

# INTERDISCIPLINARY SCIENCE OF THE MEDITERRANEAN AND BLACK COASTAL SEAS IN A GLOBAL CONTEXT

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## Abstract

Physical and biogeochemical processes and interactions of the Mediterranean and Black Seas are overviewed and the implications for the health of this semi-enclosed sea system discussed. The interdisciplinary processes of the Mediterranean and Black Seas are integrated into a discussion of similar semi-enclosed seas of the global coastal ocean in the context of the IOC/SCOR COASTS synthesis study.

*Keywords* : Coastal Systems, Infralittoral, Western Mediterranean, Eastern Mediterranean, Black Sea.

The western Mediterranean basin exchanges waters with the North Atlantic through the narrow Strait of Gibraltar, which influences the Atlantic circulation and drives the Mediterranean circulation together with winds and buoyancy fluxes. The western and eastern basins are linked through the Strait of Sicily, and the shallow Aegean Sea of the eastern basin is linked through the Dardanelles and Bosphorus Straits to the Black Sea. The generally narrow shelves of the Mediterranean are dominated by open-ocean/shelf exchange processes and strongly influenced by riverine inputs. Although coastal downwelling is prevalent, the shelf structures and variabilities are a composite of site specific dynamic scenarios. The Mediterranean is an oligotrophic system with relatively poor biological production and average phytoplankton biomass decreasing eastwards. The most productive regions lie along the coasts of France, Algeria, Egypt, Turkey and in the northern Adriatic. The Black Sea shelves are very narrow in the south, east and northeast but there is a broad northwestern shelf sea. An eddying Rim Current circulates around the basin on the continental slope which links importantly coastal and deeper sea biogeochemical processes. River discharges particularly in the northwest have resulted in eutrophication, which together with over-fishing, a severe increase of gelatinous carnivores and decadal climate fluctuations have drastically changed the Black Sea ecosystem. Modern multi-scale interdisciplinary cooperative field research and modelling projects in both seas are contributing to progress in understanding of dynamical processes and provide the basis for advanced management methods.

The COASTS (Coastal Ocean Advanced Science and Technology Studies) of IOC-UNESCO and SCOR has recently published a comprehensive global study and synthesis of sub-regional and pan-regional interdisciplinary ocean science [1, 2], which complements a multi-scale interdisciplinary process study of the global coastal ocean [3]. Pinardi *et al.* [4] overview the Mediterranean coasts and Oguz *et al.* [5], the Black Sea. These studies are integrated into a pan-regional synthesis of semi-enclosed seas and islands by Oguz and Su [6]. The Mediterranean and Black Seas are categorized as nearly enclosed basins with limited exchanges with open oceans, and analyzed together with the Baltic Sea, Red Sea, Arabian Gulf, Bohai Sea, Sea of Okhotsk and Japan/East Sea. Together with the other European semi-enclosed seas, Baltic and North, the Mediterranean and Black Seas are considered to be generally among the most threatened marine ecosystems, with serious over-exploitation of commercial fish stocks, and endangered biotopes. Dr. Ümit Ünlüata contributed important personal scientific advances to the knowledge of the Mediterranean and Black Seas. As head of ocean science at IOC he enabled the comprehensive interdisciplinary COASTS study of the global coastal ocean.

## References

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