channel deposit for the Upper Devonian Speechley sandstone in Cherryhill field in west-central Pennsylvania. Isopaching indicates the channel trend, showing the geometry of the sand body perpendicular to basin contouring. Cross sections document a downcutting erosional contact with the underlying marine shales. Using a lithologic time correlator above the sand and the erosional basal contact, a GIS map shows that maximum reservoir development coincides with the central channel axis. Thus, the isopach and GIS maps are essentially identical; both confirm the channel trend.

Bedding characteristics, sedimentary structures, and petrology, from 59 ft (18 m) of conventional core, also suggest a turbidite channel. Bedding is predominately massive, and is comprised of incomplete Bouma sequences. Grain size decreases upward. Porosities which average 8%, and permeabilities, which are generally less than 1 md, were reduced by silica and carbonate cements and clays bridging pore throats. Sedimentary structures include shale clasts, erosional basal contacts, and bioturbation.

The combination of various mapping techniques and core interpretation suggest a turbidite channel origin for the Speechley sandstone. This approach may permit predictions for field development and exploratory drilling.

GROAT, C.

Gulf Coast Geopressured Geothermal Resources: The Hard Facts

(No abstract available)

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Geological Constraints on Models for the Late Jurassic–Early Cretaceous (Wealdian) Longroño-Soria Strike-Slip Basin (Northwest Spain)

The Longroño-Soria basin was formed between N60°E-striking, left-stepping, left-lateral strike-slip faults during the Late Jurassic–Early Cretaceous (Wealdian), when as much as 6 km (20,000 ft) of fluvio-deltaic strata accumulated in it. During basin development, the ends of the master faults propagated, increasing fault length and offset. Outside the basin, compressional deformation with superimposed folding was induced near the ends of the master faults. At the same time within the basin, normal faults and depocenters migrated in a direction opposite to that of the propagating master faults. The resulting extension allowed a N130°E-trending, 50-km (31-mi) wide, synsedimentary syncline to develop in the basin fill. This syncline was related to formation of a half graben in the basement. The high rate of subsidence and the high heat flow led to a sequential development within the sediments of water escape structures, hydroplastic-type compaction-related microfaulting, pseudocleavage, and metamorphism—420°C (788°F), 1–2 kb, 100–150°C/km (5.5–8.25°F/mi) gradient.

Our interpretation of the geometry, sedimentation, tectonics, and thermal evolution of the Longroño-Soria basin is based upon 2 mathematical models of strike-slip basins and one analogue model: (1) Rodger's calculations predicting vertical deformation, stress accumulation, and secondary faulting; (2) an unpublished finite element method by Liu that gives stress deviation and accumulation patterns; and (3) microtectonics, which provide a model for stress deviations at the tip of the microfaults and for the geometry of deformation during micro-rhombgraben development. The 3 models show comparable fault geometry and stress patterns, and fit our data from the Longroño-Soria basin.

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Deposition, Diagenesis, and Porosity Relationships in the Glorieta Formation, Keystone (Holt) Field, Winkler County, Texas

Production of hydrocarbons from the Chevron 7C H. E. Lovett well, Keystone (Holt) field, is from the upper part of the Glorieta formation (Leonardian). The field is located near the western margin of the Central Basin platform (Permian basin) on a present-day structural high.

The 116-ft (35.4-m) core contains at least 7 cycles of deposition, which consist, upward from the base, of progradational subtidal, intertidal and supratidal deposits. Supratidal deposits predominantly consist of dolostones with fenestral cavities; sabkha deposits are not represented. Scattered nodules of nonevaporitic anhydrite have been emplaced within subtidally deposited carbonates after dolomitization. Intrabiopelgrapestone grainstones, oointrabiopelgrainstones, intrabiopelpackstones and wackestones, and intrapelpackstones and wackestones are the predominant lithofacies. Dolostone is the predominant lithology.

The cored interval was exposed subaerially several times, and episodes of freshwater diagenesis were interspersed with influxes of dolomitizing and anhydritizing fluids. Most dolostone intervals record the following five stages of diagenesis: (1) early dolomitization; (2) emplacement of nonevaporite anhydrite as cement, replacement or a combination of both; (3) dissolution of anhydrite; (4) precipitation of dolomite cement; and (5) emplacement of second generation anhydrite as cement and replacement. Some intervals contain additional stages of diagenesis including precipitation of the clay mineral dickite and calcite as cements.

The core contains many highly porous dolostone intervals, and 9 distinct pore types are preserved. These include primary intergranular, fenestral, and intrabiotic voids; secondary intercrystalline pores; hollow micrite envelopes; biomolds, oomolds and fractures; and tertiary anhydrite molds. The most abundantly represented pores are secondary intercrystalline and tertiary anhydrite molds.

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Hydrocarbon Maturation in Laramide Basins—Constraints from Evolution of Northern Big Horn Basin, Wyoming and Montana

Thermal and mechanical models were used to quantify the effects of Laramide uplifts and subsequent synorogenic deposition on the hydrocarbon maturation of Cretaceous source rocks in the Big Horn basin. Laramide deformation and resultant sedimentation has clearly affected hydrocarbon maturation of Cretaceous source rocks (Thermopolis, Mowry, Frontier, Cody). Modified Lopatin-type reconstructions suggest that a significant region containing Cretaceous source rocks has been within the liquid hydrocarbon window. The earliest onset of hydrocarbon maturation in the northern Big Horn basin was latest Eocene, with some regions still containing immature Cretaceous source rocks as a consequence of Cenozoic erosion, uplift of the Pryor Mountains, and lack of burial.

Regional geologic features indicate that the basin formed as a result of flexural compensation of an elastic lithosphere during emplacement of the Beartooth and Pryor Mountains, and possibly the Absaroka volcanics. This was determined by 2-dimensional models which predict sediment thicknesses caused by tectonic loading and subsequent sedimentation. Flexural rigidities of 10^{21}–10^{22} newton-meters adequately explain flexural subsidence in the northern Big Horn basin.

The present basin configuration also was compared with a theoretical profile based on geologic constraints. Subsidence models for the present basin profile suggest that Paleocene thrusting of the Beartooth block contributes a majority of the tectonic loading and that Cenozoic erosion has drastically affected the resultant sedimentary sequence (Fort Union and Wasatch). These models, along with stratigraphic reconstructions, can be combined to pinpoint areas of potential hydrocarbon maturation within Laramide-type basins.

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Energy in the Reindustrialization of America

America's future industrial growth will depend on our energy growth, and energy growth depends on the choices we make today. In the petroleum exploration industry our choices are based as much on energy and economic analyses and forecasts as they are on geologic factors. The theme of this convention, "Energy, Economics, Exploration—in Transition," is most timely, for these elements are truly in transition now more than ever before in the petroleum industry's history.

Of critical importance is the role of energy in the reindustrialization of America. Energy supply, in whatever form of fossil fuel or alternate