Brittle faulting and alteration in the Gozu granitic mass, NE Japan

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Brittle fault rocks in the Gozu granitic mass, Niigata Prefecture, were formed through 4 stage deformations. The fault rocks are divided into 6 color types (white, pale green, green, olive, red and black). White, pale green, green and olive fault rocks have clay mineral assemblages characteristics of each other, indicating different types of alteration. Red and black fault rocks contain hematite and manganese oxide respectively. Occurrence of the red and black fault rocks suggests these oxides were derived from geothermal water ascending through the faults with Fe2+ and Mn2+, and that the Fe2+ and Mn2+ were oxidized due to mixing with oxygen-containing groundwater mainly in the faults. The oxidation would result in the precipitation of the Fe- and Mn-oxides out of the geothermal water.