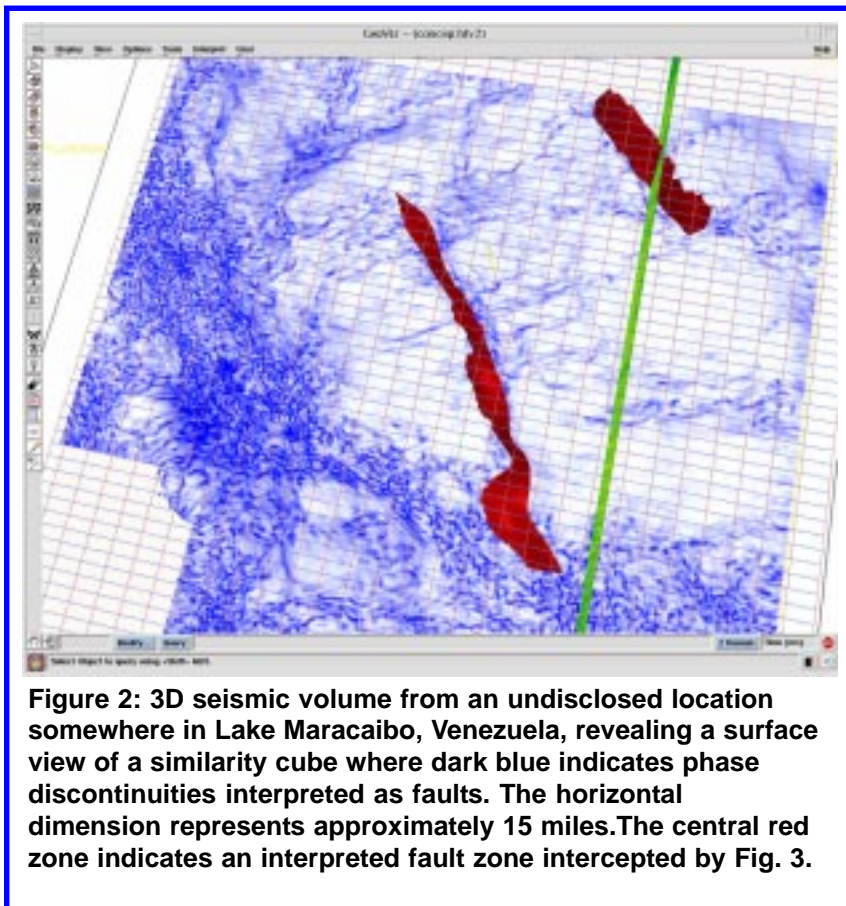


# OU MPI BASIN ANALYSIS-SEISMIC STRATIGRAPHY LAB: *HOW TO BE IN FIVE PLACES AT THE SAME TIME AND GET MORE THAN 24 HOURS OUT OF A SINGLE DAY!*



**John Pigott**

By carefully manipulating earth time zones, Dr. John Pigott and his cherubs have discovered that they can have their days exceed 24 hours, and thus in theory exceed earthly limits of uniformitarianism. This to some degree explains why his graduate students and the SG&G staff can receive emails from Dr. Pigott that appear to come from one day into the future (especially when he is in SE Asia). As another example and but one snapshot of a very busy year, one week last Fall, Dr. Pigott chaired two sessions on the Regional Geology of Tethys at the joint AAPG EPEX SEG EGS EAGE Interna-



**Figure 2: 3D seismic volume from an undisclosed location somewhere in Lake Maracaibo, Venezuela, revealing a surface view of a similarity cube where dark blue indicates phase discontinuities interpreted as faults. The horizontal dimension represents approximately 15 miles. The central red zone indicates an interpreted fault zone intercepted by Fig. 3.**



**Figure 1: On location at CoreLab in Puerta La Cruz, Venezuela, are “Los Tres Salsa Hermanos”: (left to right) Luis Cardozo (OU MS ‘02) presently with LandMark, Dr. P., and Eshetu Gebretsadik (Ph.D. Candidate).**

tional Conference in Cario while at the same time presenting three papers in different sessions at the INGEPET meeting in Lima, Peru, presenting a paper on interpreting tectonics from a 3D seismic interpretation of Lake Maracaibo, and having his seismic processing results for a USGS southern Louisiana study presented at the GCAGS in the U.S., he simultaneously consulted for PDVSA in Caracas on a design for restructuring its exploration management, all the while teaching his OU graduate class in seismic processing. Whew!

