CONTAMINANTS BIOACCUMULATION AND BIOMAGNIFICATION IN A SHORT TROPHIC SYSTEM: PHYTOPLANKTON, ZOOPLANKTON, ANCHOVY, SARDINE (COSTAS)

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Abstract
The main scientific goal of COSTAS project is to bring useful knowledge to the understanding of the conditions, which favor the accumulation and transfer of organic and metallic contaminants at the primary trophic levels (autotrophes and hetetrophes), and then within the food web of small pelagic fish (anchovy and sardine) in the Gulf of Lion, Western Mediterranean.

Keywords: Plankton, Bio-accumulation, Trace elements, Pcb, Gulf of Lyon

In the integral scheme of biogeochemical cycles of contaminants in marine ecosystems, the assimilation of anthropic compounds and elements at primary trophic levels, in plankton, is not yet well known [1,2]. However, planktonic populations play a key role in the trophic food webs in marine ecosystems by the mobilizing and transfer of organic matter towards higher trophic levels [3,4]. Thus our study focuses on the whole food web, including water column/ phytoplankton/ zooplankton/ and small pelagic fish.

The main groups of compounds and trace elements were considered: persistent organic contaminants (polychlorobiphenyls PCBs and polybrominated diphenyl ethers PBDEs), mercury (Hg) and methylmercury (CH_3Hg), other trace metals (Pb, Cd, Co, Cu, Ag, Zn), natural radioelements (^{210}Pb, ^{210}Po) and stable lead isotopes (^{204}Pb, ^{206}Pb, ^{207}Pb, ^{208}Pb). The presented approach embraces the ecological and biogeochemical dimensions of the food web. It is also based on the simultaneous use of chemical "tracers" (organic and metallic contaminants) and biological "tracers" (stable isotopes of δ13C and of δ15N and fatty acids).

The presented results show also the mechanisms of the bioaccumulation of toxic substances in the tissues of small pelagic fish (tissue distributions, excretion, metabolization), as well as the influence of ontogenic factors (growth, reproduction, migration) [5]. Finally, the modeling allow us the spatial and dynamic interpretation of data [6], as well as at the first attempt to integrate the biogeochemical, ecological, and physical behavior of contaminants in their transfer at primary trophic levels, including also development and application of the dynamic energy budget model (DEB) of anchovy in the Gulf of Lion [7,8].

The research work was carried out within COSTAS project and calls for competence in marine biology, ecology, biogeochemistry and physics employed together in the scientific tasks of data acquisition during oceanographic cruises, laboratory analysis, and coupled modeling.

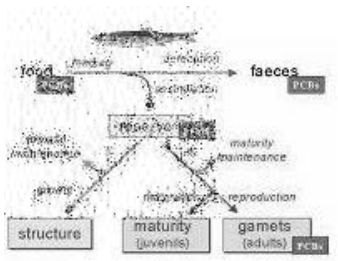

Fig. 1. Conceptual diagram: Dynamic Energy Budget DEB model comprises a good knowledge of physiology of fish controlling vital functions (such as reproduction and growth) and fate of contaminants in fish [9].

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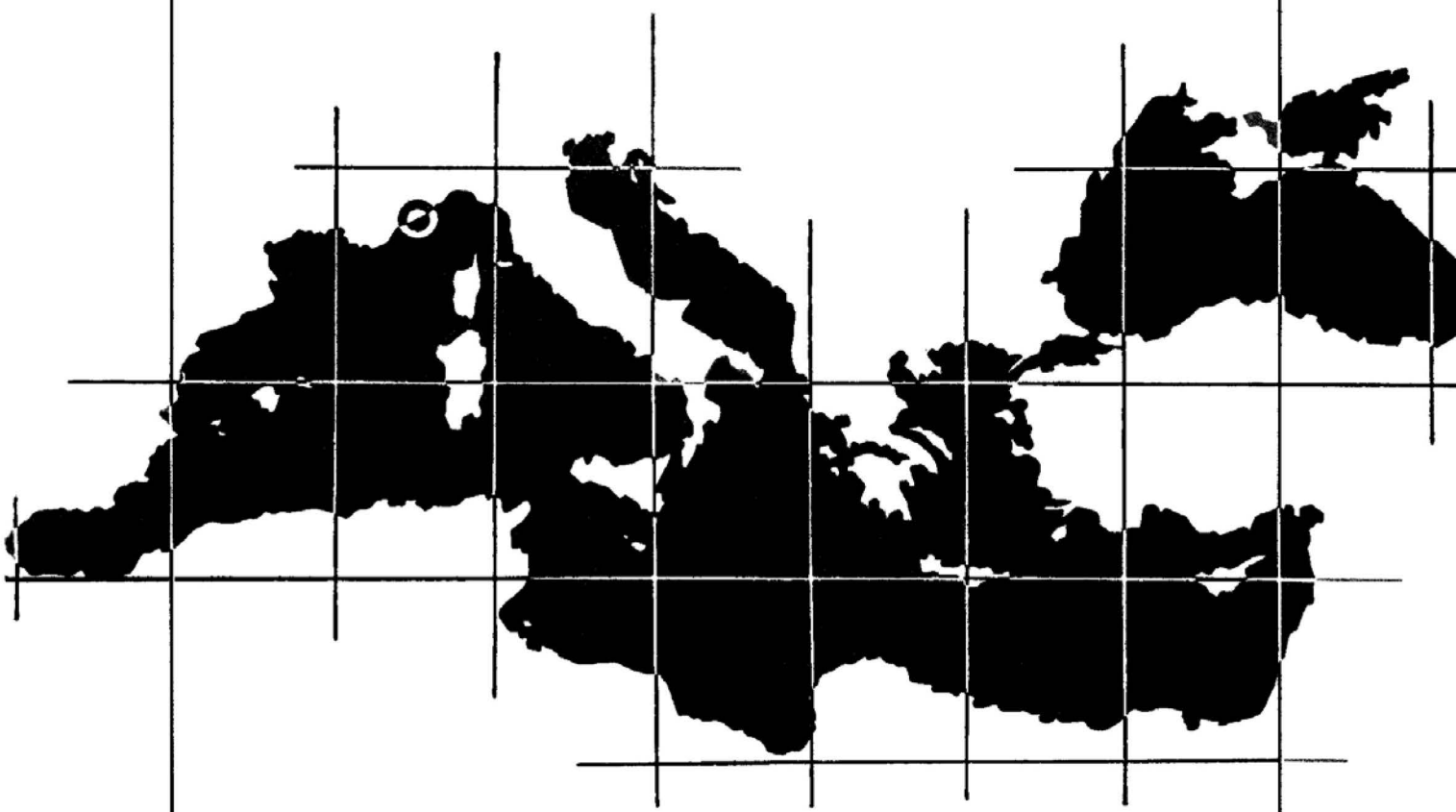

RAPPORT DU 40e CONGRÈS DE LA CIESM

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Ce volume présente sous la forme d'articles synthétiques toutes les communications scientifiques présentées lors du 40ème Congrès de la CIESM. Les articles incluent chacun un résumé et des références bibliographiques. Comme ce sont plus de 900 chercheurs originaires de 40 pays qui se sont rassemblés en octobre 2013 à Marseille, l'ensemble offre un vaste panorama, très représentatif des recherches marines menées actuellement en Méditerranée et en mer Noire.

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