

Acoustic identification and measurements of weak targets such as jellyfish and zooplankton in mixed aggregations

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Abstract

In mixed layers where several target categories are present, current multi-frequency identification algorithms are unable to properly separate and identify the weaker target category. This is because the backscatter from the stronger target usually dominates the echo intensities from the weaker targets even if they are numerically inferior. In particular this occurs at ranges where the pulse volume is large and both strong and weak scattering categories occur as multiple targets within the same pulse volume. In this paper, it is demonstrated that a stepwise top thresholding method combined with spatial filtering can reveal two or several target categories, especially when the target strength of the two categories are quite different, as is the case when jellyfish and zooplankton layers are mixed with swimbladdered fish. The method also reveals the true frequency response of the weak targets, a necessity for the target identification process. Subsequently, the abundance of the weak and strong targets can be estimated independently. The method is demonstrated on data on jellyfish from the Benguela Current Upwelling system and on zooplankton layers from Norwegian fjords.

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