

Best Season for Seismic Survey in Zaria Area, Nigeria: Data Quality and Implications

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Abstract : Variations in seismic P-wave velocity and depth resolution resulting from variations in subsurface water saturation were investigated in this study in order to determine the season of the year that gives the most reliable P-wave velocity and depth resolution of the subsurface in Zaria Area, Nigeria. A 2D seismic refraction tomography technique involving an ABEM Terraloc MK6 Seismograph was used to collect data across a borehole of standard log with the centre of the spread situated at the borehole site. Using the same parameters this procedure was repeated along the same spread for at least once in a month for at least eight months in a year for four years. The choice for each survey time depended on when there was significant variation in rainfall data. The seismic data collected were tomographically inverted. The results suggested that the average P-wave velocity ranges of the subsurface in the area are generally higher when the ground was wet than when it was dry. The results also suggested that the overburden of about 9.0 m in thickness, the weathered basement of about 14.0 m in thickness and the fractured basement at a depth of about 23.0 m best fitted the borehole log. This best fit was consistently obtained in the months between March and May when the average total rainfall was about 44.8 mm in the area. The results had also shown that the velocity ranges in both dry and wet formations fall within the standard ranges as provided in literature. In terms of velocity, this study has not in any way clearly distinguished the quality of the results of the seismic data obtained when the subsurface was dry from the results of the data collected when the subsurface was wet. It was concluded that for more detailed and reliable seismic studies in Zaria Area and its environs with similar climatic condition, the surveys are best conducted between March and May. The most reliable seismic data for depth resolution are most likely obtainable in the area between March and May.

Keywords : best season, variations in depth resolution, variations in P-wave velocity, variations in subsurface water saturation, Zaria area

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