

## Problems about the Japan Sea formation and their implications for active tectonic in the backarc side of Japan

# Atsushi Yamaji[1]

[1] Div. Earth Planet. Sci., Kyoto Univ.

<http://www.kueps.kyoto-u.ac.jp/~web-bs/yamaji/index.htm>

It is known that some of major tectonic features in the backarc side of Japan originated from grabens that were generated when the Japan Sea opened in the late Paleogene to early Neogene time. Understanding of Japan Sea formation has important implications for the active tectonics and mitigation of earthquake disasters in this region. From this point of view, I take up two topics in this paper for the understanding of the active tectonics of Eastern Japan Sea Deformation Zone.

### **Grabens perpendicular to the arc**

The Island of Honshu is subject to E-W tectonic compression. And, the graben-bounding faults that were generated in the rifting of the Japan Sea are reactivated to give rise to earthquakes and active tectonics in the backarc side. Geological field works have revealed that not only arc-parallel but also arc-perpendicular grabens were formed in the rifting. It is important that pre-existing planes of weakness with various orientations can be reactivated as faults under a state of stress. As a result, the crust is broken into the blocks at depths to create three-dimensional active folds of their soft but thick sedimentary cover by the differential movement of the blocks, especially in the Niigata area. Most of folds in this area have short axial lengths, and have three-dimensional shapes. The recognition of such arc-perpendicular grabens that are obliterated by young sedimentary cover today is important for the project to understand the Deformation Zone.

**Mesoscale faults—latent threats** The threats of mesoscale faults have been overlooked behind the discussions of active faults with mappable scales.

A young and soft sedimentary cover in the Niigata area is involved in active folding. The folds have axial trends largely parallel to the arc, the three-dimensional fold structures with short axial lengths and their en-echelon arrangement suggest the reactivation of basement faults at depths.

In the folded soft sedimentary body, there are dense population of mesoscale faults with various orientations and various shear senses. Some of the mesoscale faults are interpreted as the mesoscale entities that realize macroscale plastic flow from active structural culminations to structural depressions, as they have the (oblique)normal senses that carries hanging-walls toward depressions (Yamaji et al., 2005). Briefly, there are active mesoscale faults accompanied by active folding. Unlike land-slides, which move down to topographic depressions, the flows point toward structural depressions. Such mesoscale faults have only small displacements by definition, but can menace especially underground structures including tunnels.