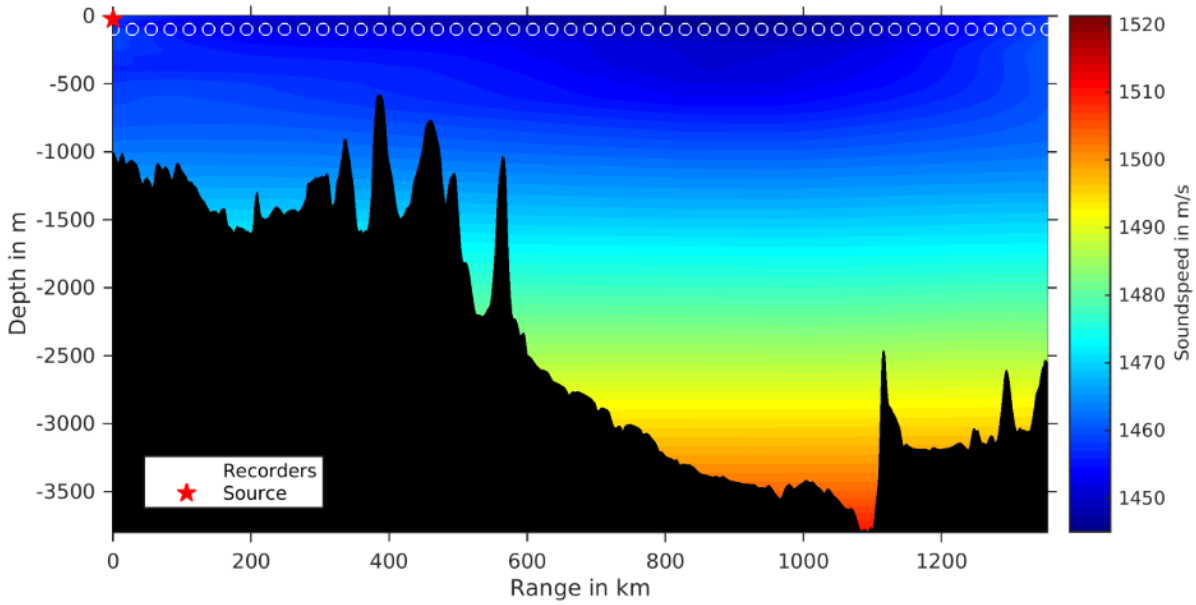
Supplementary materials to the paper

Estimating the spatial distribution of vocalizing animals from ambient sound spectra using widely spaced recorder arrays and inverse modelling

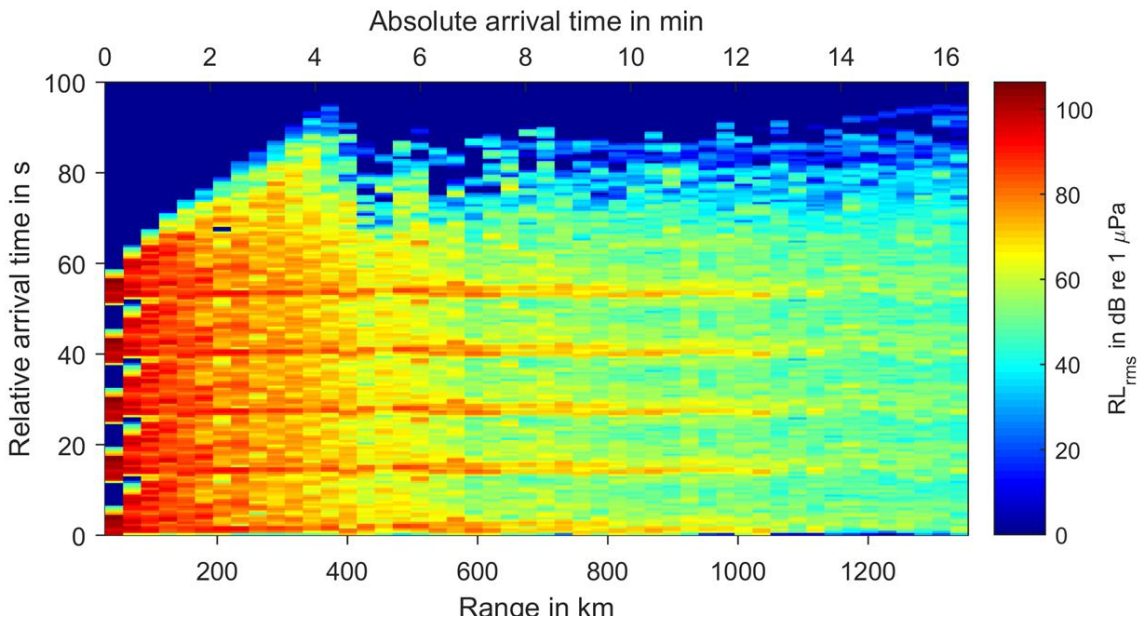
by Sebastian Menze, Daniel Zitterbart, Martin Biuw and Olaf Boebel

