# Title of Project : Crustal dynamics -Unified understanding of intra-island deformation after the great Tohoku-oki earthquake-

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## 【Purpose of the Research Project】

Since the 2011 Tohoku-oki Earthquake stimulated geoscientists all over the world and many papers have been published about the physical mechanisms. However, causes of the earthquake are still not very well explained. This is mainly because we do not understand basic properties and conditions of the island arc crust and mantle (i.e. media). It is analogous to trying to forecast weather without knowing the atmospheric pressure and humidity. The main purpose of this research project is to fully describe various phenomena that occur after the Tohoku earthquake, by clarifying the absolute values of crustal stresses, providing a unified view of deformation in the Japanese Islands, and clarifying properties of the island arc crust and mantle, such as the friction along major faults and viscosity of the mantle.

## 【Content of the Research Project】

The basic approach of this research project is,

(a) Estimate absolute values of stress, strain, and strain rate from various observations,
(b) Estimate properties of the media including crustal fluids, and their spatial and temporal changes, from field observations, and laboratory experiments,
(c) Construct numerical models based on the above knowledge, reproduce the observations.

By utilizing large changes in stress and strain caused by the Tohoku-oki earthquake, we try to resolve these problems that are difficult to answer.

The following two topics are the main contents of this project.

(1) Understanding of stress field:

We will estimate the absolute value of stress from a seismological method and investigate the related properties of the media.

(2) Understanding of strain-rate field:

We will estimate short and long term strain and strain-rate fields from geodetic, geological and geomorphological methods and investigate controlling properties of the media.

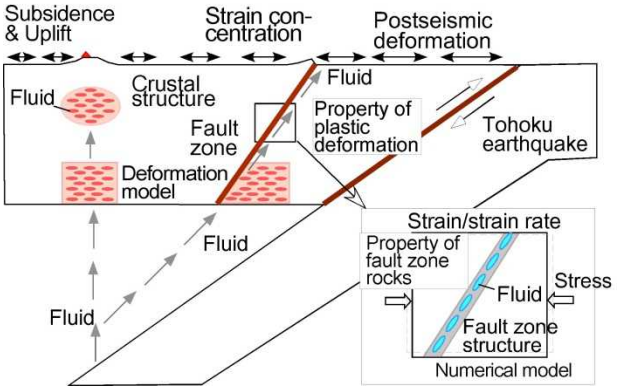


Fig. 1. Main contents of this research project (shown on a vertical cross section of the island arc).

## 【Expected Research Achievements and Scientific Significance】

It is expected that this research project will contribute to correct understanding of stress, strain and strain-rate in the Japanese Islands and the properties of the media which control these parameters. It is also expected that this research project will lead to a new view of the island arc crust, and correct understanding of island arc deformation and earthquake generation will be obtained by properly evaluating earthquakes and related phenomena. If this understanding is correct, it is possible that future crustal activities will be properly "diagnosed".

## 【Key Words】

Stress: force acting on a specified surface within a body, such as rocks, which is analogous to pressure in a fluid. Presently, the absolute value of stress in the crust is not known, even within an order of magnitude.

**【Term of Project】** FY2014-2018

**【Budget Allocation】** 1,000, 000 Thousand Yen

## 【Homepage Address and Other Contact Information】

http:// cd.dpri.kyoto-u.ac.jp