Sub-Bottom Profiling provides critical information for understanding munitions burial

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It is estimated there are over 400 underwater sites in the United States where military munitions are present. Many of these sites are associated with coastal training ranges where the offshore areas may be used for recreational and commercial activities such as wading, swimming, boating, and fishing. Key to managing or mitigating the explosive hazards posed by munitions within these areas is a thorough understanding of how munitions behave in the underwater environment as they are subjected to waves, currents, sand migration, and storm surges. Multiple studies have demonstrated burial is a significant component of munitions behavior in the offshore environment. As such, knowledge of the bottom and sub-bottom structure is critical in determining how deep munitions may bury, which ultimately impacts the potential exposure and explosive hazard they pose to human receptors.

In 2022, the Naval Facilities Engineering Systems Command (NAVFAC) Atlantic initiated an investigation of the presence and distribution of underwater munitions within 600 acres offshore of a former training range and adjacent to current and planned public beaches. As part of this investigation, sub-bottom profiling is being performed to measure sand thickness and identify areas of potential munitions burial. This information will facilitate preparation of a conceptual site model with enhanced knowledge of the horizontal and vertical extent of potential munitions and confidence in the remedy needed to protect users of the area.

Bottom and sub-bottom structure and thickness data were gathered using a multi-frequency parametric Innomar SES-2000 compact sub-bottom profiler (SBP) equipped with a Trimble R2 global positioning system (GPS) unit. The study provided opportunities to encounter and overcome various challenges associated with collecting SBP data (e.g., rough sea conditions, highly variable seafloor depth, etc.) as well as identifying strategies for enhancing final SBP results. Our results indicate combining multi-frequency data (8 kHz and 15 kHz) improved the resolution of the full sand depth profile. Additionally, coupling the SBP with the Trimble R2 GPS obviated the need for a base station and enhanced the nimbleness and adaptability of the data collection package to sea and weather conditions.