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Provenance analysis of Puxi oilfield’s G1 block

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Abstract: Provenance direction research is an important part of the sedimentary facies research. Based on a detailed summary of provenance analysis methods, after scrutinizing the current situation of the study area, this paper focuses on the sand thickness variations, Paleotopograph and single river way direction in the development zone. The results show that it was controlled by northern provenance.

Keywords: Puxi oilfield, Heidimiao oil layer, provenance analysis, sand bodies

INTRODUCTIN

The provenance direction is able to represent the direction of ancient water flow in the geological historical period. Furthermore, it is able to control the distribution range and the extensive trend of the sand body as well. Consequently, the analysis and research on the provenance direction play an important role in the comprehensive analysis involving the sedimentary facies distribution, reservoir evaluation, as well as oil and gas accumulations.

Provenance analysis

The analysis of Sedimentary sand body distribution characteristics

Previous studies showed that there is a good spatial configuration relationship between the paleo provenance and sedimentary sand body, that is the main provenance areas that close to the the basin edge develop thicker sandstone, and gradually reduced towards inside basin Therefore, the provenance direction can be obtained by studying the variation of the sandstone thickness and the content of sandstone.



Fig-1: Sandstone contour map of Heidimiao reservoir

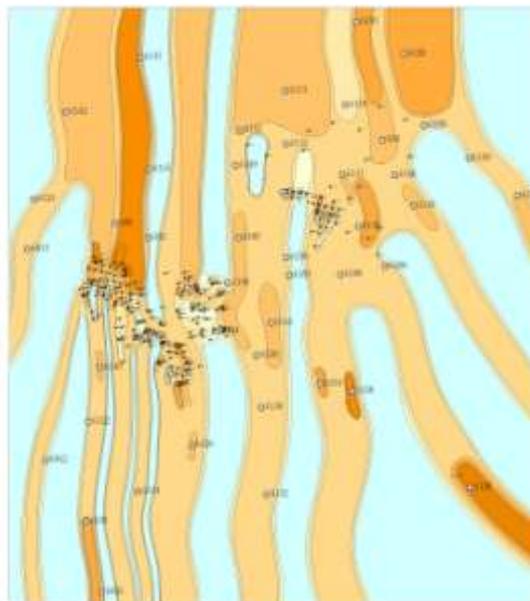


Fig-2: Sandstone ratio contour map of Heidimiao reservoir

The thickness of sandstone can reflect the source direction from a certain extent. The water power is strong, and the water power is strong, the material and the coarse clastic material are much more. The grain size can be transported and transported by the water power. Therefore, in the upper reaches of the reservoir, the distribution of the sand body is high, and the structural position is high, and the structural position of the mud rock is low.

Sand ratio can reflect the flow direction more than in a sense. In the ideal model, when water inject to lack basin, sandstone thickness is relatively large in the upstream direction, while in the downstream or lake basin, sandstone thickness is small. Therefore, the sand ground than more can effectively reflect the source direction.

According to 301 wells in the region of sandstone data and stratigraphic thickness data analysis, the writer draw the Sandstone contour map of Heidimiao reservoir (Figure 1) and Sandstone ratio contour map of Heidimiao reservoir(Figure 2),they show that, in the study area, during the deposition of the Heidimiao Reservoir, sandstone thickness is larger in the north block, and mainly along the North – South, it become thinner gradually. Sand ratio, on the whole, seems larger in the north block, and become smaller to the south.

These features show along the north – south, the distance from the main provenance is gradually increasing, hauling distance become far, and provenance supply ability drops, which happens to correspond to the northern provenance research area

formed by the prograde direction of sedimentary system, namely the study area is mainly controlled by the northern provenance.

