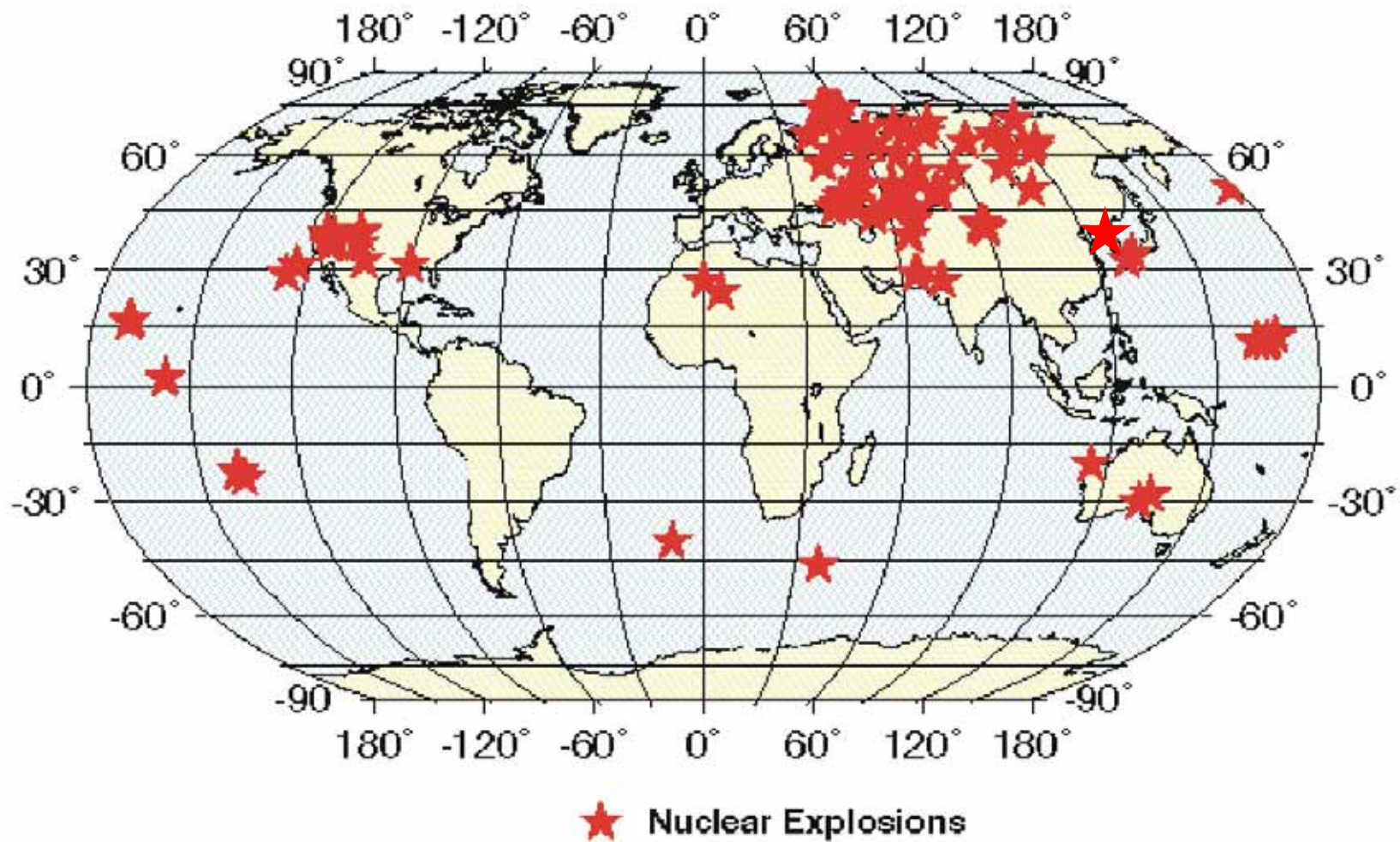# Guidance of the training course "Global Seismological Observation"

