



Centre for Air Power Studies

Carbon Fibre Obscurant Cloud: A Passive Missile Defence Solution

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The seventh fleet of the United States Navy recently tested a passive missile defence system designed to defeat anti-ship missiles. The system generates large amounts of smoke obscurants with suspended radar absorbing carbon-fibre particles which could defeat anti-ship missiles that depend on radar or IR homing seekers to home in on the target. This is a remarkable endeavour by the United States Navy to overcome the military challenges it is facing in the 21st century.

The US Navy is an expeditionary fighting force and the Carrier Battle Group (CBG) plays a central role in its operational doctrine. The CBG is centred on the aircraft carrier while other platforms in the group provide cover and support in operations. Throughout the Cold War the US Navy had depended on CBGs to maintain freedom of operations and assert dominance around the globe and continues to do so. In the 21st century, naval force is being presented with new and complex challenges to maintain its freedom of operation in vital areas such as West and East Asia. In East Asia, China has adopted the Anti-Access and Area Denial (A2AD) strategy to restrict or deny freedom of operation to the US forces in the first island chain. China intends to achieve this primarily by depending on low cost anti-ship cruise and ballistic missiles which could target US aircraft carriers and other vital naval platforms supporting it.

Cruise missiles are hard targets for ships to defend against as they have a very low radar cross section, complex terminal flight characteristics and the problem of line of sight which reduces the ship onboard defence system's reaction time. Some anti-ship cruise

missiles such as the Klub can accelerate to supersonic velocity in its terminal approach to the target skimming just a couple of meters above the sea surface. Moreover, it can perform complex terminal manoeuvres to avoid the ship's defences.¹ Even the best active defence systems may prove ineffective if the enemy resorts to saturation strikes against the target. Notable is the Chinese capability to deliver a multi axis cruise missile strike against ships from land, sea and air based platforms.

Most of the anti-ship cruise missiles use active radar homing sensors to home on to the target while few ASCMs utilise IR or dual (IR and radar) sensors. The carbon-fibre filled smoke obscurant would be effective against both these sensors. The smoke would act as a screen hiding the ship's IR signatures while the suspended carbon-fibre particles would absorb and diffuse the radar waves emitted from the missile homing sensor denying homing information to the missile. The distribution density of the suspended carbon-fibre ought to be very high to deny the missiles any chance of employing ECCM to overcome the defence. For this, the fall rate of the fibre particles needs to be very low or the ejection rate of the generator ought to be rapid and high. According to Vice Adm. Robert L. Thomas Jr., commander U.S. 7th fleet, the US navy is developing a layered approach which includes both active and passive counter measures against anti-ship missiles.² The radar absorbing obscurant cloud could be the last layer of defence in this kind of electromagnetic manoeuvre warfare.

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While this method could be highly effective, turning the table in favour of defence, there are at present certain issues that need to be worked at. For instance, deployment of the carbon fibre filled obscurant cloud might affect the functioning of Close in Weapon Systems (CIWS), which too depends on radar direction and other onboard radar systems. Further, the cloud and the suspended particles might possibly affect flight operations on the flight deck. Additionally, the effect of wind speed, timing of the deployment (all the defensive measures have to be deployed within a very short time frame as the reaction time would be very less), the deployment methods are some of the tactical issues that require to be worked on. As Capt. David Adams says, "It is not just about the technology, but also practicing how the fleet will employ these emerging capabilities".³ An appropriate method needs to be adopted to ensure reduced interference with the normal operations of the battle group. Employing obscurant has been in practice for a long time now; it is just that the US navy is now adopting this tactical defence method to deal with the cruise missile problem it is facing. Also, it will be part of a layered defence which involves both active and passive systems.

The major advantage of this system is the cost ratio for offence and defence. This system, as mentioned above, is likely to tilt the cost ratio in favour of defence as it is far cheaper to employ and deploy. Thomas J. Culora discusses this aspect in detail in his paper titled "The Strategic Implications of Obscurants".⁴ He also raises concerns on the high possibility of this system proliferating rapidly. In this case, he rightly opines that, the side that can maintain tactical or operational advantage by other means will be more difficult to deter.

This tactical development, if successfully employed, may be a cause of worry for the PLA as its A2AD strategy is centred on ASCMs and Anti-Ship Ballistic Missiles (ASBM). This simple and effective tactical military solution has a good chance of making a serious impact on the larger military strategy of China which as a result might have effects on the present geopolitical scenario considering the possibility that this system might be provided by the US to its allies in the region.

(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])

Endnotes

¹ Examples are the SAAB and Diehl produced RBS-15 Mk3, which can maneuver upto 8G (<http://aviationweek.com/awin/antiship-missiles-threaten-status-quo>, 01 April 2005, accessed on 07 August 2014) at its terminal phase and the Russian Klub anti-ship variant, which too can perform complex terminal maneuvers at supersonic velocity (<http://www.dtig.org/docs/Klub-Family.pdf>, May 2005, accessed on August 2014).

² <http://defensesystems.com/Articles/2014/06/27/Navy-Pandarra-Fog-carbon-fiber-clouds.aspx>, 27 June 2014, accessed on 06 August 2014.

³ ibid

⁴ Thomas J. Culora, "The Strategic implications of Obscurants", Naval War College Review, Summer 2010, Vol. 63, No. 3