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# China Deep-Sea Exploration: Intention and Concerns

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**ABSTRACT**
In the last few decades, given China's growing dependency on the maritime realm, it has shifted its focus from securing borders to the pursuit of national maritime interests. China is overly dependent on the seas for maritime trade, secure energy supply, access to marine resources and access to the resources outside its borders. In this context, deep-sea exploration and capacity building emerge as important indicators of China's growing dependency on and interest in the maritime domain. Beijing's interest in deep-sea exploration and capacity building includes underwater resource exploitation, developing new technology and infrastructure related to deep-sea exploration, and maritime security. Given that China's deep-sea exploration is enmeshed with its larger geostrategic interests outside its borders, it raises a series of concerns for states in its neighbourhood. The military application of these deep-sea technologies is of greatest concern, besides power projection in the regional security domain. This paper seeks to study China's deep-sea exploration and capacity building in the context of technology and infrastructure. The paper covers contested intentions behind China's deep-sea exploration and the implications as well as concerns for China's neighbouring countries.

## Introduction

China is fast emerging as a major maritime power and there is an increasing focus of the political elite on safeguarding its national maritime interests. Since the 1990s, China has gradually shifted its focus from defending its borders to the pursuit of maritime interests, given that it has resolved territorial disputes with 12 of the 14 neighbouring countries. As Robert Kaplan rightly mentioned,

> China, which, especially now that its land borders are more secure than at any time since the height of the Qing dynasty at the end of the 18th century, is engaged in an undeniable naval expansion. It is through sea power that China will psychologically erase two centuries of foreign transgressions on its territory forcing every country around it to react.[1]

The oceans are vital to China's economic growth and also for its national security. China's ocean-related economic activities account for nearly 10% of its gross domestic product (GDP), and the share of the coastal regions accounts for more than 16%.[2] The ocean economy generates as many as 33.5 million jobs in China and, therefore, any disruption in its maritime interests is viewed as a matter of concern. Besides economic imperatives, sea power is a determinant diplomatic tool in the fulfillment of China's strategic national

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interests. The development of deep-sea exploration has an economic and geopolitical significance for China. China is therefore investing a large amount of technological capability in seabed development.

This paper highlights China's deep-sea exploration and capacity building. The paper also focuses on the strategic imperatives related to China's deep-sea capacity building in the context of technology and infrastructure. The final section focuses on implications as well as concerns for China's neighbouring countries.

## China Deep-Sea Exploration: Research and Capacity Building

China's efforts in deep-sea exploration can be traced back to the 1980s when it drew its first oceanic mine resources plan. This plan was strengthened by the establishment of the China Ocean Mineral Resources Research and Development Association (COMRA). In 1995, China launched its first scientific research vessel known as *Dayang Yihao* and, in 1996, it included marine technology in the 863 Program, which demands research and capacity building in various aspects of science and technology.[3] This initiative was designed to complement the country's expanding regional influence and growing appetite for sea-based resources. Since then China has expanded its deep-sea research and capacity at various levels, which include the institutional, infrastructure, policymaking and technology domains.[4]

In 2012, the successful dive of *Jiaolong* to a depth of 7000 metres was a notable breakthrough in China's deep-sea research capacity building. It was the first ever manned submersible developed by China, which surpassed the records of submersibles developed by other countries. Up until 2016, Beijing has made remarkable progress and has now initiated several new plans. Some of the accomplishments and initiatives are:

1. China's autonomous underwater vehicle (*Haiyan*) and underwater unmanned vehicle (*Haiyi-7000*).

China has been exploring several opportunities to develop underwater autonomous and unmanned vehicles for deep-sea resource exploration. The unmanned underwater vehicle (UUV) is considered a necessary technology, and China has produced different sets of UUVs. The School of Mechanical Engineering and the National Ocean Technology Center in Tianjin completed a sea trial for the *Haiyan* (an autonomous underwater vehicle or AUV) in the northern area of the South China Sea (SCS) in 2014.[5] *Haiyan* is an underwater glider which conserves energy and thus increases endurance. It also has more advanced computing and transit information in real time, and even makes decisions about which course to follow in the sea.[6] This AUV uses small changes in buoyancy, and its wings, to convert vertical motion into horizontal movemement. Haiyan, in comparison with other AUV, the system performance is slower but, it is more energy efficient and enables longer surveillance capacity.[7]

*Haiyi-7000*, another underwater glider, has remarkable performance parameters.[8] In July–August 2016, *Haiyi-7000* was deployed in the Mariana Trench (Western Pacific Ocean), which is the deepest ocean trench, with a depth of over 11,000 metres. It was launched from China's submersible mothership, *Tansuo-1*. According to an article in the *South China Morning Post*, it was deployed to a depth of 5751 metres.[9] The Shenyang Institute of Automation, Chinese Academy of Sciences, developed the UUV. *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 with low power consumption.

