Normal Fault Segmentation in 3-D

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Open or linked fault relays between normal fault segments can form either a drain or a barrier to fluid migration due to the fault ability to be dilated, compacted, sealed by mineralization, or other elements like clay smearing or variations in capillary pressures. Thus, prediction of relay geometries, understanding scaling laws and the 4-D evolution of segment arrays can be strong tools in the localization of hydrocarbon traps in faulted reservoirs.

We firstly analyzed fault interaction and linkage processes from about forty relay zones observed on bedding planes on two different studied sites. We propose a quantitative method allowing to predict linkage between overlapping parallel faults using easily identifiable parameters. We ensure that laws of linkage do not break down over a large-scale range analyzing collected published data of large faults.

Secondly we studied the population statistics of vertically restricted faults within brittle carbonate series. We found that displacement profiles evolve from linear to flat-topped distribution when the 3-D fault shape becomes vertically restricted. This accounts for a *maximum displacement-length* relation transition from linear to power-law. The fault population also reveals nearly regular spacing and exponential fault size distribution, which may be related to the specific geometry of the vertically restricted faults.

In order to complete our work we focus now towards the understanding of vertically segmented faults in layered rocks. Especially we want to analyze the role of sediment alternation on vertical fault segmentation.