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Salt morphologies and crustal segmentation relationship: new insights from Western Mediterranean Sea and other salt passive margins

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Salt tectonics at salt-bearing margins is often interpreted as the combination of gravity spreading and gravity gliding, mainly driven by differential sedimentary loading and margin tilting, respectively. Nevertheless, in the Western Mediterranean Sea, the classical salt tectonics models are incoherent with its morpho-structural setting: the Messinian salt was deposited in a closed system, formed several Ma before the deposition, horizontally in the entire deep basins, above a homogenous multi-kilometre pre-Messinian thickness. The subsidence is purely vertical in the deep basin, implying a regional constant initial salt thickness, the post-salt overburden is homogenous and the distal salt deformation occurred before the mid-lower slope normal faults activation. Instead, the compilation of MCS and wide-angle seismic data highlighted a clear coincidence between crustal segmentation and salt morphology domains. The geometrical variation of salt structures seems to be related to the underlying crustal nature segmentation. Regional thermal anomalies and/or fluid escapes, associated with the exhumation phase, or the mantle heat segmentation, could therefore play a role in adding a further component on the already known salt tectonics mechanisms. The compilation of crustal segmentation and salt morphologies in different salt-bearing margins, such as the Santos, Angolan, Gulf of Mexico and Morocco-Nova Scotia margins, seems to depict the same coincidence. In view of what is observed in Western Mediterranean Sea, the heat segmentation influence in the passive margins should not be overlooked and deserves further investigation.