Jan. 8, 2010
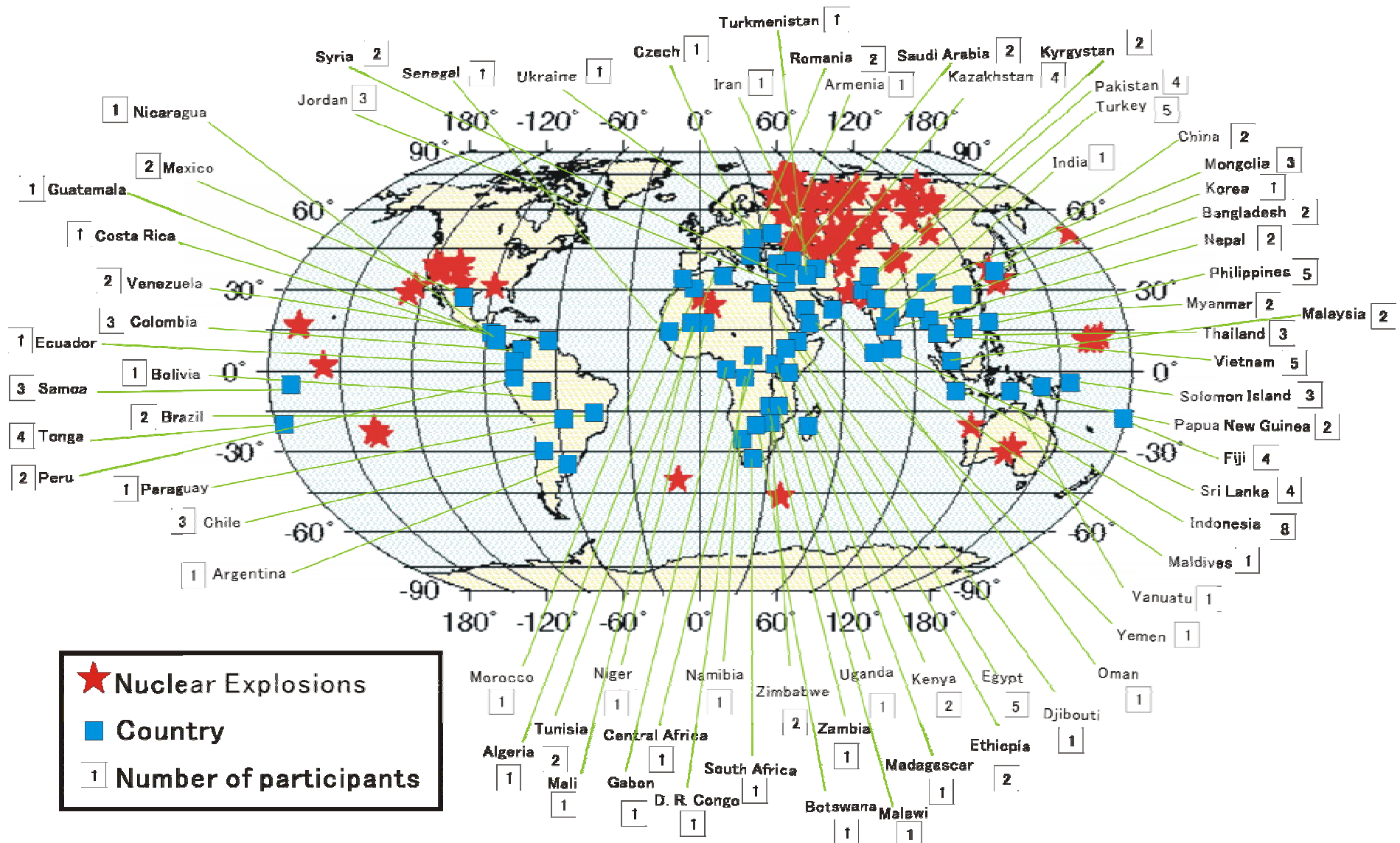
Tatsuhiko Hara

Location of nuclear tests
and
Countries of participants

★ Nuclear Explosions

(The original figure: courtesy of Daisuke Suetsugu. Modified by the lecturer)

World Map with Participants of Global Seismological Observation Course (As of 2009)

(The original figure: courtesy of Daisuke Suetsugu. Modified by the lecturer)