The underwater glider is shaped like a yellow torpedo with a pair of wings. Its deflation and inflation are controlled by a balloon-like device filled with pressurised 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 scientific research and ocean exploration activities. Perhaps what differentiates *Haiyi-7000* from other AUVs is its slow speed and consequent low drag, permitting extended-duration operations. It is capable of measuring temperature, salinity, current optical backscatter, bottom depth and occasionally acoustic backscatter. The underwater glider navigates with the help of periodic surface Global Positioning System (GPS), a pressure sensor, a tilt sensor and a magnetic compass. Commands and data are relayed between glider and shore station by satellite. It is also known for its low manufacturing and low maintenance costs.

2. China's Deep-Sea Station

The 13th Five-Year Plan of the Chinese government was notable for making a significant announcement about the deep-sea station. This announcement gained importance partly due to China's growing assertiveness over the SCS dispute. The idea of a deep-sea station had been on the table for a long time and the China Ship Scientific Research Centre, in 2012, revealed the construction of the deep-sea station. However, the 13th Five-Year Plan made the project official. This is the first ever deep-sea station to be built by China in the SCS. The importance of the project can be understood from the fact that the it was placed into number two position among several major projects to be completed by 2020.

The undersea lab station as planned will support 12 crew members for months at a stretch. It is considered an upgrade to the *Jiaolong* which can hold only a few people underwater for 12 hours. To remain underwater for 2 weeks, the station would be powered by either fuel-cell technology or nuclear energy. Yan Kai, the director of the National Key Lab for Deep Sea Manned Equipment, maintained that the choice of material was made to ensure that the undersea station could resist high pressure effectively. This promises to be a major challenge.[10] This long-term inhabited underwater station will be packed with a variety of equipment, such as small manned submersibles, to facilitate deep-sea research work. The station will also accommodate scientists to cultivate deep-sea creatures, and discover oil and gas resources, as well as analyse genes of organisms for potential medical use.[11]

The primary objective of the station is deep-sea mining. The project's military application has also been debated by scholars. Bryan Clark, from the Centre for Strategic and Budgetary Assessments, argues that "Having this long-term inhabited station has not been attempted at this depth, but it is certainly possible. Manned submersibles have gone to those depths for almost 50 years. The challenge has been operating it for months at a time".[12]

## Contested Intentions of China's Deep-Sea Exploration Activities

Every underwater technology developed by China, especially in the context of China's assertive behaviour in the maritime domain, is hotly debated in public forums. Most of these debates seek to analyse the intentions behind these technological developments. There are primarily four debated intentions, namely economic and mineral exploration; to become a global technology super power; securing the interests of the People's Liberation Army (PLA) Navy; and power projection against China's competitors.

The primary intention of these projects seems to be underwater mineral exploration to feed China's growing economic demand. Ma Xiangneng, a researcher working on the deep-sea station project, argues that the primary objective of the station is driven by the search for underwater resources. He further opines that the price for energy and raw minerals continues to rise, thereby placing more pressure on China to explore deep-sea resources.[13] A scientist associated with *Haiyi-7000* also made similar comments, stating the economic motives for the undersea glider. China is now the second-largest economy in the world, after the United States. Beijing is the world's largest consumer and importer of minerals and metals and is the second largest oil consumer after the United States. China is also a hub of manufacturing and leads in exporting a large range of manufactured goods. The government plans to further expand China's economic influence across the world through Xi Jinping's One Belt One Road (OBOR) initiative.

The ocean economy also continues to make a significant contribution to the national economy. In 2013, the contribution of China's ocean economy reached RMB 5.4 trillion, amounting to 9.5% of its GDP. China's ocean-related economy is expected to contribute up to 30% of the national GDP by 2050.[14] In this context, deep-sea exploration and seaborne trade become essential parts of the Chinese ocean economy. Tabitha Mallory argues that China's conflict with its neighbours in the SCS and the East China Sea (ECS) is motivated by economic and resource interests, and the security needed to protect those interests.[15] Given the unprecedented seaborne commerce, and its influence in domestic economics as well, China is focusing its effort on deep-sea capability, which includes both research and capacity building.

