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Proposed Thin-Skinned Tectonics Along Basement of Gulf of Cadiz Continental Margin Enhances Petroleum Potential

The continental margin of the Gulf of Cadiz has experienced a complex geologic history since Jurassic continental rifting. Plate convergence between NW Africa and the Iberian Peninsula caused the Alboran Platelet/Domain, underlying the Alboran Sea, to be involved in a westward tectonic escape movement of cerca 100 km. The migrating platelet oversteepened the Cadizian continental margin, causing extensive Neogene mass-wasting across the slope, rise, and abyssal plain.

The Alboran Platelet movement apparently caused the continental, transitional, and oceanic crust beneath the Cadizian margin to migrate westward also. Crustal blocks from depths of 15-25 km deep were converted into thrusts moving laterally some 100 km. These thrusts are suggested here caused the creation of thin-skinned tectonics with the thrust blocks moving to the west. The various thrusted slivers would successively over-ride accumulated sediments. With thin-skinned tectonics within the basement as a possible regional tectonic model containing sediment wedges, the total sediment accumulation along this preliminarily explored margin could be multiples greater than published estimates.

Using a geothermal gradient of 25*C/km (measured in wells along the shelf offshore from Cadiz) for the entire continental margin, temperatures would be 375*C to 625*C at sub-crustal depths of 15 and 25 Km. These warmed rocks transport heat to the sediments above and below the thrusts, causing hydrocarbon generation. The thin-skinned tectonic model proposed here, while speculative, is geologically reasonable. Should this model be verified, the petroleum potential of the Gulf of Cadiz is enhanced, suggesting serious regional exploration.