

Strategic Forecast

Russian Navy Rising

The Borei-class Submarines

Flag-raising ceremony on the ballistic missile submarine Alexander Nevsky on 23 December 2013, at Sevmash shipyard (photo: Oleg Kuleshov)

One of Russia's most complex and ambitious weapons programmes, the Project 955, *Borei*-class, fourth-generation strategic nuclear missile submarine (SSBN) reached several

important milestones in 2013. In December 2012, the Russian MoD had signed the acceptance certificate for the first boat in the series, the *Yuri Dolgorukiy*. On 23 December 2013, it formally took delivery of

the second boat, the *Alexander Nevsky*. The Russian Navy is expected to receive another six submarines of this class, for a total of eight. The third boat, *Vladimir Monomakh*, has already entered begun trials and after



The commissioning ceremony of the Alexander Nevsky (photo: Oleg Kuleshov)

a series of missile launches it will join the fleet some time in 2014. The hulls of the fourth and the fifth submarines in the series are now being built using modified *Borei-A* specifications at the Sevmash shipyard in Severodvinsk, the shipyard that built the *Vikramaditya* aircraft carrier for the Indian Navy.

The *Borei*-programme has emerged from a period of uncertainty caused by early manufacturing problems with the submarine's main weapons system, the *Bulava* SLBM and there is now little doubt that the original plans to build eight



Alexander Nevsky in the White Sea



Alexander Nevsky undergoing sea trials

Borei-class boats will be fulfilled. There are no longer any technical risks that could conceivably derail the programme. Having been accorded top priority by the Kremlin, financing is secure and is certain to be spared any budget cuts in the near future. Even if the Russian economy deteriorates and Moscow is forced to reduce its arms procurement spending (which is currently slated to reach 500 billion euros in 2011-2020), *Borei* and all the other nuclear-related programmes will remain sacrosanct. All of this means that Russia has taken arguably the most important step in augmenting its strategic nuclear deterrence capability since break-up of the Soviet Union.

The fourth-generation Russian SSBN

The *Borei* programme was conceived by the Soviet Union as an answer to America's *Trident* system. Initially, Soviet engineers developed the *Typhoon* system, which

consisted of Project 941 third-generation SSBNs and the D-19 solid-fuel missile system with R-39 missiles. But the Project 941 submarines were very large and extremely expensive and in the period 1981-1989 Moscow managed to build only six of them, not enough to achieve numerical parity with the U.S. fleet of 18 *Ohio*-class submarines used in the *Trident* system. As a stopgap solution, the Soviet/Russian Navy continued to build the cheaper Project 667 nuclear missile submarines, which were upgraded to Project 667BDRM specification (representing 2+ generation technology). Six Project 667BDRM boats were built between 1985 and 1992.

Nevertheless, the Soviet Union proved unable to come up with a fitting response to the *Trident* system. Its fleet of strategic submarines (which was already operating too many submarine designs) had acquired another two SSBN types. These boats were armed with two new types of missiles, which

were inferior, each in its own way, to the *Trident-2* missiles the Americans began to use with their *Ohio*-class submarines in the late 1980s. The Soviet Navy's R&D centres had begun work on the future fourth-generation SSBN design back in 1978. Their objective was to make sure that the new Soviet submarines would turn out "equal or superior" to America's *Ohio*-type boats. In November 1985 the Communist Party Central Committee and the Soviet Cabinet of Ministers authorised the Leningrad-based Rubin design bureau (the developer of all Soviet SSBNs) to launch the development of Project 955 fourth-generation SSBN. Rubin began to draw up the Project 955 *Borei* engineering design in 1990.

The development of Russian nuclear missile submarines was seriously affected by break-up of the Soviet Union and the deep economic crisis that followed. But despite economic woes, the Russian government designated the modernisation of SSBN fleet



Russia's first Borei-class submarine, the Yuri Dolgorukiy (photo: Sevmas)

as a top priority for its nuclear forces and for the Navy in general. One of the reasons for this was the START-1 (strategic offensive nuclear reductions) treaty Moscow and Washington signed in 1991. Under terms of the treaty, the nuclear missile submarine fleet accounted for up to 50 per cent of the agreed nuclear ceilings. The government in Moscow therefore decided to start building a series of new Project 955 SSBNs.

The first boat in the series, *Yuri Dolgorukiy*, was laid down at the Sevmas shipyard in Severodvinsk in November 1996. Amidst the severe economic crisis

that followed breakup of the Soviet Union in 1991, the programme predictably faced chronic funding shortages. Another major problem was fragmentation of the supply chain as many of the critical component supplies were based in newly-independent, former Soviet republics. In the period between 1997 and 1999, no discernable progress was made towards completion of *Yuri Dolgorukiy*.

