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An overview of TS-5A reservoir sand of South West Geleki field, Upper Assam, India – an attempt to present an integrated geological model

Abstract

The paper deals with some inputs that require to build up a geological model which again required as input to reservoir simulation programs, which predicts the behavior of the rocks under various hydrocarbon recovery scenarios. This integrates structural geology, sedimentology, stratigraphy, paleoclimatology, and diagenesis. The present work is aimed to define some geological inputs to build up a static geological model of TS – 5A reservoir sand, Southwest Geleki Oil field, Upper Assam, India.

The main objectives of the study are to evaluate the log in detail and demarcating stratigraphic horizons and thereby prepare a geological model. An attempt is also made to identify the future potential as well as demarcation of undrained area for future exploration and exploitation.

TS-5A is one of the most prominent and extensive reservoir in Geleki field occurring at a depth of about 2700 m to 3100 m. It is a sub unit of Tipam Formation and the top of the sand is very well demarcated on the well logs at the base of a regional clay marker called lower clay marker (LCM). Presence of clayey sand is found in between TS-5A sand in litho-units separation based on gamma & resistivity log. The sand is typically channel sand deposited under braided river system in continental environment. The channel was extending in NE-SW direction with feeding from NE direction.

Sand thickness of TS-5A is maximum (91m) at well no. 7 situated centrally in the study area. The well was tested in TS-5A1 and flowed @ 39 m³/d with 4% water. The wells namely 8, 19, 11, 3 are located in the structurally low region (central part) of the sand and is not seems to be promising. Well No. 8, 11 and 19 are having very low oil saturation (12-6%). Presently well no 10 is the highest producer well from TS-5A1 sand. It is located in the structurally higher position and also has higher gross thickness. Well No. 13 was tested in TS-5A1 flowed oil & Gas. It has not been exploited till date. The well has an average oil saturation of 40 % with average porosity of 18% in the TS-5A1 Sand. The well is also located in the relatively structurally higher position (3080.2 m MSL). Similarly nearby well no. 17 is located at same level (3086.4 m MSL) with oil saturation of 35%.

The shale layer separating TS-5A and TS-5B is thickest in southern most part (near well no. 6) and in the east-central region (near well no. 19) whereas it is thinner in west-central part near well no. 7 and in the north side of the oil pool (i.e. near well no. 17). The shale layer between TS-5A1 and TS-5A2 layer is not continuous indicating possible windows of communication between TS5A1 and TS5A2.

Hydrocarbon distribution in the sand is seems to be structure controlled where the oil accumulations are confined to structurally higher areas. The structural model has been built on the basis of actual well data only as the seismic data in the area are not sufficient to be concluded for. This model shows a large central low area which is devoid of oil. Acquisition of high definition seismic data may help in finer interpretation of structure to locate local highs within this central low

that may be targeted for exploitation. The northern part of the sand has not been produced and from the saturation and porosity distribution, it seems to be promising for hydrocarbon.

The extent of the oil pool in further southward beyond well no. 10 may be explored to test the structural disposition. In absence of seismic data it was not possible to map the area in the present study. A well **GKET** has already been drilled in this area which has given a better idea about lower Tipam Formation development and prospect of TS-5A reservoir sand further south.

