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ACOUSTIC IMAGES OF MUD VOLCANOES IN THE SOROKIN TROUG, BLACK SEA

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The Sorokin Trough (Black Sea) is characterized by diapiric structures and compressional tectonics that facilitate fluid migration to the seafloor. Abundant mud volcanoes and near surface gas hydrate occurrences were identified in this area. We present acoustic images of the mud volcanoes in the Sorokin Trough, which we collected recently with a variety of different seismic and acoustic imaging systems. The internal structure of the mud volcanoes and the surrounding sedimentary deposits were studied with multichannel seismics and the Parasound sediment echosounder. The Parasound system allows to resolve the upper tens of meters with a sub-meter resolution, while the multichannel seismic data reveals information of the deeper subsurface and the feeder channels of the mud volcanoes. Morphological information of the mud volcanoes was gathered by means of deep-tow side-scan sonar and swath sounder systems.

Several mud diapirs and diapiric ridges mainly striking in a WSW-NEN direction were identified on the seismic sections. Mud volcanoes are located above or on the edges of these near surface diapirs and diapiric ridges. Their feeder channels, imaged as transparent zones on the seismic records, originate from the mud diapirs. Three different types of mud volcanoes can be distinguished: cone-shaped, flat-topped, and collapsed. The mud volcanoes have diameters of up to 2.5 km and heights of up to 120 m above the surrounding sea floor. Most of the acoustic images will be from Dvurechenskii mud volcano, a flat-topped and very active mud volcano in the Sorokin Trough. Mudflows imaged by the side-scan sonar are visible on the flanks of this and other mud volcanoes.

Despite the known near-surface occurrences of gas hydrates, bottom simulating reflectors were not present in our acoustic images, but bright spots - indicating free gas - were identified in the approximate depth of the base of the gas hydrate stability zone. Pronounced lateral amplitude variations in the Parasound data may indicate the occurrence of near surface gas hydrates and/or carbonate crusts.