

GEOLOGI DAN EVOLUSI TEKTONIK PULAU BELITUNG BERDASARKAN KARAKTERISTIK GEOKIMIA DAN PETROGRAFI GRANITOID SERTA IMPLIKASINYA TERHADAP *RARE EARTH ELEMENT*

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ABSTRAK

Pulau Belitung memiliki empat satuan granitoid, yaitu Granit Tanjungpandan, Adamelit Baginda, Granodiorit Burungmandi, dan Granit Batubesi. Perbedaan tipe granitoid ini diindikasikan merupakan akibat dari perbedaan tatanan tektonik pada saat pembentukan granitoid. Secara geografis, lokasi penelitian terletak pada koordinat UTM 48N 77360 mE – UTM 49N 207300 mE dan 9721670 mN – 9636540 mN. Penelitian ini merupakan studi awal untuk mengetahui evolusi tektonik Pulau Belitung berdasarkan analisis petrografi dan geokimia granitoid. Penelitian ini juga bertujuan untuk mengetahui batuan granitoid sebagai sumber penghasil *REE* (*Rare earth element*) di Pulau Belitung. Analisis utama yang dilakukan adalah petrografi sayatan tipis dan analisis geokimia menggunakan XRF (*X-ray Fluorescence*) dan ICP-MS (*Inductively Coupled Plasma-Mass Spectrometry*). Berdasarkan analisis petrografi dan geokimia, Satuan Granit Tanjungpandan terdiri dari *syenogranite*, *alkali-feldspar granite*, dan *monzogranite*, serta merupakan granitoid tipe S dengan kandungan SiO₂ 75,80%, Na₂O 2,57%, Al₂O₃ 12,60%, CaO 1,22%, K₂O 5,20%, nilai ASI (*Alluminium Saturation Index*) > 1 menunjukkan sifat peralumina, dan memiliki afinitas magma *high-K calc-alkaline series*. Satuan Adamelit Baginda terdiri dari *monzogranite*, *quartz-rich granitoid*, dan *syenogranite*, serta merupakan granitoid tipe I dengan kandungan SiO₂ 70,33%, Na₂O 2,36%, Al₂O₃ 13,67%, CaO 3,01%, K₂O 4,29%, nilai ASI < 1 menunjukkan sifat metalumina, dan memiliki afinitas magma *high-K calc-alkaline series*. Satuan Granodiorit Burungmandi terdiri dari *granodiorite* dan *monzogranite*, serta merupakan granitoid tipe I dengan kandungan SiO₂ 67,85%, Na₂O 2,35%, Al₂O₃ 14,34%, CaO 4,62%, K₂O 2,87%, nilai ASI < 1 menunjukkan sifat metalumina, dan memiliki afinitas magma *calc-alkaline series*. Serta Satuan Granit Batubesi terdiri dari *quartz-rich granitoid* dan *syenogranite*, serta merupakan granitoid tipe S dengan kandungan SiO₂ 75,81%, Na₂O 2,61%, Al₂O₃ 12,61%, CaO 0,97%, K₂O 5,11%, nilai ASI > 1 menunjukkan sifat peralumina, serta memiliki afinitas magma *high-K calc-alkaline series*. Satuan Granit Tanjungpandan dan Satuan Granit Batubesi terbentuk pada tatanan tektonik *syn-collision* atau pada saat tumbukan antara Benua Sibumasu dengan Indochina berlangsung pada Trias Akhir. Sedangkan Satuan Adamelit Baginda dan Satuan Granodiorit Burungmandi terbentuk pada tatanan tektonik *post-collision* atau pada akhir tumbukan benua yang berlangsung pada Trias Akhir hingga Kapur Awal. Kadar unsur *REE* tertinggi berada pada Satuan Granit Tanjungpandan dengan kandungan (tertinggi) Ce 490 ppm; La 89,8 ppm; Nd 186 ppm; Y 108 ppm; dan Total *REE* tertinggi 1130,13 ppm pada sampel granitoid Tanjung Binga. Mineral tanah jarang yang ditemukan antara lain monasit, alanit, dan xenotime. *REE* diinterpretasikan bersumber dari kerak Benua Sibumasu yang mengalami pelelehan selama terjadinya tumbukan benua (*collision*) dan pada akhirnya membentuk Granit Tanjungpandan.

