**Deep sea mineral exploration – resources, technology, and technology gaps**

Harald Brekke, Senior Geologist, Norwegian Offshore Directorate

Parts of the seabed over which Norway has jurisdiction (i.e. the Norwegian Continental Shelf (NOC)) host seabed mineral resources in the form of deposits of polymetallic sulphides and ferro-manganese crusts. These deposits occur in the oceanic deep-sea parts of the NOC (1500 – 3500 m depths). This area lies seaward of the shallow shelf area that is underpinned by continental crust basement and hosts the oil and gas resources. In contrast to the oil and gas pools, which are found in the sedimentary rocks at depth in the subsurface, the sulphide and crust deposits are found on the top of the oceanic crust where that is exposed in the seabed surface or overlain by minor amounts of unconsolidated recent marine clays. Internationally, exploration for deep sea minerals have been going on for more than fifty years, but no commercial extraction has taken place so far. The demand for certain metals may, however, lead to such extraction in near future. The exploration for deep sea minerals involves substantial ship- and underwater robot operations to acquire bathymetric, geophysical, and environmental data, and to sample the seabed. In modern acquisition cruises, a suite of various geophysical and electrical data is acquired by AUVs equipped with different kinds of sensors. This suite of data overlaps only to a minor degree with the typical geophysical data acquired for exploration for oil and gas. Moreover, we still lack a method for mapping the mineral resources with an efficiency comparable to that of reflection seismic in oil and gas exploration. However, most of the technology developed for major marine operations by the oil and gas industry may be used and adapted for the seabed minerals activity. An overview of the exploration for deep sea minerals and the role of the existing offshore technology in that respect will be presented.