



## **Perils of the Deep: The Dangers of Submarine Operations in Asia**

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RECENT accidents involving US Navy submarines have provided a graphic reminder of the inherent risks of submarine operations. In late December 2006, two sailors were swept to their deaths from the hull of the USS *Minneapolis-St Paul* in rough weather off Plymouth in the United Kingdom. About a week later, the USS *Newport News*, travelling submerged, hit the large Japanese tanker *Mogamigawa* while passing through the Straits of Hormuz. As a consequence of these accidents, the Commander of the US Naval Submarine Forces ordered a week-long “safety stand-down” of all American submarines.

Leaving aside the loss of life with the *Minneapolis-St. Paul* incident, the collision involving the *Newport News* was potentially the most serious of these events. The submarine was in an area where the depth averages about 100 metres. The other vessel involved, the *Mogamigawa*, displaces about 300,000 tonnes, is over 300 metres in length and when laden, has a draft over 20 metres. Such a large vessel underway creates major pressure effects on waters around it, and the *Newport News* may have been sucked up into its hull by a “venturi effect”. This is when a partial vacuum is created as the water passing under the ship changes velocity and pressure. The submarine may have been trying to “hide” beneath the larger vessel but misjudged the water depth and the pressure interaction between the two hulls. Fortunately damage to both ships was relatively slight but the consequences could have been much, much worse. The hull of the submarine could easily have been breached and the vessel lost with all hands.

Submarine accidents are not uncommon. The most infamous one in recent years was the sinking of the Russian submarine *Kursk* in the Barents Sea in August 2000 with the loss of its entire crew of 118 personnel. The full crew of 70 of the Chinese submarine *Ming 361* suffered a similar fate in May 2003 when they all suffocated after a technical malfunction onboard.

There have been several incidents in both Japanese and Scottish waters when submerged submarines have caught the nets of fishing boats and dragged them under – in some cases with loss of life. However, the worst incident in recent years involving a US submarine occurred off Honolulu on 9 February 2001 when the USS *Greenville* surfaced underneath the Japanese fisheries research vessel *Ehime Maru*, sinking it with the loss of nine lives. The submarine at the time was conducting an “Emergency Main Ballast Tank Blow”, a dramatic procedure to bring the vessel quickly to the surface. This operation was intended to impress distinguished civilian guests onboard at the time. Two were actually at the submarine’s controls during its rapid ascent!

## **Submarines in Asia**

These incidents have resonance for Asia. The number of submarines in the region is increasing and the risks of major accidents are increasing proportionately. The number of submarines in Asia has increased by about 50% over the last seven years or so. China, India, Japan and South Korea all have large submarine fleets. In Southeast Asia, Indonesia has long had submarines. Singapore moved into the business with the commissioning of RSS Conqueror in July 2000, and Malaysia soon followed suit. All three countries are planning to upgrade their fleets while Thailand continues to talk about acquiring submarines. The undersea environment of the region will be rather “crowded” in the future.

The reasons for submarine proliferation are not difficult to discern. Submarines are a potent weapon system. They can fire torpedoes, launch missiles, lay mines, land covert parties and conduct secretive surveillance and intelligence operations. Surveillance, reconnaissance and intelligence gathering are major roles for submarines. Conventional diesel-powered submarines are well suited for special operations and intelligence work, particularly inshore and in relatively shallow waters. They can covertly listen in on communications and other electronic emissions that might not be detectable from space.

### **The Risks of Submarine Operations**

The underwater environment is a dangerous one. Submarines face many perils of the deep. Even a small fire or gas leak inside a submerged submarine can have catastrophic consequences. A collision with another vessel or grounding may be much more serious for a submarine than for a surface ship. On 8 January 2005, the USS *San Francisco* struck an undersea mountain South of Guam, and one sailor died as a result of injuries received when the submarine came to a sudden stop.

The recent USS *Minneapolis-St. Paul* incident showed that even when a submarine is on the surface, its working environment can be dangerous. Some years ago, two crew members of an Australian submarine perished when their boat dived with them still on deck. The commanding officer was not aware that they remained outside stowing gear.

Apart from the risks of an accident, there are the potential dangers with the increasing number of submarines working in the relatively confined and potentially dangerous seas of Asia. Some vessels might be engaged on intelligence and surveillance missions that take them into sensitive waters where they are at risk of being detected by another country’s anti-submarine forces. An “intruder” submarine detected in an area of disputed sovereignty would be warned off and even attacked. However, anti-submarine weapons are clumsy ones with an “all or nothing” result that could lead to the sinking of the submarine with all its crew. Such an incident would have very serious repercussions for regional security.

### **Safe Submarine Operations**

There are many prerequisites of safe submarine operations. Submariners are among the most highly trained of all naval professionals. They have advanced technical skills and are proficient in submarine escape procedures. Submarines must be extremely well maintained with “zero tolerance” of even minor defects that could jeopardise their safety.

Effective command and control arrangements are required for submarine operations. They must include procedures for dealing with incidents when submarines are overdue in reporting their location or that they have surfaced (referred to as “Submiss/Subsunk” procedures). Communications with submarines, particularly if they are engaged on sensitive missions,

may not always be reliable and comprehensive standard operating procedures must be in place to deal with all eventualities.

The successful and safe operation of submarines also depends on good hydrographic and oceanographic data. Large areas of sea in the region are poorly charted for submarine operations. The charts may be safe for surface navigation but the surveys on which they are based are old and may not have detected all the features that could endanger a submerged submarine.

At a regional level, arrangements are required for water space management and the prevention of mutual interference (PMI) with submarine operations. The concern for submarine safety has been demonstrated by several multinational submarine rescue exercises that have been held around the region mainly under the auspices of the Western Pacific Naval Symposium (WPNS). Singapore has participated regularly in these exercises, the first of which was held in the South China Sea in October 2000.

The Republic of Singapore Navy (RSN) operates its submarines very efficiently. Singapore's submariners are highly trained but submarine safety is a bit like road safety: the avoidance of an accident largely depends on the skill of the other driver and the quality of the road rules. And we are going to have more drivers on regional undersea highways in the future. Human error has been identified as the major cause of accidents at sea – the consequences are just much greater if you are fifty metres or more beneath the surface!

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