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New Seep Sites along the West-African Passive Margin Identified from Seismo-Acoustic Data

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Recent and ongoing venting activity is documented offshore West Africa by large pockmarks, as has been observed by previous marine expeditions along the continental margin (e.g. Meteor Cruises M47/3 and M56). In summer 2008, an interdisciplinary campaign was carried out in cooperation between the MARUM Center for Marine Environmental Sciences in Bremen and IFREMER, Brest. The main scientific goal of the cruise was to assess the influence of different geological settings on the nature of venting and related features.

Multi-frequency seismo-acoustic tools including swath bathymetry, sediment echosounder, flare imagery, and high-resolution multichannel seismics were utilized within the scope of geophysical studies for investigating the distribution of seep structures and associated subsurface feeder systems. Observations confirm a widespread occurrence of pockmarks along the continental margins of Gabon, Congo and Angola in deep water. Spatial surveys have further shown that venting-related features are present on different scales, particularly with sizes of tens of meters in diameter and topographical expressions on the meter scale. While these structures seem to be related to relatively shallow gas reservoirs, larger ones reveal roots to gas reservoirs in several hundred meters below the seafloor. At some sites, gas flares of a few hundred to over a thousand meters height could be identified within the water column.

Comparing target areas north and south of the Congo Canyon, it has become evident that different driving forces and sedimentary and tectonic boundary conditions may be responsible for fluid venting and its distribution. While in the north, a thick sediment cover restricts seepage to selected zones of weakness and higher permeability, salt diapirism in the south is massively fracturing overlying sediments, creating numerous promising morphological features at the seafloor. However, only a few active vents could be found in the area of salt diapirism.

Future work will particularly focus on the details of seep systems, the comparison with site-specific information from coring and video surveys and the integrated interpretation of the acoustic and seismic data sets.