

Temporal change of magma characteristics for volcanic rocks in Aso area, implication from Sr and Nd isotopic ratios

Taro Shinmura[1]; Yoji Arakawa[2]

[1] Economics, Kumamoto Gakuen Univ; [2] Earth Evol. Sci., Grad. School. Life and Envir. Sci. Univ. Tsukuba

Chemical compositions and isotopic ratios ($^{87/86}\text{Sr}$ and $^{143/144}\text{Nd}$) for late-Pliocene to Quaternary (pre-Aso (pre-caldera), inter-caldera and post-caldera stage) volcanic rock in Aso area in SW Japan, were determined to reveal the magma characteristics of the central Kyushu through these periods and the mechanism of caldera formation.

1) pre-Aso volcanics (pre-caldera stage) (ca. 2.2-0.45 Ma): Sr ratios for basalt to andesite dykes and lavas were 0.7040-0.7046 and minimum value through this period was about 0.7040. Maximum value of Sr ratios rose when the ages became younger. 2) caldera and inter-caldera stage (ca. 0.3-0.09 Ma): Sr ratios for pyroclastic deposits of caldera-stage were 0.7040-0.7041 and ratios for volcanic rocks of inter-caldera stage 0.7041-0.7050. 3) post-caldera stage (ca. 0.09-0 Ma): Sr ratios for lavas of Aso central cones were 0.7040-0.7045 and it fell the lower the stage was latter. Nd ratios were 0.5126-0.5128 and were close to the area of bulk silicate Earth on the Mantle array of the Sr-Nd isotopic diagram. Minimum values of Sr ratios was nearly 0.704 all through the period, and this implies origins of these volcanics were same Sr isotopic ratio. Maximum values rose from old pre-caldera stage and its peak was in inter-caldera stage (although pyroclastic deposits of caldera-stage remained low value). Sr ratios suddenly fell in post-caldera stage and this shows that post-caldera activity is different from inter-caldera stage.

In $\text{SiO}_2\text{wt\%}$ -Sr ratio diagram, some end members seemed to exist. One was origin of all through the period and its characteristic was mafic and low-Sr-ratio. And two different end members which would be mixed with original material were mafic and felsic, and both of these Sr ratios were high. REE pattern normalized to C1 chondrite showed values increased from HREE to LREE. Values for post- and inter-caldera volcanics were almost overlapped to those of pyroclastic deposits of caldera-stage. Values for Pre-Aso volcanics were shifted a little but pattern were same. REE pattern of all through the period were almost same and values did not differ very much. This implies that three end members including origin had same REE pattern.