J024-008 Room: C403 Time: May 28 11:15-11:30

Plastic flow and deformation of regional metamorphic belts at convergent plate boundaries

Hikaru Iwamori[1]

[1] Geological Inst., Univ. Tokyo

Plastic flow and deformation of viscous fluid between rigid boundaries have been modelled for investigating deformation of a forearc wedge and a regional metamorphic belt as a weak deforming zone between the plates at convergent boundaries. Three types of analytic formulations for fluid with a constant viscosity have been found to be adequite for investigating the corresponding flow and deformation for various configurations: (i) squeezing between two parallel boundaries, (ii) squeezing and mass influx in the corner wedge between two oblique boundaries (e.g., accretionary wedge over the subducting plate with the continental plate as a backstop), and (iii) dragging and mass influx in the corner wedge as in (ii). All cases can include strike-slip movements of the boundaries, which allows us to investigate three-dimensional deformation, although flow in the strike-slip direction is assumed to be homogeneous. The corresponding streamlines, instaneous deformation (strain and vorticity), finite deformation of an infinitesimal and finite elements, and the time scale of flow are calculated for each configration with various mechanical boundary conditions (e.g., no-slip or no-shear condition).

The model results show that, configuration and mechanism of the flow can be inferred from a combination of the spatial distribution of instantaneous and finite deformation (e.g., deformed radiolaria as a strain marker for each point, and geometry of folding as finite deformation of a large block). In particular, prolate strain (uniaxial extension) nearly parallel to the strike of subduction zone, together with a large scale folding, can be a good indicator for deformation in the accretionary wedge associated with three-dimensional corner flow induced by oblique subduction. Deformation observed in the Cretaceous regional metamorphic belts in southwest Japan can be explained by this mechanism.