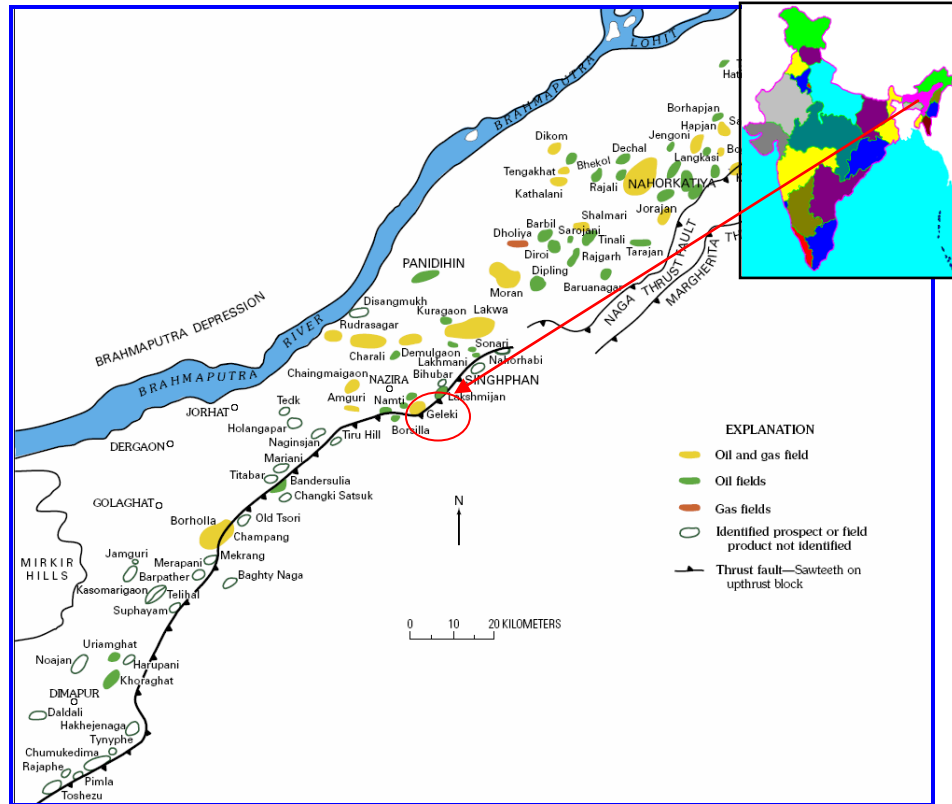


Fig. 1: Location of Geleki Oil Field with other identified prospects in Assam Geological Province, (After C.J. Wandrey, 2004)

