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# Persian Gulf Analogs for the Permian Strata of Southeastern New Mexico and West Texas

The modern deposits of the western and southern margins of the Persian Gulf (also known as the Arabian Gulf) have long been successfully used as analogs for arid-region deposits in the geologic record. The very low rainfall and moderate to high evaporation rates in the region, coupled with the presence of a shallow, largely landlocked seaway, make it rather unique in the modern world. As a result of these climatic and physiographic factors, this area has some of the world's best examples of mixed carbonate-clastic-evaporite sedimentation as well as extensive diagenetic dolomite formation. Both make the region an oustanding analog for the Permian Basin.

Most published works have focused on the well-studied windward coastline of the United Arab Emirates (the Abu Dhabi area) and present a simple progradational sedimentation model involving lagoonal, tidal flat and supratidal sabkha deposits. However, the region includes a more complex variety of models, including ones from leeward and wind-parallel margins (as noted in two short papers by Shinn in 1973). On leeward coastlines, migration of aeolian dunes into the sea has led to formation of massive offshore terrigenous sand bodies. These sand bodies will continue to grow only as long as dune sand supply remains available, but sea-level rise has cut of terrigenous sediment resupply in areas such as the Qatar peninsula. Thus, the marine sand bodies will eventually become encased in marine carbonate sediments. On wind parallel margins, longshore drift produces a series of elongate spits that become encased as shoestring sands in tidal flat and sabkha sediments.

Even the windward Abu Dhabi model has far greater temporal complexity than is normally presented. Growth of barrier islands and tobolo spits has led to changes of dominant shoreline environments from wave-dominated beaches to tidal flats. The fixed location of the barrier island cores, coupled with the growth of probable future barriers on offshore banks imposes a built-in autocyclicity to facies evolution in this area.

These regional (wind-controlled) and temporal variations add diversity to the types of plays that can be modeled in arid settings and are an excellent match for the diversity of field types found in circular basins with a dominant wind direction, including the Permian, Williston, and Michigan basins.