Corresponding author: Sebastian Menze, Institute of Marine Research, Bergen, Norway

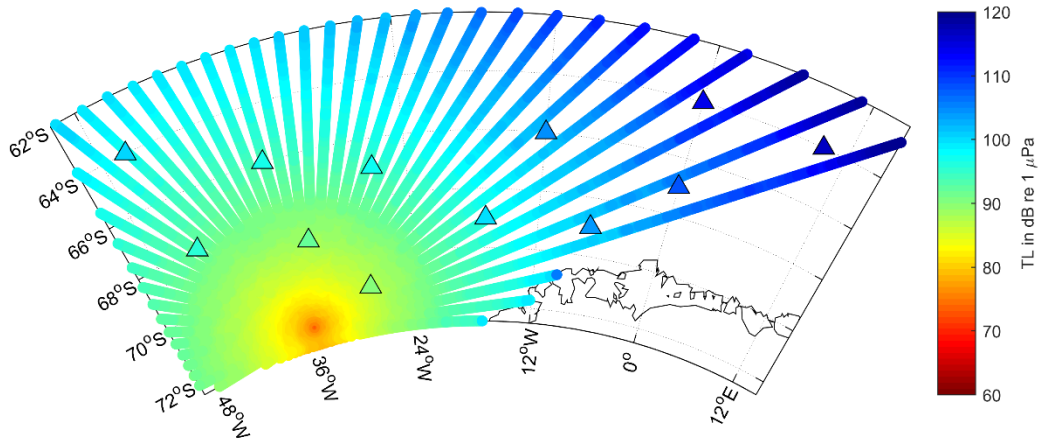
sebastian.menze@imr.no



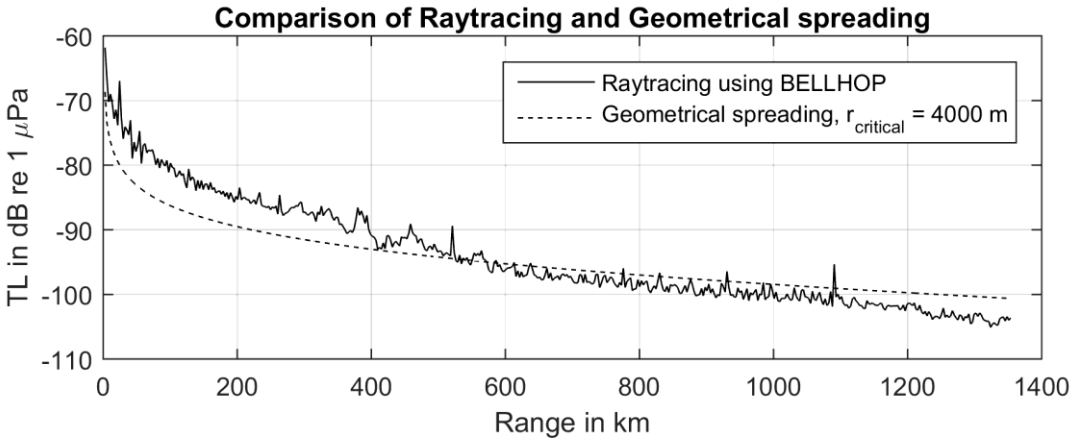
Suppl. Figure 1: Bathymetry and sound speed of section for which impulse responses were modelled. Bathymetry extracted from ETOPO-1 dataset, Sound speed from world ocean atlas mean climatology dataset. Red star represents the location of the sound source and the white circles the receiver locations.



