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Implications of Regional Faults to Mud Diapirs Formation in a Failed Rift Basin, Recôncavo Basin, Brazil

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Introduction

Mud diapirs are frequently found in convergent settings where the compressional stress makes the environment conducive to the rise of these structures. Nevertheless, in extensional settings, their occurrence is minor, leaving a gap for discussions related to their formation models. Mud diapirs are found in the Recôncavo Basin, an onshore rift basin in Brazil with NE-SW trend, half-graben geometry and NW-SE transfer faults that segment it into three regional sectors: south, central and north.

Method and/or Theory

To understand the geometry and evolution of those structures, two 3D seismic comprising 300km² and ten well data covering the deep basin were used to geomorphologically characterize the mud diapirs and investigate their correlation with the structural and morphological aspects of the basin.

Results and Conclusions

After seismic interpretation and well correlation, four mud diapirs were identified: Diapir 1 trends N-S having a ridge geometry and positioned above deep pre-rift faults, however, not following their trend; Diapir 2 trends NW-SE having a ridge geometry, following the same trend of the transfer faults, but localized 10 km away from them. Diapir 3 has oval shape geometry and is positioned above the deep pre-rift faults in a separated step in the faulted border. Diapir 4 trends NW-SE but is broadly influenced by a large listric fault generated in the rift section. By investigating the relationship between mud diapirs and structures our study suggests that: 1) the deep rift faults activity seems to have initiated the diapiric movement but does not have direct control in the evolution and 2) The loading gradient from the flexural border to the deep basin may be a secondary mechanism of mud diapirs formation in rift basin. Those results can provide insights into the rising mechanism of mud diapirs in an extensional setting.