

# Inelastic deformation in a region of the transient and forced extensional horizontal crustal strain

\*Takao Eguchi, Yasuyuki Iwase<sup>1</sup>

1. National Defense Academy, Japan

Just after the focal rebound displacement by the 2011 Off-Tohoku Earthquake ( $M \sim 9$ ), forced horizontal extension was confirmed in the Japanese archipelago. For example, from Miyagi to Yamagata prefectures on the overriding lithosphere, it was approximately stretching in the E-W direction.

We here investigate the "*transient inelastic deformation process*" in the adjacent island-arc environment immediately after such horizontally forced arc-extension.

For simplicity, let us assume that the main origin of inelastic island-arc deformation is not due to biaxial extension but due to transient elongation in a specific direction.

Since the island-arc is not necessarily an isotropic homogeneous elastic body, the mode of inelastic deformation depends on geometrical characteristics such as zonal contrast in elastic constants at pre-existing material block boundaries and/or at active faults within the island-arc.

We discuss the stress-strain relationship in the island-arc as an inelastic deformable body in the environment after the above-mentioned unidirectional elongation.

The response to the stress change in the subsequent environment becomes a nonlinear phenomenon that is transiently time-space dependent at least, and it will be different from the case of the linear elastic body.

In particular, even a small subsequent stress change will result in greater strain than in the case of linear elastics.

In this study, incorporating rheology such as thixotropy, we present some hypothetical models on the inelastic deformation of the island-arc system with the geometric distributed blocks, etc.

Keywords: inelastic deformation, island-arc system just after a greater interplate earthquake, block deformation, thixotropy