Kata kunci: granitoid Pulau Belitung, geokimia, petrografi, REE, tektonik

GEOLOGY AND TECTONIC EVOLUTION OF BELITUNG ISLAND BASED ON GEOCHEMISTRY AND PETROGRAPHY CHARACTERISTICS AND ITS IMPLICATION ON RARE EARTH ELEMENT

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ABSTRACT

Belitung Island has four granitoid units, namely Tanjungpandan Granite, Baginda Adamelite, Burungmandi Granodiorite, and Batubesi Granite. This difference in granitoid type is indicated as a result of differences in tectonic setting at the time of granitoid formation. Geographically, the study location was located at the coordinates of UTM 48N 77360 mE - UTM 49N 207300 mE and 9721670 mN - 9636540 mN. This research is a preliminary study to determine the tectonic evolution of Belitung Island based on petrographic analysis and granitoid geochemistry. This study also aims to determine granitoid rocks as a source of producing REE (Rare Earth Element) on Belitung Island. The main analysis carried out was thin-section petrography and geochemical analysis using XRF (X-ray Fluorescence) and ICP-MS (Inductively Coupled Plasma-Mass Spectrometry). Based on petrographic and geochemical analysis, Tanjungpandan Granite Unit consists of syenogranite, alkali-feldspar granite, and monzogranite, and is S-type granitoid with SiO₂ content of 75.80%, Na₂O 2.57%, Al₂O₃ 12.60%, CaO 1.22 %, K₂O 5.20%, ASI (Alluminium Saturation Index) > 1 indicates peraluminous properties, and has a high-K calc-alkaline series magma affinity. The Baginda Adamelite consists of monzogranite, quartz-rich granitoid, and syenogranite, and is I-type granitoid with a SiO₂ content of 70.33%, Na₂O 2.36%, Al₂O₃ 13.67%, CaO 3.01%, K₂O 4.29 %, ASI value <1 indicates metaluminous properties, and has a high-K calc-alkaline series magma affinity. The Burungmandi Granodiorite consists of granodiorite and monzogranite, and is I-type granitoid with a SiO₂ content of 67.85%, Na₂O 2.35%, Al₂O₃ 14.34%, CaO 4.62%, K₂O 2.87%, ASI value <1 indicates metaluminous properties, and has a calc-alkaline series magma affinity. The Batubesi Granite consists of quartz-rich granitoid and syenogranite, and is S-type granitoid with SiO₂ content of 75.81%, Na₂O of 2.61%, Al₂O₃ of 12.61%, CaO of 0.97%, K₂O of 5.11%, ASI value > 1 indicates peraluminous properties, and has a high-K calc-alkaline series magma affinity. Tanjungpandan Granite and Batubesi Granite are formed in the syn-collision tectonic setting or when collisions between Sibumasu Continent and Indochina take place in the late Triassic. Whereas Baginda Adamelite and Burungmandi Granodiorite are formed in the post-collision tectonic order or at the end of the continental collision which took place in the Late Triassic to Early Cretaceous. The highest levels of elemental REE are in the Tanjungpandan Granite with the highest content of 490 ppm (part per million); La 89.8 ppm; Nd 186 ppm; Y 108 ppm; and the total REE was highest at 1130.13 ppm in the Tanjung Binga granitoid sample. Rare earth minerals found include monasite, alanite, and xenotime. REE is interpreted as originating from the Sibumasu Continent crust which experienced melting during the collision and eventually formed Tanjungpandan Granite.

Keywords: Belitung Island granitoid, geochemistry, petrography, REE, tectonics.