



MUD VOLCANOES IN THE ALBORAN SEA: LEARNING FROM OCCURRENCES IN THE WESTERN MEDITERRANEAN

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Recent surveys from the West Alboran Basin (WAB), in the Westernmost Mediterranean, show the occurrence of active mud volcanoes in the sea floor of the Spanish and Moroccan margins. Mud volcanoes build on from the mud diapir province of the WAB and are connected to mud diapir structures, in a region corresponding to the major sedimentary depocenter (up to 7 km in sediment thickness). The diapir province is formed of under compacted shale and olistostromes from the lowermost marine sedimentary sequences early to middle Miocene in age, which overlie the metamorphic basement of the WAB. High-resolution side-scan sonar imaging depicts morphology of mud volcanoes and high-resolution seismic profiling recognizes their internal structure. Multi-channel seismic reflection demonstrates that volcano feeder channels are rooted in deep diapir bodies. The extruded material has been sampled in and around craters of cone-shaped volcano by coring and grabbing. Regional tectonic was the main triggering mechanism for mud diapirs and volcanoes. Distinct stages of active diapirism and volcanism are punctuated by events of mud-flux activity and over pressured material rise, stepping forward from the middle Miocene to Present. Mud diapirism matches to processes of widespread crustal extension during middle and late Miocene (between 18 and 9 Ma), being linked to low-angle normal faults and concurrent tectonic subsidence in the basin. Major diapiric structures are consistent with the W-SW-directed extension disturbing the basin at those times. The younger stages of diapirism (Pliocene to Holocene) proceed with piercing diapirs and mud volcanoes. Actual or sub-actual active mud volcanoes result from latest rising through piercing diapirs, mainly along faults. Mud volcanoes extrude olistrotrome material form the older and deeper sediments in the basin, in addition to mud-breccias and fluids, from

more than 5 km depth. Pliocene to Present mud diapirs and related mud volcanoes build up meanwhile the WAB is under sub meridian contraction and roughly E-W transtension. Mud-volcano features in the Alboran Sea are comparable to those shown in the Gulf of Cadiz and in the Mediterranean Ridge, but illustrate occurrence and evolution in a different tectonic setting. Mud volcanism in the western Mediterranean Sea represents a case of active sediment-and-fluid flows in a back-arc basin instead of in accretionary prism domains.