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WORLD | CHINA

The Era of Total U.S. Submarine Dominance Over China Is Ending

New Chinese submarines and sensors to catch U.S. subs will alter the balance of power

A Chinese nuclear-powered submarine took part in a 2019 naval parade off the eastern port city of Qingdao. PHOTO: JASON LEE/REUTERS

By Alastair Gale Follow

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For decades, the U.S. hasn't had to worry much about China's submarines. They were noisy and easy to track. The Chinese military, meanwhile, struggled to detect America's ultraquiet submarines.

Now, China is narrowing one of the biggest gaps separating the U.S. and Chinese militaries as it makes advances in its submarine technology and undersea detection capabilities, with major implications for American military planning for a potential conflict over Taiwan.

Early this year, China put to sea a nuclear-powered attack submarine with a pump-jet propulsion system instead of a propeller, satellite imagery showed. It was the first time noise-reducing technology used on the latest American submarines had been seen on a Chinese submarine.

A few months earlier, satellite images of China's manufacturing base for nuclear-powered submarines in the northeastern city of Huludao showed hull sections laid out in the complex that were larger than the hull of any existing Chinese submarine. A second modern construction hall at the plant was finished in 2021, indicating plans to boost output.

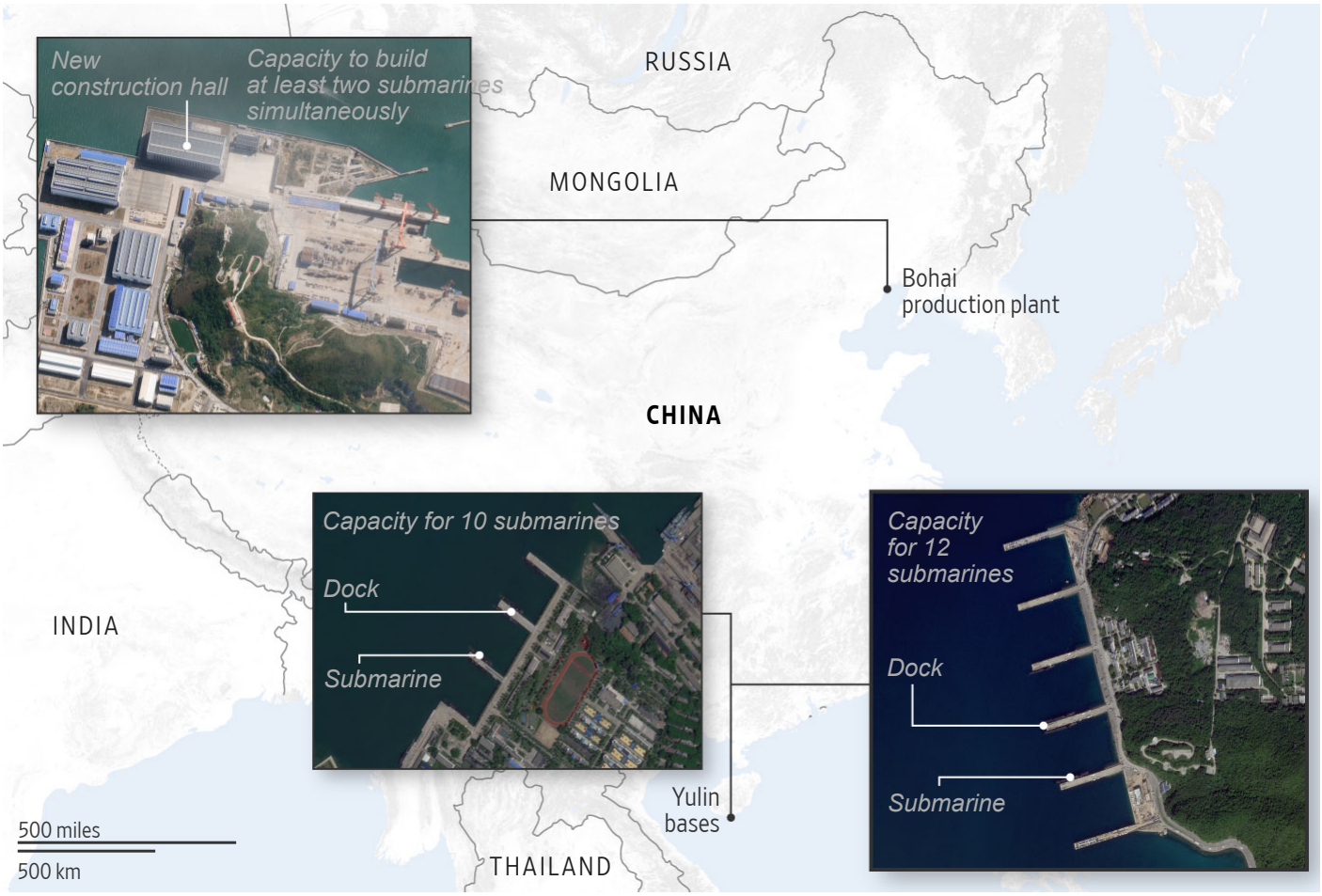
At the same time, the western Pacific is becoming more treacherous for U.S. submarines. Beijing has built or nearly finished several underwater sensor networks, known as the "Underwater Great Wall," in the South China Sea and other regions around the Chinese coast. The networks give it a much better ability to detect enemy submarines, according to Chinese military and academic texts.

