

KAJIAN BATUAN ASAL, TATANAN TEKTONIK, DAN IKLIM PURBA PADA BATUPASIR FORMASI NANGGULAN BERDASARKAN ANALISIS PETROGRAFI

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Material rombakan yang menyusun batuan sedimen dapat dijadikan sebagai alat untuk mengetahui sejarah geologi dan aspek-aspek geologi lainnya terutama mengenai batuan sumber, proses sedimetasi, tatanan tektonik, dan iklim purba. Sebelas sampel batupasir Formasi Nanggulan (Eosen Tengah-Atas) dianalisis dengan maksud untuk merekonstruksi kembali proses geologi selama periode sedimentasi Formasi Nanggulan.

Kajian ini dilakukan dengan menggunakan Metode *Point Counting* Gazzidickinson (1979) untuk meminimalisir ketergantungan variasi ukuran butir terhadap abrasi selama proses transportasi. Setiap sampel dianalisis dengan hati-hati dengan menggunakan 250 butir material rombakan di bawah mikroskop polarisasi dengan perbesaran maksimal. Kemudian, data yang dihasilkan diproses dengan cara membuat kelompok sampel berdasarkan kedalaman yang secara langsung mewakili umur geologi tertentu.

Formasi Nanggulan bagian bawah tersusun oleh kuarsa monokristalin (36%), kuarsa polikristalin (6%), feldspar (5%), litik (4%), mineral lain (7%), semen (10%), dan matriks (4%). Sementara itu, batupasir Formasi Nanggulan bagian atas tersusun atas litik vulkanik (73%), semen (13%), plagioklas (7%), kalsit (6%), mineral lain (1%).

Berdasarkan hasil *plotting*, batupasir Formasi Nanggulan bagian bawah berasal dari tatanan tektonik *recycled orogen* dan tatanan blok benua dengan batuan sumber berupa batuan plutonik pada iklim *humid-semi humid*. Kemudian seiring berjalannya waktu, tatanan tektonik mulai berubah menjadi busur magmatif aktif berupa *undissected arc* yang dicirikan dengan banyaknya litik vulkanik.

Kata kunci : Formasi Nanggulan, *provenance*, *recycled orogen*, *undissected-arc*, *humid climate*

***STUDY OF PROVENANCE, TECTONIC SETTING, AND
PALAEOCLIMATE ON NANGGULAN FORMATION SANDSTONE BASED
ON PETROGRAPHICAL ANALYSIS***

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Detrital modes of siliciclastic sedimentary rocks, as a result of sedimentary process, can become a tool for recognising the geological history and any sedimentary aspects particularly source rock, sedimentary processes, palaeoclimate and tectonic setting. Fifteen sandstone samples of The Nanggulan Formation (Middle-Upper Eocene) were analysed in order to reconstruct the geological processes during the deposition period of the Nanggulan Formation.

The study was conducted using Gazzi-Dickinson Point Counting Method (1979) to minimise the dependance of grain size variation due to abrasion of grain during the transportation process. Each sample was carefully examined by using approximately 250 grains under the maximum microscope magnification. Then, the data was processed by grouping the samples based on several depth intervals which also represent the consecutive geological time events. The result is then plotted to both Dickinson & Suczek triangular diagrams (1979) and Tortosa (1991) to analyse the source and tectonic setting using modal composition of QFL; QmFLt; QpLvLs; Qp>3, Qm un, Qm non, and Qp>3. Furthermore, the palaeoclimate and relief are determined using Suttner & Duta (1986) bivariate diagram and Weltje (1994) with modal composition of Qt, Qp, F, Rf and Q, F, L, CE.

The lower part of Nanggulan Formation is predominantly composed by monocrystalline quartz (36%), polycrystalline quartz (6%), feldspar (5%), lithic (4%), other mineral (7%), cement (10%), and matrix (4%). In the other hand, The upper part of Nanggulan Formation is predominantly composed by volcanic lithic (73%), cement (13%), plagioclase (7%), calcite (6%), other mineral (1%).

Based on the plotting results, Lower Nanggulan sandstones were derived from recycled orogen tectonic setting and cratonic setting with low grade metamorphic source in humid-semi humid climate. As time went by, the geological setting slowly changed to an active magmatic arc (undissected arc) which can be shown by the abundant volcanic lithics.

Keywords : *Nanggulan Formation, provenance, recycled orogen, undissected-arc, humid climate*