CIESM Congress Session : Cold seeps and gas hydrates

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Moderator's Synthesis

Methane and other low-molecular-weight gases, such as ethane and carbon dioxide, can combine with water to form ice-like substances at high pressure or low temperature in what are known as gas hydrates. The stability of these compounds is controlled by several factors including pressure, temperature, salinity, and gas concentrations. On a global scale a lot of methane is stored in methane hydrate of the ocean sediments there some principle questions all of global aspects are under discussion: What is the contribution of methane from hydrates as a greenhouse gas to climate? Can we use the methane from the ocean for energy? What is the influence of hydrate dynamics to seafloor stability and landslides at continental margins? How important is the role of methane hydrate for chemosynthetic life?

Gas hydrates have been recovered from shallow sediment cores whose locations are cold seep environments. Typical cold seeps are characterized by chemosynthetic macro-fauna like bivalves (Mytilids, Vesicomyds, Lucinids and Thyasirids), bacterial mats, and or vestimentiferan tube worms as well as by mineral authigenic precipitates (calcite, aragonite and barite). Methane in form of methane hydrate or free gas is oxidized by sulfate through AOM processes. Although larger amounts of chemosynthetic animals are associated in many cases with shallow gas hydrate deposits, gas hydrates in the Mediterranean are only known from mud volcanoes of the Anaximander area. The deep water of the Mediterranean has a temperature of ca. 14°C and high salinity (>38 PSU) which both push the stability of the methane hydrates to much greater water depth than in other oceans of the world. The reason why gas hydrates occur in mud volcanoes of the Anaximander area is probably because water of reduced salinity from deep sources is used for hydrate formation in the chimneys of the mud volcanoes. The stability zone for methane hydrate occurs shallower in the Black Sea because of lower water temperature (ca. 9°C) and lower salinity (ca. 22 PSU). The presentations during the session contributed both to the lower stability boundary of methane hydrates in sediments from the Black Sea. This can be shown by the presence of a bottom simulating reflector in the seismic records or by 3D-seismic images from local areas in the ocean, which are important tools for detecting hydrates in the seabed.

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