



Centre for Air Power Studies (CAPS)

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YJ-18 ASCM ANOTHER LEAF FROM RUSSIAN TECHNOLOGY: REVERSE ENGINEERED AND IMPROVED

Mr Arjun Subramanian P
Associate Fellow, CAPS

China has borrowed another leaf from Russian technology to improve its counter-intervention strategy. This trend of the Chinese is still continuing across the military hardware spectrum. A noteworthy component of this trend is that China, in most cases, manages to improve upon the existing technology through various means. Apart from strike platforms, China is also trying to improve its C4ISR capability which would enable efficient employment of the strike platforms.

Chinese online media is abuzz with the news of the recent U.S.-China Economic and Security Review Commission report on the Chinese Y-18 Anti Ship Cruise Missile (ASCM).¹ The new missile deployed by China has raised serious concern for the US Navy as the missile is believed to be lethal and a potentially greater threat to the US naval flotillas, particularly its aircraft carriers. As per the report, the US Office of Naval Intelligence (ONI) has confirmed the

deployment of the missile in some of Peoples Liberation Army Navy's (PLAN) submarines and surface ships.² China has gone another step in further perfecting its conventional counter intervention strategy.

China has been continually perfecting its counter intervention strategy or what is called in the west and elsewhere as the anti-access and area denial (A2/AD) strategy. Certainly, ballistic missiles and anti-ship cruise missiles form the core component of this strategy. While ballistic missiles form the primary offensive weapon to strike land targets and deny access to theatre air bases and other land based facilities to China's adversaries, cruise missiles form the leading part of the anti-ship component. China is attempting to develop anti-ship ballistic missile (ASBM) too, but so far there is no conclusive evidence to suggest that they can effectively perform such operations, though the DF-21D ASBM is known to be deployed.

Coming to anti-ship cruise missiles, almost the entire inventory of Chinese cruise missiles are based on reverse engineered Soviet technology. It has to be understood that the primary reason for this is that, firstly, China has been enjoying very good access to Russian weapon systems via the purchase route, and secondly, Russian weapons technology perfectly suits China's strategy as China basically adopted the Russian "bastion strategy" and Russian weapons are custom built for maritime anti-access and area denial purposes. More importantly, the weapons were also tailor-made for US naval targets.

China has re-engineered most of the Russian anti-ship cruise missile systems and have developed their own advanced variants which are mostly in the C series (eg, C-601 C-801 etc.). The latest YJ-18 missile is believed to be the Russian Klub variant going by the flight characteristics of the missile. The Klub flies at sub-sonic speed during most of its flight and uses way point navigation like most missiles. However, during the terminal phase of the flight, i.e from the point it breaks the radar horizon, the missile jettisons its air-breathing engine stage and a rocket motor stage kicks in, accelerating the missile to supersonic speeds. However, the only difference between the Klub and the YJ-18 is that the Chinese have enhanced the range of YJ-18 to 290 km³ from the Klub's 190 km. At the terminal phase, the missile skims 3 to 5 meters above sea level.⁴

The increased range enhances the fire power of the Chinese Navy. It is not known if the Chinese have designed the missile to perform complex manoeuvres at the terminal end of the flight like the Klub. If this is so, it would be nearly impossible to defend against this missile as the supersonic speed reduces the reaction time and the high G manoeuvres further complicate ship based defence.

The missile is reportedly deployed on PLAN's recent surface combatants - the Type 052C and Type 052D destroyers⁵ and also in their submarines. The submarines are the most challenging threat as surface combatants are relatively more vulnerable to detection and targeting. China operates more than fifty diesel-electric submarines and nuclear attack submarines (SSN). Among the diesel electric submarines, the most potent is the Russian origin Kilo class boats which can host and fire the YJ-18 either in the vertical launch tubes or in the torpedo tubes.

Diesel-electric boats lack endurance while submerged and need to come out often, say every seven to ten days. Nuclear attack boats, on the other hand, have unlimited endurance, the only limitation being crew fatigue and rations. Chinese SSNs are reported to have high acoustic signature as mentioned in an acoustic profile chart released by the US Office of Naval Intelligence (ONI) in 2009. As per the chart PLAN's Han class and Shang class nuclear propelled boats have acoustic signature higher

than the older Russian Victor III class SSNs.⁶ Again in 2013, a new SSN was said to be at the last stage of development. It is speculated to be the Type 095 SSN.

The Type 095 SSN, unlike other Russian double hulled design with two reactors and two turbines, could be propelled by a single naval Pressurised Water Reactor (PWR) with a single turbine which would tremendously reduce the acoustic signature.⁷ But a more deadly threat is China's Type 039A/B Yuan class submarine which is reported to have air independent propulsion (AIP) technology giving it longer endurance and making it deathly silent. If this class of submarine is armed with the YJ-18, it would pose a serious threat to the US carrier battle group.

Despite China's progress in submarine technology and advancement in Anti-Ship Cruise Missile (ASCM) capability, the US report believes that China lacks sufficient C4ISR systems capable of detecting and cueing target details to the strike platform.⁸ It can also be expected that, in the event of conflict, US forces might go for pre-emptive strikes on China's C4ISR nodes (sensors) and command and control sensors to degrade China's target detection and engagement capability. Nevertheless, the YJ-18 ASCM is certainly a potent threat to US forces within the first and second island chain, if any of China's naval platforms, particularly undersea platforms, manage to get within firing range. The 2003 incident of a Han class boat surfacing within

torpedo firing range of the USS Kitty-Hawk aircraft carrier, after penetrating the defences, is a case in point. In addition, there is also the possibility of China developing an air launched variant of the YJ-18 which would further increase the strike range of the missile owing to the kinematics imparted by the launch platform.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes

1 "US Media: Chinese anti-ship missile difficult to counter by Advancing US Aircraft Carrier", <http://mil.sohu.com/20151103/n425046037.shtml>, 03 November 2015.

2 Michael Pilger, China's New YJ-18 Anti-Ship Cruise Missile: Capabilities and Implications for U.S. Forces in the Western Pacific, U.S. -China Economic and Security Review Commission", p.1. Available at <http://origin.www.uscc.gov/sites/default/files/Research/China%E2%80%99s%20New%20YJ-18%20Antiship%20Cruise%20Missile.pdf>

3 "US Report: YJ-18 Will be a Bigger Hurdle than Previous missiles", http://news.ifeng.com/a/20151103/46088259_0.shtml , November 2015.

4 "Anti-Carrier Weapon Would Soon Come", <http://military.dwnnews.com/news/2015-11-05/59693321.html> , 05 November 2015.

5 "China has completed the construction of seven 052D ship with YJ -18 threaten US aircraft carrier", <http://military.china.com/news/568/20151218/20966087.html>, 18 December 2015.

6 "China's Silent Service Enters the Fourth Generation Club", http://capsindia.org.managewebsiteportal.com/files/documents/CAPS_Infocus_AS.pdf, October 2013

7 ibid

8 No.2