How Geochemical Data Substantiate Findings in Lithostratigraphy with Specific Reference to Characterizing Lithodemes

HAMZAH MOHAMAD

Program Geologi, Fakulti Sains dan Teknologi
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

There are three main factors which hinder accurate characterisation and correlation of a metamorphic complex, supersuite, suite or a lithodeme. The factors are related to the direct dependence of type and nature of metamorphic rocks (i.e. mineral composition, texture and microstructure) on (1) The specific type of metamorphism affecting the area, (2) The intensity of the metamorphism, and (3) The initial composition of the protoliths. Before using mineral composition, texture and microstructure as prime rock characters, detailed understanding about the

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relation between the three factors and the metamorphic rocks is very important in order to avoid, amongst others: (1) Mixing up of lithostratigraphic and lithodemic nomenclature, (2) Giving more than one name to a single lithodeme, and (3) Mixing up of ranks in lithodemic units, i.e. complex, supersuite, suite and lithodeme. The proven isochemical nature of regional metamorphism of metapelites, except for H_2O and CO_2, has enabled the bulk chemical composition to be treated as an additional rock character in characterising lithodemic units. In this study the chemical character is represented by Niggli numbers si, al, alk, and fm. Four correlations based on the these Niggli numbers and their derivatives have been formulated to discriminate lithodemic units, as follows: (1) si vs. al-alk, (2) si vs. alk, (3) si vs. fm, and (4) si vs. [fm/(fm + alk)]. The correlations have been applied to the Scottish Highlands metapelites near Angus District, and three formal and informal lithodemes in Semenanjung Malaysia, i.e. Kenny Hill formation, Taku Schist, and the East-West Highway metapelites. All lithodemic units portray common trends of slopes in all correlations, but any individual lithodeme is distinguishable from the others by the si ranges, as well as the gradients of curves. The strongest discriminating correlation is si vs. al-alk.