CONQUERING NEW SPACES

The underwater exploration of the Mediterranean, from the surface to the deep sea

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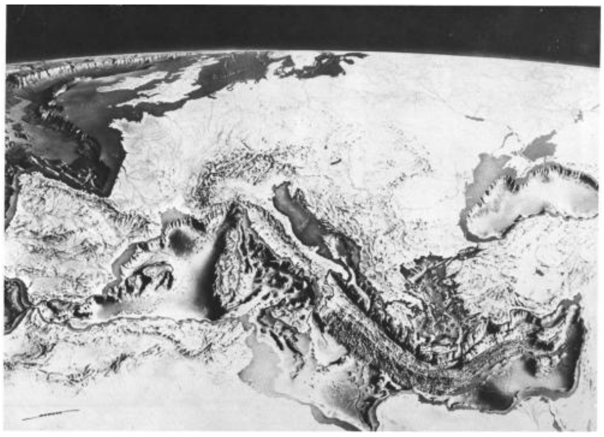
ABSTRACT

Throughout history, commerce, war, and the exploitation of marine resources have become the driving forces behind the development of technologies to explore the ocean's depths. The exploration of the Mediterranean Sea constitutes a paradigmatic case on how coastal societies have attempted to build knowledge on marine life forms, seawater masses, and seafloor, from its surface to each time deeper regions. Its semi-enclosed nature, surrounded by human communities from ancient times, makes the Mediterranean a reduced model of the oceans: strategically important for warfare and communication, promising for its natural resources, and particularly prone to environmental degradation.

Jules Verne, *Vingt Mille Lieues sous les mers*, Paris, J. Hetzel, 1871, p. 392.

« La catastrophe du Farfadet », *Le Petit Journal, Supplément illustré*, no. 766, 23 juillet 1905.



« Physiographic panorama of the Mediterranean region prepared from bathymetric studies," in Ryan, W.B.F., Hsü, K.J., et al. 1973. *Initial Reports of the Deep Sea Drilling Project*, vol. XIII, Washington (US Government Printing Office), p. 6.

The unknown depths: from ancient navigation to the underwater telegraphic cables

For ancient Mediterranean civilizations, knowledge of the Mediterranean depths was mainly built from fauna hoisted by fishing nets and sailing techniques. Sounds, long rope lines with a weight attached at its tip, were used from Roman times to measure water depths in shallow regions. By spreading tallow in the weight's base, mariners could recover sediments from the sounded region, which helped them to identify suitable anchoring and fishing grounds. As sailing across the Mediterranean Sea required skilled knowledge of its surface winds and coastal relief, Greek experts like Marinus of Tyre (I B.C.E.) already designed nautical and coastal charts.

Marine fauna began to arouse scientific interest late in the 17th C., when the Italian Count Luigi Ferdinando Marsigli adapted an oyster dredge to recover invertebrates from coastal sediments in the Adriatic Sea. The depths, however, remained unexplored: until mid-nineteenth century, the deep seabed was an unreachable region, deemed featureless and devoid of life.

This belief was challenged by the development of underwater telegraphic cables. In 1860, a cable laid at 1,700 meters depth between Sicily and Algeria broke. When engineers recovered the severed section, they found it incrusted with living organisms: an irrefutable evidence that life can thrive in deep-sea regions. Laying submarine cables also fostered the interest for submarine topography. The French *Service Hydrographique de la Marine*, for instance, assessed the laying of telegraphic cables with their hydrographic cruises and depth soundings. The first topographic maps demonstrated that, far from being a vast plain, the seafloor was a geographical region as rich in mounts and valleys as the emerged land.

European nations began to support research on the Mediterranean's seawater circulation to enhance trading routes after the opening of the Suez Canal, in 1869. Backed by the British Government, oceanographer William Carpenter demonstrated the existence of underwater currents, undetectable from the sea's surface, which discharged Mediterranean seawater into the Atlantic Ocean.

