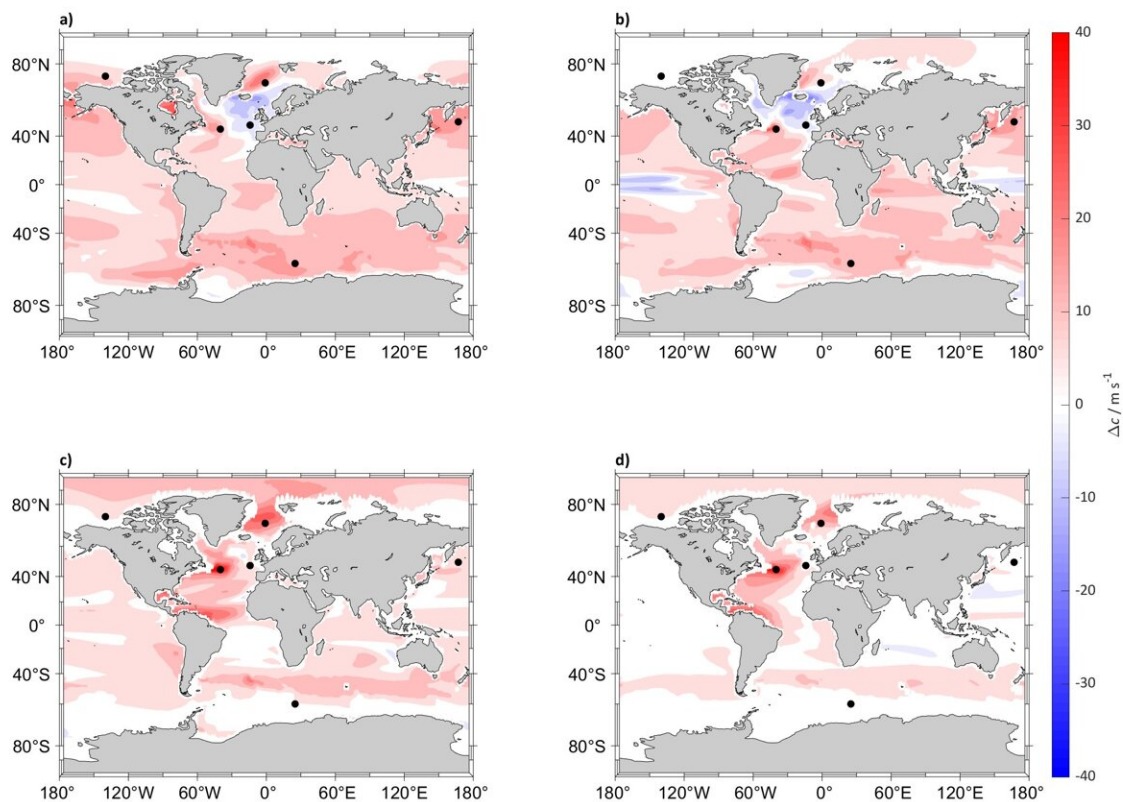


# The changing climate creates more noise in the oceans

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Sound speed difference between (2018 to 2022) and (2094 to 2098) for SSP5-8.5. Maps of the difference in 5 years mean of sound speed (c) in  $\text{m s}^{-1}$  between (2018 to 2022) and (2094 to 2098) at (A) 5, (B) 125, (C) 300 and (D) 640 m depth calculated for SSP5-8.5. The black dots indicate the sound source locations. Credit: *PeerJ* (2023). DOI: 10.7717/peerj.16208

Due to the changing climate, the underwater world is getting ever noisier. That is the main conclusion of a study that was published today in the journal *PeerJ*. "In some places, by the end of this century, the sound of ships, for example, will be five times as loud," the article's first author, NIOZ oceanographer Luca Possenti says. "That will interfere with the behavior of many species of fish and marine mammals."

The study was based on mathematical modeling in collaboration with Utrecht University and TNO, using a moderate or an extreme [climate](#) scenario by the UN climate panel IPCC. Both the temperature and acidity of the water affect how easily or difficult sound travels through the [ocean](#). Because of ongoing emissions of greenhouse gases, seawater becomes more acidic, and together with the rise in seawater temperature, the researchers anticipate that underwater sound will travel further in the future in most parts of the oceans.

Because the supply of warmer surface water to the northern Atlantic Ocean will most likely decrease, the researchers foresee a change in temperature layers in this part of the ocean. Possenti says, "As a result of this, a separated 'sound channel' in the upper part of the North Atlantic may be formed. This will act as a kind of tunnel, which will carry sounds much further. As a result, the underwater sound level in this part of the oceans will increase by 7 decibels by the end of this century, under a moderate climate scenario."

An increase of "just" 7 dB, corresponds with almost five times as much noise energy under water. Therefore, sounds generated by marine traffic as well as other sources, such as air guns used for seismic surveys, will increase. Moreover, it is likely that the number of ships will also increase in the near future, adding to the total amount of noise in the oceans. Therefore, even under a moderate climate scenario, changes may be severe.



Breaking glass spheres which generates sounds at a level that marine mammals use at great depth, which are then recorded from tens to hundreds of kilometers away. Credit: NIOZ

Possenti emphasizes that this louder human noise will affect much of the [marine life](#). "In the absence of good visibility underwater, fish and also marine mammals communicate mainly through sounds. If fish can no longer hear their predators, or if whales have a harder time communicating with each other, this will affect the entire ecosystem."

In addition to this theoretical study, Possenti and collaborators at TNO

and MARIN are also working on actual measurements of underwater sounds. Using breaking glass spheres, they generate sounds at a level that marine mammals use at great depth, which are then recorded from tens to hundreds of kilometers away.

"Much is still unknown about the exact effects of underwater conditions on the speed of [sound](#). But because of the potentially profound effects on the ecosystem, that knowledge is essential if we want to understand what the changing climate may do to marine life."

**More information:** Luca Possenti et al, Predicting the contribution of climate change on North Atlantic underwater sound propagation, *PeerJ* (2023). [DOI: 10.7717/peerj.16208](https://doi.org/10.7717/peerj.16208)

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