Course Objective

- Nurture of personnel who have acquired knowledge and advanced techniques of global seismological observation and are able to play important roles in the monitoring system for nuclear tests

Course Outputs

- Acquiring knowledge of the CTBT regime and the role of seismology in the International Monitoring System (IMS)

- Understanding global seismological observation technologies for monitoring nuclear tests and earthquakes

- Acquiring data analytical techniques to discriminate nuclear tests from natural earthquakes

- Making the Action Plan

Objective

Nurture of personnel who have acquired knowledge and advanced techniques of global seismological observation and are able to play important roles in the monitoring system for nuclear tests

Ourputs

| Global seismological observation technologies for monitoring nuclear tests and earthquakes | Analytical techniques to discriminate nuclear tests from earthquakes | Knowledge of the CTBT regime and IMS | Action Plan |

Main subjects

| Seismic instrumentation and observation | General techniques | Techniques for discrimination | CTBT regime and IMS concerning Seismology | Study trip Observation |

Contents

Seismometer,	Data processing,	Discrimination by mb-Ms,	Introduction of CTBT regime,	Observation of JMA and NDC,
Noise Survey,	Analysis of teleseismic waves,	Discrimination by short-period seismograms,	Characteristics and Progress Status of the IMS of the CTBTO,	Study trip to Kansai,
Seismic network,	Seismicity and tectonics,	General discrimination tecniques,		Study trip to Matsushiro
Design of seismic network,	Source mechanism,			
AutoDRM,	Hypocenter location,			
NDC	Seismic array,			
	GEOTOOL			

(The original figure: courtesy of Daisuke Suetsugu. Modified by the lecturer)

Lectures and Practice on Seismic Instrumentation and Observation (8.5 days)

Noise Survey (2 days)

Seismometer (2 days)

Seismic Network (1 day)

AutoDRM (1 day)

NDC (0.5 day)

Design of Seismic Network (2 days)

