SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR A RUG PLOT FOR GEOSTEERING APPLICATIONS

FIELD OF THE INVENTION

The present invention relates generally to geosteering in hydrocarbon reservoirs and, more specifically, to a geosteering system that provides real-time, 3-Dimensional ("3D") modeling of a well path to optimize well placement.

BACKGROUND

Conventionally, one of the challenges in drilling horizontal wells for accurate well placement is that sedimentary depositional environments are inherently complicated. Channel sands are one such depositional environment which is typically very difficult to model and view in three dimensions. To date, operators have been limited to hand drawn pictures or curtain plots that only model along a vertical plane showing the geology above and below a desired area.

Accordingly, there is a need in the art for a geosteering system that not only provides visualization above and below a desired section of the wellbore, but also provides visualization to the left and right of that section, thus providing a complete, real-time, 3D visualization.

SUMMARY

According to a first aspect of the present invention, there is provided a method to geosteer a downhole assembly, the method comprising: analyzing data related to a geological formation; generating a geological model based upon the data related to the geological formation; generating a first plot which reflects a left and right orientation along a True Vertical Depth ("TVD") slice within the geological model; and geosteering the downhole assembly using the first plot.

According to a second aspect of the present invention, there is provided a system comprising processing circuitry utilized to geosteer a downhole assembly, the processing circuitry performing the method comprising: analyzing data related to a geological formation; generating a geological model based upon the data; and generating a first plot which reflects a left and right orientation along a True Vertical Depth ("TVD") slice within the geological model, wherein the downhole assembly may be geosteered using the first plot.

According to a third aspect of the present invention, there is provided a computer program product comprising instructions utilized to geosteer a downhole assembly, the instructions which, when executed by at least one processor, causes the processor to perform a method comprising: analyzing data related to a geological formation; generating a geological model based upon the data related to the geological formation; and generating a first plot which reflects a left and right orientation along a True Vertical Depth ("TVD") slice within the geological model, wherein the downhole assembly may be geosteered using the first plot.

According to a fourth aspect of the present invention, there is provided a method to geosteer a downhole assembly, the method comprising: modeling a rug plot that reflects a left and right orientation along a True Vertical Depth ("TVD") slice; and geosteering the downhole assembly using the rug plot.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a block diagram of rug plot visualization system according to an exemplary embodiment of the present invention;

FIG. 2A illustrates a formation utilized to explain an exemplary embodiment of the present invention;

FIG. 2B illustrates a rug plot according to an exemplary embodiment of the present invention;

FIG. 2C illustrates a curtain plot according to an exemplary embodiment of the present invention;

FIG. 3A is a rug plot workflow according to an exemplary methodology of the present invention;

FIG. 3B is a plan view utilized in the workflow chart of FIG. 3A;

FIG. 4 is a display showing a rug and curtain plot generated by an exemplary embodiment of the rug plot visualization system of the present invention;