

Kawasan Indonesia Timur memiliki banyak cekungan migas yang masih belum dieksplorasi secara maksimal. Salah satu cekungan di wilayah ini yang memiliki petroleum sistem yang aktif dan kemungkinan akumulasi hidrokarbon adalah Cekungan Manui. Sekuen berumur Miosen Tengah-Akhir pada cekungan tersebut diduga memiliki potensi sebagai batuan induk. Akan tetapi pemahaman geologi terkait sekuen tersebut masih terbatas. Formasi Pandua yang tersingkap di daerah Andowia, Konawe Utara, Sulawesi Tenggara merupakan salah satu interval serpih yang berumur Miosen. Studi lebih lanjut terkait Formasi Pandua bertujuan untuk mengetahui pembagian fasies, lingkungan pengendapan dan proses pengendapan serpih serta potensinya sebagai batuan induk. Penelitian ini menggunakan analisis lapangan dari data pengukuran stratigrafi, analisis petrografi dan paleontologi untuk menentukan litofasies, lingkungan dan proses pengendapan serpih. Selanjutnya analisis geokimia organik meliputi analisis *Total Organik Karbon* (TOC), *Rock Eval Pyrolysis* (REP), *Vitrinite Reflectance* dan petrografi organik digunakan untuk menentukan potensi serpih sebagai batuan induk.

Serpih Formasi Pandua Formasi Pandua terdiri atas 11 jenis litofasies yang ditentukan berdasarkan identifikasi makroskopis dan mikroskopis yaitu *clayey shale*, *massive claystone*, *clastic detritus-rich claystone*, *massive mudstone*, *iron oxide-rich mudstone*, *mica-rich mudstone*, *low-angle laminated mudstone*, *massive siltstone*, *carbon-rich massive siltstone*, *laminated siltstone*, dan *carbon-rich laminated siltstone*. Formasi Pandua terendapkan di lingkungan fluvial hingga delta. Lingkungan pengendapan serpih Formasi Pandua dimulai dari *lower delta plain* hingga *back-barrier*. Proses pengendapan serpih yang terbentuk pada fasies *crevasse splay*, *interdistributary bay* dan *swamp* didominasi oleh mekanisme suspensi (aliran *hypopycnal*). Sementara itu, serpih yang terbentuk pada fasies *distributary mouth bar* didominasi oleh aliran *hyperpycnal*. Berdasarkan analisis geokimia organik, serpih Formasi Pandua memiliki kekayaan organik yang tergolong *poor* (TOC<0,5) dan *excellent* (TOC>4%). Data petrografi organik menunjukkan kehadiran maseral vitrinit dominan dan tergolong tipe kerogen III. Berdasarkan analisis pirolisis didapatkan nilai S₂, *Hydrogen Index* (HI) dan *Potential Yield* (PY) rendah yang menunjukkan tipe kerogen IV. Hasil ini menunjukkan potensi serpih Formasi Pandua untuk menghasilkan hidrokarbon masih rendah. Tingkat kematangan kerogen dalam serpih tergolong *overmature*.

Kata kunci: Formasi Pandua, Konawe Utara, serpih, litofasies, lingkungan pengendapan, proses pengendapan, geokimia organik.

ABSTRACT

Eastern Indonesia region has many oil and gas basins that have limited exploration. One of the basins in this region that has an active petroleum system and possible hydrocarbon accumulation is the Manui Basin. The Middle-Late Miocene sequence in this basin expects to have potential as source rock. However, the geological understanding of the sequence is still limited. The Pandua Formation, which is exposed in the Andowia area, North Konawe, Southeast Sulawesi is one of the Miocene shale intervals. Further studies related to the Pandua Formation aim to determine the distribution of facies, depositional environment and depositional process of shale and their potential as source rock. This study uses field analysis of stratigraphic measurement data, petrographic analysis, and palaeontology to determine lithofacies, environment and deposition process of shale. Furthermore, organic geochemical analysis including analysis of Total Organic Carbon (TOC), Rock Eval Pyrolysis (REP), Vitrinite Reflectance and organic petrography were used to determine the potential of shale as source rock.

Pandua Formation shale consists of 11 types of lithofacies determined based on macroscopic and microscopic observation, namely clayey shale, massive claystone, clastic detritus-rich claystone, massive mudstone, iron oxide-rich mudstone, mica-rich mudstone, low-angle laminated mudstone, massive siltstone, carbon-rich massive siltstone, laminated siltstone, and carbon-rich laminated siltstone. The depositional environment of Pandua Formation is fluvial to deltaic. The shale depositional environment of the Pandua Formation starts from the lower delta plain to the back-barrier. The shale deposition process of crevasse splay, interdistributary bay and swamp deposits dominated by the suspension mechanism (hypopycnal flow). Meanwhile, the shale of the distributary mouth bar deposit is dominated by hyperpycnal flow. Based on organic geochemical analysis, the shale of the Pandua Formation has an organic material content that is classified as poor ($TOC < 0.5$) and excellent ($TOC > 4\%$). Organic petrographic data showed the predominant presence of vitrinite maceral and classified kerogen type III. Based on the pyrolysis analysis, the values of S_2 , Hydrogen Index (HI) and Potential Yield (PY) were low, indicating kerogen type IV. These results indicate that the potential of the Pandua Formation shale to produce hydrocarbons is still low. The maturity level of kerogen in the shale is classified as overmature.

Keywords: *Pandua Formation, North Konawe, shale, lithofacies, depositional environment, depositional processes, organic geochemistry.*