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Exploration of sub-marine resources using electromagnetic methods

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Electromagnetic (EM) methods have proven useful to explore the electrical properties of the earth and are a standard geophysical tool in ground and airborne measurements, but less often in marine applications. The electrical resistivity which can be derived from EM data depends on various rock properties, such as porosity, permeability, mineral content, nature of pore-fluid, or presence of hydrocarbons. In this paper we touch three applications of EM methods for marine resource exploration. The first one is the exploration of seafloor massive sulfides which form as a result of hydrothermal activity at mid-ocean ridges. BGR has developed a customized deep-sea EM platform (Golden Eye) which is used in the German license areas for polymetallic sulfide exploration in the Indian Ocean. The second application is the exploration of submarine gas hydrates, a naturally occurring, solid form of compromised methane gas that forms in continental slope sediments, which is considered as a possible future unconventional energy resource. The third one are offshore aquifers that have formed during the last glacial maximum when sea levels have been about 100 m lower than today. Such fresh water aquifers have been identified in shallow sediments up to 40 km offshore from today's coastlines, and are currently investigated as a sustainable water resource in population-rich and agriculture-intensive coastal regions.

Category

Geophysics

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