The People's Liberation Army, as China's military is known, is getting better at finding enemy submarines by adding patrol aircraft and helicopters that pick up sonar information from buoys in the sea. Most of China's navy now has the ability to deploy underwater listening devices called hydrophones on cables trailing ships or submarines.

In August, China conducted a submarine-hunting exercise lasting more than 40 hours in the South China Sea, involving dozens of Y-8 anti-submarine patrol aircraft. A few weeks earlier, the Chinese and Russian navies conducted a joint anti-submarine warfare exercise in the Bering Sea, off the coast of Alaska.

The developments mean the era of unchallenged dominance of the U.S. under the seas around China is ending.

China's manufacturing plant and main bases for nuclear-powered submarines



Note: Dock capacities are for areas shown in image, not full bases.
Sources: Planet Labs PBC (images), Preligens (image analysis)
Peter Champelli and Carl Churchill/THE WALL STREET JOURNAL

In recent years, China has also rapidly expanded its surface fleet. It now exceeds the U.S. fleet by number of ships, although China's ships are generally smaller and less sophisticated. In response, a larger percentage of the U.S. Navy has been deployed to the Pacific, including some of America's most advanced ships and aircraft. The U.S. has also increased the tempo of naval operations in the region and deepened coordination and training with allied fleets, such as Japan.

The U.S. also needs new strategies below the waves to face a more potent adversary, said Christopher Carlson, a former U.S. Navy officer. The U.S. needs far more resources, such as patrol aircraft and attack submarines, to locate, track and potentially target a new generation of quieter Chinese submarines, he said.

"The implications for the U.S. and our Pacific allies will be profound," he said.

Simulations of a Chinese invasion of Taiwan conducted by American military analysts often assume U.S. submarines would try to sink ships in the attacking Chinese fleet. The destruction of Chinese ships could help blunt the invasion and enable Taiwan to better defend itself, some of the simulations show, but a greater threat to U.S. submarines would complicate that task.

Even getting close to the Taiwan Strait might become more precarious. China's nuclear-powered attack submarines could be assigned to a hunter-killer role seeking U.S. and allied submarines to the east of Taiwan, said Brent Sadler, a former U.S. submarine officer who is now senior research fellow at the Heritage Foundation, a think tank based in Washington, D.C.

Hard to hunt

An indication of the rising stakes in countering China's submarine fleet came in March, when Gen. Anthony Cotton, head of U.S. Strategic Command, said during a congressional hearing that China had deployed new missiles on its ballistic-missile submarines that could hit targets deep inside the U.S. while remaining close to China.

Keeping track of these Chinese submarines is one of the primary roles of the U.S. Navy and its attack submarines in the Asia-Pacific region.

