ID: W1989493708

TITLE: Impact of Bottom Trawling on Deep-Sea Sediment Properties along the Flanks of a Submarine Canyon

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ABSTRACT:

The offshore displacement of commercial bottom trawling has raised concerns about the impact of this destructive fishing practice on the deep seafloor, which is in general characterized by lower resilience than shallow water regions. This study focuses on the flanks of La Fonera (or Palamós) submarine canyon in the Northwestern Mediterranean, where an intensive bottom trawl fishery has been active during several decades in the 400-800 m depth range. To explore the degree of alteration of surface sediments (0-50 cm depth) caused by this industrial activity, fishing grounds and control (untrawled) sites were sampled along the canyon flanks with an interface multicorer. Sediment cores were analyzed to obtain vertical profiles of sediment grain-size, dry bulk density, organic carbon content and concentration of the radionuclide 210Pb. At control sites, surface sediments presented sedimentological characteristics typical of slope depositional systems, including a topmost unit of unconsolidated and bioturbated material overlying sediments progressively compacted with depth, with consistently high 210Pb inventories and exponential decaying profiles of 210Pb concentrations. Sediment accumulation rates at these untrawled sites ranged from 0.3 to 1.0 cm y-1. Sediment properties at most trawled sites departed from control sites and the sampled cores were characterized by denser sediments with lower 210Pb surface concentrations and inventories that indicate widespread erosion of recent sediments caused by trawling gears. Other alterations of the physical sediment properties, including thorough mixing or grain-size sorting, as well as organic carbon impoverishment, were also visible at trawled sites. This work contributes to the growing realization of the capacity of bottom trawling to alter the physical properties of surface sediments and affect the seafloor integrity over large spatial scales of the deep-sea.

SOURCE: PloS one

PDF URL: https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0104536&type=printable

CITED BY COUNT: 83

PUBLICATION YEAR: 2014

TYPE: article

CONCEPTS: ['Submarine canyon', 'Trawling', 'Sediment', 'Canyon', 'Bottom trawling', 'Geology', 'Sedimentary depositional environment', 'Dredging', 'Oceanography', 'Submarine pipeline', 'Seafloor spreading', 'Geomorphology', 'Structural basin', 'Fishing', 'Fishery', 'Biology']