



Abstracts
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Acoustic modelling of Safety zones for marine mammals at noise exposure from industrial activity in the Russian Arctic

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E&P of hydrocarbon along with shipping are the main sources of manmade noise in the Arctic ocean. But very few information on the noise from industry activities in Arctic is currently available. In the next decade we expect increasing level of anthropogenic sound in the Russian Arctic due to planned large scale construction of Oil & Gas projects including the Shtokman project in the Barents Sea, one of the world's largest natural gas deposits. Seismic Survey, pile driving and noise from construction can damage hearing or disquiet marine mammals.

To protect marine mammals from pile driving and chronic continuous noise at different stages of Shtokman project construction we estimated the sizes of Safety zones with SPL thresholds 180 dB (zone of injury) and 120 dB for continuous noise (behavior disturbance). Modeling of acoustic propagation and TL was done by parabolic equation models (PDPE) based on the environmental characteristics in the Barents Sea. Open-source databases were used as input data sources for sound propagation calculations (Amante and Eakins, 2009; Monterey and Levitus, 1997). The influence of ice cover was investigated within the framework of an approximate consideration. For the spectra of noise sources (construction vessels) the data from similar vessels were used, for which the noise measurements were done and published.

The results shown changes in the Safety Zones footprints depending on the stage of construction, season, specific environmental conditions like ice cover interface or presence of gas saturated layer on sea floor.

It is shown that size of Safety zones increase for September hydrological conditions in comparison with the May due to the heating of the surface layers of the water column and the transition to the bottom nature of sound propagation.