One book published by a former PLA officer in 2020 suggests new Chinese attack submarines will have their engines mounted on shock-absorbing rafts to better damp vibrations. China is working on other quieting technology for submarines, such as new hull materials and more-efficient nuclear reactors for propulsion, academic research papers show.

Based on the available information, Carlson, the former U.S. Navy officer, anticipates the new Chinese submarines will be as quiet as Russian Akula I-class attack submarines commissioned from the 1990s—a series still in service today that marked a leap forward in stealth and speed from previous Russian submarines.

"Finding a boat this quiet is going to be really hard," he said.

Submarine-launched missiles rolled through Beijing during a 2019 parade. PHOTO: MARK SCHIEFELBEIN/ASSOCIATED PRESS

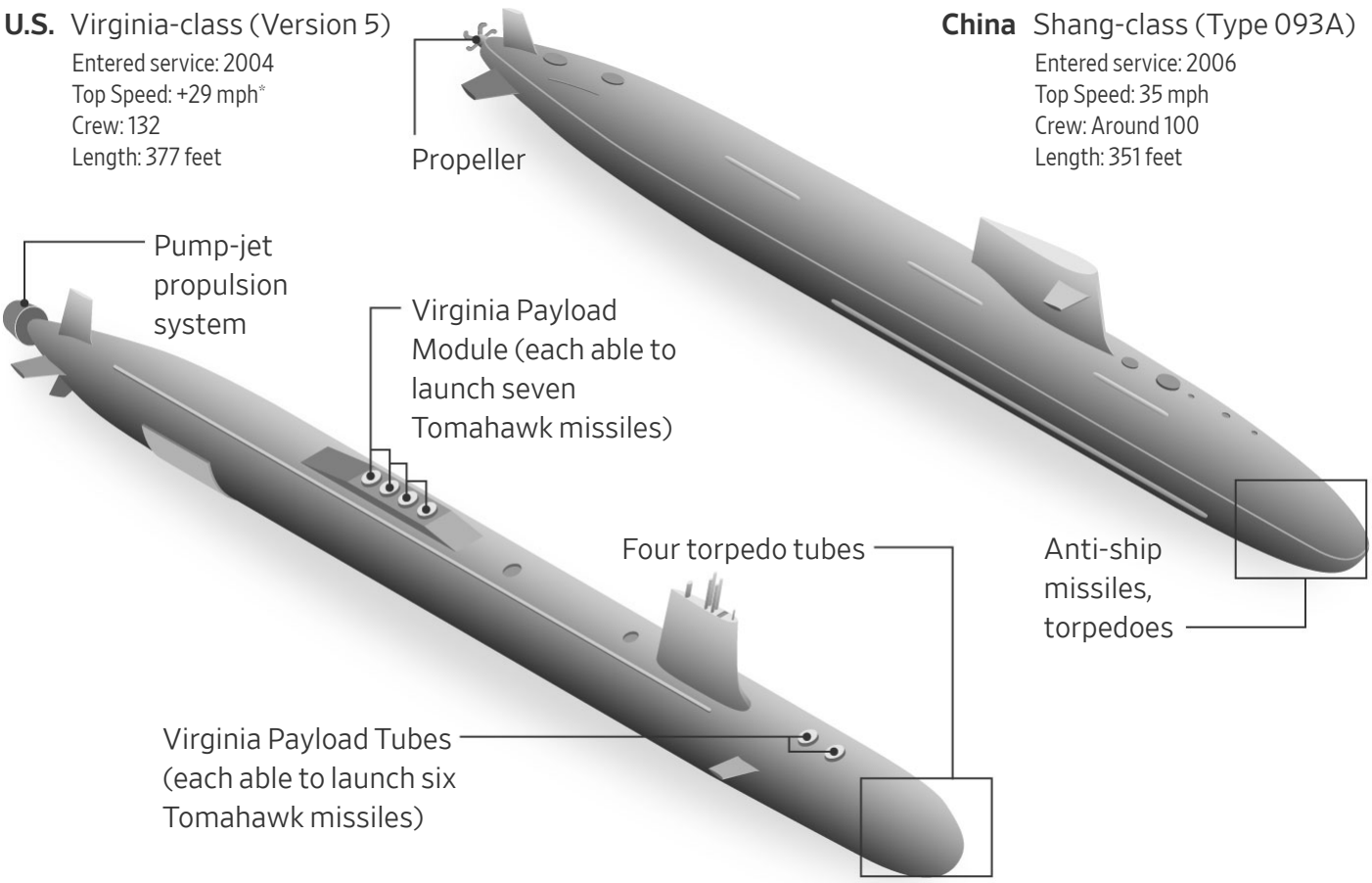
Much of China's current submarine technology comes from reverse-engineering diesel-electric submarines bought from Russia after the collapse of the Soviet Union. Closer military ties between Moscow and Beijing in the wake of Russia's invasion of Ukraine have spurred concerns that Russia may be willing to share some of its advanced submarine technology with China, but there have been no clear indications of such transfers.

