Chapter 6: Fracture Analysis from Kurdamir #1 - Kurdistan, Iraq

Notes for slides:

Slide 1: The Kurdamir #1 well drilled in the Zagros mountains encountered a thick section of fractured Miocene /Oligocene carbonate rocks.

Slide 2: Data from the Image Log may be used to infer different flow regimes within the well.

Slide 3: Using vector analysis on the poles to bedding (each vector has unit value) the average bedding orientation may be calculated.

Slide 4: A density plot of the same data gives a graphical image of the spread of the data. Density plots can be very powerful tools as it is possible to visually determine if there are distinct data populations and the confidence of that separation is easier to evaluate.

Slide 5: Poles to fracture planes interpreted from the image log

Slide 6: Density plot of poles to fracture planes allows easy determination of the different fracture sets and the dominant orientation of the fracture set.

Slide 7: Position of fractures along the well bore. The data is smoothed at the decimetre scale.

Slide 8: The same data as slide 7 but smoothed at the one metre scale window

Slide 9: Smoothing at the 10 metre window scale shows the lower set of fractures are more significant than the upper set of fractures.

Slide 10: Drill Stem Tests run over the two zones verifies the conclusions reached from the image log analysis. The lower zone has superior flow capability compare to the upper zone.

Slide 11: Showing the different smoothing curves. The longer windows seem to reflect the actual results better suggestive that flow through fracture systems is dendritic and the larger smoothing windows are more representative of fluid flow in the rock.

Slide 12: Fourier Analysis of the wave form created by the 10 metre smoothing curve. The implication is that there is a greater probability seeing a fracture swarm every 80 metres along the well. It is important to understand the limitations of this analysis as the well path is penetrating different depths (different stress conditions), different units, and different fluid/pressure conditions. This is likely not a good application of the Fourier Analysis method.

Slide 13: Cross-section of the well showing inferred fracture barrier within the Oligocene section

Slide 14: Regional Cross-section