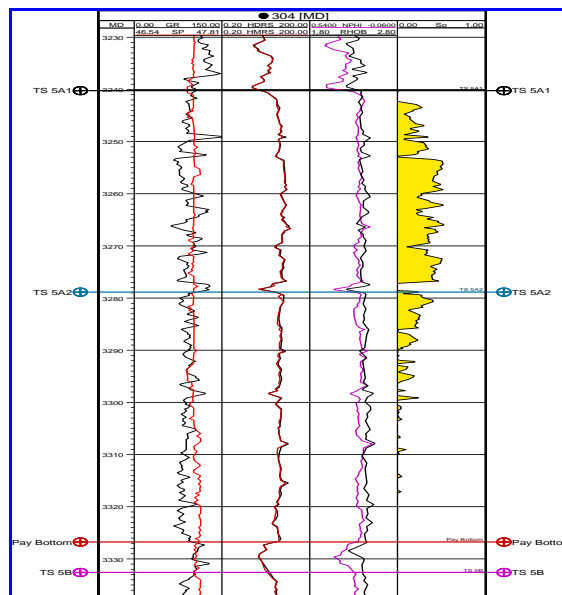


Fig. 2. Oil Saturation (S_o) in TS-5A1 & TS-5A2 separated by a shale layer

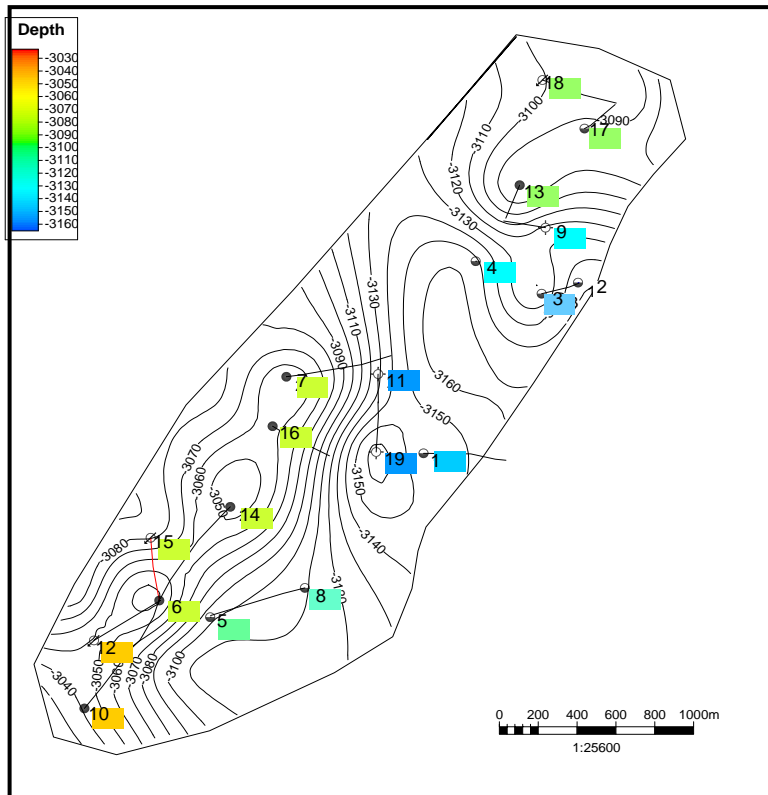


Fig. 3. Structure contour map on top of TS-5A1 of South West Geleki Field