To be sure, a new generation of Chinese nuclear-powered submarines is years away from active duty, and significant progress in the program isn't guaranteed. Submarines often go through several prototype stages over a period of years before final designs are reached.

The new attack submarine launched by China this year could be a test model that isn't intended for deployment. Entire projects can be scrapped for technical, economic or political reasons. The U.S. Seawolf-class submarine program was dropped in 1995 because of high costs.

There is also little chance that China will catch up with the U.S. in submarine technology soon. The latest U.S. Virginia-class attack submarines and the planned Columbia-class ballistic-missile submarines are a generation ahead of China's capabilities in terms of noise-reduction technology, propulsion, weapons systems and other areas, military analysts say.

Nuclear-powered attack submarines



*Over 25 knots (28.8 mph). Exact speed not available.
Note: The Virginia Payload Module is a planned component for future submarines.
Source: U.S. Navy (U.S.); Naval-Technology.com (China)
Peter Champelli/THE WALL STREET JOURNAL

But China doesn't necessarily need to match U.S. capabilities. By making submarines that are much harder to detect and producing them at scale, it can stretch the resources used by the U.S. military to keep track of them. And any war would likely be fought in China's backyard, the area it knows best.

To patrol the region, the U.S. rotates squadrons of P-8 aircraft through a base in Okinawa, Japan. One recently retired U.S. anti-submarine warfare officer said that a lack of American anti-submarine patrol aircraft based permanently in the Asia-Pacific region would be a handicap.

"We know where their subs are now," he said. "But continuing to do so depends on having the assets to keep track of them."

The fast-attack submarine USS Connecticut visits a U.S. base at Yokosuka, Japan. PHOTO: MCC BRETT COTE/ASSOCIATED PRESS

China's 'Underwater Great Wall'

In 2017, the Chinese government approved plans to build sensor networks over five years in the South China Sea and East China Sea, where Taiwan is located, to monitor the regions in real time.

China's underwater sensor networks echo the Sound Surveillance System, or Sosus, developed by the U.S. during the Cold War to detect Soviet nuclear submarines through a network of hydrophones fixed to the sea floor.

A few years ago, China also placed listening devices on the seabed near the island of Guam, home to a major American submarine base.

The growth of Chinese underwater sensor networks means U.S. submarines can no longer rely solely on their stealth capabilities to avoid detection in the South China Sea and other areas close to the Chinese mainland, said Bryan Clark, a former naval officer who is now a senior fellow at the Hudson Institute, a think tank based in Washington, D.C.

Clark said the U.S. needs a new strategy to confuse or suppress China's undersea sensors, by deploying unmanned submersible craft that can jam the surveillance systems, act as decoys or destroy sensors.

China is under pressure to improve its sub-hunting capabilities as the U.S. works with allies to boost its undersea advantage. In 2021, the U.S. and U.K. said they would help Australia build its first nuclear-powered submarines.