Ancient landform morphology reveals the provenance area

Paleogeomorphology restoration is an important content of basin analysis, especially in the fault basin, the ancient landform highland is often the erosion source area. By the recovery of ancient morphology in the study area, we can roughly understand provenance, sedimentary area, palaeocurrent direction etc. Geomorphology is impacted by the weathering denudation, the difference of sedimentary and tectonic deformation. Especially the tectonic movement, It often leads to changes in face basin, overall, is one of the biggest factors. Predecessors did lots of in-depth researches of paleogeomorphology restoration. Both ideas and methods have a bold attempt, it has formed rich method and theory. As for the study area, the paper mainly starts with the formation thickness restoration.

Ancient landform, to a certain extent, affected the palaeocurrent direction. On the basis of existing conditions, researchers mainly study geomorphology by "depositional compensation principle"to reflect the characteristics of ancient landform with strata thickness. According to the stratigraphic thickness data of 299 Wells in the study area analysis, draw the Heidimiao reservoir strata thickness isoline map (Fig. 3). In the west - south , the strata become thicker gradually, which consistent to northwest – southeast water flow direction.

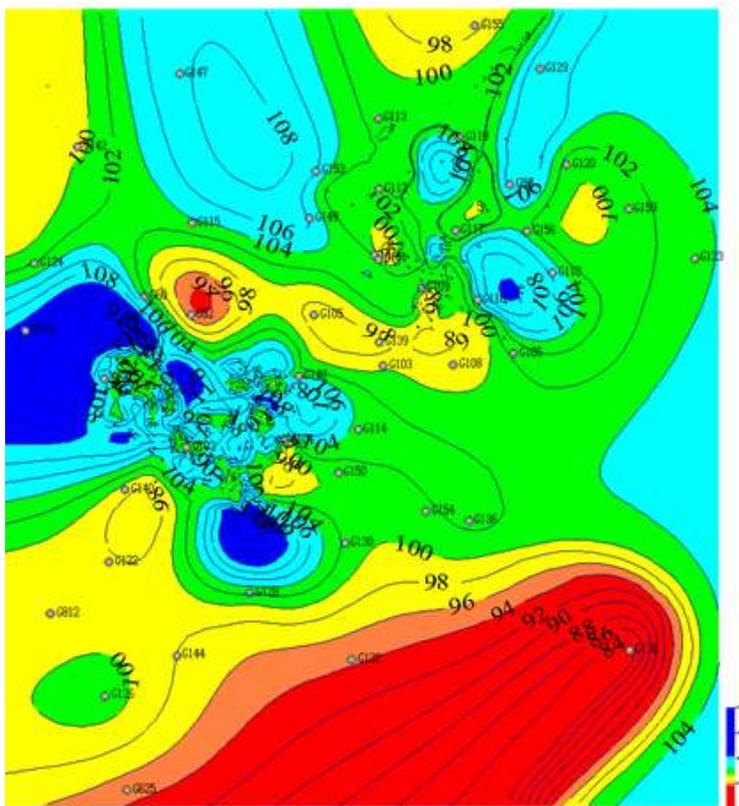


Fig. 3: Heidimiao reservoir strata thickness isoline map

The direction of channel sand body

The sedimentary microfacies that Heidimiao reservoir mainly develops are debouch bar, sheet sand and inter-distributive bay. On both sides of the river, in ideal mode, it symmetrically develops sheet sand and inter-distributive bay. And the developmental degree of sedimentary microfacies gets poor away from the river way. Furthermore, there is a bigger difference in electric logging curves among the sedimentary microfacies.

Through the G1 zone dense well pattern planar sedimentary microfacies careful dissection, the ancient channel direction is the north - south.

Conclusion

Comprehensively studied sandstone thickness change, palaeogeomorphology, and river development zone, single direction of source parameter distribution, the Heidimiao reservoir of Puxi oilfield's G1 block is controlled by the northern provenance. Provenance analysis has a vital function in understanding and determining the reservoir types, distribution pattern and characteristics of the sedimentary system, favorable reservoir sand body distribution rule in the study area. Also, it is of great significance in finding favorable oil and gas reservoir.

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