Evaluation of Reservoir Quality of Mardin Group Carbonates within the Sequence Stratigraphy Framework in Adiyaman and Diyarbakir Regions, SE Turkey

Suzan Müge Yetim (1) and Demir Altıner (2)

(1) Turkish Petroleum, Sedimentology and Reservoir Geology Department, Ankara, Turkey (smergene@tp.gov.tr), (2) Middle East Technical University, Geological Engineering, Ankara, Turkey (demir@metu.edu.tr)

An integrated sequence stratigraphic study based on well samples and well log data documents the signals of eustatic sea level change during the Cenomanian-Turonian time interval in Diyarbakır, Adıyaman and Mardin provinces, southeastern Turkey. Derik section in the Mardin province measured in the outcrops of the Mardin Group, consisting of Areban, Sabunsuyu and Derdere Formations, is composed of globally correlated twenty one depositional sequences spanning from lower Aptian to upper Turonian (Özkan and Altıner, 2018). These sequences are questioned whether they can be correlated with well data throughout the basin. In the interval from Cenomanian to Turonian, eleven depositional sequences are recognized and they are correlated with the eustatic sea level chart. Eleven wells, which are considered as representative of different depositional trends in Adıyaman and Diyarbakır regions, are selected in order to correlate with the depositional sequences defined in the outcrops of the Derik section. Among these eleven wells, frequently cored Well A has been selected as the pilot well in order to develop a sequence stratigraphic framework. Third-order depositional sequences typical of Cretaceous greenhouse carbonate systems are defined in this pilot well based on lithofacies, paleontological data and well log data. Highstand systems tracks contain a greater abundance of grain-dominated shoal lithofacies with various benthic foraminifers while transgressive systems tracks are represented by pelagic facies with high amount of mud dominated lithofacies containing calcispherulid and planktonic foraminifers. Third-order sequences defined in Well A are correlated with the depositional sequences recognized in other wells by using INPEFA log (Integrated Prediction Error Filter Analyses), on which turning points are sensitive to eustatic sea level changes. These shoaling and deepening upward depositional sequences and their characteristic stratigraphic surfaces are tested whether they correspond to the depths where turning points are observed on INPEFA log.

Sequence stratigraphy is used to understand how facies are related in time and space and it helps to make an interpretation on how the depositional sequence architecture might be related to oil and gas reservoirs. This aspect of sequence stratigraphy provides a good opportunity to assess variations in depositional trends of Mardin Group Carbonates which contain main oil and gas reservoir levels in Adiyaman and Diyarbakir regions. In addition to primary depositional features, determination of syn-depositional and post-depositional diagenetic mechanisms (cementation, dolomitization, dissolution, fracturing, recrystallization, replacement etc.) and relative timing of these mechanisms (earliest to latest) enhances the assessment of reservoir characterization.