A few telling snapshots of this past years work are those of the “Los Salsa Hermanos”: Figures 1-4, an intrepid OU team (Dr. P., Luis Cardozo, and Eshetu Gebretsadik) who journeyed to Venezuela in order to geologically constrain their Geoquest seismic interpretations (never an easy job to accept the truth!).

Earlier this past year, “Los Hermanas Seismicas” (Dr. P. with Eshetu Gebratsadek, Ahmed

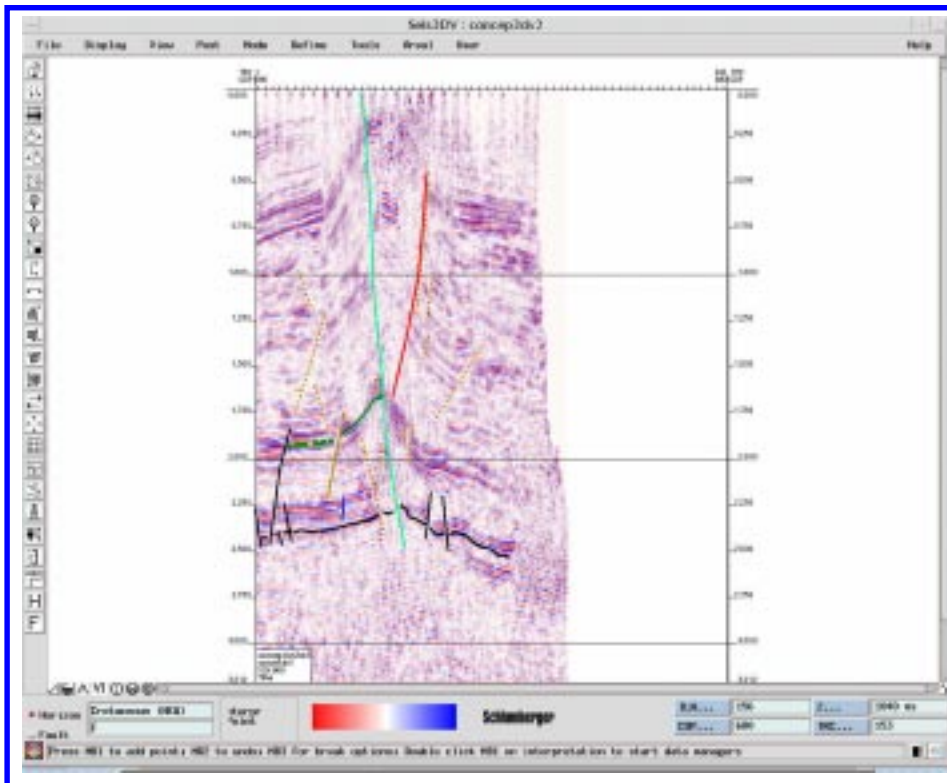


Figure 3. Reverse fault zone shown on a time section processed at the OU MPI seismic stratigraphy laboratory and extracted from the previous 3D seismic volume (Figure 2). The bright alternating “rainbow” colors at 0.5 seconds indicate multiple gaseous “pay” zones. The horizontal dimension is approximately 15 miles and the vertical depth (to 3 seconds) is approximately 25,000 feet.



Figure 4. Drag folds along one of the thrust faults encountered in a Lake Maracaibo core which was drilled at the crest of the structure of the extracted seismic line from the 3D volume shown in Fig. 3.

Aladahl, and Kulwadee Lawwongnam) processed and interpreted southern Louisiana lines for the USGS’s energy division in Denver using their state of the art Omega processing system. The objectives were to improve the imagery complicated by the salt tectonics and to define the ages of faulting as conduits and permeability barriers for hydrocarbon migration (see Figures 5-7). In addition, careful velocity work revealed several zones of velocity inversion (Figure 7). Such information greatly facilitates the USGS in determining its reserve estimates for the region.