The deep-sea station, along with other underwater technologies, is also part of China's drive to become a global technology superpower by 2020.[16] At present, the United States, Russia and Japan are the leading powers in the field of undersea technology. As far as the deep-sea station is concerned, during the Cold War, the Union of Soviet Socialist Republics (USSR) had deployed underwater habitats for military purposes. The United States also built three sea labs for experimental purposes, but these were discontinued quickly. The Aquarius Reef Base, owned by the United States National Oceanic and Atmospheric Administration (NOAA), is currently the world's only undersea research station. Therefore, if China succeeds in building the proposed deep-sea station, it would achieve a significant breakthrough in technology, as envisaged in its 13$^{th}$ Five-Year Plan.

There is also a great deal of speculation on the possible military application of the deep-sea station, which can be viewed from two perspectives. First, the construction of technologies such as deep-sea stations is being undertaken by the China Ship Scientific Research Centre (CSSRC). The CSSRC, operated under the China State Shipbuilding Cooperation, is one of the country's largest naval shipbuilders. Second, since 2002, most of China's deep-sea research has been financed by the 863 Program, a government effort that is primarily known to promote military needs. Xu Liping, a senior researcher for Southeast Asian Affairs at the Chinese Academy of Social Sciences (CASS), familiar with the deep-sea station project, maintains that "China's project will be mainly for civil use, but we cannot rule out that it will carry some military functions".[17] China's recent capture of a United States drone further problematises the economic viability of these technologies. The dual use of these technologies is of concern for countries who share maritime borders with China.

Another significant aspect in this regard is related to China's power projection aspirations. Today, China is a major player in the regional strategic arena. With its growing capabilities, China has often behaved aggressively in the SCS and the ECS. China's seizure of the US' UUV in the SCS in December 2016 also sent an important signal in this regard. China has also regularly marked its presence in the islands claimed by Vietnam, the Philippines and Malaysia, to reinforce its influence in the SCS. Hence, deep-sea technology and infrastructure development can be considered important diplomatic tools of power projection.

Among all these intentions, the military application of the project is of greatest concern. These concerns arise mostly from China's proactive presence in the SCS dispute. Besides military applications, these technologies are expected to play a major role in power projection.

## Concerns for Neighbouring Countries

China has a comprehensive national ocean development strategy to become a major maritime power. Deep-sea exploration capacity building is an integral part of this broader objective. Given China's growing aggressive behaviour in the SCS dispute, China's deep-sea exploration raises a number of concerns among its neighbouring countries.

One of the major concerns of China's growing interest in the deep-sea exploration is China's growing assertiveness with regard to maritime territorial disputes. China has often behaved aggressively to push its maritime claims in the SCS and ECS. Until recently, little formal deep-sea exploration had occurred in the SCS, partly because of longstanding territorial tensions and unclear commercial viability. Also, for a long time countries surrounding the SCS, including China, lacked the necessary technology to carry out these kinds of operations. However, with its growing deep-sea exploration capability, Beijing, for the first time in 2014, deployed its *Haiyang Shiyou 981* oil rig to water near the disputed Paracel Island in the SCS.[18] This was China's first step towards unilateral deep-sea exploration in the SCS, which raised serious concerns among its neighbours. Until 2014, China's deep-sea exploration was primarily confined to shallow waters adjacent to its southeast coast. In response, Vietnam vociferously protested the move by sending 29 ships to disrupt the deployment of the Chinese platforms. China considers deep-sea exploration a strategic weapon to support its physical presence in the SCS. China's deployment of *Haiyang Shiyou 981* in the SCS is one example of how Beijing is firming up its presence in the area, and gradually eroding other claimants' ability to challenge its supremacy.[19] Countries like Vietnam, the Philippines and Malaysia, which have been at loggerheads with China over maritime territorial disputes, are concerned with China using its ocean exploration capability to enforce its control over disputed waters. Deep-sea exploration capability along with growing PLA Navy power could put these countries in a disadvantaged position to stake their claims in the SCS.

In the recent past, through the use of satellite imagery, the United States Department of Defense captured China's construction of helipads, airstrips, piers, and radar and surveillance structures on Subi Reef and Fiery Cross in the Spratlys. These facilities were erected with the help of deep-sea technologies, which have assisted in data collection on islands, and paved the way for construction. Such developments also serve to remind neighbouring countries of the possible military and other applications of this technology. Furthermore,

experts argue that China's artificial island building and infrastructure construction are increasing its potential to project power in the region.[20]

With regard to the ECS, China has been less aggressive as compared to in the SCS. Nevertheless, China has used deep-sea exploration as a political tool to further its maritime interests. From 1998 to 2000, China sent 16 ships into areas on the Japanese side of the median line, on 22 different occasions.[21] Some of these ships were Chinese naval vessels that are believed to have conducted oceanographic studies with military implications.[22] Through such continual interventions, Beijing seeks concessions from the Japanese side, to come to an agreement on the ECS dispute.[23]

