Systematic variation of shear-induced physical properties and fabrics in Gulf of Mexico, IODP Expedition 308

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IODP Expedition 308 drilled the Brazos-Trinity and Ursa basins in the Gulf of Mexico for the purpose of document spatial distribution of fluid pressure, rock (sediments) properties, and geochemical and biological properties. In Ursa region, we penetrate the eastern levee of the Mississippi-canyon channel levee system (Sites U1322, 1323, 1324). Existence of mass-transfer deposits (MTDs) composed of contorted sediments and highly homogenized sediments are essentials to document spatial distribution of rock (sediments) properties and fluid pressures especially in Site U1322B and U1324B, because their positions correspond to intervals that these properties are changed. This presentation will mention the systematic relationships between the shear-induced fabric changes and -physical properties variation, elucidated by means of Anisotropy of Magnetic Susceptibility (AMS) and on-board physical properties data.

Some of the MTDs in Site U1324B are lithologically and seismically correlated to them in Site U1322B. However, MTDs in Site 1324B have minor-fabric and -physical properties variations compare with them in Site U1322B. On the other hand, they have major variations in Site U1322B. The strong shear-induced textures such as S-C structures and bedding-oblique foliations are also observed under the SEM analyses in Site U1322B, corresponded with AMS and physical properties data. The systematic relation between differential porosity and differential magnetic lineation (indicative of grain alignments) values was constructed. The intensity of magnetic lineation and physical properties data such as porosity and shear strength show gradual change in the upper part of MTDs, while sudden change in the lowermost. These results indicate that strong mechanical and strain decoupling occurred in the base of MTDs in Site U1322B. The MTDs apparently preserve the initial state of slope failures in Site U1324B, while they would reflect the long-distance transfer plausibly associated with high fluid pressure in site U1322B.