Mud Volcanism at the Alboran Sea: Insingts for Oil and Gas Prospecting

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Mud volcanoes in the Alboran Sea formed upon the west Alboran Mud Diapir Province (MDP), from the Spanish to the Moroccan margins. The MDP occupies a major sedimentary depocenter up to 8 km in thickness, and is formed of overpressured shale, including olistostromes from the lowermost sedimentary sequences (Burdigalian to Langhian) in the basin.

MCS reflection profiles demonstrate that initiation of the mud diapirism during the Miocene (between 18 and 9 Ma) matches to processes of widespread crustal extension. Younger stages of mud diapirism (Pliocene to Quaternary) occurred in compressive tectonic context, and proceed with pierced diapirs and subsequent development of extrusive mud volcanism. MSC lines show volcano feeder-channels connected to deeper mud-diapir bodies, so that it is proved that volcanic processes bring up to the seafloor over-pressured material and fluids from more than 5 km deep.

Side-scan sonar data imagine mud volcano morphologies, and high-resolution seismic profiles provide accurate information on volcano's internal structure and host rocks. Different stages of active mud volcanism are punctuated by events of mud-flux activity. The extruded material, in addition to likely fluids and gases, is formed of a mixture of mud-breccias and exotic blocks.

Mud volcanoes appear within pockmark fields, indicating that active fluid discharges (methane seepages?) occurred in the western Alboran Sea. Association of mud volcanoes and pockmarks may be a signal of hydrocarbon migration in the basin. So that the Alboran basin, defined as a gas-prone basin, seems of high potential for oil and gas prospecting. Future survey in the Alboran mud-volcano field will shed light in the nature of fluids and gases producing overpressures at depth that caused the mud volcanism.

Key words: Alboran Sea. Mud-volcanoes. Hydrocarbon potential