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Seismoacoustic Events in the Arctic Ocean

Rapid changes to the Arctic Ocean impact its acoustic environment. As the Arctic warms, the soundscape is modified by changes to the thermohaline stratification of the water column as well as changes in the distribution and morphology of sea ice. Sea ice attenuates sound through scattering and absorption, emits sounds as it deforms and exerts control over the generation of sea surface waves and the distribution of sound-producing marine wildlife populations and industrial activity. Geophysical modeling and sensing on seasonal and decadal scales are needed to track changes in the Arctic soundscape and their impacts on our ability to detect sound sources of interest. We examine changing propagation and noise conditions in the Arctic Ocean using projections from the US Department of Energy's Energy Exascale Earth System Model (E3SM) and in situ data from the Beaufort Sea including passive recordings from a National Oceanic and Atmospheric Administration (NOAA) hydroacoustic station and an active acoustic experiment. We present progress toward understanding ice-affected acoustic propagation in parts of the Arctic as well as mapping seasonal sound patterns recorded at the NOAA hydrophone. Moreover, we evaluate the impacts on our ability to detect underwater acoustic sources arising from the evolving Arctic Ocean environment.

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