The self-potential method as a tool for exploring submarine buried ore bodies

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The self-potential method can be traced back in the literature in the nineteenth century as a tool for exploring ore deposits in land environments [1] but now it has been replaced by active electromagnetic surveys. The reason is simple: The self-potential method in land environments takes an effort to obtain reliable data set. The self-potential method, however, has been revived as a tool for imaging subsurface fluid flow associated with volcanoes, geothermal systems, and contaminated aquifers combined with numerical modeling of fluid flow [1].

The self-potential method can be revived as a tool for exploring buried ore deposits in marine environments; though, it has not been used in these environments except for a few exceptions [2,3]. A conceptual model for land environments [4] indicates that a negative self-potential anomaly is expected above an ore body. Our numerical modeling extended to marine enviroemnts indicates that self-potential signals from an ore body several tens of meters below the seafloor is detectable several tens of meters above the seafloor. We report a preliminary result of self-potential surveys conducted in a known hydrothermal field near the Japan Islands.

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