

Chemical composition of the Permian mudstones in the South Kitakami Terrane, north-east Japan

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Chloritoid-bearing mudstones are distributed in the Permian and Carboniferous strata in the South Kitakami Terrane, northeast Japan [1]. The chemical composition of the mudstones is characterized by high concentration of Al_2O_3 and TFe_2O_3 , and the rocks are considered to have originated from residual clay deposits [1]. This study aims to clarify the climatic and environmental factor controlling paleoweathering during the Permian time.

The analyses of chemical composition of the mudstone and modal composition of sandstone in the Permian strata are carried out in the Tassobe and Nakadaira areas in the South Kitakami Terrane. These data are compiled with previous reported geochemical data of mudstones (e.g. [2]) as the variations in chemical weathering index such as CIA index [3].

Major element composition of Lower Permian mudstones suggests that significant concentration of TiO_2 , Al_2O_3 , TFe_2O_3 , whereas the Middle and Upper Permian mudstones are depleted in Al_2O_3 and TiO_2 . CIA index of the Lower Permian mudstones varies from 83 to 95, and Middle and Upper Permian vary from 61 to 81.

Thus a gradual decrease in the chemical weathering degree in the Lower Permian succession can be noted. This trend suggests that the intensity of weathering weakened with time, when the volcanic terrane can be supposed as a hinterland of the Lower Permian strata. The weathering in the Lower Permian is considered to have been under warm and humid climatic conditions with efficient paleodrainage and relatively slow sedimentation rate. However, less weathered sediments are typical of the Middle and Upper Permian, though the sediments in the basal horizon of the Triassic system show intense paleoweathering [4]. This indicates the possibility that the increasing of sedimentation rate by uplift of hinterland reflecting the Permian arc evolution suppressed the proceeding chemical weathering during Middle and Late Permian time.

References

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