

SEDIMENTATION RATE OF PLOUGHING ACTIVITY DURING BALEARIC SUBMARINE PIPELINE CONSTRUCTION (MALLORCA LANDFALL AREA)

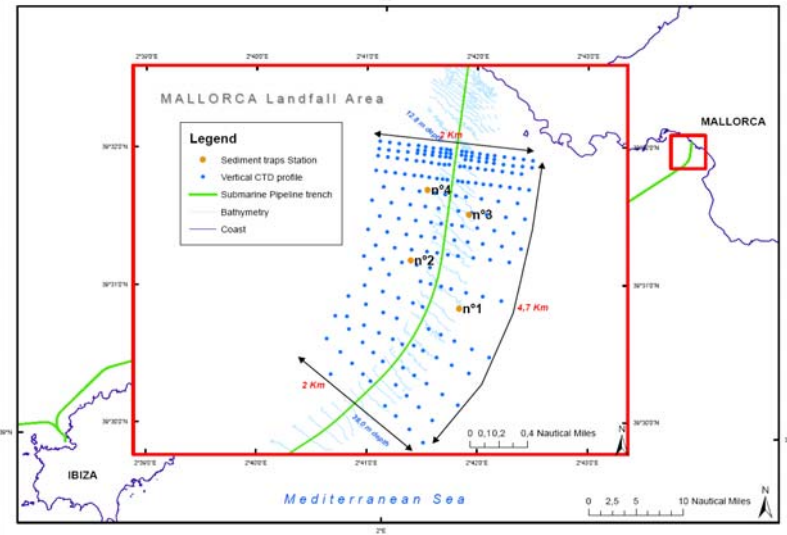
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ABSTRACT

- We study the sediment concentrations (g/m²/day) with **sediment traps** and turbidity levels (FTU and mg/L) with **multiparametric probe** (CTD plus turbidity sensors) generated **during ploughing activity**.
- A main results of this study are values between **5.41 and 32.27 g/m²/day** and **1.876 ±3.13 FTU** (equivalent of **1.944±4.12 mg/L**).

STUDY AREA



PLOUGHING METHODOLOGY



ENVIRONMENTAL SAMPLING METHODOLOGY

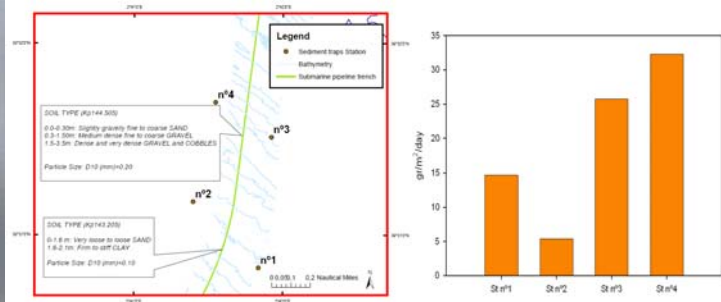


MATERIAL

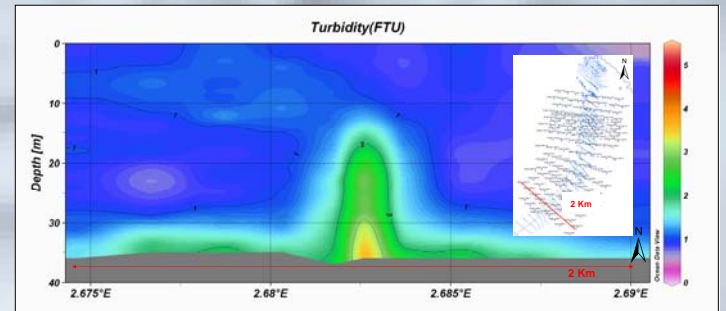
2 SBE19plusV2 (Sea-Bird Electronics, Inc) - 2 SEASOFT® - 2 licenses of Hypack (6.2/8.0) - 2 boats - 4 handmade sediment traps

RESULTS

Sediment traps - (g/m²/day)



Multiparametric probe - Turbidity levels (FTU & mg/L)



Example of water column (from surface to bottom) of turbidity parameter (FTU) during ploughing activities. The effect of the current is also recognizable.

Turbidity in the water column down to 2 mab increased progressively because of the direct contact between the sediment and the plough. Consequently, it exist a gradual diffusion of sediment resuspended by ploughing creating a **bottom nepheloid layer (BNL)** typically from the first hours of the activity. The turbidity concentrations increase progressively above (2-7 m) such as at the BNL even 24-48h after the beginning of the plough.

DISCUSSION & CONCLUSION

During the experiment, the suspended sediment concentration (SSC) ranged from 1.94 to 129.32 mg/L, and the highest values were near the seabed, where a BNL was well developed. The total amount of SS during each grid of hydrographic stations was calculated to qualitatively assess the effect of the ploughing-induced resuspension.

A total of 398 CTD profiles were measured backscattered infrared light at 4-sec sampling intervals and provided Formazin Turbidity Units (FTU) units, which were converted to suspended sediment concentration (SSC) through the function obtained by Guillén et al. (2000) :

$$SSC \text{ (mg/L)} = 1.74 \times FTU - 1.32 \quad (FTU > 0.2)$$

We can conclude that using this methodology and process of the plough, the forecast during the experiment, the soil type and the designed experiment, the mean values of turbidity (FTU) all over the study area were 1.876 ±3.13 FTU. This means, suspended sediment concentration of 1.944±4.12 mg/L. Nevertheless, there were also few exception with 16FTU (26.52 mg/L). The average of the sedimentation rate was 19.527±11.88 g/m²/day.

ACKNOWLEDGEMENTS

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REFERENCES

DURRIEU DE MADRON, X., FERRÉ, B., LE CORRE, G., GRENZ, C., CONAN, P., PUJO-PAY, M., BUSCAIL, R. & BODIOT, O. 2005. Trawling-induced resuspension and dispersal of muddy sediments and dissolved elements in the Gulf of Lion (NW Mediterranean). *Continental Shelf Research* 25: 2387-2409.

GULLÉN, J., PALANQUES, A., PUIG, P., DURRIEU DE MADRON, X. & NYFFELER, F. 2000. Field calibration of optical sensors for measuring suspended sediment concentration in the western Mediterranean. *Scientia Marina* 64(4):427-435.

PALANQUES, A., GULLÉN, J. & PUIG, P. 2001. Impact of bottom trawling on water turbidity and muddy sediment of an unfinished continental shelf. *Limnol. Oceanogr.* 46 (5): 1100-1110.

PUSCEDDU, A., GRÉMARE, A., ESCOUBEYROU, K., AMOUROUX, J.M., FIORELDONDO, C. & DANOVARO, R. 2005. Impact of natural (storm) and anthropogenic (trawling) sediment resuspension on particulate organic matter in coastal environments. *Continental Shelf Research* 25: 2506-2520.

