Petrochemistry of basic to ultrabasic rocks in the Ranau Area, Sabah

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The basic to ultrabasic rocks occur over an area of 50 km^2 in the northeastern part of Ranau area. These rocks are related to the igneous activities of the Late-Cretaceous Chert-Spilite Formation. The ultrabasic rocks comprise mainly peridotite (harzburgite and lherzolite) with subordinate pyroxenite (olivine websterite, orthopyroxenite and olivine clinopyroxenite), while the basic rocks are mainly gabbro and quartz gabbro with some norite, tonalite and anorthosite. In general, the ultrabasic rocks are dark in colour or melanocratic, while the gabbroic rocks are mostly leucocratic in nature. On the whole, the ultrabasic rocks show some degrees of serpentinization: antigorite

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and bastite were found to infill fractures and joints; and were also often found to replace olivine and pyroxene in the host rocks. These ultrabasic and basic rocks have a wide SiO_2 compositional range of 37.8 to 59.5%, high MgO of 18.7% and low total alkali ($Na_2O + K_2O$) of 2.11%. From the petrogenetic point of view, these rocks were probably derived by magmatic differentiation of primitive basic magma of tholeiitic composition formed in the upper mantle. This magma was evolved from peridotites through pyroxenite into gabbroic rocks. The genetic relationship of these rocks and the magmatic differentiation were evidenced by the continuity of the variation diagrams. The rocks here and the style of formation are comparable to the layered basic intrusives of the Stillwater Complex in Montana.