Application of the isocon method to argillaceous rocks of accretionary complex and quantitative estimation of volume change

Kuniyo Kawabata[1], Eisei Ikesawa[2], Hidemi Tanaka[3], Gaku Kimura[4]

[1] Earth and Planetary Sci., Tokyo Univ, [2] Dept. eps, Univ. of Tokyo, [3] Dept. of Earth and Planet Sci., Univ. Tokyo, [4] Earth and Planetary Science . Inst., Univ. of Tokyo

The isocon method has been further improved from Gresens method by Grant[1986]. The method is useful to estimate change in mass and volume from concentration of immobile elements. The method has been widely used in fault zone [for example, Tanaka et al, 2001]. All these studies, however, examined fault rocks derived from granitic rocks. Only few attempts have been so far made at altered / deformed rocks originated from sedimentary rocks. Because the sedimentary rocks have been thought to be highly inhomogeneous from the viewpoint of chemical compositions. This study presents (1) application the isocon method to sedimentary rocks, (2) determination of immobile elements for deformed and altered sedimentary rocks, and (3) a relationship between mode of deformation in sedimentary rocks and volume change. Sedimentary rocks were sampled from the Shimanto accretionary complex in southeastern part of the Shikoku Island. The Shimanto belt in this area is composed of melange and coherent sandstone-shale turbidite units constituting accretionary complex. Volume change in sedimentary rocks would be caused by four factors. For volume decrease, 1) simple mechanical compaction, 2) mechanical wear, and 3) pressure solution deformation. For volume increase, 4) dilation. From microscopic observation, pressure solution is widely recognized. Therefore, this study especially concentrates on mode of chemical change from host rocks to deformed/altered rocks by pressure solution mechanism.

As a result, the isocon method can be successfully applied. The mechanism for volume loss are explained by dissolution by pressure solution mechanism. From the map analysis of pressure solution seams(PSS) by EPMA, Ti concentrated within PSS. These results indicate that Ti is hardly soluble (immobile) element, and Al, Nb and Th fitted along Ti isocon line are immobile in argillaceous rocks.