Problems also emerged with the new submarine's main weapons system, the D-19UTTKh *Bark* SLBM. All three of the test launches made from the firing range

in Nenoks in 1993-1997 ended in failure, for various reasons. In September 1998 the MoD shut down the *Bark* programme altogether. Before the year's end it issued a tender for the development of a new solid-fuel missile system, codenamed *Bulava*, for Project 955 submarines. Two bids were submitted; the MoD choosing the design proposed by the Moscow Thermal Technology Institute (MIT, led by Y.S. Solomonov). The institute's *Bulava-30* SLBM was to weigh about 36 metric tonnes. The *Bulava-30* design was chosen despite the fact that the MIT had no previous



The Yuri Dolgorukiy undergoes trials (photo: Sevmas)

experience in designing sea-based missiles. Part of the reason for the MIT's selection was that at about the same time the institute had successfully completed the development of the *Topol-M* ground-based ICBM. The institute said that it would use many of the solutions developed for the *Topol-M* in the *Bulava-30* design.

The rapid economic recovery that began in Russia post-1999 enabled the government to increase spending on the *Borei* programme and work on the *Yuri Dolgorukiy* resumed. The hull was completed in 2005. On 15 April 2007 the boat was moved from the assembly floor to the Sukhona floating launch dock. It was launched on 12 February 2008 followed by launch of the submarine's nuclear reactor on 21 November. Harbour trials began on 17 March 2009, and the first stage of sea trials was held between 19 June and 10 July.

Problems with the Bulava

The submarine used as the test bed for the *Bulava* SLBM was a modified Project 941 SSBN that was upgraded in the 1990s and re-named *Dmitry Donskoy*. The first throw launch of a *Bulava* mock-up was made from that boat in December 2003. The launch of a dimension and mass-accurate mock-up of the SLBM from a submerged position followed in September 2004, and in September 2005, the *Dmitry Donskoy* performed the first successful test launch of a working prototype of the missile.

The second *Bulava* test launch from the *Dmitry Donskoy* in September 2005 was also successful – but then came a series of failures. Out of the six launches attempted by the submarine in 2006-2008, four failed completely, and two were only partially successful (in both cases the missile failed at the warheads' dispensing stage). There was a successful launch in November 2008, followed by three failures in a row in the space of 12 months. During another attempt, the submarine's own launch system failed.

Finally, in October 2011, the *Dmitry Donskoy* performed two successful *Bulava* launches in a row. On 28 June, 2011, the *Bulava* was successfully launched from its intended carrier, the first submarine in the Project 955 series. As part of a joint state trials programme of the SLBM and the Project 955 SSBN combination, the *Bulava* was successfully launched from the *Yuri Dolgorukiy* in August and October

2011. On 28 December, 2011 the boat successfully fired a salvo of two missiles.

The successful completion of the *Bulava* saga put the whole *Borei* programme out of 'danger'. It is also worth emphasising that the problems with the SLBM were not due to any flaws in its design but all stemmed from poor manufacturing standards. In other words, the nature of the difficulties were organisational rather than technological. The Russian government regards the *Borei* programme as a very important priority, and Moscow is making energetic efforts to revitalise the Russian defence industry as a whole. There is little doubt, therefore, that any remaining problems with manufacturing quality will be eliminated - at least with regard to the *Borei*.

Series production

The Russian economic recovery in the 2000s enabled the government to resurrect previous plans under which a whole series of the *Borei* boats was to be built. Under the previous State Armament Programmes for 2007-2015 and the latest programme that covers the 2011-2020 period, the Russian Navy will receive a total of eight *Borei* submarines.

The second Project 955 *Borei* boat, *Alexander Nevsky*, was laid down at Sevmas on 19 March, 2004, followed by the third boat, *Vladimir Monomakh*, on 19 March, 2006. *Alexander Nevsky* was launched on 6 December, 2010, followed by the commencement of sea trials on 22 October, 2011. The submarine entered service with the Russian Navy on 23 December, 2013.

The third boat in the series, *Vladimir Monomakh*, began trials in January 2013. The manufacturer's internal trials were completed in December and the state trials are still in progress.

The five remaining SSBNs in the series will be built to improved Project 955A (*Borei-A*) specifications. Each will still carry a set of 16 *Bulava* SLBMs.

