

the Bohai Basin, northern China (Allen, MacDonald, Xun, Vincent, and Brouet-Menzies).

The section on Oblique Convergence Zones consists of eight scientific papers which address processes of transpressional deformation in a variety of geologic environments scattered across several continents. Topics include the Precambrian transpressional tectonics of southeast Brazil (Ebert and Hasui), stress rotations during transpression in the Western Carpathians and Southwest British Variscides (Gayer, Hathaway and Nemcok attempt to distinguish between primary stress-trajectory deflections versus later rotations of paleostress vectors), Hercynian dextral transpression in the Pyrenees (Gleizes, Leblanc, and Bouchez), Late Cretaceous compressive deformation in the Bohemian Massif, Germany (Tanner, Behrmann, Oncken, and Weber; this study incorporates constraints from a nearby 9 km-deep borehole), pure-shear dominated transpression, Ellsworth Mountains, Antarctica (Curtis documents kinematic partitioning related to pre-existing structures), Karakoram fault zone, northern Ladakh (Searle, Weinberg, and Dunlap challenge models of large-scale extrusion of Tibetan crust), Quaternary deformation along Pollino Ridge, southern Italy (Schiattarella). Also included in this section is a paper by Saint Blanquat, Tikoff, Teysier, and Vignerresse on transpressional tectonics in magmatic arcs, in which they emphasize the role of “tectonic overpressuring” as opposed to simple buoyancy in the ascent of arc magmas.

Overall the book is clearly and concisely written. There are very few typographical errors. It is grammatically rather homogeneous despite the varied nationalities of the authors. The quality of figures is generally very good, although some line drawings and maps are rudimentary and could have benefited from more careful design and execution. Color figures are included in two papers.

Special Paper No. 135 is clearly intended for structural geologists and tectonicists. I would have preferred, however, to see a somewhat more multidisciplinary approach to the broad subject of transpressional and transtensional tectonics. Only two papers deal in any detail with related topics (stress, magmatism). The subject of sedimentary tectonics does not go much beyond the rudiments of “basin” and “uplift”. The relatively narrow topical focus of the volume notwithstanding, this is clearly the most definitive treatment of transpressional and transtensional tectonics yet published and belongs in the library of any serious student of these subjects.

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***Structural Geology in Reservoir Characterization*, Coward, M.P., Daltaban, T.S., and Johnson, H. (eds), 1998. Geological Society Special Publication 127. ISBN 1-897799-94-2. List price: \$115/£69.**

Efficient exploitation and management of hydrocarbon reservoirs that are dominated by structural heterogeneities depends largely on thorough technical characterization. Reservoir characterization is the study of subsurface, outcropping, or model geologic bodies that are capable of containing and conducting fluid. It is an applied science, chiefly practiced within the petroleum industry, often requiring integration of diverse data sets from geological, geophysical, and engineering disciplines. The sub-discipline of structural reservoir characterization distantly trails other areas such as stratigraphic and geophysical characterization in application, and therefore this volume is valuable in its timeliness. Its stated aim is to capture the wide range of research within this expanding field and to promote synergy between geoscience and engineering disciplines. To this end, 16 papers are offered covering faulted and fractured reservoirs, development and characterization of fault zones, fluid flow issues, and case studies of application. Included are two introductory papers, ten papers on faults and fractures, and four on case studies. The volume represents the efforts of 43 contributors, two-thirds of whom reside in academic institutions, and the remainder are from petroleum industry technology groups.

This review assesses the contribution of the book within the broad definition discussed above. Its principal weakness is that many of the included papers deal with topics that do not fall within the broadest definition of *Structural Geology in Reservoir Characterization* yet it contains many valuable contributions. I am struck by the fundamental lack of attention given to the integration between geoscience disciplines, which is one of the volume's stated goals. Perhaps this is a testimonial to the condition of the science. Another shortcoming is that it is too provincial (for my tastes). It is primarily authored by U.K. contributors, and its primary application focus is on North Sea reservoirs.

