Two dimensional modeling of subsurface structure over upper Benue trough and Bornu basin in North eastern Nigeria.

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Abstract

A two dimensional modelling of the subsurface structures of parts of Benue Trough and Bornu Basin, northeast Nigeria, using aeromagnetic data was carried out in this study. The area under investigation is bounded by latitude 9.5^0 N to 12.0^0 N and longitude 9.5^0 E to 12.0^0 E. It is covered by 25 aeromagnetic maps. The data obtained were subjected to filtering process using polyfit. Residual data obtained were subjected to 2D subsurface modelling. The study area was covered by seven profiles labelling, AA^1, BB^1, CC^1, DD^1, EE^1, FF^1 and GG^1. The depth to magnetic sources results obtained from the Source Parameter Imaging (SPI) was used as depth constraint for modelling the residual magnetic field anomalies. The results of the 2D modelling showed that the sedimentary thicknesses ranged from 0.0 km to a maximum depth of about 5.40 km. The highest sedimentary thicknesses were found around Gombe, Ako Gombe, Bulkachuwa and Damaturu areas, with a value of about 3.80 km to 5.40 km. The highest sedimentary thicknesses obtained, which range between 3.80 km to about 5.40 km is adequate for the hosting of hydrocarbons. The least sedimentary thicknesses obtained from this study could be found around Bauchi axis in the basement complex region, Kaltungo and volcanic area at the eastern part of the survey area. The results of this study also indicated that Borno Basin is separated from the Upper Benue Trough at about latitude 11.0^0 N to 11.2^0 N, which corresponds to "Dulbulwa-Bage High". This separation could have been aided by the paleostructure called St Paul that passes through the area at that latitude. The subsurface lithology obtained from 2D modelling of the residual field showed the presence of two lithological units. The sedimentary rock unit underlined by the basement rock consists of shales, sandstones, limestones, siltstones, clay and non-marine facies. The Basement rock units were composed of pegmatite, granite gneiss and migmatites.

Keywords: Aeromagnetic data, 2D modelling, Sedimentary thickness, Source Parameter Imaging and Subsurface lithology

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Received: 2015/03/20

Accepted: 2015/06/12

DOI: http://dx.doi.org/10.4314/njtr.v10i1.S11