

Subs add depth to defence arsenal

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Singapore's recent acquisition of submarines with air-independent propulsion is being matched by similar purchases by other regional navies.

While such submarines do not necessarily upset regional military balances, they are part of a larger trend in regional naval expansion which could have far-reaching repercussions.

Recent reports about the Republic of Singapore Navy's (RSN) acquisition of two used but refurbished Archer-class submarines from Sweden were not particularly newsworthy. The well-publicised purchase was consummated four years ago.

There was, however, one noteworthy admission by the RSN that was nearly buried in the news. These submarines have been outfitted with special engines for air-independent propulsion.

This is a means of powering conventional diesel-electric submarines without using their batteries or having to surface to recharge. It permits the sub to remain submerged for much longer periods, two to three weeks, as opposed to just a few days on battery power.

What is particularly astonishing about this disclosure is that these RSN submarines were not originally outfitted with such a capability. So, the RSN did not simply acquire these engines by happenstance of purchase.

Obviously, the Singaporean navy paid the Swedish submarine builder Kockums to do a retrofit, which involves literally cutting the hull in half and inserting these engines - no small feat.

In other words, this was a conscious effort by the RSN to get the most advanced conventional submarine they could. Singapore, therefore, has become the first country in the southern Asia-Pacific to acquire submarines with this capability.

There are basically three kinds of air-independent propulsion technologies. First, the Swede-designed Stirling engine which uses a closed-cycle engine - meaning no exhaust - based on heat exchange.

Second, the French-developed Module d'Energie Sous-Marine Autonome (Mesma) system using a steam turbine power plant to generate heat that runs generators to power the engine.

Third, the German fuel cells system that uses proton exchange membrane hydrogen fuel cells to generate electricity.

By no means, however, will the RSN's acquisition be the only one in the region. Other Asian-Pacific navies are also acquiring similarly capable submarines.

Japan is currently building the new Soryu-class of diesel-electric submarines, which is outfitted, like the RSN Archer, with the Stirling engine. At least four boats in this class are envisioned.

South Korea is constructing, under licence from Germany, three fuel cell-equipped Type-214 submarines, with options on six more.

India recently signed an agreement to acquire six Scorpene-class submarines, which will be constructed under licence at the country's Mazagon Docks shipyard. The last three subs in this buy will have the Mesma module installed.

Not to be outdone, Pakistan has ordered three Type-214 submarines from Germany as well.

Australia, which plans to double its submarine fleet from six to 12 boats by 2030, will likely acquire the technology, probably the Stirling engine, given its long-standing association with Kockums of Sweden.

Finally, rumours abound that China may soon acquire the technology for its new Yuan-class diesel-electric subs. Which engine the Chinese will employ is still unknown, however, but it will probably be a variant on the Stirling engine.

The coming 'mini-proliferation' in such submarines could have an impact on the way subs are employed regionally. In and of themselves, such submarines do not disturb the overall military balance in the Asia-Pacific.

True, they do extend the operational endurance and range of conventional diesel-electric submarines. However, all air-independent propulsion systems are only auxiliary power sources, intended to supplement normal diesel-electric propulsion. They do not have the speed of an electric motor or the endurance of a nuclear-powered submarine, which can remain submerged almost indefinitely.

It is, therefore, probably best suited for long-endurance silent running, hiding from threats and hunting prey. This gives the subs expanded capacities for operations like anti-submarine warfare or trailing surface ships.

They are also more capable of projecting power farther out into the open ocean. Consequently, they can do a better job patrolling sea lanes of communication or protecting exclusive economic zones.

At the very least, air-independent propulsion greatly expands the range of options and opportunities for the submarine forces of regional navies. At the moment, the number of such submarines, current or planned, does not appear to threaten a new mini-arms race. Yet.

Malaysia, which is acquiring two Scorpene submarines, has not bought the Mesma-equipped version (although after the Archer deal, future Malaysian sub purchases, if any, could include this option).

Indonesia had once considered acquiring several Russian submarines, but this deal fell apart over infrastructure financing: Jakarta had wanted to use Russian export credits to build a sub base, which Moscow refused to fund.

Still, there is always concern about the impact of injecting new capabilities into regional military balances. These new submarine acquisitions are part of an overall trend in qualitative improvements to regional navies.

Such upgrades will result in increased capacities in long-range force projection, stealth,

amphibious operations and precision-strike.

All these trends add up to something much more than the 'mere' modernisation of naval forces. Depending on how these forces are utilised, they could have far-reaching repercussions on regional peace and stability. As such, these developments need to be studied for possibly negative consequences as well.

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