

Flow-path geometry in accretionary complex: formation process and its longevity

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Various fracture filling minerals and secondary minerals in flow-path walls were formed by fluid-rock interaction during the formation of accretionary complex distributed in Japan. Each mineral formed under favourable geological conditions and can be used to estimate the conditions of accretion and formation of the flow-paths. Petrographic observations, mineralogical and geochemical analyses were made on fracture fillings and secondary minerals from boreholes of ca. 140 metres depth. Results reveal that the secondary minerals were formed in major three-stages distinguished by the sequential textural relationships of the minerals and the interpreted environment of mineral formation. Filling mineral assemblages show that the studies rock formation has been subducted to a depth of several km and the temperature reached was ca. 200 - 300°C. After the subduction, the rock formation uplifted and most of the fractures (up to ca. 90%) are sealed by filling minerals due to water-rock interaction. Surface acidic water (redox front) penetrated up to 80 metres beneath the present ground surface thereafter. The acid water dissolved calcite fracture fillings to form the present groundwater flow-paths which allowed recent wall rock alteration to occur. However, still the deeper part of host rock remained relatively intact feature and less number of flow-path. The results shown here imply that filling mineral assemblages can be an effective tool to evaluate the formation process of flow-path within the deeper host rock and its longevity in the accretionary complex distributed in the orogenic field of Japan.