The Sevmas shipyard started building the first Project 955A boat (and the fourth in the *Borei* series) in late 2009, but the official laying-down ceremony was held only on 30 July, 2012. Each successive Project 955 submarine is taking less time than the previous one to complete. It is safe to assume that all the remaining boats in the series, starting from No 4 or 5, will take no more than four or five years to launch.

Borei-class SSBN in the Russian nuclear deterrence system

The Russian MoD originally wanted to assign all Project 955 submarines to the Pacific Fleet and to that end it started building the required coastal infrastructure in Vilyuchinsk, on the Kamchatka peninsula. It now appears that only the first boat in the series, the *Yuri Dolgorukiy*, will continue to serve with the Northern Fleet but all the others will definitely be assigned to the Pacific Fleet. The first two Project 955 SSBNs, *Yuri Dolgorukiy* and *Alexander Nevsky*, are expected to enter routine service in 2014.

Moscow's decision to deploy the *Borei* boats in the Far East provides certain grounds to suggest that they will primarily be used as an instrument of nuclear deterrence against China rather than the United States. Another piece of evidence in favor of this suggestion is that unlike Russia, China is not bound by the Intermediate Nuclear Forces (INF) treaty; in fact, Beijing is rapidly increasing its arsenal of intermediate-range missiles, which poses a threat not only to Russia but to India as well. The decision to deploy the *Borei* submarines in the Pacific may be a part of Moscow's response to that threat. Unlike the United States, China does not have a formidable anti-submarine capability, and the *Boreis* will remain completely invulnerable to Chinese defences for many years to come. At the same time, the *Bulava* SLBM is capable of defeating existing and future missile defences, making the *Borei-Bulava* combination an effective instrument of deterrence against the United States as well.

Borei as an indicator of Russian defence industry policy

On the whole, the *Borei/Bulava* programme has been a success and an outstanding achievement of the Russian defence industry, and clearly demonstrates that catastrophic consequences of the 1990s crisis in the defence sector have been overcome. The Project 955 submarines and their *Bulava* missiles show that the Russian strategic nuclear deterrent remains fairly advanced and very capable. They are also proof that with sufficient political will, Russia can still bring to a successful conclusion complex and ambitious technology programmes.

In addition, the *Borei/Bulava* program reflects some distinctive features of Russian defence industry policy over the past decade. One of these features is that for all the technical and economic difficulties, most of the Russian weapons programmes launched in the late 1990s are extremely ambitious. The *Bulava*, for example, is a radically new design that has very little in common with the old Soviet SLBMs. Essentially, this is Russia's first sea-based solid-fuel ICBM;

Defence Forces and the Strategic Missile Troops (new types of ICBM). Such an approach not only meets the current needs of the Russian armed forces, but also lays solid foundations in terms of the country's future military security requirements.

Implications for India's security requirements

This author strongly believes that defence technology cooperation between Russia

assistance to India in developing the naval component of the Indian nuclear deterrent. Cooperation in this area would mean that military-political partnership between India and Russia is becoming as close as the partnership between the United States and Britain. Of course, it may still be premature to speak about the possibility of the kind of deep cooperation that now exists between America and Britain under the *Trident* programme, nevertheless, some individual



The Yuri Dolgorukiy at Sevmaash shipyard (photo: Sevmaash)

in terms of its size, mass and performance it is quite similar to American SLBMs. In fact, the entire State Armament Programme 2020 is highly ambitious; and involves many bold decisions which show that Russia is prepared to take serious technological risks. For example, the Russian MoD intends to replace all the existing armoured vehicles with three radically new families of armoured platforms (*Bumerang*, *Kurganets*, and *Armata*). None of these platforms represents a mere evolution of previous-generation technology. Similarly bold and ambitious programmes are underway in the Air Force (the PAK FA fighter and the PAK DA long-range bomber), the Aerospace

and India should include sub-strategic and strategic systems, including nuclear missile and missile defence technologies. In fact, the two countries' cooperation is no longer limited to conventional weapons and India and Russia are already working together in such areas as powerful sub-strategic systems, including multirole nuclear-powered submarines, aircraft carriers and heavy, long-range, versatile and multi-platform supersonic missiles.

It may sound revolutionary and possibly even unrealistic at this time, nevertheless, this author is convinced that it would be in Russia's own security and commercial interests to provide the most energetic

elements of the *Borei/Bulava* complex could potentially be used in the sea-based nuclear deterrence forces now being built by India. There is no doubt that the United States would vehemently oppose such an idea. But China's continued growth, and the fact that India itself is now closer to becoming a "proper superpower", may soon make discussions of Russian-Indian cooperation on fourth-generation SSBN less hypothetical and more realistic.

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