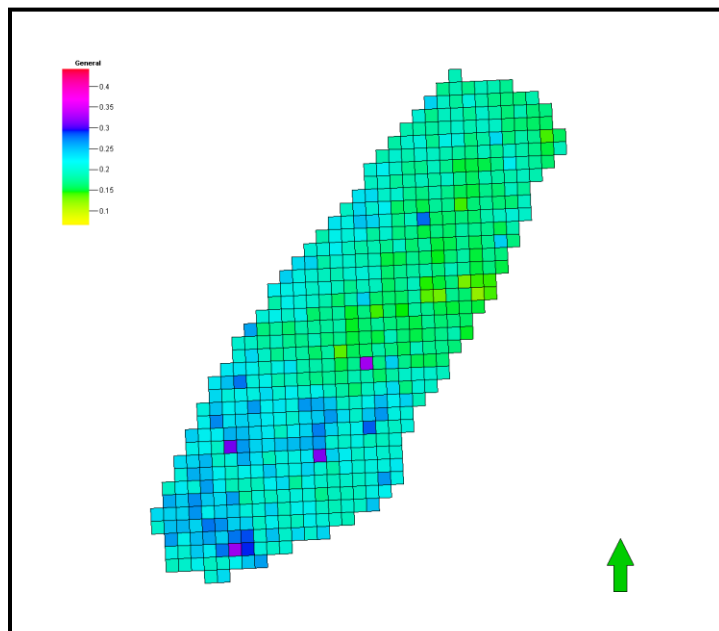


Fig. 4. Porosity Distribution in TS-5A Sand, SW Geleki Field

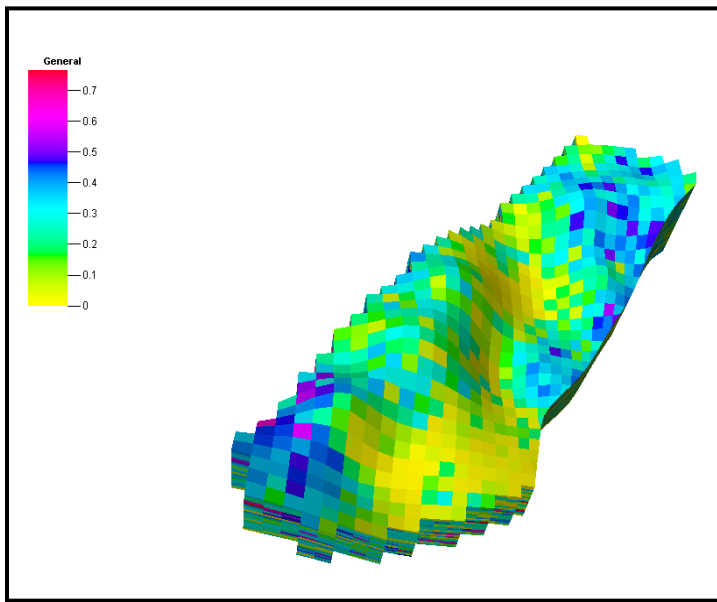


Fig. 5 : Distribution of initial S_0 at TS-5A Sand Top, South West Geleki Field

