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Carbon and oxygen isotope study of Cambro-Ordovician Pungchon limestone from the Taebaegsan mineralized district, South Korea

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Cambro-Ordovician Pungchon limestone (less than 300 meters in thickness) was intercalated in Lower Chosun Supergroup from the Taebaegsan Basin and occurs as originally fine-grained and blackish to dark grey in lithology and color. The hydrothermal alteration of the limestone has facilitated by granite intrusions of the Jurassic and Cretaceous ages, respectively. W-Mo, Pb-Zn, Au-Ag and Fe-Cu mineralization occurs as skarn and quartz vein deposits and was accompanied by late Cretaceous igneous activities. Alteration is somewhat extensive in the western part of the basin, but locally different in the mode of occurrence. The upper part of limestone was dominantly altered into high-Ca limestone with more than nearly 98% of calcite. In southeastern part of the basin, the original lithology is mostly preserved. The original composition and fabric of limestone was changed and obliterated by virtue of recrystallization resulting from hydrothermal alterations. Hydrothermal minerals occur as calc-silicates such as illite, pyrite, clinochlore, tremolite and garnet. Isotopic data obtained from fresh limestone, altered limestone and hydrothermal calcite samples display $\delta^{13}C_{PDB}$ variation from -5.4 to +0.98o/oo and $\delta^{18}O_{V-SMOW}$ variation from 8.2o/oo to 20.9o/oo. $\delta^{13}C_{PDB}$ values(-0.5o/oo$\sim$+0.5o/oo) of fresh limestone are correspond to seawater composition and should represent primary $\delta^{13}C$ signatures. Altered limestone displays a wide $^{13}C_{PDB}$ variation ranging from -1.5 to -3.86o/oo. This suggests that carbon and oxygen isotopic system in all analyzed limestone was opened and that they have undergone isotopic alteration approaching igneous values. Hydrothemal calcite of skarn deposits represents the lightest carbon isotope composition ranging from -5.79 to -2.28o/oo. All Isotope compositions of Pungchon limestone show the coupled trend of decreasing $\delta^{13}C$ and $\delta^{18}O$ in calcites of the Pungcheon limestone. Isotopic depletions of calcite carbonates were initiated with volatilization accompanying calc-

silicate-forming reactions and then the H_2O-rich siliceous fluids of igneous origin actively infiltrated the system to promote fluid-rock interactions.