the arc toward the chord. Many interpret this as evidence of external compression.

A Permian basin model can explain many diverse and, to many geologists, unrelated structural and stratigraphic phenomena. If this model is correct, it may mean that many other aborted rift systems are not being properly described. The North Sea is a case in point.

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Depositional Controls on Production in San Andres Stratigraphic Traps, Southeastern New Mexico

The San Andres Formation of Permian age (late Leonardian–early Guadalupian) is the most prolific producer of hydrocarbons within the Permian basin. The Levelland-Slaughter trend, located in the northwestern shelf province, is a series of east-west-trending fields characterized by stratigraphically controlled, updip porosity pinchouts from porous dolomites to nonporous dolomites and evaporites. Equivalent facies crop out in Chaves and Lincoln Counties, New Mexico.

Outcrop study and examination of subsurface data from shallow pay zones within the Diablo, Linda, and Twin Lakes fields, indicate that a variety of high- and low-energy subtidal facies serve as reservoirs. These include (1) oolite packstones and grainstones, (2) wispy-laminated crinoid wackestones, (3) fossiliferous wackestones, and (4) ripple-laminated pellet grainstones. These facies were deposited as a mosaic in channels, lagoons, shoals, and shallow open-marine environments. Vertical and lateral facies relationships are therefore highly variable and play a major role in reservoir heterogeneity.

Secondary porosity is wholly responsible for oil production, although the depositional setting controls its type and abundance. Intercrystalline porosity is characteristic of the mud-rich facies and is crucial for economic production. Sucrosic textures associated with coarse crystalline dolomite and large intercrystalline pores provide the highest production potential. Moldic porosity is characteristic of the oolitic and fossiliferous facies, but pores are disconnected and only marginally productive unless combined with fractures.

Producing intervals are sealed by tight dolomite mudstones and a thick (5-10 ft), laterally continuous bed of nodular mosaic anhydrite. Unequivocal evidence for supratidal sabkha deposition of this lithofacies is absent. The location of the sealing anhydrite and the presence of high intercrystalline porosity in the underlying subtidal facies are the most important factors determining San Andres production.

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Mesozoic Stratigraphy of Canadian Arctic Archipelago and Implications for Opening of Amerasian Basin

Mesozoic strata in the Canadian Arctic archipelago occur mainly in the Sverdrup basin where the succession is up to 9 km thick. The strata consist of alternating sandstone-dominant units and argillaceous intervals and record 25 regional transgressions and regressions. These resulted from the interplay of sedimentation, tectonics, and eustatic sea level changes. Subaerial unconformities occur on the basin margins and disappear basinward. Most of these unconformities are interpreted to be the product of eustatic sea level fall on the basis of correlation with global sea level charts. However, unconformities of latest Aalenian, late Callovian, Hauterivian, and Coniacian ages are interpreted to be related to tectonic activity and the formation of the Amerasian basin.

Normal faulting and basic dike and sill intrusion occurred in the Sverdrup basin from Middle Jurassic to early Late Cretaceous. The latest Aalenian and late Callovian unconformities probably reflect early rifting events. Hauterivian uplift was widespread and coincides with the final phase of rifting and initiation of sea-floor spreading in the Amerasian basin. Marine onlap across the breakup unconformity began in Barremian time and by Albian much of the Arctic archipelago had been transgressed.

Basalt flows are intercalated with Barremian to Turonian strata in the northeastern Sverdrup basin and represent the cratonward extension of the Alpha-Mendeleyev volcanic ridge, which was active during the opening of the Amerasian basin. Coniacian uplift coincided with the cessation of volcanism in the Sverdrup basin and of sea-floor spreading in the ocean basin to the north.

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Evaluation of Direct Hydrocarbon Indicators Through Comparison of Compressional- and Shear-Wave Data: Case Study of Myrnam Gas Field, Alberta

A recent paper documents a new method of evaluating bright spots or other direct hydrocarbon indicators (DHIs). The technique involves the qualitative comparison of compressional (P)-wave and shear (S)-wave[1] seismic data. In practice, such a comparison offers a viable means of evaluating DHIs previously observed on P-wave data. The application of SH-wave seismic data for evaluation of DHIs was documented with a case study of P- and SH-wave data from the Putah Sink field of central California. As a second case history, this paper presents an interpretation of P- and SH-wave seismic data from the Myrnam field of Alberta.

Shear waves differ from compressional waves in both the direction of particle motion relative to the direction of wave propagation and in the rock properties that control the wave velocity. A P-wave is an elastic wave in which the particle motion is perpendicular to the direction of wave propagation. Because of this relationship between P- and S-waves, the velocities of the two are functions of different rock properties.

Consideration of the elastic properties that control the velocity of P- and S-waves in a rock indicates that P-waves are sensitive to the type of pore fluid present within a rock whereas S-waves are only affected slightly by changes in fluid type. Thus, if the presence of gas within a reservoir rock gives rise to an anomalous seismic expression on P-wave data, a DHI, there will be no comparable expression on S-wave data. However, a P-wave anomaly generated by a lithologic feature, a false DHI, will have a corresponding S-wave anomaly. One consequence of this relationship is that it is possible to evaluate the potential of P-wave DHIs through a comparison of P- and S-wave seismic data recorded over a prospect.

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Eolian Paleotopographic Highs as Stratigraphic Traps: Origin and Distinction

Significant hydrocarbon accumulations occur where eolian paleotopographic highs are preserved beneath transgressive marine deposits. Paleotopographic highs can represent erosional remnants of an unconformity, or partly preserved eolian dunes, or combinations of both. Paleotopography reflects the extent of modification undergone by eolian units prior to or during transgression. Modification varies between extremes of (1) destruction—where eolian deposits are deeply eroded and the former dunal profile is lost, and (2) preservation—where dunes and interdune areas are preserved nearly intact. The extent of modification that occurs during transgression is controlled primarily by (1) the energy of the transgressing sea, (2) the speed of transgression, and (3) the abundance of sand-stabilizing early cements or plants. High-energy seas destroy dunes through persistent erosion by tides and waves and by initiating dune collapse and mass flowage of dune sands. Preservation occurs where quiescent seas flood interdune areas and create shallow to periodically emergent marine environments, such as interdune sabkhas or tidal flats. Gradual filling of interdune areas with shallow marine sediments can fortify and preserve adjacent dunes. These varied processes that interact between marine and eolian environments to create different types of topography are exemplified in ancient eolian-marine sequences of the Western Interior of North America, and preserved Holocene dunes of coastal Australia. Different types of eolian highs can be recognized by analysis of bounding surfaces in outcrop or core. An understanding of eolian-marine processes and environments that create topography allows for prediction of areas of potential stratigraphic traps.

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Preserved Aragonite Cements in Miocene Coral Reefs: a Record of Messinian Salinity Crises in Mediterranean

Layers of fibrous aragonite cement up to 2 cm thick, developed on aragonitic corals and micritic cements, occur in outcrops of Miocene coral reefs in western Sicily. These aragonitic fabrics show only minor amounts