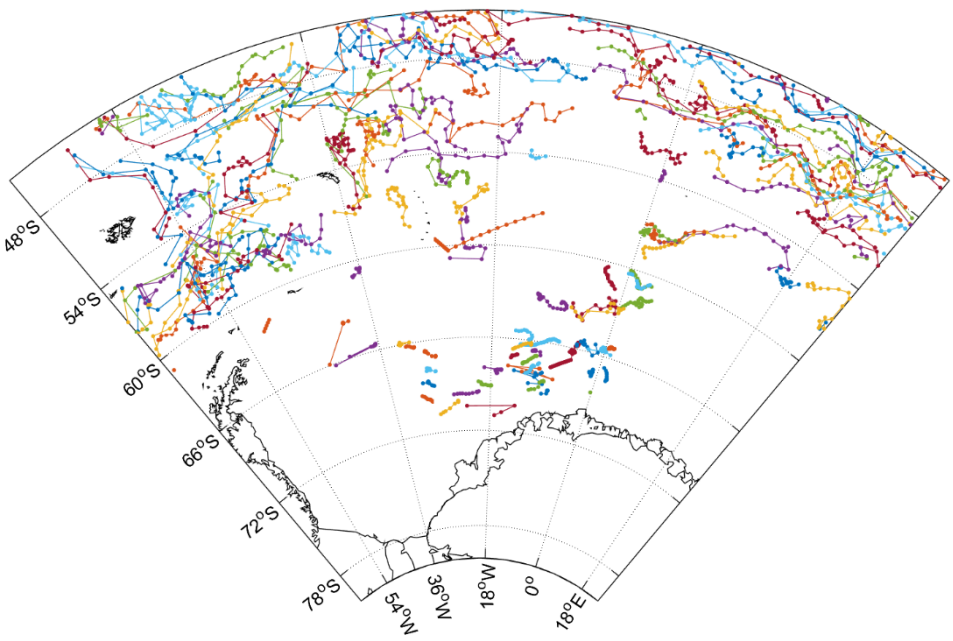
Supplementary Figure 2: Convolution of fin whale pulse train (5 pulses and 12 s intervals) with modelled impulse response from the Raytracing model BELLHOP. Horizontal axis represents range and absolute arrival time and the vertical axis the relative arrival time (the time of first arrival at each receiver subtracted from the absolute arrival time) Color represents the received level.



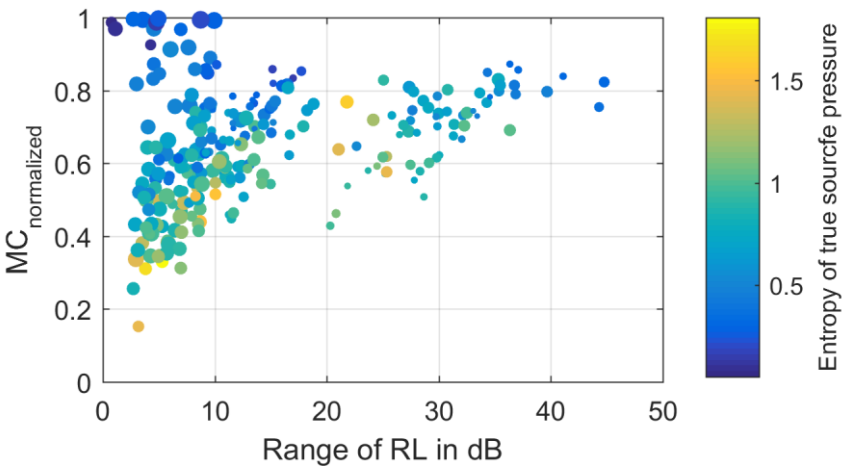
Supplementary Figure 3: Example of 2xN dimensional raytracing for calculating the TL matrix at 150 Hz. Colored slices show the TL slices calculated with Bellhop in 5° steps, and colored triangles the TL at the recorders locations, as interpolated from the TL slices.