Besides the SCS and ECS, China's deep-sea exploration in the Indian Ocean has raised apprehensions, primarily in India. As far as India is concerned, it shares a long land boundary with China. India–China relations have remained tense, although cooperation between the two countries is growing. Given the predominance of the border dispute in their bilateral relations, both countries face a number of challenges. The level of threat perceived on both sides in the bilateral relation, and the trust deficit, are the greatest challenges. In 2011, the International Seabed Authority awarded a Chinese company the right to explore deep-sea minerals at the Southwest Indian Ocean Ridge, following which a number of Indian analysts raised concerns about China's presence in the Indian Ocean. China's first submersible, *Jiaolong*, has made several research visits to the Indian Ocean. Radhanakrishna Rao argued that through ventures like deep-sea exploration, China will not only strengthen its commercial activities, but will also expand its strategic reach in the Indian Ocean Region.[24] He further argued that the Chinese fishing trawlers moving along the Wheeler Islands, off India's eastern coast, could have equipment and devices to monitor Indian missile test launches, and to collect important data.[25] This could provide China with valuable military data against India, and requires India to be aware of the Chinese presence in the Indian Ocean Region, and also to prepare a long-term maritime security plan to protect Indian interests in the Indian Ocean.[26] According to the Indian Navy, it would provide an excuse for China to operate its warships, besides compiling data on the vast mineral resources in India's backyard.[27]

In response to the Chinese government's construction of the undersea wall, there are speculations that the India is developing undersea surveillance sensors in the Bay of Bengal.[28] Although there is no official confirmation from the Indian government, an article published on this matter indicated that New Delhi is considering Japanese assistance in the construction of an undersea network of seabed-based sensors, stretching from the tip of Sumatra to Indira Point in the Bay of Bengal, to prevent Chinese submarines from approaching the Indian Exclusive Economic Zone undetected.[29]

## Conclusion

China has shifted its national goal from the need to guarantee its survival during the country's revolutionary days to the current state of securing stable economic development. Beijing is overly dependent on maritime trade, a secure energy supply, and access to resources outside its borders. As a matter of fact, China's geoeconomics and geostrategic objectives are enmeshed within its ocean development strategy. Therefore, deep-sea capability including research, technology and related infrastructure development will prove vital for China's vision of achieving stable economic growth. China's growing capability

for deep-sea exploration is one part of building a comprehensive national sea power to accommodate its geoeconomic objective. It is also a matter of fact that most of these technologies are of dual use, able to serve both economic and military objectives. China is the only country involved in the SCS disputes that currently possesses the technology required for deep-sea exploration. Consequently, its deep-sea technology and exploration capacity can also serve as a vital strategic weapon to further its larger maritime interests. While China still faces severe challenges and limitations in achieving its goals in the domain of deep-sea exploration, it is without doubt that its efforts will go beyond the fulfillment of its economic agenda, and serve a larger strategic purpose, with severe ramifications for India and the neighbourhood.

