UNDERWATER MUNITIONS MAPPING: CURRENT AND FUTURE DIRECTIONS

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Since the advent of gunpowder warfare, expended and discarded ordnance has been making its way into our oceans, lakes and rivers. Aside from military engagements, munitions contamination is caused by weapons testing and training, accidents, and by dumping. In the U.S. many active and former military installations have ordnance training sites that are adjacent to inland waterways and coastal ocean areas. Over the years, weapons testing, disposal and accidents have generated munitions contamination in coastal and inland waters throughout the country. In Europe, the primary sources of underwater munitions contamination are mines laid during the two World Wars, and the post-war dumping of millions of tons of munitions in an oceanic arc spanning from Spain to Norway. With population and economic activity growing about coastal and inland waters, many nations are investing in and developing new technologies to map these areas to determine the extent and threat of underwater munitions. This paper reviews conventional underwater sensing technologies that have been used to date with various levels of success, describes the challenges posed by many common environments encountered, and discusses emerging advances in underwater sensors, platforms, and automation predicted to increase the efficiency of munitions classification in many areas and make it possible for the first time in some of the more challenging environments.