Geophysical Research Abstracts
Vol. 15, EGU2013-13169, 2013
EGU General Assembly 2013

Commercial bottom trawling: a driver of deep seascape evolution in the Anthropocene?

Jacobo Martín (1), Pere Puig (1), Miquel Canals (2), Joan B. Company (1), David Amblas (2), Galderic Lastras (2), Albert Palanques (1), and Antoni M. Calafat (2)

(1) Institut de Ciències del Mar (ICM-CSIC), Pg. Marítim de la Barceloneta 37-49, 08003 Barcelona, Spain, (2) CRG Marine Geosciences, Universitat de Barcelona, E-08028 Barcelona, Spain.

The offshore displacement of bottom trawling fleets has raised concerns over the impact of this human activity on deep-sea ecosystems and associated living resources, which are characterized by a lower resilience than shallow water correlatives. However, the effects of bottom trawling on sediment remobilization across continental margins and on the alteration of seafloor morphology still remain largely unaddressed.

We present a compilation of results from studies conducted during the last decade in the La Fonera (Palamós) submarine canyon (NW Mediterranean Sea), where a bottom trawling fishing fleet is active on a daily basis at depths from 400 to 800 m.

Deployments of mooring lines equipped with punctual and profiling current-meters, turbidimeters and sediment traps have documented that trawling gears passing along the canyon flanks generate daily sediment gravity flows, implying a periodic sediment removal from fishing grounds. These sediment-laden flows are able to reach the main canyon axis and progress to a minimum depth of 1200 m. Also, sediment accumulation rates in the lower canyon have increased since the industrialization of the local trawling fleet (1970s), suggesting a human-induced enhancement of along-canyon transfer of sediments from the fishing grounds to greater depths.

Sedimentological and Pb-210 analysis of interface sediment cores collected from the canyon flanks confirm that widespread erosion and stirring of surface sediments is notable on trawled areas when compared to control (untrawled) sites at similar depths.

This chronic reworking and removal of surface sediments from trawling grounds has ultimately led to modifications of the seafloor morphology over large spatial scales, as revealed by high-resolution multibeam bathymetry and Vessel Monitoring Systems (VMS) data sets. Untrawled canyon flank segments are dominated by a dense network of tributary valleys that progress upslope from the main canyon axis, reaching up to five orders of bifurcation. Such complex morphology is missing in the trawled depth range and slightly below, where the sea floor becomes smoother and only the main branches of the tributary valley networks are preserved.

Given the global dimension of commercial bottom trawling, our findings suggest that this human activity may have become a significant driver of sediment dynamics and seascape evolution over substantial parts of the world's upper continental slopes.