## Notes

1. Robert Kaplan, "The South China Sea is the Future of the Conflict", *Foreign Policy*, August 15, 2011, http://foreignpolicy.com/2011/08/15/the-south-china-sea-is-the-future-of-conflict/ (accessed April 10, 2017).
2. Takeda Jun'ichi, "China's Rise as a Maritime Power: Ocean Policy from Mao Zedong to Xi Jinping", *Review of Island Studies*, April 23, 2014, https://www.spf.org/islandstudies/research/docs/a00011r.pdf (accessed April 9, 2017).
3. National High-tech R&D Program (863 Program), Ministry of Science and Technology of the People's Republic of China, 863 Program is a State High Tech Development Plan. In 1986, to meet the global challenges of new technology revolution and competition, four Chinese scientists, Wang Daheng, Wang Ganchang, Yang Jiachi, and Chen Fangyun, jointly proposed to accelerate China's high-tech development. The late Chinese leader Deng Xiaoping personally approved the National High-tech R&D Program, namely the 863 Program. See http://www.most.gov.cn/eng/programmes1/200610/t20061009_36225.htm (accessed April 4. 2017).
4. See Kamlesh K. Agnihotri, "Holistic Maritime Capacity Building: New 'Route' to China's Rise", *Maritime Affairs*, 9, no. 1 (summer 2013): 30–44; Sunil K. Agarwal, "China Moves in for Deep Sea Mining in the Southwest Indian Ocean", August 2, 2011, http://www.maritimeindia.org/CommentryView.aspx?NMFCID=1290 (accessed on April 12, 2017).
5. Zachary Keck, "China Tests New Unmanned Mini Sub", July 1, 2014, http://thediplomat.com/2014/07/china-tests-new-unmanned-mini-sub/ (accessed April 10, 2017).
6. Ibid.
7. Ibid.
8. Greater details of this particular project may be found at Dolma Tsering, "China's Undersea Glider Haiyi-7000: An Assessment", http://www.maritimeindia.org/View%20Profile/636108198369849142.pdf (accessed on April 12, 2017).
9. *South China Morning Post*, "PLA Navy Eyes China's Deep-Sea Underwater Glider after Successful Test Shows It Rivals US Vessel", September 1, 2016, http://www.scmp.com/news/china/article/2012137/chinas-successful-test-deep-sea-underwater-glider-interests-peoples (accessed on September 13, 2016).
10. CCTV.com, "China to Build Deep-Sea 'Space Station' Carrying Dozens of People", March 10, 2017, http://english.cctv.com/2017/03/10/ARTI4kKJZEmofUH8AxwVkH5r170310.shtml (accessed April 7, 2017).
11. Ibid.
12. Bloomberg News, "China Is Planning a Massive Sea Lab 10,000 Feet Underwater", June 8, 2016, https://www.bloomberg.com/news/articles/2016-06-07/china-pushes-plan-for-oceanic-space-station-in-south-china-sea, (accessed February 27, 2017).
13. China Daily Mail, "After Orbiting Space Lab, China Wants an Undersea Lab for Deep Sea Mining", July 8, 2012, https://chinadailymail.com/2012/07/08/after-orbiting-space-lab-china-wants-an-undersea-lab-for-deep-sea-mining/ (accessed April 7, 2017).

14. Tabitha Grace Mallory, "Preparing for the Ocean Century: China's Changing Political Institution for Ocean Governance and Maritime Development", *Issues and Studies*: *A Social Science Quarterly on China, Taiwan and East Asian Affairs*, 51, no. 2 (June 2015): 111–38.
15. Ibid.
16. In January 2016, the Ministry of Science and Technology Development unveiled the new comprehensive plan for 2016–2020. The plan aims for China to become a science and technology super power by 2020.
17. Bloomberg News, "China Is Planning a Massive Sea Lab".
18. Haiyang Shoyou 981 is a semi-submersible oil rig owned and operated by the China National Offshore Corporation.
19. Stratfor, "China Uses Deep Sea Oil Exploration to Push Its Maritime Claim", May 8, 2014, https://www.stratfor.com/analysis/china-uses-deep-sea-oil-exploration-push-its-maritime-claims (accessed April 19, 2017).
20. Council on Foreign Relations, *China's Maritime Disputes*, http://www.cfr.org/asia-and-pacific/chinas-maritime-disputes/p31345#!/?cid=otr-marketing_use-china_sea_InfoGuide, (accessed April 18, 2017).
21. The median line is a maritime boundary demarcation drawn by Japan with regard to Diaoyu/Senkaku Island. According to this demarcation, waters on the eastern side belong to Japan and waters on the western side belong to China.
22. Selig S. Harrison, "Quiet Struggle in the East China Sea", *Current History*, 101, no. 656 (September 2002): 274.
23. Ibid.
24. Radhakrishna Rao, "Strategic Advantages of Deep Sea Mining", September 4, 2012, http://www.claws.in/897/strategic-advantages-of-deep-sea-mining-radhakrishna-rao.html (accessed April 8, 2017).
25. Radhakrishna Rao, "A Strategic Chinese Move in the Indian Ocean", 6 December 2011, http://www.claws.in/734/a-strategic-chinese-move-in-the-indian-ocean-radhakrishna-rao.html (accessed April 8, 2017).
26. Ibid.
27. The Hindu Business Line, "China to Expand Seabed Mining in Indian Ocean", September 17, 2011, http://www.thehindubusinessline.com/economy/china-to-expand-seabed-mining-in-indian-ocean/article2462204.ece (accessed April 12, 2017).
28. See Dolma Tsering, "China's 'Undersea Great Wall' Project: Implications", December 2016, National Maritime Foundation, http://www.maritimeindia.org/View%20Profile/636168593758883600.pdf (accessed on April 11, 2017).
29. Abhijit Singh, "India's 'Undersea Wall' in the Eastern Indian Ocean", June 15, 2016, http://www.orfonline.org/research/indias-undersea-wall-in-the-eastern-indian-ocean/ (accessed April 12, 2017).

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