



Hydrocarbon gases at eastern Mediterranean mud expulsion structures: origin, migration, and water column expression

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In the eastern Mediterranean a variety of different mud expulsion structures is found on the seafloor at passive and continental margins, all of which appear to have active emission of hydrocarbon gases. The eruptions are thought to be triggered by the overpressure occurring at depth and resulting from excess gas and water pressure. Gas, fluids, and sediments are then mobilized and migrate through the sedimentary column (often via faults), building mud domes.

At all mud structures investigated in the eastern Mediterranean, not only enhanced concentrations of methane, but also of ethane, and propane, have been observed in the sediment, and in the water column. The water column gas plumes extend up to several hundreds of meters above the seafloor and even reach the sea surface. These gas plumes are associated with enhanced light scattering, which can be associated to the release of gas bubbles and/or sedimentary particles. Part of the hydrocarbons may have been altered by (microbial) oxidation.

The signature of the gases that resembles most the initial composition can be found in the deepest core samples. Several of the water column plumes closely resemble these, thereby confirming their direct emission via bubble transport into the water column. On the basis of gas concentrations and isotope composition, a thermogenic origin with a smaller but variable biogenic contribution can be deduced for the hydrocarbon gases at most mud expulsion structures.

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