The sounds of science: Melting of iceberg creates surprising ocean din

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(Phys.org) —There is growing concern about how much noise humans generate in marine environments through shipping, oil exploration and other developments, but a new study has found that naturally occurring phenomena could potentially affect some ocean dwellers.

Nowhere is this concern greater than in the polar regions, where the effects of global warming often first manifest themselves. The breakup of ice sheets and the calving and grounding of icebergs can create enormous sound energy, scientists say. Now a new study has found that the mere drifting of an iceberg from near Antarctica to warmer ocean waters produces startling levels of noise.

Results of the study are being published this month in *Oceanography*.

A team led by Oregon State University researchers used an array of hydrophones to track the sound produced by an iceberg through its life cycle, from its origin in the Weddell Sea to its eventual demise in the open ocean. The goal of the project was to measure baseline levels of this kind of naturally occurring sound in the ocean, so it can be compared to anthropogenic noises.

"During one hour-long period, we documented that the sound energy released by the iceberg disintegrating was equivalent to the sound that would be created by a few hundred supertankers over the same period," said Robert Dziak, a marine geologist at OSU's Hatfield Marine Science Center in Newport, Ore., and lead author on the study.

"This wasn't from the iceberg scraping the bottom," he added. "It was from its rapid disintegration as the berg melted and broke apart. We call the sounds 'icequakes' because the process and ensuing sounds are much like those produced by earthquakes."

Dziak is a scientist with the Cooperative Institute for Marine Resources Studies (CIMRS), a collaborative program between Oregon State University and NOAA based at OSU's Hatfield center. He also is on the faculty of OSU's College of Earth, Ocean, and Atmospheric Sciences.

When scientists first followed the iceberg, it encountered a 124-meter deep shoal, causing it to rotate and grind across the seafloor. It then began generating semi-continuous harmonic tremors for the next six days. The iceberg then entered Bransfield Strait and became fixed over a 265-meter deep shoal, where it began to pinwheel. The harmonic tremors became shorter and less pronounced.

It wasn't until the iceberg broke loose and drifted into the warmer waters

of the Scotia Sea that the real action began. Photos from the International Space Station showed visible melt ponds on the iceberg's surface, indicating it had was in a period of rapid disintegration. Within two months, the iceberg had broken apart and scientists were no longer able to track it via satellite.

But the scientists' hydrophone array recorded the acoustic signature of the breakup – short duration, broadband signals that were distinctly different from the harmonic tremors, and much louder.

"You wouldn't think that a drifting iceberg would create such a large amount of sound energy without colliding into something or scraping the seafloor," noted Dziak, who has monitored ocean sounds using hydrophones for nearly two decades. "But think of what happens why you pour a warm drink into a glass filled with ice. The ice shatters and the cracking sounds can be really dramatic. Now extrapolate that to a giant iceberg and you can begin to understand the magnitude of the sound energy."

"In fact, the sounds produced by ice breakup near Antarctica are often clearly recorded on hydrophones that we have near the equator," Dziak added.

Scientists are just starting to study the impact of anthropogenic and naturally occurring sounds on marine life and are unsure about the possible impacts. Most at-risk are those animals that use sound to facilitate their life-sustaining activities, such as feeding, breeding and navigation.

"The breakup of ice and the melting of icebergs are natural events, so obviously animals have adapted to this noise over time," Dziak said. "If the atmosphere continues to warm and the breakup of ice is magnified, this might increase the noise budget in the polar areas.

"We don't know what impact this may have," Dziak added, "but we are trying to establish what natural sound levels are in various parts of the world's oceans to better understand the amount of anthropogenic noise that is being generated."

Provided by Oregon State University

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