AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Jack Dvorkin[1] (1) Stanford University, Stanford, CA

On Universality of Diagenetic Trends

For decades, the main use of seismic data has been to delineate sedimentary bodies and tectonic features in the subsurface. The mission of seeing inside the geological body has been added recently. Mapping porosity, lithology, and other reservoir bulk properties inside the geological body has become possible due to the recent dramatic improvement in seismic acquisition, imaging, and inversion quality as well as the accompanying progress of rock physics. The application of a rock physics trend to a volume of seismic data is appropriate if the two are stratigraphically consistent. Examples are velocity-porosity trends that correspond to changing grain size and sorting due to deposition, or changing amounts of quartz or reactive clay cement due to diagenesis. Honoring stratigraphic constraints guarantees that a rock physics trend is deposition- and site-specific. Rationalization by effective-medium modeling makes a trend general, determines the domains of its applicability, and thus reduces the risk of using the trend outside of the initial data range. How general are rational rock physics trends? Can they be applied across tiers of deposition and across geographical areas? These are the questions addressed in this work. By analyzing rock physics trends from wells located in different parts of the world,one may find a striking similarity among them. This similarity confirms the self-evident truth that there are only a few natural forces -- gravity, water and air transport, temperature, and pressure -- that shape rock, and that these natural forces are the same everywhere on earth.