

3-D X-ray CT imaging of inclusion fabric in plagioclase porphyroblasts of Sambagawa metamorphic rocks

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High-P/T ratio type metamorphic belts are formed by subduction and exhumation of sediments along subduction zones. In Sambagawa metamorphic belt, the foliation and lineation of metamorphic rocks were pervasively developed by ductile deformation during their exhumation along an oblique subduction zone. In contrast, deformation during subduction stage can be estimated from the inclusion fabric within porphyroblasts, which grew during prograde and peak metamorphic stages. At oblique subduction zones, sediments could flow in a spiral and this flow may be recorded in three-dimensional inclusion fabric.

In this study, 3-D alignment of inclusion minerals in plagioclase porphyroblasts was examined by X-ray microtomography. Analyzed sample is a basic schist collected from the oligoclase-biotite zone along the Asemi-River, central Shikoku, Japan. Plagioclase porphyroblasts have numerous epidote, amphibole and titanite inclusions, which are preferentially aligned, forming an internal curved foliation in both XZ (parallel to lineation and normal to foliation) and YZ (normal to lineation) sections.

The previous 3-D imaging using X-ray CT system at BL20B2 in SPring-8 (SP-micro CT: 30 keV, spatial resolution of about 13 microns) could show sigmoid alignment of inclusion minerals (curved internal foliation), which are comparable with the 2-D observation of thin sections, although individual grain can not be imaged (Ishii et al., the last meeting). Present imaging with higher resolution (BL20XU, 20 keV, spatial resolution of about 5 microns) have shown internal lineation due to the alignment of columnar inclusion minerals, in addition to internal foliation. We intend to present the comparison between this alignment in CT-image and the fabric measurement by EBSP (Takeshita et al., the last meeting).