

Technologies for exploring and exploiting from the macro to the microscopic resources in marine ecosystems and understanding human interactions.

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Sometimes referred to as the earth's "inner space," the deep sea remains the last frontier on our planet (European Marine Board position paper 22). Although there is no common agreement on "deep sea" definition, if we consider "deep" as that part of the ocean deeper than 200 m the deep sea covers 65 % of the earth's surface area and provides 95 % of its habitable space or biosphere and this vast domain is almost entirely unexplored. For a long time, the deep ocean was thought to be a desert in terms of species diversity but thanks to nearly 200 years of deep ocean exploration we now know that life occurs in all parts of the deep ocean and even beneath the seabed at temperatures ranging from -2 °C to more than 120 °C. The deep sea encompasses many "extremes" compared to more familiar terrestrial or coastal environments, with an average depth of 4.2 km, near total darkness, average temperatures less than 4°C, and hydrostatic pressures between 20 to nearly 1,100 atm (Danovaro et al., 2014). Human activities in the ocean have accelerated rapidly in recent years and recent figures set the EU's blue economy at approximately € 500 billion per year in gross value added. In the past, with the exception of shipping and the laying of trans-oceanic cables, commercial activities have been largely restricted to coastal and shelf seas. However, economic drivers coupled with technology developments mean that existing activities such as fisheries and oil and gas production are moving into increasingly deeper waters. Finally societal and economic pressure are driving the development of renewable energy schemes also from seas and oceans.