

## The Quality Assessment of Seismic Reflection Survey Data Using Statistical Analysis: A Case Study of Fort Abbas Area, Cholistan Desert, Pakistan

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**Abstract :** In geophysical exploration surveys, the quality of acquired data holds significant importance before executing the data processing and interpretation phases. In this study, 2D seismic reflection survey data of Fort Abbas area, Cholistan Desert, Pakistan was taken as test case in order to assess its quality on statistical bases by using normalized root mean square error (NRMSE), Cronbach's alpha test ( $\alpha$ ) and null hypothesis tests (t-test and F-test). The analysis challenged the quality of the acquired data and highlighted the significant errors in the acquired database. It is proven that the study area is plain, tectonically least affected and rich in oil and gas reserves. However, subsurface 3D modeling and contouring by using acquired database revealed high degrees of structural complexities and intense folding. The NRMSE had highest percentage of residuals between the estimated and predicted cases. The outcomes of hypothesis testing also proved the biasness and erraticness of the acquired database. Low estimated value of alpha ( $\alpha$ ) in Cronbach's alpha test confirmed poor reliability of acquired database. A very low quality of acquired database needs excessive static correction or in some cases, reacquisition of data is also suggested which is most of the time not feasible on economic grounds. The outcomes of this study could be used to assess the quality of large databases and to further utilize as a guideline to establish database quality assessment models to make much more informed decisions in hydrocarbon exploration field.

**Keywords :** Data quality, Null hypothesis, Seismic lines, Seismic reflection survey

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