

Structural Geology & Tectonics at Rutgers University

Faculty

Roy W. Schlische, *Professor*, Ph.D., Columbia, Extensional tectonics; structural and stratigraphic evolution of rift basins; scale modeling; growth and development of normal faults; inversion

Martha Oliver Withjack, *Professor*, Ph.D., Brown, Experimental modeling of geologic structures; seismic expression of structures; development of rift basins and passive margins; basin inversion; hydrocarbon habitat of extensional systems

Facilities, Equipment, and Resources

- Experimental structural modeling laboratory
- Sectioned clay models of normal, oblique-slip, and strike-slip faulting experiments
- 2-D/3-D seismic-interpretation lab
- Seismic data from several rift basins and passive margins
- Rutgers Core Repository: Newark Basin Coring Project, Army Corps of Engineers cores from Newark basin

Research Projects

- Reactivation of pre-existing strike-slip and thrust faults during extension
- Synrift and postrift history of Orpheus rift basin, offshore Canada
- Influence of synrift salt on rift-basin development
- Fault corrugations as kinematic indicators
- Relationships among rifting, breakup, inversion, and large-igneous-province volcanism in eastern North America
- Comparison of the deformational styles of wet clay and dry sand
- Influence of deformation rate on fault populations
- Experimental modeling of multiple phases of extension
- Influence of mechanical stratigraphy on faults and fault-related folds
- Geometric and experimental modeling of extensional fault-bend folds
- Experimental modeling of oblique extension and oblique inversion
- 3-D geometry of inversion structures, Mesozoic rift basins, eastern North America
- Evolution of accommodation zones and fault linkage structures in experimental models
- Normal-fault populations and scaling laws: field studies and experimental models
- Structural controls on sedimentary systems
- Using experimental models to test restoration / balancing methods
- Comparative studies of passive margins: U.S. Atlantic Margin, Grand Banks, North Sea, Norwegian margin, Northwest Shelf of Australia
- Reconstructing 3D geometry of faults and deformed horizons using serial sections of clay models
- Effects of viscous material on basement-involved and detached extension
- Experimental and numerical modeling of extensional fault systems

For more information:

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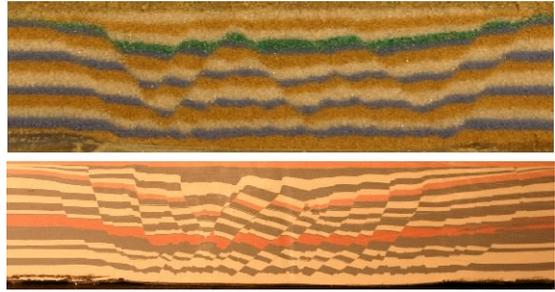
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Department Website: <http://geology.rutgers.edu>

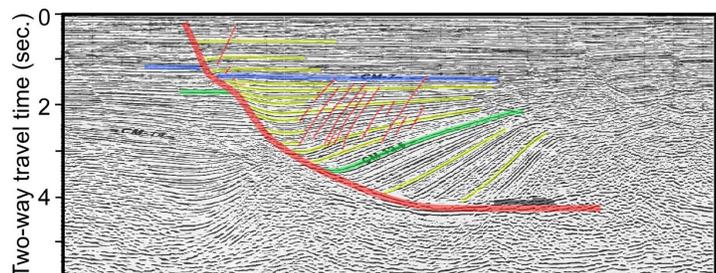
Structure Group Website:

<http://www.rci.rutgers.edu/~schlisch/>

Cross section of sand model (top) and clay model (bottom)



Old Wife Point, Five Islands Park, Fundy rift basin, Nova Scotia, Canada

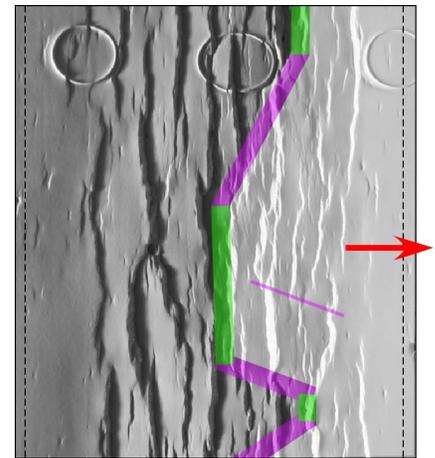


Interpreted seismic profile of a listric fault showing associated fault-bend folds

