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Seismic imaging and origin of fluid flow structures in the Kwanza Basin, offshore Angola

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Recently acquired, high resolution, three-dimensional seismic data in the Kwanza Basin has shown the widespread occurrence of past and present fluid flow phenomena along the central part of the Angolan continental margin, complementing numerous studies in the Lower Congo Basin to the north.

Bathymetry within the study area is dominated by the presence of large topographic highs associated with salt tectonics, as well as the extensive occurrence of seabed fluid flow structures such as pockmarks, mud volcanoes and seafloor mounds.

Located within the contractional domain, salt re-mobilization into salt diapirs and salt nappes causes large heterogeneity within the sedimentary basin fill. The presence of salt diapirs is generally associated with seal bypass systems characterized by the occurrence of fluid flow features such as mud volcanoes and seafloor mounds, as opposed to salt nappes over which both the overburden and seafloor appear featureless.

In addition to focused fluid flow pathways, the presence of highly conductive salt structures produces local variation of the regional geothermal gradient. Thermal variation within the overburden plays an important control on the base of the gas hydrate stability zone, as shown by the occurrence of bottom simulating reflections (BSRs) occurring progressively shallower, up to depth very close to the seafloor when directly overlying salt diapirs.

The presence of past and present fluid flow phenomena within the Kwanza Basin brings new insights into to the occurrence and intensity of fluid flow phenomena along the Angolan continental margin, in particular gas hydrate dynamics and focused fluid flow pathways associated with salt deformation.