ID: Type: **Oral**

Carlo simulation tool for maritime operations risk reduction and enhancement of IMS hydroacoustic network sustainment

Thursday, 27 June 2019 12:30 (15 minutes)

Conducting successful and timely at-sea installation and sustainment of International Monitoring System (IMS) hydroacoustic (HA) stations requires proactive management of the risks associated with challenging ocean environmental conditions, such as those which prevail at remote IMS HA sites. To support the planning of maritime operations for the establishment of hydroacoustic station HA04 at the Crozet Islands located in the Southern Ocean, one of the world's most challenging ocean environments, the IMS HA team used an in-house Monte Carlo simulation tool to estimate installation weather delay days using as input a database of historical ocean weather records available from the local meteorological station, together with a breakdown of maritime operational steps. The model's predictions were found to be in good agreement with the actual outcome of the installation. Based on this experience APL-UW were approached for the development of a sophisticated Monte Carlo Mission Time Simulation (MMTS) tool for more general at-sea operations performed at various locations. MMTS uses NOAA WaveWatch III oceanographic re-analysis data for the assessment of ocean weather together with a detailed mission planner for all stages of the maritime operations. The MMTS has potential applications to other missions associated with the Comprehensive Nuclear-Test-Ban Treaty Organization.

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Session Classification: T1.3 Properties of the Ocean

Track Classification: Theme 1. The Earth as a Complex System