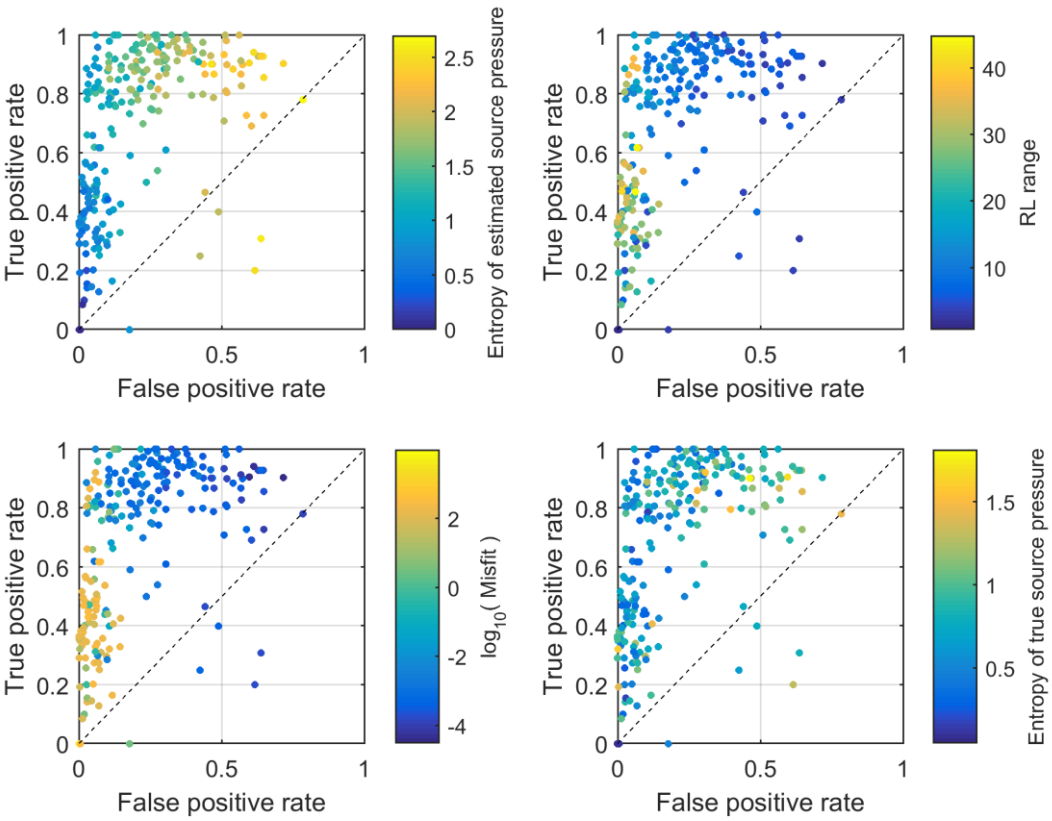
Supplementary Figure 4: Comparison of transmission loss models at 100 m depth and 150 Hz for the example transect presented in suppl. Figure 1.



Supplementary Figure 5: Argo float tracks between the 1.1.2013 and 29.5.2013, obtained from the Coriolis Global Data Assembly Centre (http://www.argodatamgt.org/Access-to-data/Argo-data-selection). Each dot represents the location of an Argo float profile.



Supplementary Figure 6: Scatterplots comparing the normalized inversion accuracy (A_n within the trust zone) and the range of received levels. Marker size indicates the average distance between the true sources and recorders and color indicates the entropy of the true source distribution. Each dot represents one of the 250 random source distributions.



Supplementary Figure 7: Scatterplots comparing the true and false positive rate of the estimated source pressure grids (considering only source presence/absence) in relation to different metrics. Each dot represents one of the 250 random source distributions.