

GEOSEA 2018

**15th REGIONAL CONGRESS ON GEOLOGY,
MINERAL AND ENERGY RESOURCES
OF SOUTHEAST ASIA**

16-17 October 2018



GEOSEA XV
HANOI-VIETNAM

ASEAN Geosciences and Earth resources
for sustainable development

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Studying on Late Miocene petrographical characteristics, sedimentary environment and petroleum potential in the Southeast area of Hanoi Depression

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Late Miocene sedimentary rocks in the Southeast area of Hanoi Depression is researched in detail by quantitative method based on the samples from 13 boholes and interpreted 5 seismic profiles. Late Miocene sedimentary rocks in the studied area can be divided to three groups: (1) Group 1: polymineralic and oligomictic silty-sandstone (lithic - arkose, greywacke - quartz, lithic - greywacke, lithic - quartz); (2) Group 2: claystone and lime- claystone; (3) Group 3: mixed rocks consisting of calcareous silty-sandstone, lime-claystone belong to five various lithofacies: (1) River channel polymineralic sand facies, (2) Coastal tidal flat oligomictic lithic - quartz sand facies, (3) Coastal sand bar of river mouth oligomictic sand facies, (4) Estuary - shallow sea calcareous silty-sand facies and (5) Coastal swamp mud facies rich in organic material.

The first method applied is analyzing thin sections through the option microscope with the purposes to identify the different components of sedimentary rock (quartz, feldspar, rock fragment, and cements) as well as some sedimentary parameters which are roundness (Ro) and sorting (So). The sorting and roundness numerical classification use in paper are based on Tran Nghi's classification (Nghi, 2012). The authors also analyzed sedimentary structures and interpreting depositional environments based on core samples from the wells in study area. Another method applied in the paper is interpreting seismic data in order to divide into three system tracts (LST, TST, and HST) in Late Miocene.

The petroleum potential is evaluated by the quality of reservoir, source and seal rocks. Good source rocks for gas are claystone of coastal swamp environment rich in organic material accumulated from mangrove forest. The quality of intergranular reservoir rocks directly depend on lithologic composition and petrophysic features of sandstones. Good quality of reservoir rocks is oligomictic sandstone of tidal flat facies, sandy bar of river mouth facies. On diagram good reservoir rocks are showed by close normal linear relationship between effective porosity (Me) varying 15-20% and quartz content - $\geq 70\%$, sorting coefficient - $So \leq 1.5$, roundness coefficient - $Ro \geq 0.5$. Meanwhile, bad reservoir rocks are characterized by inverse close linear relationship between effective porosity with correlation coefficient (r) more than 0.7. Me is ranging from 8% to 3% corresponding to I- 0.7-0.9. Its reason may be explained by late catagenesis change lead to increasing I and decreasing Me. Good seals is thick marine clay parallel bedding of marine flooding surface, so that clay content is more than 70%, mainly illite and montmorillonite with permeability less than 5 mD.

Keywords: *Silty-sandstone, facies, reservoir, source, seals, sand bar of river mouth, tidal flat.*



HA NOI - GEOSEA 2018

ISBN: 978-604-913-751-8



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