H125-P001 **Room: Poster Session Hall** **Time: May 23**

Fractionation of stable isotopes during dehydration from subducting slabs: implications for origin of non-volcanogenic fluids

Chiho Kusuda[1]; Hikaru Iwamori[2]

[1] EPP,Tokyo Univ.; [2] Dept. Earth Planet. Sci., Univ Tokyo

Various isotopic studies indicate that non-volcanogenic hot springs such as a source of Arima-type thermal water have strong similarities to magmatic fluids, and that they might be relevant to an aqueous fluid originated from a deep source at high temperature. However, the origin of non-volcanogenic hot springs and the relevant processes are poorly constrained at present. Although it is speculated that such fluids might have been directly originated from subducting oceanic crusts through dehydration reactions, this possibility has not been tested quantitatively in a framework related to the thermal structure and fluid process in subduction zones. The main aim of this study is to model the dehydration processes of subducting oceanic crusts (in particular altered oceanic basalts) and to predict the isotopic characteristics of aqueous fluids released from the crust, considering thermal structures and phase relations of the subducting slabs. In this study, first, a model is introduced, in which 1) the amount of fluid dehydrated from slab, 2) isotopic fractionations between water and hydrous minerals (involved in dehydration; amphibole, chlorite, and lawsonite) at a given pressure and temperature, and 3) variations in hydrogen and oxygen isotope ratios of expelled fluids with increasing depth are estimated. Then the model results are compared with the observations to discuss the origin of non-volcanogenic hot springs.

Application of this model to the Philippine Sea plate, the Pacific plate, and other hypothetical subducting plates with various subduction parameters (subduction velocity, angle, and the age of subducting plate) shows a common feature insensitive to the subduction parameters: i.e., dehydration mainly occurs from the bottom of upper continental crust (about 30 km depth) to 100 km depth while it occurs a little below 100 km depth. Overall predicted ranges of hydrogen and oxygen isotope ratios of generated fluid are delta D = -10 ~-60 per mil and delta O-18 = +6 ~+9 per mil, respectively, which are close to those of observed magmatic fluids. The model also predicts that, as the slab subducts, isotope ratios of the fluids change from delta D = -20 per mil and delta O-18 = +6 per mil to -60 and +9 per mil with increasing depths. This suggests that the depth dependence of isotopic fractionations during dehydration may provide a key to resolve where the fluids come from.

At this moment our model involves only hydrogen and oxygen isotopic fractionation during dehydration. We will improve this model by incorporating other processes such as an upward fluid flow through continental crust and reactions during ascent. This type of modeling can potentially be applied to other isotopic and elemental systematics, which is then used to find successful tracers to examine the origin of non-volcanogenic hot springs in subduction zone systems.