

TECTONICS OF GULF COAST SALT DOMES

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ABSTRACT

In the immediate past the maximum growth rate of salt domes in the Gulf Coast Salt Dome Province appears to have been about one foot per century. The oldest domes are the more interior domes and youngest are those on the outer continental shelf. A youth-maturity-old age cycle of growth is suggested. It seems doubtful if salt domes can be started under uniform static load alone, that is without some triggering action. The triggering action which starts salt movement is postulated here as the deformation, including folding, several types of faulting, etc., which takes place between the forward moving edge of the down warping lens of sediments of the Gulf Coast geosyncline and the less down warped, less sedimentated area beyond. The maximum of this deformation is postulated as being located under the forward or deeper portion of the continental slope. After salt movement starts in this zone, and differential static load is developed due to the upwelling of salt under compressional forces, further upward movement of the salt continues because of the difference in static load around and over the elevated salt mass. This differential reaches a maximum as the continental slope moves forward by sediment deposition or filling and the salt mound comes to a location under the newly deposited continental shelf. The growth rate ultimately slows to the pace of the interior domes. By this hypothesis the variation in the age of the domes, a triggering mechanism, and a means for continued growth is postulated for all the domes of the area.

Local unconformities, off dome stratigraphic divergences, etc., in the sediments associated with domes can be explained by either one of two postulations. These two postulations are, a. pulsation in the upward movement of salt, and b. variation in the rate of sedimentation. Only one variable is necessary to account for these unconformities, etc. Either a or b could cause the local unconformities, etc., but the preponderance of evidence indicates that the variation in the rate of sedimentation is responsible rather than pulsation in salt growth rate. A changing of location in the deep supply of movable salt, due to differential salt drainage into the salt plugs, may result in a shifting of the areal location of the upthrust of salt. However, once the salt movement starts under differential static load the movement accelerates or decelerates gradually and not by pulsating movement. The supply of salt may become exhausted or the resistance to upward growth may become too great for continued upward movement and thereby terminate the active life of the dome.

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