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## **The Submarine in Naval Warfare, 1901-2001**

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### **In lieu of an abstract, here is a brief excerpt of the content:**

The Submarine in Naval Warfare, 1901-2001 | This article surveys the evolution of submarine technology, submarine capability, and strategy for the use of submarines. It traces change in the operational capabilities of submarines since their introduction, evaluates the past effectiveness of submarine forces in war, and suggests how their roles and capabilities are likely to develop in the future. It also addresses the current debate over the proper roles of submarines in naval strategy and discusses prevalent misconceptions about their past and present capabilities. Submarines are fundamentally different from other warships. Because they function in the underwater medium, submarines tend, unlike surface ships and aircraft, to operate best in isolation; they require unique combinations of weapons and sensors; and they require tactics based on stealth and surprise. They are most capable in the role of hunter in hit-and-run attacks, in attrition warfare, and as platforms for single-salvo strikes ashore. They are least capable in missions that require prolonged exposure and the capability for sustained defense, such as sea control, naval presence, and projection of force ashore in a manner that requires more than a single salvo. Submarines further differ from surface and naval air forces in being most effective when dispersed rather

than concentrated. Finally, submarines are different in that the strategies that give them their greatest warfighting potential do not conform to the classical Mahanian naval strategy of defeating the enemy by annihilating his main naval forces. Instead, whether they are employed in commerce warfare, as in the past, or for the delivery of nuclear weapons, submarines are the most effective means for a navy to circumvent classical battle and engage in direct anti-state warfare. This article is drawn from research in long-range trends being conducted at the Los Alamos National Laboratory, which is operated by the University of California for the U.S. Department of Energy. The conclusions and opinions expressed herein are solely those of the author. I would like to thank Linda L. Riley and Thomas W. Dowler for their very helpful comments and suggestions, as well as Norman Friedman for providing material on British submarines. Karl Lautenschlager is a Staff Defense Analyst at the Los Alamos National Laboratory. He has been an Advanced Research Scholar at the Naval War College and a Visiting Faculty Member at the Fletcher School of Law and Diplomacy, and was a naval officer for five years with two combat deployments to the Tonkin Gulf.

International Security, Winter 1986-87 (Vol. 11, No. 3) © 1986 by the President and Fellows of Harvard College and of the Massachusetts Institute of Technology. 94 Submarine in Naval Warfare 195 Submarines have been in regular naval service only since 1901 and have been effective as warships only since about 1910. Yet during their relatively short history, developments in technology have given them the capabilities to perform six basic roles in naval warfare. By the outbreak of World War I, submarines were fully capable in three roles: coast defense, naval attrition, and commerce warfare. Their capacity to perform three additional missions—projection of power ashore, fleet engagement, and assured destruction—matured in the 1960s, after a long period of relative equilibrium in submarine technology that lasted well into World War II. All six remain the basic mission capabilities of submarines today. Current trends suggest three further developments in the near future: a new capability to perform strategic counterforce missions, a decline in the capacity to wage commerce warfare, and the possibility of a new capability in the form of decisive naval battle. The history of how these capabilities were developed and used in war suggests five principal conclusions about submarine warfare. First, submarines possess no general immunity against countermeasures. Although they are difficult to find and largely immune to attack while cruising submerged, they become vulnerable once they disclose their presence by attacking. In fact, when actively employed in most combat missions, submarines are usually more vulnerable than other types of warships. This reflects the conflicting requirements of lethality and survivability in submarines and is a basic problem of submarine operations. Second, navies have had difficulty solving the twin problems of...

# The Submarine in Naval Warfare, 1901–2001

Karl Lautenschläger

**T**his article surveys the evolution of submarine technology, submarine capability, and strategy for the use of submarines. It traces change in the operational capabilities of submarines since their introduction, evaluates the past effectiveness of submarine forces in war, and suggests how their roles and capabilities are likely to develop in the future. It also addresses the current debate over the proper roles of submarines in naval strategy and discusses prevalent misconceptions about their past and present capabilities.

Submarines are fundamentally different from other warships. Because they function in the underwater medium, submarines tend, unlike surface ships and aircraft, to operate best in isolation; they require unique combinations of weapons and sensors; and they require tactics based on stealth and surprise. They are most capable in the role of hunter in hit-and-run attacks, in attrition warfare, and as platforms for single-salvo strikes ashore. They are least capable in missions that require prolonged exposure and the capability for sustained defense, such as sea control, naval presence, and projection of force ashore in a manner that requires more than a single salvo. Submarines further differ from surface and naval air forces in being most effective when dispersed rather than concentrated. Finally, submarines are different in that the strategies that give them their greatest warfighting potential do not conform to the classical Mahanian naval strategy of defeating the enemy by annihilating his main naval forces. Instead, whether they are employed in commerce warfare, as in the past, or for the delivery of nuclear weapons, submarines are the most effective means for a navy to circumvent classical battle and engage in direct anti-state warfare.

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Karl Lautenschläger is a 1999 Defense Analyst at the Los Alamos National Laboratory. He has been an Adjunct Research Scholar at the Miami Beach College and a Visiting Faculty Member at the Fletcher School of Law and Diplomacy, and was a naval officer for five years with two combat deployments to the Persian Gulf.

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