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Petrogenesis dan Karakteristik Granitoid Menggunakan Metode Petrografi dan Geokimia di Komplek Granitoid Sibolga: Korelasi terhadap Sebaran Mineralisasi Logam Tanah Jarang = Petrogenesis and Characteristics of Granitoid Using Petrographic and Geochemical Methods in the Sibolga Granitoid Complex: Correlation with the Distribution of Rare Earth Element Mineralization

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Abstrak

Komplek Granitoid Sibolga (KGS) di Blok Sumatra Barat merupakan objek studi yang penting untuk memahami proses magmatisme paska kolisi di wilayah tersebut. Penelitian ini bertujuan untuk mengkarakterisasi batuan, menginterpretasikan petrogenesis, proses evolusi magma, serta hubungannya dengan sebaran mineralisasi LTJ pada granitoid KGS. Analisis dilakukan melalui pendekatan petrologi, petrografi, geokimia unsur mayor, dan unsur jejak. Hasil analisis menunjukkan bahwa granitoid KGS secara dominan terdiri dari syenogranit dan monzogranit yang bersifat peraluminous, ferroan, dan termasuk dalam seri kalk-alkalin tinggi-K. Berdasarkan analisis petrologi, terlihat batuan di utara didominasi oleh syenogranit yang memiliki ukuran butir lebih besar dibanding ukuran butir di selatan yang didominasi oleh batuan monzogranit. Mikrotekstur di utara berupa zonasi plagioklas, di area transisi berupa perthite, sedangkan mikrotekstur di selatan berupa graphic intergrowth. Berdasarkan analisis diskriminasi geokimia, granitoid ini terklasifikasikan sebagai granit Tipe-A (subtipe A2) yang terbentuk dalam lingkungan tektonik post-collisional. Evolusi magma secara dominan dikontrol oleh proses diferensiasi melalui fraksinasi kristal yang intensif. Hal ini dibuktikan oleh deplesi kuat pada unsur Ba, Sr, P, Ti, anomali negatif Eu yang signifikan yang mengindikasikan fraksinasi plagioklas serta tingginya unsur Rb. Selain itu, terjadi proses magma mingling di area utara yang membuat persentase SiO2 pada granit tipe-A ini berkurang dan FeO bertambah. Al2O3 yang cukup tinggi pada granit tipe-A ini, dihasilkan dari peleburan batuan kerak sebelumnya yang cukup kaya akan Al2O3. Pengayaan seluruh LTJ terjadi di selatan, yang merupakan area kristalisasi akhir magma, sementara terdapat pengayaan LTJR di utara akibat proses sekunder (alterasi).
.....The Sibolga Granitoid Complex (SCG) in the West Sumatra Block is an important object of study to understand the post-collisional magmatism process in that region. This research aims to characterize the rocks, interpret the petrogenesis, the magma evolution process, as well as its relationship with the distribution of REE mineralization in the SCG granitoid. Analysis was conducted through petrology, petrography, major element geochemistry, and trace element approaches. The analysis results show that the SCG granitoid is dominantly composed of syenogranite and monzogranite which are peraluminous, ferroan, and are included in the high-K calc-alkaline series. Based on petrological analysis, it is seen that the rocks in the north are dominated by syenogranite which has a larger grain size compared to the grain size in the south which is dominated by monzogranite rocks. Microtextures in the north are in the form of plagioclase zoning, in the transition area in the form of perthite, while microtextures in the south are in the form of graphic intergrowth. Based on geochemical discrimination analysis, this granitoid is classified as A-type granite (A2-subtype) which was formed in a post-collisional tectonic environment. Magma evolution is dominantly controlled by the process of differentiation through intensive crystal fractionation. This is proven by the

strong depletion in Ba, Sr, P, Ti elements, a significant negative Eu anomaly which indicates plagioclase fractionation, as well as the high Rb element. Besides that, a magma mingling process occurred in the northern area which made the SiO percentage in this A-type granite decrease and FeO increase. The fairly high AlO in this A-type granite is produced from the melting of previous crustal rocks which were fairly rich in AlO. REE enrichment occurs in the south, which is the final crystallization area of the magma, while LREE enrichment is found in the north due to secondary processes (alteration).