

Sedimentary Simulation to Analyze Burial Diagenesis and Petroleum System of the Upper Tertiary Sequences in Southern Ulleung Sedimentary Basin, East Sea (Sea of Japan)

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The block 6-1 located in the southwestern margin of the Ulleung Basin, East Sea (Sea of Japan) is an area where recently produces commercial natural gas and condensate. A total of 17 exploratory wells have been drilled, and also many seismic explorations have been carried out since early 1970s. Among the wells and seismic sections, the Gorae 1 well and a seismic section through the Gorae 1-2 well were chosen for this simulation work. Then, a 2-D graphic simulation using SEDPAK elucidates the evolution, burial history and diagenesis of the sedimentary sequence. The study area is a suitable place for modeling a petroleum system and evaluating hydrocarbon potential of reservoir. Shale as a source rock is about 3500m deep from sea floor, and sandstones interbedded with thin mud layers are distributed as potential reservoir rocks from 3,500m to 2,000m deep. On top of that, shales cover as seal rocks and overburden rocks upto 900m deep. Input data(sea level, sediment supply, subsidence rate, etc) for the simulation was taken from several previous published papers including the well and seismic data, and the thermal maturity of the sediment was calculated from known thermal gradient data. In this study area, gas and condensate have been found and commercially produced, and the result of the simulation also shows that there is a gas window between 4000m and 6000m deep, so that three possible interpretations can be inferred from the simulation result. First, oil has already moved and gone to the southeastern area along uplifting zones. Or second, oil has never been generated because organic matter is kerogen type 3, and or finally, generated oil has been converted into gas by thermally overcooking. SEDPAK has an advantage that it provides the timing and depth information of generated oil and gas with TTI values even though it has a limit which itself can not perform geochemical modeling to analyze thermal maturity level of source rocks. Based on the result of our simulation, added exploratory wells are required to discover deeper gas located in the study area.