

## Summary

This report is a summary of the observational results obtained through the five-year (1984-1988) project "A Study of Destructive Intraplate Earthquakes". Intraplate earthquakes, though destructive sometimes, are generally of smaller scale than interplate earthquakes and can occur under any populated areas. So a denser observational network is required for detecting effectively the precursory phenomena of intraplate earthquakes. The limited budget and number of working staff allocated for the task makes it impossible to operate such a network. Our network plan was, therefore, based on the idea called "tsubo" in Japanese. "Tsubo", a term used in Chinese medicine, is a decisive spot on the skin to which an appropriate treatment, such as moxsa burning, can be effectively applied in curing a disease. At about the time when this project began, the idea of tsubo as a spot very sensitive to precursory phenomena was popular. So the construction of our observational network was planned as follows : first, to find a tsubo through geophysical exploration by gravity and geoelectromagnetic measurements, and then to install volumetric strainmeters there, and to deploy a mobile seismograph network around them. Volumetric strainmeters have been an important tool in the JMA routine observation for the Tokai earthquake prediction. We intended to capture precursory phenomena by effectively using this network. First we operated the seismograph network in the Kasama area, Ibaraki Prefecture, as a test field, and later we selected a possibly fractured area at Yui, Shizuoka Prefecture, as a representative tsubo and operated a network including six seismographs and two volumetric strainmeters.

In carrying out this project we were convinced that the gravity and the geoelectromagnetic measurements were very useful for determining the subsurface structure, and devised techniques necessary to detect subsurface structural changes. The observation by the volumetric strainmeters clarified that the strain steps, frequently observed also by the other JMA strainmeters and thought to be possible precursors, were probably due to a change in the stress field around the strainmeters. Numerical simulation and laboratory experiments showed the correlation between the elastic properties around the strainmeters and their responses. The methods of data transmission and processing were improved through mobile observations at Kasama and Yui. The analysing system was constructed and tested.

The greatest difficulty with our five-year project is the fact that the tsubo, if it really exists, is almost impossible to locate prior to the precursory phenomena, at the present stage of our

science. Still we persist in the belief in its existence and are groping for effective means to locate it. For this, not only a longer term observation but also much more items of observation would be necessary.

On the basis of the results hitherto obtained we have embarked on the Five-Year Project II, the report on which will be published in due time. The contents of this technical report are as follows:

#### Chapter 1 Mobile Observation System

- 1.1. Seismic Observation at the Kasama area, Ibaraki Prefecture
- 1.2. Seismic Observation at the Yui area, Shizuoka Prefecture

#### Chapter 2 Observation by Volumetric Strainmeters and Data Analysis

- 2.1. Observation at a Test Field
- 2.2. Analysis of Data from the JMA Volumetric Strainmeter Network

#### Chapter 3 Exploration by Gravity and Geoelectromagnetic Observation

- 3.1. Gravity Observation
- 3.2. Geoelectromagnetic Observation