ABSTRACT

This research is aimed to understand the development of the Serayu Basin, including the deposition history, tectonic and volcanic activities, by probabilistic study approach. This study elaborates how far tectonic and volcanic activities affect the characteristics of the Paleogene – Neogene sedimentary facies of the central Serayu Basin, which is represented by populations, from the older to the younger, Worawari Formation, Merawu anf Penyatan Formations.

The method used in this research is probabilistic analysis involving several variables, *i.e.* (1) Amount of volcanic constituents (Rv + Gv), or amount of volcanic rock fragments and volcanic glasses, (2) Q/(Q+F), or ratio between quartz and quartz + feldspar, (3) Sand/clay ratio (Rsc), (4) Frequency of bed (Fb), and (5) Average thickness of bed (Tab).

On the basis of paleogeographic study, it is revealed that during Paleogene, or exactly during Middle Eocene – Oligocene times, the southern part of the study area was occupied by the Bogor Trough Low, or Bobotsari Low in the Purbalingga area. The lows were bounded by the Southern Serayu Range high in the south. During that time, the South Serayu Range high ,including the active volcanoes on it , was still above the sea level, and therefore the Serayu Basin formed a back arc basin.

During the Neogene time the volcanic belt moved northwards to the north of the Bogor Through. The peak of volcanism occurred during Late Miocene – the lower part of Early Pliocene, which is indicated by formation of the Kumbang volcanic rocks. Meanwhile, the South Serayu Range has been submerged by transgression event causing the Serayu Basin turned to be fore-arc basin.

The result of probabilistic analysis using the variables as mentioned previously suggests that since the formation of the Worawari Formation (Middle Eocene – Oligocene) to the formation of the Penyatan Formation (Late Miocene – lower part of the Early Pliocene) tectonic activity increased, triggering increasing volcanic activity. Afterwards, during the formation of Tapak and Kalibiuk Formations, it is supposed that tectonic and volcanic activities decreased.

SARI

Penelitian ini dimaksudkan untuk mengetahui perkembangan Cekungan Serayu, termasuk sejarah pengendapan, kegiatan tektonik dan vulkanisme, melalui pendekatan studi probabilistik. Dalam studi ini dibahas sejauh mana kegiatan tektonik dan gunungapi berpengaruh terhadap karakteristik fasies sedimen Paleogen – Neogen di Cekungan Serayu bagian tengah, yang diwakili oleh populasi - populasi, dari tua ke muda, Formasi Worawari, Formasi Merawu dan Formasi Penyatan.

Metode yang dipakai dalam penelitian ini adalah analisis probabilistik yang melibatkan beberapa variabel, yaitu (1) Jumlah penyusun asal vulkanik (Rfv + Gv), atau jumlah fragmen batuan vulkanik dan gelas volkanik , (2) Q/(Q+F), atau rasio kuarsa terhadap kuarsa + felspar, (3) Rasio pasir/lempung (Rsc), (4) Frekuensi lapisan (Fb), dan (5) Tebal rata-rata lapisan (Tab).

Berdasarkan studi paleogeografi diketahui bahwa selama Paleogen, atau tepatnya pada waktu Eosen Tengah – Oligosen, bagian selatan daerah penelitian ditempati oleh rendahan Palung Bogor, atau rendahan Bobotsari di daerah Purbalingga, sementara rendahan tersebut berbatasan langsung dengan tinggian Pegunungan Serayu Selatan. Pada waktu itu Pegunungan Serayu Selatan beserta gunungapi – gunungapi yang aktif masih berada di atas muka air laut, sehingga Cekungan Serayu merupakan cekungan busur – belakang.

Pada waktu Neogen, terjadi pergeseran lajur gunungapi ke sebelah utara Palung Bogor. Puncak kegiatan vulkanisme terjadi pada Miosen Akhir – bagian bawah Pliosen Awal, yang ditandai oleh pembentukan Batuan Gunungapi Kumbang. Sementara itu, Pegunungan Serayu Selatan sudah tenggelam oleh peristiwa genang-laut yang menyebabkan Cekungan Serayu berubah menjadi cekungan busur muka.

Hasil analisis probabilistik dengan variabel-variabel tersebut di atas menunjukkan bahwa sejak pembentukan Formasi Worawari (Eosen Tengah – Oligosen) hingga Formasi Penyatan (Miosen Akhir – bagian bawah Pliosen Awal) menunjukkan peningkatan kegiatan tektonik yang disertai peningkatan kegiatan