The Tapered Wedge Theory as Applicable to the Northern Gulf of Mexico: Benefits and Limitations

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ABSTRACT

The tapered wedge theory is often expressed through the image of a bulldozer accumulating sediments in front of the advancing blade. As the sediments reach maximum build-up, they can "escape" by over-topping the blade and also sliding underneath the blade and be over-run by the bulldozer. This tectonic model was initially applied to subduction zones with the approaching oceanic crust as the mechanism to deliver sediments. Later, the tapered wedge theory was proposed as an explanatory mechanism to "dynamic" passive margins such as the Gulfs of Mexico and of Cadiz. There the dynamic elements are the salt and crustal blocks, respectively, which serve to "gather" sediments into the wedge by their advancing.

As applied to the Gulf of Mexico, the tapered wedge is an interpretational artifice that simplifies a dynamic continental margin into a single geologic unit. A difference from the subduction wedge is the fact that the continental wedge does not apparently lose incorporated sediments. The gulf wedge from N to S is bisected by fault systems from the state line faults, the shelf-break growth faults, fault patterns within the underlying salt and margin-wide breaking by salt tectonics that weaken the structural integrity of the wedge itself

The entire continental margin may be intermittently subsiding downslope, sediments within the tapered wedge are compressional and extensional from internal stresses and mass-wasting on all scales from regional to local. Interaction(s) between tectonics and sediment dynamics along with hydrogeology play key role(s) in evolution of the margin.

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