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Origin of Fluids and Salts at Mercator Mud Vulcano, Gulf of Cadiz

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The Gulf of Cadiz is located at the plate boundary between the Eurasian and African plates and is characterized by widespread mud volcanism all along the continental margins. It is commonly believed that this results from sediment dewatering enhanced by the compressional forces within the accretionary prism. Recently, 3D seismic data and geochemical sediment cores indicated that in addition to compressional tectonics, halokinesis controls the location and dynamics of the Mercator mud volcano (MMV). The MMV is located in the El Arraiche mud volcano field offshore Morocco at a water depth of 350 m and was one of the main target areas of recent HERMES cruises with the RV MERIAN and RV JAMES COOK. During both cruises fluid flow and gas ebullition were observed. The acquired seismic and geochemical pore water data are best explained by the existence of a shallow rising salt diapir possibly playing a major role as driving force for the mud volcanism. In a number of cores collected at the center of the MMV, both, gypsum and halite crystals of several cm-size have been found. A detailed geochemical and mineralogical analysis of the minerals suggests that these crystals ascended as clasts within the mud matrix. These evaporates are likely of Triassic origin and might be connected to the salt province 500 km further south on the Moroccan Margin, thus suggesting, that the Moroccan salt province extends this far to the north. Further to the halokinesis, the geochemical analysis of the pore fluids and mineralogical measurements on the sediments provide information about diagenetic processes at greater depth and the origin of the fluids and mud matrix. Regarding the fluids, the enrichment in Li and B indicates a deep fluid source from mineral dewater-

ing reactions at elevated temperatures (>150 ˚C).