Select Recent Publications

- Withjack, M.O., Henza, A.A., Schlische, R.W., 2017, 3D fault geometries and interactions within experimental clay models of multiphase extension: *AAPG Bulletin*, v. 101 (11), p. 1767-1789.
- Whipp, P.S., Jackson, C.A.L., Schlische, R.W., Withjack, M.O., Gawthorpe, R.L., 2016, Spatial distribution and evolution of fault-segment boundary types in rift systems; observations from experimental clay models, in *The geometry and growth of normal faults: Geological Society of London Special Publication 439*.
- Schlische, R.W., Groshong, R.H., Withjack, M.O., Hidayah, T.N., 2014, Quantifying the geometry, displacements, and subresolution deformation in thrust-ramp anticlines with growth and erosion: From models to seismic-reflection profile: *Journal of Structural Geology*, v. 69, p. 304-319.
- Withjack, M.O., Schlische, R.W., Malinconico, M.L., Olsen, P.E., 2013, Rift-basin development—lessons from the Triassic-Jurassic Newark basin of eastern North America, in Mohriak, W.U., et al., eds., *Conjugate Divergent Margins, Geological Society (London) Special Publication 369*, p. 301-321.
- Henza, A.A., Withjack, M.O., Schlische, R.W., 2011, How do the properties of a pre-existing normal-fault population influence fault development during a subsequent phase of extension?: *Journal of Structural Geology*, v. 33, p. 1312-1324.
- Faulkner, D., Jackson, C.A.L., Lunn, R.J., Schlische, R.W., Shipton, Z., Wibberly, C., and Withjack, M.O., 2010, A review of recent developments regarding the structure, mechanics and fluid-flow properties of fault zones: *Journal of Structural Geology*, v. 11, p. 1557-1575.
- Withjack, M. O., Baum, M.S., Schlische, R.W., 2010, Influence of preexisting fault fabric on inversion-related deformation: A case study of the inverted Fundy rift basin, southeastern Canada: *Tectonics*, v. 29, TC6004, 22 pages.
- Schlische, R.W., Withjack, M.O., 2009, Origin of fault domains and fault-domain boundaries (transfer zones and accommodation zones) in extensional provinces--result of random nucleation and self-organized fault growth: *Journal of Structural Geology*, v. 31, p. 910-925.
- Withjack, M.O., Schlische, R.W., Henza, A.A., 2007, Scaled experimental models of extension: Dry sand vs. wet clay: *Houston Geological Survey Bulletin*, v. 49 (8), p. 31-49.
- Withjack, M.O., Schlische, R.W., 2006, Geometric and experimental models of extensional fault-bend folds: *Geological Society (London) Special Publication 253*, p. 285-305.
- Schlische, R.W., Withjack, M.O., Olsen, P.E., 2003, Relative timing of CAMP, rifting, continental breakup, and inversion: tectonic significance: *American Geophysical Union Monograph 136*, p. 33-59.
- Schlische, R.W., Withjack, M.O., Eisenstadt, G., 2002, An experimental study of the secondary deformation produced by oblique-slip normal faulting: *AAPG Bulletin*, v. 86, p. 885-906.
- Withjack, M.O., Schlische, R.W., Olsen, P.E., 2002, Rift-basin structure and its influence on sedimentary system: *SEPM Special Publication 73*, p. 57-81.

Plan view of accommodation zones in clay model of extension



Recent Student Research Projects

- Bari Hanafi, Ph.D.**, Experimental modeling of inversion in salt-rich rift basins; salt tectonics in eastern North America
- César Sequeira, Ph.D.**, "Correlation of postrift deformational elements in northeastern North America: Constraints from radiometric ages, seismicity and uplift"
- Mattathias Needle, M.S.**, "Effect of varying the geometry of pre-existing zones of weakness in clay-putty models on structural development, with comparisons to the Jeanne d'Arc basin"
- Natalie Stier, M.S.**, "Kinematic development of the Flying Foam region of the Jeanne d'Arc rift basin, offshore eastern Canada"
- Sean Kinney, Henry Rutgers Honors Research Project**; "Influence of mechanical stratigraphy on the development of thrust faults and associated secondary structures: A scaled experimental approach"
- Christian Putra Ginting, M.S.**, "Influence of pre-existing strike-slip faults on fault development during a subsequent phase of extension"
- Beatriz E. Serrano Sanchez, M.S.**, "Evolution of the Jeanne d'Arc basin, offshore Newfoundland, Canada: 3d seismic evidence for >100 m.y. of rifting"
- Nicholas Tedeschi, Independent Study Project**; "Analysis of a mass-transport deposit (MTD) from the northwestern Jeanne d'Arc basin, offshore Newfoundland, Canada"
- Etikha, M.S.**; "Postrift deformation of the Scotian basin, offshore Nova Scotia and Newfoundland, Canada: Insights from 2D and 3D seismic-reflection data"
- Zulfutriadi Syamsir, M.S.**, "The Mesozoic Orpheus rift basin, offshore Nova Scotia and Newfoundland, Canada: Synrift and early postrift evolution of a well-imaged North Atlantic rift basin"
- Emily Poorvin, M.S.**; "Experimental modeling of gravitational collapse structures"
- Michael Durcanin, M.S.**, "Influence of synrift salt on rift-basin development; Application to the Orpheus basin, offshore eastern Canada"
- Alissa A. Henza, Ph.D.**, "Normal-fault development during multiple phases of rifting"
- Mark Baum, Ph.D.**, "Controls on the deformation produced by oblique inversion of rift basins: Which structures reflect the paleostrain state?"
- Amber Granger, M.S.**, "Influence of basal boundary conditions on normal-fault geometries in scaled physical models of extension"
- Jennifer S. Elder Brady, M.S.**, "Effectiveness of small-scale structures in deciphering the tectonic history of the Fundy rift basin"

Normal faults in Solite Quarry, Danville rift basin, Virginia

