

Executive Summary

International Research and Development

The panel conducted a top level analysis of the significance of quantitative knowledge of environmental parameters to naval weapons and naval warfare. While it is readily apparent that all naval platforms and weapon systems are affected to some degree by the environment, the panel reviewed a number of scenarios where the impact of the environment was significant. There are combinations of weapon systems and environmental parameters where knowledge of the environment can result in order-of-magnitude improvements in system performance. However, quantifying exactly how much performance can be gained and what degree of precision of environmental measurements are required must be determined on a case-by-case basis and was beyond the scope of this panel. Adequately characterizing the marine environment in space and time requires the use of remote sensing techniques, both ground-based and space-based. Using remotely sensed data supported by in-situ measurements, ocean/atmosphere models will be able to accurately predict the state of the environment and weapon system performance.

As the trend towards stealth continues to drive the signatures of platforms and weapons deeper into the environment, knowledge of the environment and how it affects weapon systems continues to grow in importance. The importance and utility of environmental knowledge continues to increase until the signature is so deep in the environmental noise that it is beyond detection, even in the most favorable environment. At this point, performance can be improved only through the development of new technologies and better system design. Knowledge of the environment is equally vital in system design.

The panel developed four basic observations.

1. The impact of the environment is not adequately addressed during the research, development and acquisition process. Each new naval and marine system concept should be evaluated to determine the effect of the environment on system performance and what environmental measurements must be obtained to support the system.

RECOMMENDATION: OPNAV (OP-07 and OP-098) and SECNAV (ASN (RE&S)) should vigorously review every Development Options Paper against the probable environmental background before an Operational Requirement is approved (i.e., will the physics and our knowledge of the environment permit the proposed system to operate as advertised).

2. There is no central environmental/oceanographic top level requirement or master plan.

RECOMMENDATION: Oceanographer of the Navy should develop and publish a "Master Plan for Oceanography" for environmental support to future naval planners, battle force commanders and system developers.

3. The more than 20 organizations involved in various aspects of environmental science and effects are not connected by any formalized communication network, leading to duplication of effort and misuse of products.

RECOMMENDATION: The interrelationships of all these organizations should be identified in the Oceanographic Master Plan.

4. The 1984 Naval Research Advisory Committee (NRAC) Panel on Environmental Support to Naval and Marine Forces is an impressive in-depth report that retains much of its validity today.

RECOMMENDATION: The Oceanographer of the Navy and CNR should review the 1984 panel document, and report to the CNO and ASN(RE&S) on the status of implementing the recommendations within the report.