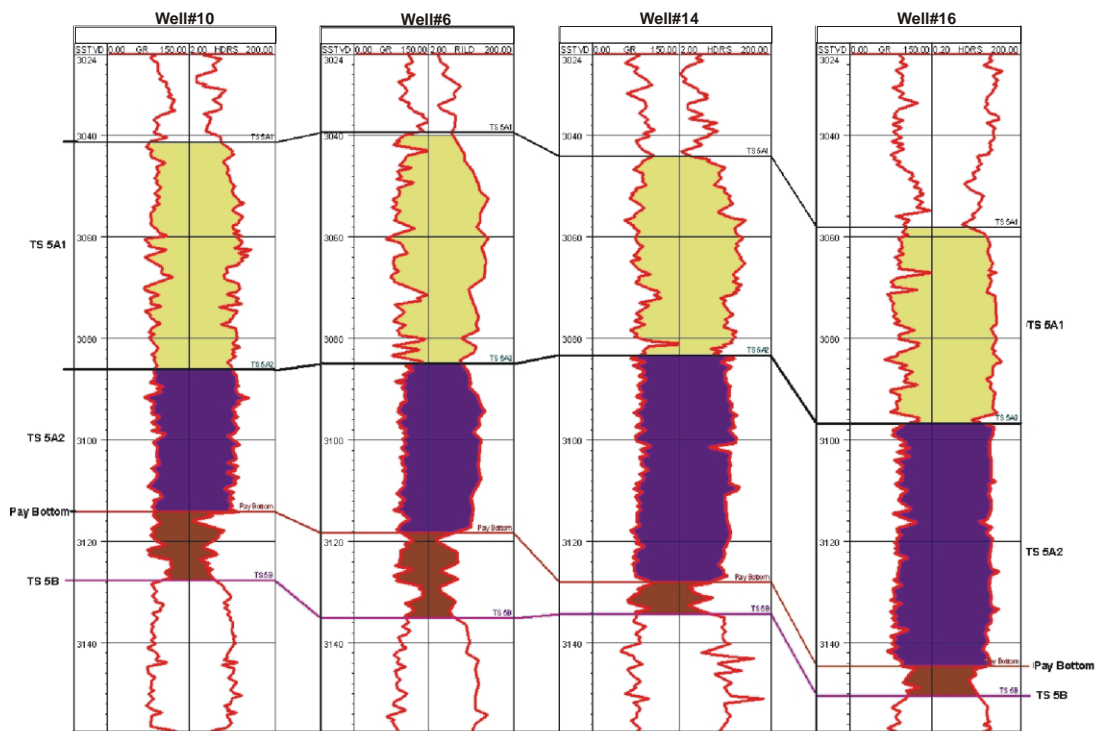


Fig. 6 : Correlation between Well # 10, 6, 14 and 16

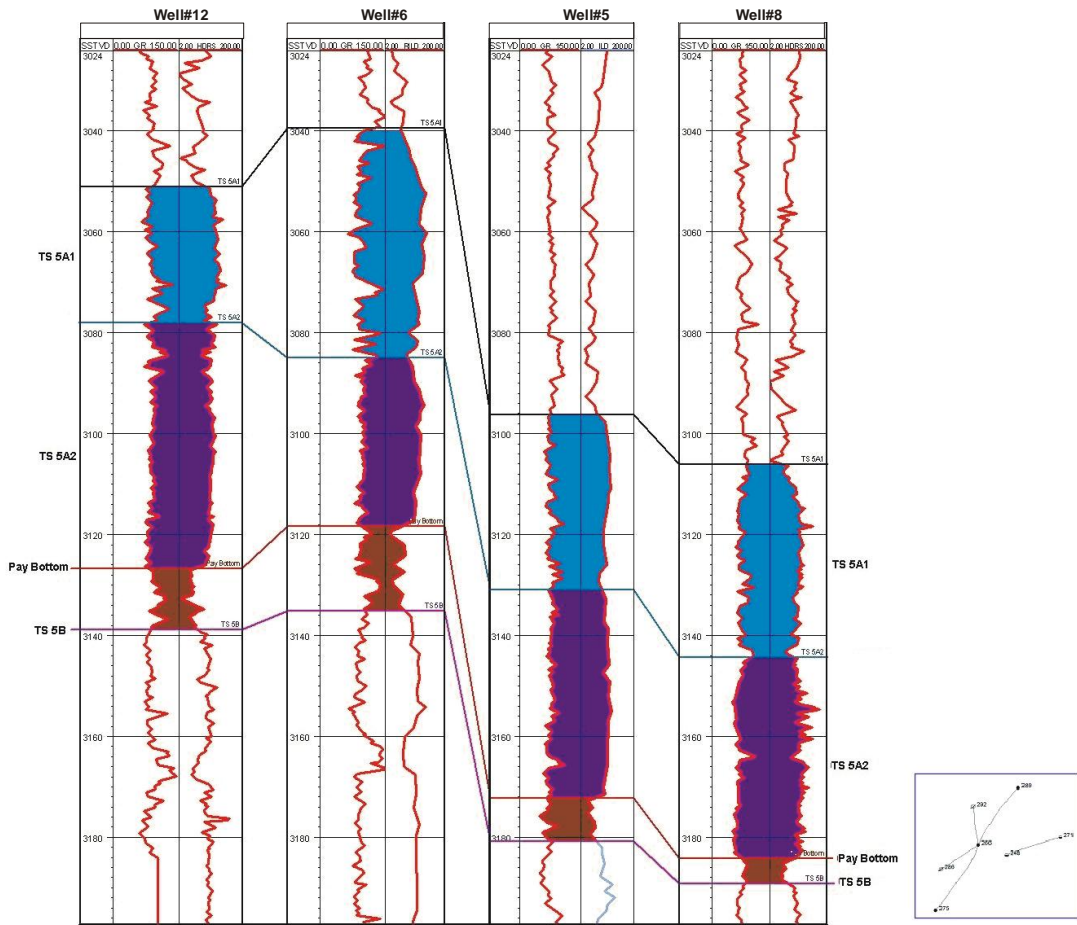


Fig. 7 : Correlation between Well # 12, 6, 5 and 8

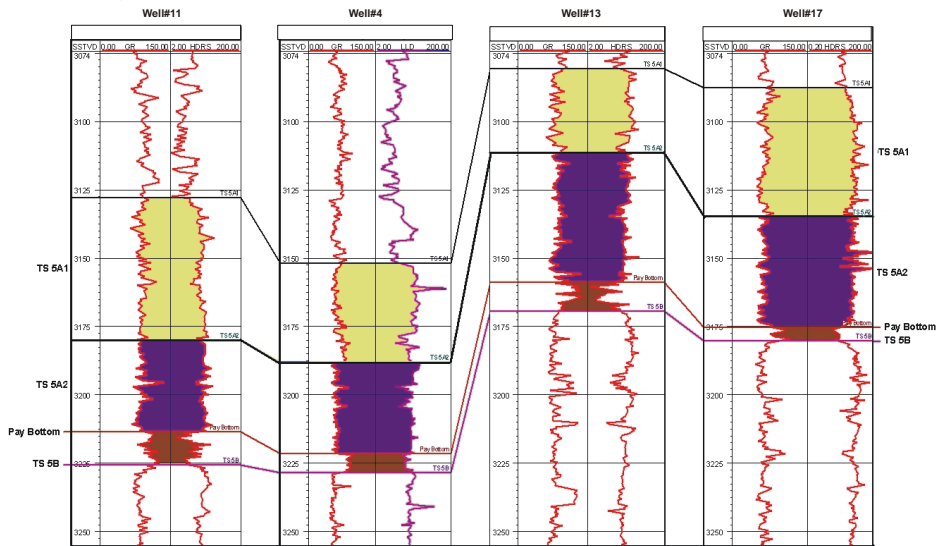


