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China's Undersea Glider Haiyi - 7000: An Assessment

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China's growing assertiveness in the South China Sea and the verdict of the Hague-based Permanent Court of Arbitration tribunal have made international headlines. In the wake of these developments, China has recently testes its new undersea glider Haiyi-7000 ("Sea Wing"), which is an unmanned Autonomous Underwater Vehicle (AUV). In July-August 2016, Haiyi-7000 was deployed in the Mariana Trench (western Pacific Ocean), which is the deepest ocean trench of over 11,034 metres. Haiyi-7000 was launched from China's submersible mother ship, Tansuo-1. According to South China Morning Post, it was deployed to a depth of 5,751 metres. It was developed by the Shenyang Institute of Automation, Chinese Academy of Sciences.

In 1976, when the first discovery of hydrothermal vents was made in the Indian Ocean, like many other countries, China committed itself to deep-sea exploration. Nearly a decade later in 1986, the country strove to meet the global challenges of new technology revolution and competition. Therein, four Chinese scientists jointly cautioned the then Chairman Deng Xiaoping that if China failed to accelerate its high technology development, it would have to watch technological revolution from the outside. With this strategic vision, a numbers of resolutions were passed on scientific developments, and marine science was added in the list. This initiative was expected to enhance China's regional influence and support its growing appetite for sea-based resources. The first ocean going research vessel "Dayang Yihao' in 1995, the deepest

Jiaolong manned submersible (2012), and now the undersea glider Haiyi-7000 can potentially support China's deep-sea exploration capacity. Particularly in the last few years, with its unprecedented economic development demanding even more resources, any development like Haiyi-7000 is vital for China.

Haiyi-7000, like other undersea gliders, uses small changes in buoyancy in conjunction with wings to convert vertical motion to horizontal, thereby propelling itself forward at a very low power consumption. The underwater glider is shaped like a yellow torpedo with a pair of wings. The vessel deflation and inflation is controlled by a balloon like device filled with pressurized oil. It also works without an engine or motor by drawing free power from the natural buoyancy of water to move around. The vessel can cruise noiselessly (without human intervention) for months while collecting data for various scientific research and ocean exploration activities.

Perhaps what differentiates Haiyi-7000 from other AUVs is its slow speed and consequent low drag, permitting long duration operations. It is capable of measuring temperature, salinity, current optical backscatter, bottom depth and occasionally acoustic backscatter. It navigates with the help of periodic surface GPS, a pressure sensor, tilt sensor and magnetic compass. Commands and data are relayed between glider and shore station by satellite. It is also known for low manufacturing and low maintenance costs.

Given these features, the PLA Navy has evinced an interest in Haiyi -7000. It has the potential for military use in various capacities. For instance, the glider ability to measure the temperature and salinity of sea water at various depths can provide valuable intelligence for maritime security. The PLA Navy can use the temperature and salinity data from ocean to develop a data bank, which would be useful for submarine navigation, operation and collision avoidance. It also enhances naval operation from better pick up and targeting data. Haiyi-7000 can be armed with an explosive warhead to attack underwater target such as enemy submarines. Armed glider can be unleashed in packs of 100 units, to deny enemy submarines access to specific areas. Hence, when necessary, the glider can be used for anti-submarine operations.

The older version of Haiyi (built in 2014) capable of being deployed in a depth of 1500 metres was earlier deployed at the western areas of South China Sea. It is not clear whether it is still deployed by the PLA Navy, but other undersea gliders including Haiyan are being tested by the PLA Navy.

Besides its military implications, the development of Haiyi-7000 has geo-political implications. Yu Jiancheng, the lead scientist of the Haiyi-7000 project, in an exclusive interview with the South China Morning Post mentioned that the idea of developing an undersea glider is the direct result of the U.S. and its allies banning export of underwater glider to China, fearing that the technology would be used for military purposes. Subsequently, Professor Yu recalls how China had built its own supercomputer 'TaihuLight' after the US banned American company Intel from selling high-performance chip to the country; and also how Beijing is now building its own space station after the US banned China from the international space station. Although, Haiyi-7000 has not broken the record of 'Seaglider' (US), it has enabled China to reduce its technological dependence on other countries, including the US.

Given the lack of information on technical specifications of Haiyi-7000, it would be misleading to compare it with 'Seaglider' and other AUVs developed by the US. Nevertheless, it can serve the purposes of scientific research, resource development and naval applications as well. The military applications of Haiyi-7000 has become cause of concern to China's neighbours who are involved in the South China Sea maritime disputes.

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