Faulting in Southeastern Louisiana: Misconceptions, Realities & Research Needs

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ABSTRACT

Outside of the energy industry and the academic community, there are a number of misconceptions about coastal fault systems. Common ones are that all major faults strike E-W and dip gulf-ward, that the fault contribution to coastal landloss is understood, and that faults no longer interact with salt structures. Collaborative ongoing research across several Louisiana universities (UNO, ULL and Tulane) aims to provide a more scientifically accurate assessment of fault activity in order to better inform planners and policy makers, especially in the context of coastal restoration and longevity of critical infrastructure. Overarching observations are that the main Late Pleistocene-Holocene onshore fault systems – the Baton Rouge fault zone, the Lake Pontchartrain & Lake Borgne fault zones, and the Golden Meadow fault zone – differ in that the Golden Meadow fault zone (GMFZ) is still significantly salt-involved. Salt structures segment the GMFZ with fault tips ending near or within ductile salt, resulting in highly localized fault-related subsidence separated by shallow salt structures that are inherently buoyant and virtually incompressible. Fault segments within the GMFZ include well-known marsh breaks, such as near Empire and Lake Enfermer, which are likely manifestations of transient slip events (known as slow slip events, or SSEs, in the rock mechanics and seismology literature) in an otherwise slowly creeping fault system. Shallow slip occurring in SSEs is promoted by weak fault zone materials, high fluid pressure in shallow sediments, and low confining pressure. As such, currently active coastal faults make excellent analogues for gravity-driven deltaic growth faults in general. A better understanding of the structural geology and mechanics of the currently active coastal faults will provide a holistic perspective, and possibly a new paradigm, for coastal restoration efforts.

BIOGRAPHY

Nancye Dawers received her B.S. in Geology from University of Kentucky in 1984, an M.S. from the University of Illinois at Urbana-Champaign in 1987, and her Ph.D. from Columbia University in 1997. She is best known for her work on normal fault evolution and displacement-length scaling relationships, which began as part of her Ph.D. research. As a postdoctoral research associate at the University of Edinburgh, Scotland, she developed a love of 3d seismic data while working on continental rifting and syn-rift stratigraphy in the Brent Province. After joining the Tulane faculty in 2000, Nancye's research has focused on geomorphic expressions of active normal faults, including footwall topography in the Basin & Range, morphological response of channels to fault linkage, dike-related graben on Mars, and Late Quaternary faulting in coastal Louisiana.

At Tulane Nancye teaches Structural Geology, Tectonic Geomorphology, and Subsurface Geology, among other courses. From 2006-2008 she held the School of Science and Engineering's Ken & Ruth Arnold Endowed Professorship. She has served on the Board of the New Orleans Geological Society, the Academic Liaison Committee of the American Association of Petroleum Geologists, and the

Structural Geology & Tectonics Best Paper Award Committee for the Geological Society of America. Nancye was the convention vice-chair for the 2010 AAPG Annual Convention and Exhibition, held in New Orleans. In addition, she has served on the editorial board of the journal *Geology*, and on proposal review panels for the National Science Foundation and the American Chemical Society's Petroleum Research Fund.