Fig. 8 : Correlation between Well # 11, 4, 13 and 17

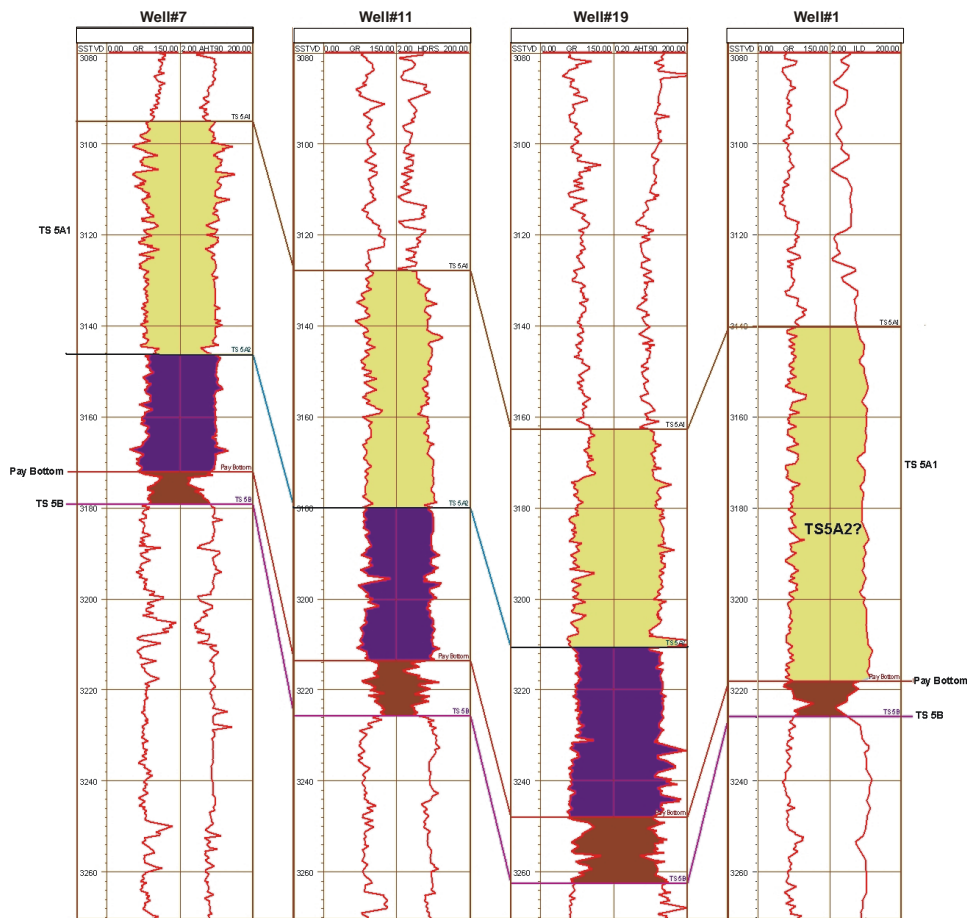


Fig. 9 : Correlation between Well # 7, 11, 19 and 1

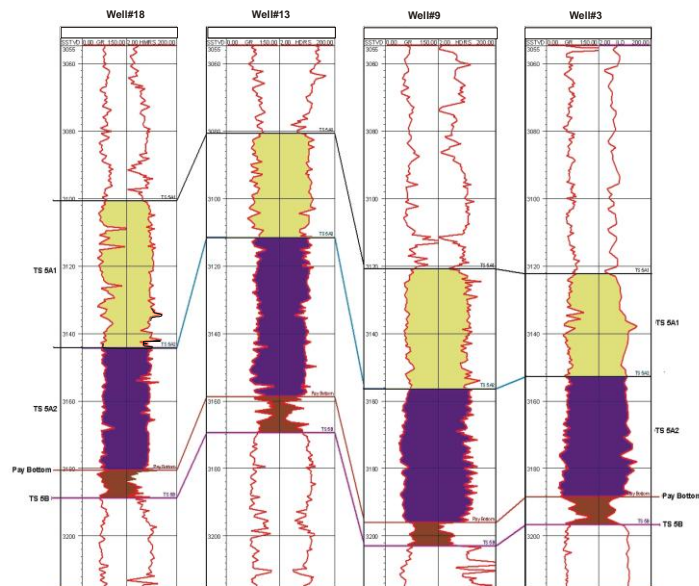


Fig. 10 : Correlation between Well # 18, 13, 9 and 3