Fall 2005
Geos 692: Topics in Structural Geology

Fractures, In Situ Stress & Fluid Flow

Friday 9:30 am @ ACRC

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In this seminar, we will read current literature on fractures development in basins, their relationship to *in situ* stresses and the resulting fluid flow patterns. In the process we will try to answer the following questions:

- How and why do fractures develop in flat, basinal sediments?
- What is their relationship to the in situ stresses in a basin?
- What controls the in situ stress state within a basin?
- How might fractures and in situ stresses affect fluid flow within a basin?

Instructor:

Cathy Hanks: NSF 346, x5562, chanks@gi.alaska.edu
Office Hours: Tuesday, 9:30-11 am

Readings

Journal articles will be assigned each week for the following class.

Attendance & Grading Policy

While this is a Pass/Fail course, the seminar will only be successful if everyone comes prepared to discuss the assigned paper. Please make your best efforts to do so. Your grade will depend upon the quality of your participation in discussions and attendance.

Day	Topic
Sept. 9	Organizational meeting
Sept 16	Lorenz, J. C; Teufel, L. W; Warpinski, N. R, , 1991, Regional fractures; I, A mechanism for the formation of regional fractures at depth in flat-lying reservoirs: AAPG Bulletin, vol.75, no.11, pp.1714-1737.
Sept 23	Engelder, Terry; Fischer, Mark P, 1996, Loading configurations and driving mechanisms for joints based on the Griffith energy-balance concept: Tectonophysics, vol.256, no.1-4, pp.253-277.
Sept 30	Lacazette and Engelder, 1992, Fluid-driven cycle propagation of a joint in the Ithaca Siltstone, Appalachian Basin, New York in B.

	Evans & T. Wong, eds., Fracture Characterization and Physical Properties of Rock, Acad. Press, San Diego, CA, United States (USA). pp. 297-323.
Oct. 7	Lorenz, J. C; Sterling, J. L; Schechter, D. S; Whigham, C. L; Jensen, J. L, 2002, Natural fractures in the Spraberry Formation, Midland Basin, Texas; the effects of mechanical stratigraphy on fracture variability and reservoir behavior: AAPG Bulletin, vol.86, no.3, pp.505-524.
Oct 14	Bell & Bachu, 2003, *In situ* stress magnitude and orientation estimates for Cretaceous coal-bearing strata beneath the plains area of central and southern Alberta: Bulletin of Canadian Petroleum Geology, vol. 51, no. 1, pp. 1-28.
Oct 21	Yassar and Bell, 1994, Relationships between Pore Pressure, Stresses, and present-day geodynamics in the Scotian Shelf, Offshore eastern Canada
Oct 28	Lorenz, 1999, Stress sensitive reservoirs: SPE 50977. Connolly, P., and Cosgrove, J., 1999, Prediction of fracture-induced permeability and fluid flow in the crust using experimental stress data AAPG Bulletin, vol.83, no.5, pp.757-777.
Nov. 4	Cosgrove, J.W., 2001, Hydraulic Fracturing During the Formation and Deformation of a Basin: A Factor in the Dewatering of Low-Permeability Sediments, AAPG Bulletin, v. 85; no. 4; p. 737-748
Nov 11	Finkbeiner, T., Barton, C. A., Zoback, M. D, 1997, Relationships among *in-situ* stress, fractures and faults, and fluid flow; Monterey Formation, Santa Maria Basin, California: AAPG Bulletin, vol.81, no.12, pp.1975-1999.
Nov 18	Hanks, C. L. , Parker, M., and Jameson, E., 2000, Regional stress patterns of the northeastern North Slope, Alaska: Alaska Division of Geological and Geophysical Surveys Short Notes on Alaskan Geology, 1999, p. 33-44.
Nov 25	***No Class—Thanksgiving Holiday***
Dec, 2	Parris, T M; Burruss, R C; O'Sullivan, P B, 2003, Deformation and the timing of gas generation and migration in the eastern Brooks Range foothills, Arctic National Wildlife Refuge, Alaska AAPG Bulletin, vol.87, no.11, pp.1823-1846.
Dec. 9	Moore and others, 2004, Two stages of deformation and fluid migration in the west-central Brooks Range fold and thrust belt, northern Alaska: *in* R. Swennen, F. Roure, and J.W. Granath, eds., Deformation, fluid flow and reservoir appraisal in foreland fold-and-thrust belts: AAPG Hedberg Series, no. 1, 157-186

materials. We will work with the Office of Disabilities Services to provide reasonable accommodation to students with disabilities.