Interest on enhancing coastal fisheries prompted the establishment of national marine stations across the Mediterranean from the 1870s. As biologists, physiologists and naturalists got interested in studying marine fauna, so did the public, attracted by compelling narratives like Jules Verne's *20,000 Leagues Under the Sea* (1870). In Naples, the Anton Dohrn marine station was built in 1872 to provide specimens for the city's aquarium, a new kind of space designed to bring the ocean depths closer to the wide public.

The time of submarines: towards a new perception of the deep sea

Submarine prototypes had existed for centuries, but until late 19th C. they were not more than experimental devices. In 1897, Irish inventor John Philip Holland designed the first submarine capable of moving autonomously with an innovative combination of two-motors' system: an electric engine for running undersea, and a gasoline engine for surface navigation. The US Navy commissioned the prototype, while the British Navy adapted its technical specificities to its own fleet. Several navies began to operate with submarines at the onset of 20th C. and, by the outbreak of the First World War, Britain possessed the largest submarine fleet, followed by France, Russia, the United States, and Germany.

Once underwater, submarines had been blind until the development of SONAR systems (Sound Navigation And Ranging). Initially designed to detect icebergs after the Titanic's sinking in 1912, sonar utilize sound waves and acoustical echoes to detect solid bodies underwater – including submarines, torpedoes, and mines; but also marine fauna, the seafloor's relief, and hydrographical features. Of the latter, the discovery of the thermocline in 1930 by American oceanographers was of a pivotal strategic and scientific importance. The thermocline constitutes a boundary layer between superficial and deep, colder water masses, and it reflects sonar signals. Thus, before its identification, submarines could hide from enemy sonars by submerging beneath it.

Military submarines transformed the ocean's depths in theaters for military operations, at the same time that they brought an unprecedented scientific understanding of the oceans as spaces perceptible to human senses, full of sound, movement, and life.

Exploration, exploitation, and conservation: reframing our relation with the sea

From 1945, the search for marine resources hastened around the world. Echo-sounders proved relevant for fisheries research from the 1930s, when marine biologists realized its potential to detect fish schools and study fishes' size and abundance. However, as these technologies brought new knowledge on the oceans' life, the fishing industry's abuse of echo-location devices, larger nets and massive vessels prompted an unparalleled overfishing.

New geophysical techniques allowed the study the seabed's deep geological structure, morphology, and composition, fostering the emergence of continental drift as a new paradigm in geology. They also enhanced offshore oil exploration, a practice that benefited from the invention by American oil companies of the first drilling vessels: ships equipped with an oil rig and cutting-edge navigation systems, prepared to drill deep into ocean floor around the world.

As oil exploration moved from shallower to deeper waters, so did scientific research: in summer 1970, the only scientific drilling vessel, the American *Glomar Challenger*, recovered for the first time rock samples from the Mediterranean's seafloor – penetrating below the seabed twice and a half the height of Eiffel Tower (up to 860 meters). From the analysis of those deep-samples, geologists suggested that the Mediterranean Sea could have become a desert-like basin five million years ago, due to the closing of water-connections with the Atlantic Ocean. However, and despite the common association of salt domes and oil deposits, the extensive prospections carried in the 1960s and 70s concluded that the Mediterranean Western basin was rather poor in profitable oil fields.

As industrial activities increased, so did public concerns on preserving the marine environment. Underwater films starred by Commander Jacques-Yves Cousteau, like *Le monde du silence* (1955), exhibited the underwater space as never before: its colorful fauna, its dark depths, and its ancient shipwrecks; at the same time, they drove attention on the critical need of protecting marine spaces. From the mid-1970s, coastal governments attempted to foster measures to minimize the human impact, beginning by the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, signed in 1976 by coastal nations to jointly prevent pollution from ships, aircrafts, and land sources.

However, in recent years and despite an increasing number of policies to protect the Mediterranean Sea from pollution and over-exploitation, new underwater technologies as ROVs (Remotely Operated Vehicle) have brought us images of the critical state of the deep seabed. In 2019, Italian scientists presented a footage of the Messina Strait's seafloor covered by the densest amount of human litter ever found. In an ironical turn, the same technologies that have allowed us to exploit and enhance our knowledge of the deep Mediterranean, remind one of the main lessons of the Anthropocene: the footprint of human activities is deep even in the most unreachable regions on Earth.

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