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Strike from the Sea: The Development and Deployment of Strategic Cruise Missiles since 1934 by Norman Polmar and John O'Connell.

Annapolis: Naval Inst. Press, 2020. Pp. xix, 217. ISBN 978–1–68247–389–4.

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In *Strike from the Sea*, prolific author and defense analyst Norman Polmar[1] and the late John O'Connell[2] offer a concise, accessible history of sea-launched, strategic cruise missiles from their origins as German terror weapons in World War II. Their book is highly relevant in light of the recent tests (and accidents) involving advanced Russian cruise missile programs. It synthesizes a wide range of sources in its 165 pages (plus technical appendices). Throughout, Polmar and O'Connell lament that the American reliance on the 1970s-vintage BGM-109 Tomahawk "has continued into the 21st century with minimal advances in missile technology beyond limited improvements to the weapon" (160).

The book's first nine chapters move quickly through the origins of the submarine land-attack missions of World War I to the development of the German V-1 Buzz Bomb during World War II. The United States reverse-engineered the V-1 (late 1944), and by 1946 the US Navy was experimentally launching its version of the weapon, known as the "Loon." This program led directly to the first American cruise missile, the nuclear-armed Regulus; meant to be launched by surfaced submarines, it represented the Navy's first strategic deterrence weapon. The few submarines equipped to launch Regulus missiles were quietly dispatched on deterrence patrols in 1959–64; they were ultimately replaced by better known Polaris-armed ballistic missile submarines. However, the apparent success of the submerged-launch Polaris had already doomed the Regulus program (and its successors) by 1958, even before Regulus patrols began. The result was a ten-year hiatus in US cruise missile development.

Although Regulus was relatively inaccurate and thus ill-suited to a conventional strike role, the authors argue that the dismantling of the US cruise missile program in the 1960s stymied US technological development and so allowed the Soviets to forge ahead.

The authors devote three chapters to an in-depth look at both the US Navy's Regulus program and Soviet cruise missile programs. While less detailed than the exploration of Regulus and the submarines designed to launch it, these sections underscore the perceived obsolescence of the strategic cruise missile concept of the 1960s vis-à-vis rapidly advancing ballistic missile technology. While the United States abandoned cruise missile development entirely, the Soviets successfully converted their P-5 (SS-N-3 Shaddock) missile to an anti-ship role. Its ultimate incarnation, the P-700 *Granit* (SS-N-19 Shipwreck) remained in service with Russian navies into the 1990s. Continued use of various cruise missiles by the Soviets (particularly in an air-launched, nuclear strike role) led the United States to resume cruise missile development in the early 1970s.

1. Polmar is a defense analyst and regular contributor to the US Naval Institute's *Proceedings*.

2. In his long naval career O'Connell (1930-2018) served as an officer in submarines and as a docent at the National Air and Space Museum. His previous work includes three volumes on air power and two on submarines.

A long chapter explores the origins, development, and deployment of the Tomahawk cruise missile system. Originally meant simply to match Soviet intermediate-range nuclear-strike capabilities, by the early 1970s the Tomahawk evolved into a conventional precision land-attack and anti-shipping weapon thanks to advanced guidance systems and computing power, lightweight engines, and high-energy fuels.

Though the Tomahawk remains a high-profile military and political weapon in the United States, Polmar and O'Connell conclude by warning that American weapons development is again in danger of falling behind that of a resurgent post-Soviet Russia:

> the venerable Tomahawk remains the weapon of choice for US presidents when a military response is needed in a crisis situation. At the beginning of the 21st century the American president's choices of military action had been significantly limited. While advanced-technology missiles were being discussed and proposed, the Tomahawk remained the only sea-launched, land-attack cruise missile in the US inventory well into the century (and that weapon without a nuclear variant). (162)

Russian development of an "unlimited range" nuclear-powered cruise missile and a "boost-glide" hypersonic missile, have appeared in news reports.[3]

In a book chiefly about cruise missiles, the authors are too preoccupied with details about submarines designed or converted to launch the various missiles they describe. In the case of the Regulus program, the histories of five submarines (one of them nuclear) that fielded the missile system are too thoroughly catalogued. This leads, in a chapter titled ("Regulus Aftermath"), to a diversion from the book's stated subject to needless details about the special operations careers of *Tunny* (SSG-282), *Greyback* (SSG-574), and *Halibut* (SSGN-587). The intent of these stories, like that of other anecdotes through the book, is likely to relieve the constant stream of technical data and deployments with humorous anecdotes, as in the following.

> Two SEALs got "locked into" the forward torpedo room escape trunk from the sea. Unknown to the SEALs, they were accompanied by a large and very poisonous sea snake. Over the intercom the Tunny's watch personnel in the conning tower could hear the shouts and curses of the SEALs as they tried to avoid being bitten while the escape chamber was drained. The SEALs managed to kill the sea snake. But they did not see the humor of the event as did those listening over the intercom. (72)

While interesting to read, these paragraph-long stories (and blurbs on extraneous events like the 2000 *Kursk* sinking) are out of place in a volume explicitly dedicated to a specific set of weapon systems.

Distractions aside, *Strike from the Sea* succeeds in its stated purpose: compressing the highly technical story of strategic cruise missiles into a succinct volume intelligible to interested common readers as well as specialists. No small thing, given the current state of international affairs and the United States' repeating cycles of cruise missile neglect.

3. N.b., since this review was written, the US Dept. of Defense has revealed that it has tested its own "boost-glide" hypersonic missile. See, further, *Congressional Research Service Report* (8 June 2021) "Defense Primer: Hypersonic Boost-Glide Weapons"—available online.