**Presently Dr. Pigott and his students continue to work on problems in basin analysis and seismic stratigraphy, specifically on reading tectonics from field fracture data, seismic processing experiments in subsalt imagery, Q analysis, 3D seismic mechanical stratigraphy of faulting, and the application of Bayesian risk analysis through fuzzy arithmetic and Monte Carlo hindcasting (see his web page at <http://geosciences.ou.edu/~mpi/>).**

**Dr. Pigott is always open to opportunities (read: financial funding of research) from the industry on topics in basin analysis and seismic acquisition modeling, exploration, and exploitation!**

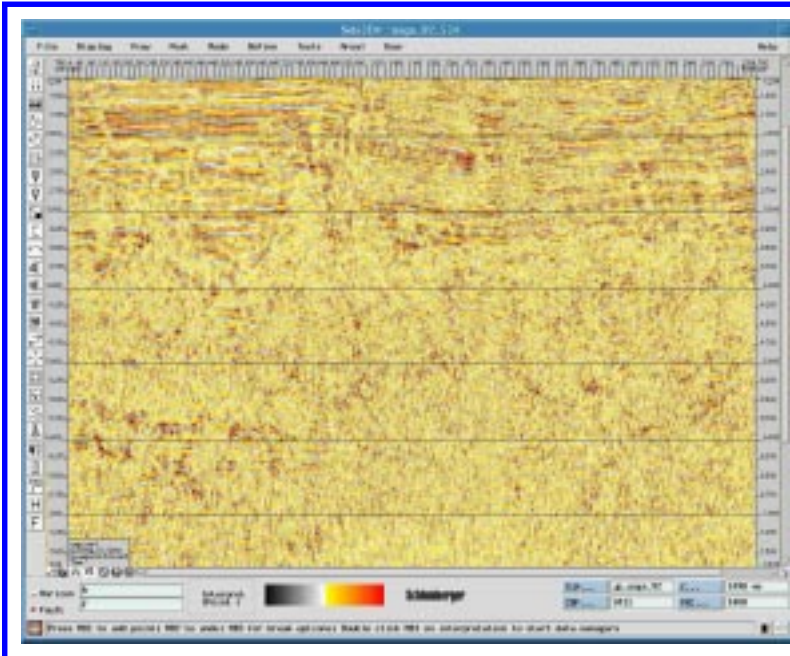


Figure 5: FK Stolt Migration of a USGS Line from an undisclosed location in southern Louisiana. Horizontal dimension of this and the following figures is approximately 10 miles with the vertical exceeding 25,000 feet.

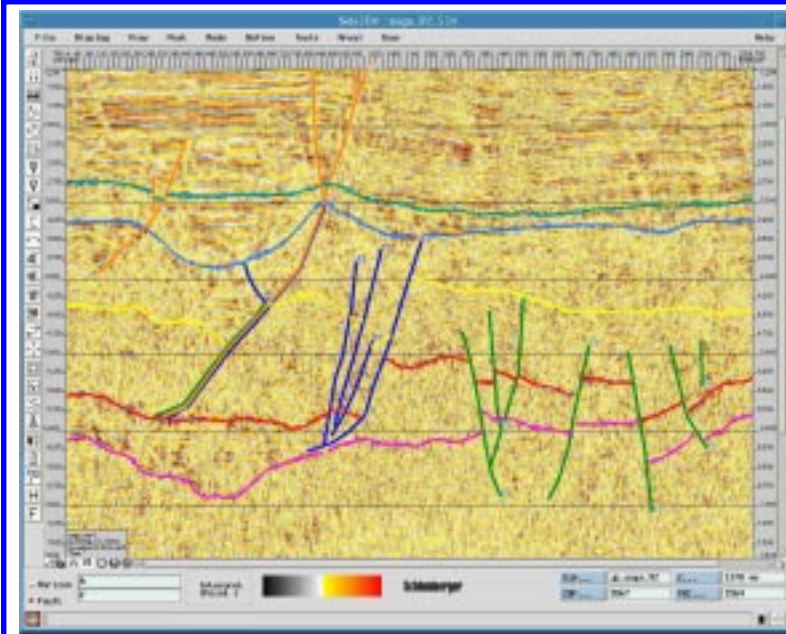


Figure 6: Interpreted seismic line. Vertical trending fault zones displace major sequence boundaries and are color keyed to times of deformation, e.g. Orange represents Tertiary-Quaternary activation, Purple that of Tuscaloosa activation, and Green for Jurassic-Early Cretaceous activation

Figure 7: RMS Velocity profile along migrated line, with hotter colors indicating higher velocities and cooler colors lower velocities. Such velocity information when carefully conducted greatly assists the interpretation of anomalies owing to heterogeneities in geology and/or fluid-gas content.

