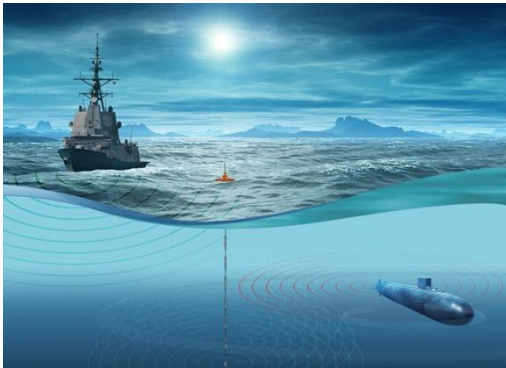


Bluecomm – Underwater Acoustic Engine

Introduction

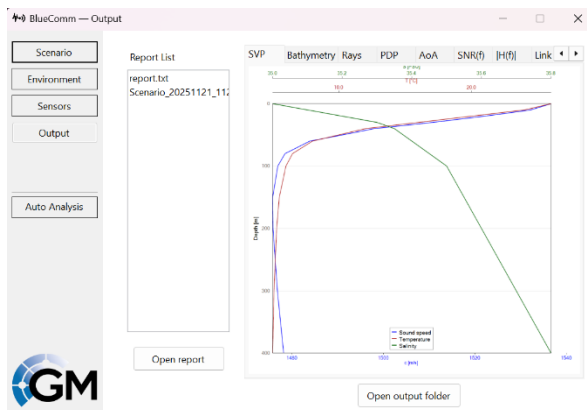
BlueComm is a modeling and simulation tool for underwater acoustic communications and sonar sensors. It is designed to support engineers and operators who need to design, evaluate or employ communication systems at sea, providing a controlled numerical environment to study the behavior of the acoustic channel and the involved platforms. BlueComm acts as a digital twin of the underwater environment, allowing rapid analysis of scenarios that at sea would require long and expensive trials.



What BlueComm does

BlueComm allows a complete definition of the operational scenario: bathymetry, sound speed profiles (SVP), seabed characteristics, presence of thermoclines or haloclines, positioning of transmitters and receivers, network geometries and acoustic modem parameters. Based on these elements, the tool computes signal propagation along the water/seabed/surface paths, estimating attenuation, reflections, multipath effects and time of arrival of acoustic rays.

The user can quickly change environmental conditions and node configurations to compare alternative scenarios, assess the robustness of a link and identify the operating limits of the system. The graphical interface guides the user step by step from environment definition to sensor and communication parameter configuration, up to the execution of simulations and interpretation of results.



Outputs and results

BlueComm generates numerical and graphical outputs that are immediately usable for technical studies, reporting and operational decision making. Main results include path loss curves as a function of distance and depth, acoustic coverage maps for the area of interest, and received signal level trends at different points of the underwater domain.

For each simulated link, the tool provides synthetic performance indicators such as link margin with respect to modem threshold, probability of successful communication as

a function of environmental conditions, and the impact of scenario changes (depth variations, node displacement, SVP modifications). Results can be exported in standard formats and integrated into external analysis tools and technical documentation.

In this way, BlueComm helps reduce the number of sea trials, anticipate in simulation the critical aspects of underwater acoustic links, and quantitatively support the design, configuration and operational use of underwater communication systems and sensors.