

The impact of bottom trawl fisheries on sediment and organic carbon dynamics in the Greater North Sea

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Bottom trawl fishing is one of the most widespread anthropogenic activities on the continental shelf. Dragging heavy nets and chains across the seafloor disturbs the sediment and resuspends large amounts of sediment and organic carbon. The degree of disturbance and the amount of sediment and, thus, particulate organic carbon (POC) mobilized is highly dependent on the fine sediment fraction and the hydrodynamic drag of the gear components. The accurate spatial quantification of resuspended sediment is crucial for our understanding of the anthropogenic fingerprint on sedimentary shelf systems and marine biogeochemical cycles.

Here, we quantify the amount of sediment and particulate organic carbon (POC) that is mobilized by bottom trawl fishing from the North Sea seafloor. We combine empirical models of trawling-induced sediment resuspension with high-resolution intensity trawling data, mud content, and POC data. Results show that annually, bottom-trawling resuspends $\sim 36 \text{ Gt yr}^{-1}$ of sediment and $\sim 180 \text{ Mt yr}^{-1}$ of POC in the Greater North Sea. Trawling-induced POC resuspension from the seafloor is 30% greater than the total POC input to the seafloor. Consequently, sediment disturbances caused by bottom trawl fisheries will lead to an increase in the suspended POC load in the water column of the Greater North Sea.

Keywords

Bottom Trawling; Sediment Resuspension; Organic Carbon; Continental Shelf