The following is an editorialized description of the volume beginning with the papers that I feel are most valuable. *Fault Seal Prediction: the Gouge Ratio Method* nicely summarizes the fundamentals of damage-related fault sealing processes and their interpretation. *Flow through Fault Systems in High Porosity Sandstones* thoroughly discusses the critical factors that impact flow in faulted, high-porosity sandstones. The discussion of scaling, fault connectivity, and compartmentalization provides background that supplements other papers in the volume. The flow modeling section deals primarily with fault con-

nectivity and is quite thought provoking. *Physical Character and Fluid-Flow Properties of Sandstone-Derived Fault Zones* offers a nice description of deformation band character and their impact on permeability, making it essential reading when dealing with reservoirs of that type. *Assessment of the Effects of Sub-Seismic Faults on Bulk Permeabilities of Reservoir Sequences* serves for completeness within the volume but makes for confusing reading. It treats itself honestly and does offer conclusions that are qualitatively useful. *Curvature Analysis of Gridded Surfaces* contains essential discussions of sampling and gridding as it applies to curvature calculations. Anyone attempting to use morphology as a proxy for deformation to predict reservoir scale attributes should be aware of this work. It is well written and nicely illustrated. *Fracture Distribution in Faulted Basement Blocks: Gulf of Suez, Egypt* describes an outcrop-based study of jointing and faulting in granite. It serves as the only offering in the volume that deals with an unconventional reservoir lithology. It is thoroughly developed and nicely written and illustrated. *Fault and Fracture Characteristics of a Major Fault Zone in the Northern North Sea: Analysis of 3D Seismic and Oriented Cores in the Brage Field (Block 31/4)* describes a core-based structural characterization of a fault zone that attests to the interpretation complexities that must be considered when dealing with well-bore-based data sets. It also provides a useful subsurface analog for deformation of the hanging wall of a curved normal fault. *Structural Geology of the Gullfaks Field, Northern North Sea* offers a detailed sub-regional scale structural characterization and analysis of a suite of normal faults. The paper is an interesting offering in normal fault kinematics and strain prediction from geometric considerations but the application to the reservoir-scale is indirectly treated.

The value of the remainder of the papers within the context of the volume is variable. *The Role of Structural Geology in Reservoir Characterization* provides a nice review of brittle failure phenomena that serves the reader's purposes for the portions of the volume dealing with faulting and fracturing. The role of fluid during deformation is also useful. The paper's shortcoming is that it is an incomplete treatment of its title. What is really needed in its place is a thorough synopsis of the relationship between structural geology and reservoir characterization. *Reservoir Characterization and Modelling: a Framework for Field Development* succinctly outlines recent advancements in field development technology and future needs, from the petroleum engineering perspective, but does little to address the potential impact of structural geology in this area. *Experimental Fault Sealing: Shear Band Permeability Dependency on Cataclastic Fault Gouge Characteristics* is hopelessly entangled in the tech-

niques required to experimentally produce and analyze cataclastic gouge zones and fails to make a strong case for application. The results will find their strongest application in the study of stress-sensitive reservoirs. *Identification and Spatial Distribution of Fractures in Porous, Siliciclastic Sediments* is a review paper with a useful citation list, however, the paper contains a seemingly endless list of generalities that are left unsubstantiated. *Reservoir Characterization: How can Anisotropy Help?* is inappropriately titled, lightly treats a complex topic, and will be of little use to most readers. *Numerical Simulation of Fluid Flow in Complex Faulted Regions* summarizes flow modelling strategies involving faults and describes advanced simulation techniques. While these topics are informative, a more complete survey of flow simulation in complex structural traps would have better suited the theme of the volume. *Strain Partitioning during Flexural Slip Folding* discusses the role of layer-parallel slip during deformation. This paper provides a thorough literature review, is thought provoking, but remains largely hypothetical and provides no tangible recommendations for application. *Polygonal Faulting in the Tertiary of the Central North Sea: Implications for Reservoir Geology* describes the effects of volumetric compaction on reservoir segmentation in North Sea Tertiary Reservoirs. It is quite general in scope but lacks enough specifics to be of general application.

As with compilations of this type there are hits and misses but on the balance I think the book has considerable merit. It would have been greatly improved if the editors had used greater discretion in culling papers that would have had greater significance elsewhere or simply do not serve the purposes of the compilation. In place there would have been room for critical omissions such as deformed carbonate reservoirs, petrographic characterization techniques, the use and application of seismic attributes, and the calibration of deformation metrics for interpolation and extrapolation, and case studies that more thoroughly integrate engineering and geological data.

The audience for the book is any geoscientist concerned with reservoir exploitation, especially reservoirs that are dominated by clastic rocks. But at \$115/£69 a copy I cannot make strong case for individual ownership and I do not envision a fit within any standard graduate-level geoscience curriculum. I strongly recommend that a copy be stocked by all academic institutions and industry applications groups.

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