is in Kamchatka that a new air army of the Pacific Fleet should soon be formed on the basis of the active units. Kamchatka also has a base of strategic submarines which are covered by aviation. In other words, the Kremlin is simply trying to continue its course towards turning the Sea of Okhotsk into forbidding waters. Another problem is that after taking off with such a missile, the MiG-31 will not be able to land with it. But this, apparently, is considered an insignificant detail, unworthy of mention.

**ICBM Sarmat.** At present, Russia [has](#) approximately 286 intercontinental ballistic missiles, of which it will need to replace about 190 missiles by 2027. Today, it engages in serial production of ICBM Yars to the tune of [12-16 units per](#) year and develops its [modification](#) called Yars-M with new combat units (see below). Thus, the rate at which old missiles are eliminated is still higher than the rate of production. As a result, Moscow, which perceives this state of affairs as humiliating, needs to develop a new missile. Such a missile is needed to replace the retiring heavy ICBM R-36M Voevoda of Ukrainian production: one of the main political assets of Russia's nuclear arsenal. This laid the foundation for the Sarmat project.

The production capacity for the new missile in the 2020s will be found at the Makeev State Rocket Centre. By that time, the production of Liner missiles will be completed there for the rearmament of six 667BDRM Dolphin submarines. This company also deals with the Sarmat ICBM, which, apparently, is a completely localised and improved version of the R-36M. This is supported by the fact that since 2015, after the final disruption of military and technical ties with Ukraine, the Makeev SRC has carried out [technical support](#) for these missiles. This is also confirmed by the characteristics mentioned by Putin: the mass of over 200 tons and the possibility of striking through the South Pole, i.e. along a partially orbital trajectory.

In general, since 1979, within the framework of the SALT-2 Treaty (although it was not ratified), the Soviet Union gave up the partially orbital R-36orb rockets and confirmed this commitment in START-1. While sceptics can claim that Russia has no obligations regarding partially orbital missiles, START-1 formally ended in 2009, but this time the conversation is about the international regime for reducing nuclear weapons. This regime is based on adhering to the commitments made by countries under START-1 and even under SALT-2. It turns out that the Sarmat project is designed not only to provide Russia with missiles that were previously produced in Ukrainian plants. It also raises the question of revisiting Russia's overall approach towards nuclear disarmament which it pursued in the previous decades.

**Hypersonic planning warhead.** No hot news here: after being separated from the ICBM, any warhead flies with hypersonic speed. And if it has a hull shape, it will plan the route, increasing the range of its flight. Such work is currently [being done by China](#). However, such warheads have very limited manoeuvring possibilities, since it loses speed with any manoeuvre. If it is supplied with an engine, it will become too heavy and less versatile.

However, the U.S. missile defence system does not provide for any opposition to the Russian nuclear arsenal. Consequently, any effort to develop new warheads (and Putin's personal effort to create an illusion involving such warheads) has no military significance. It does, though, have political significance. The Kremlin is trying again to raise the stakes and reinforce its status vis-à-vis the United States.

**An unmanned underwater torpedo vehicle.** Russia has been working on a small unmanned nuclear submarine with nuclear or conventional ammunition [for a long time](#). It also has two special-purpose nuclear submarines in the Northern Fleet (carriers of nuclear deep-sea stations) and is building two more nuclear submarines that can be used to launch such unmanned vehicles. However, their declared range of several thousand kilometres and the depth of immersion of more than [1000 meters](#) means that they simply have no communication on most of the route. For example, when a regular submarine is at a depth (up to 600 m) away from the shore, it can only receive a signal on extra-long waves from special ground stations. This means that soon after being sent, such an underwater vehicle becomes uncontrolled and operates only in accordance with a pre-defined programme. This makes it unsuitable for use when not accompanied by a submarine with a crew in relative proximity.

Moreover, there is a problem of navigation. Its own inertial navigation system (gyroscopes and accelerometers) and long-range radio engineering system (three transmitters in different parts of Russia), with

accuracy of up to several kilometres are insufficient when the signal is transmitted deep underwater. For such devices it is necessary to build and maintain tracks made of radio beacons located at the sea bottom. Such a task is far from trivial. Such projects can feed a much larger number of state-controlled defence enterprises than simply the construction of yet another regular submarine. The absence of a real result can always be blamed on objective insurmountable circumstances.

Overall, the only rational element of this quite crazy dream of the 'doomsday ship' revealed by Putin, is to surround the Kremlin with an additional veil of uncertainty, to strengthen positions and start bargaining for the much coveted 'renewed, promising system of international security'. Considering the context of the speech, the primary goal is quite clear from behind this claim, namely to 're-invent' the regime for the reduction of strategic weapons. The ultimate goal is also quite clear from the phrase where the territory of the USSR is referred to as 'the national territory of Russia'. The phantasmagoria of goals corresponds to the phantasmagoria of Putin's message.

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