

Petrogenesis of Perhentian granite and Perhentian Kecil syenite from the Perhentian Island, northeastern Peninsular Malaysia: evolution of two contrasting magmas

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The Perhentian complex consists of two plutons, the younger Perhentian granite and the older Perhentian Kecil syenite. They form a reversely zoned complex where the syenitic rock is rimmed by the granitic rock. The former ranges in composition from syenite to monzonite to gabbroic rocks whereas syenogranite dominates the latter pluton. The syenitic rocks are characterized by an extended composition of lower SiO_2 (46 to 66 %) compared to the Perhentian granite ($> 70.9\% \text{SiO}_2$) and have significantly high Al_2O_3 , TiO_2 , Fe^{tot} , MnO , MgO , CaO , P_2O_5 , Sr, Ba and V compared to the granitic rocks. Petrology and geochemical data indicate that both rocks are individual melt probably derived from a different sources. It is suggested that the syenitic magmas formed by hydrous melting of lower crust probably as a result of underplating by, or intrusion of mantle derived basaltic magma. The strong enrichment of large ion lithophile elements (Sr and Ba) is probably related to transfer of enriched (hydrous?) fluids from the mantle into the lower crust, and possibly initiated melting to form the syenites. In contrast to the Perhentian Kecil syenite, the Perhentian granite has no mafic association. The felsic nature of the Perhentian granite suggests that it may be derived from an SiO_2 rich source or may represent a minimum melt, the first melt produced from a solid containing plagioclase-K-feldspar-quartz.
