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Unsaturated and cyclic hydrocarbons in the mud volcanic gases of the Gulf of Cadiz (results of TTR-16)

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Unsaturated homologues are detected at almost all sediments gases. They are interpreted as in situ (microbial) origin and represented by generally ethene and propene. During Training Through Research Cruise year 2006 in the Gulf of Cadiz (TTR-16 Leg-2) head-space gas sampling has been done in order to study detail hydrocarbon gas composition and established their origin. Unsaturated ethane and propane were detected only at the hemipelagic sediments (reference stations and uppermost sediments above mud volcanic deposits) which point to the biogenic origin of these gases. Hydrocarbon gases from mud volcanic deposits mostly consist of methane. However homologues up to pentanes have been detected, retrieved thermogenic gas source. Unsaturated butane (isobutene) has been found in the majority of the samples both mud volcanic deposits and hemipelagic material. At the last case isobutene occurs in much higher content than propene or ethene. Distribution of unsaturated butane concentration is generally decreases with depth, which most probably point to also its microbial origin. But heightened concentration and its occurrence at the mud breccia may suggest origin of isobutene due to microbial degradation of heavy molecular weight thermogenic migrated gas. Unfortunately, up to now there is no isotopic data to prove or refute this concept. Beside this, high amount of butane homologue (most probably cycle-butane) has been detected at all mud volcanic deposits. Its concentration is much higher than sum of all butanes and sometimes propane. It is important, cycle-butane(?) content increases with depth in the mud breccia and almost absents in the hemipelagic deposits, which points to its thermogenic origin. Cycle-pentane has been found only at the Bonjardim, Carlos Ribeiro mud volcanoes and traces at the Soloviev, Semenovich mud volcanoes. Ratio of cycle-C4(?)/cycle-C5 usually less

than 10 and decreases with depth up to 1 generally due to increasing in cycle-pentane concentration. Isotopic study will give much more information about origin of these compounds. Presence in the mud breccia such heavy homologues as butanes, unsaturated and cyclic compounds clear points to the thermogenic origin of these fluids generated from the organic matter of the oil window zone.