The new Australian submarines aren't expected to be deployed until the 2040s, so as a stopgap measure, the U.S. agreed this year to sell as many as five U.S. Virginia-class nuclear-

powered attack submarines to Australia in the 2030s. The U.S. also pledged to rotate attack submarines through a base in western Australia by 2027 to help its military gain proficiency in maintaining nuclear submarines.

A Chinese government spokesman said in March the plans to boost Australia's capabilities would lead "down the path of error and danger."

USS North Carolina, a Virginia-class submarine, docks in Western Australia. PHOTO: TONY MCDONOUGH/AGENCE FRANCE-PRESSE/GETTY IMAGES

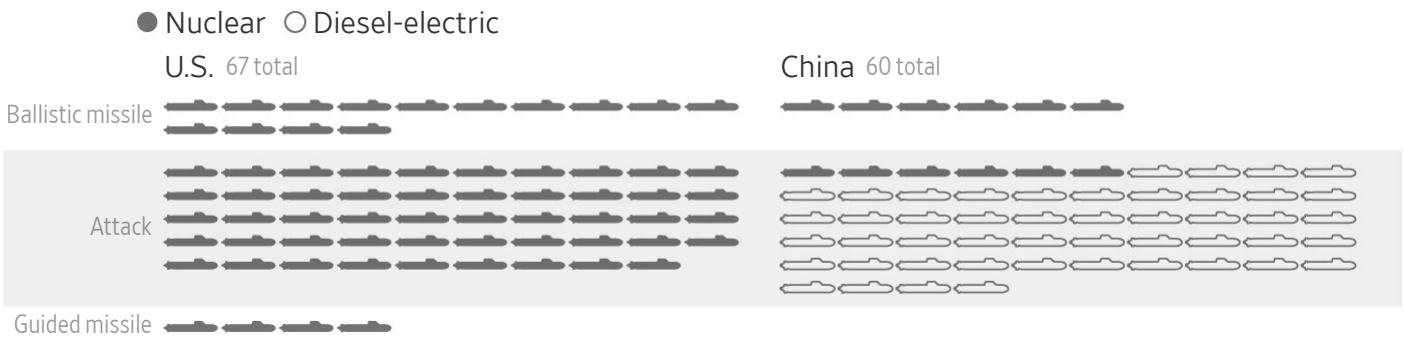
U.S. behind schedule

China's recent advances have also highlighted a shortfall the U.S. is facing in its own submarine fleet. The Navy has started moving more submarines to the Asia-Pacific region and says it needs 66 nuclear-powered attack submarines to meet global missions. The U.S. has 67 nuclear-powered submarines, but only 49 of those are attack submarines, a result of a decline in construction after the end of the Cold War.

Its fleet of attack submarines is forecast to decline to 46 boats by 2030 as older submarines are retired, before recovering to 50 in 2036 if an annual construction rate of two submarines can be reached, up from the current rate of 1.2. In the Navy's most optimistic scenario, it would have 66 attack submarines in 2049.

China currently has six nuclear-powered attack submarines. Carlson, the former U.S. Navy officer, predicts that once China has settled on new designs it could triple the current U.S. annual production rate. In its annual assessment of the Chinese military published this month, the Pentagon forecast China would have a total fleet of 80 attack and ballistic-missile submarines by 2035, up from 60 at the end of last year.

Submarine fleets, U.S. vs. China



Source: U.S. Navy (U.S. fleet); Pentagon China Military Power Report 2023 (Chinese fleet)
Peter Champelli/THE WALL STREET JOURNAL

China's main base for nuclear-powered submarines is on the southern island of Hainan. To accommodate more submarines, China added two new piers at the base this year, on top of four existing piers. Two submarines can dock at each pier.

Hainan is at the northern edge of the South China Sea, a maritime region where China has built military bases on artificial islands and has some of its most extensive surveillance systems, both above and below the sea surface.

Sadler, the former U.S. submarine officer, said China's development of more advanced submarines added to the likelihood of a military showdown with the U.S. this decade.

"Regardless, the U.S. submarine force will certainly be in greater demand than ever before across the wider Pacific," he said, "and with narrowing margins of advantage over its chief adversary."

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