Seismometer

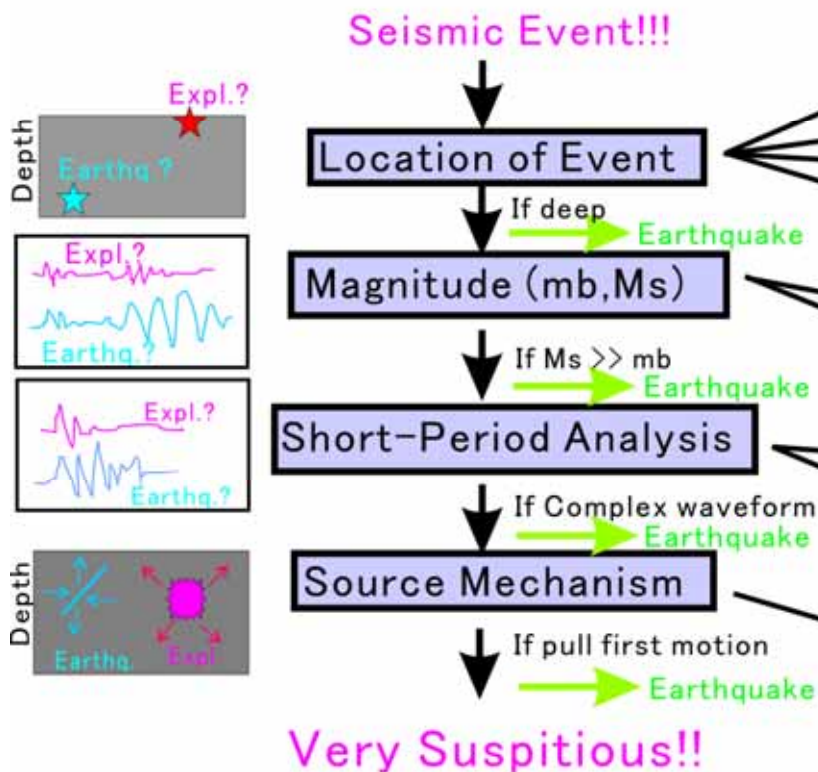Telemeter

Recorder

Data Management Syetem

Internet
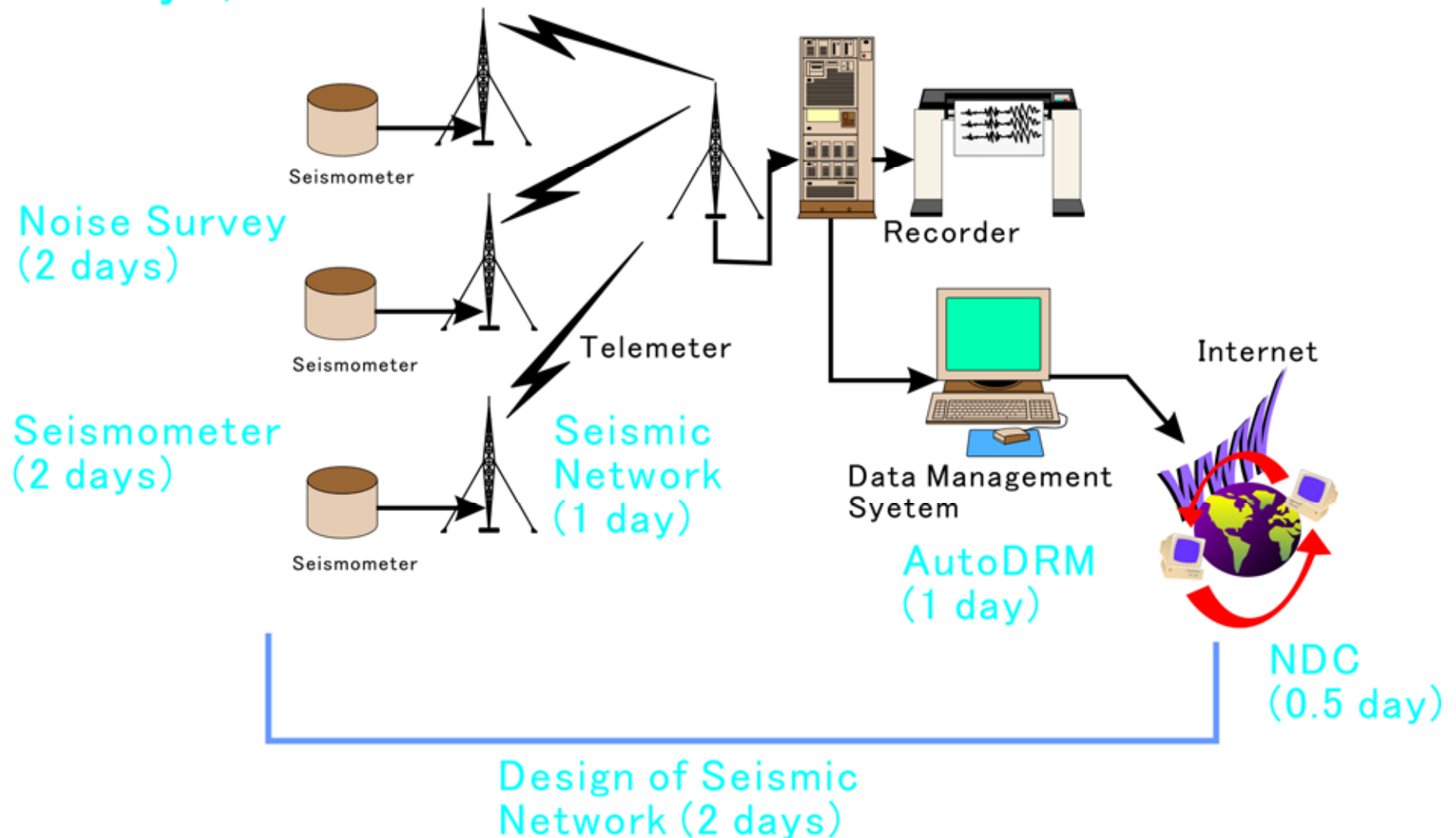
(Courtesy of Daisuke Suetsugu)

Lectures and Practice on Analysis of Seismic Data

Lecture and Practice(19 days)

Screening Process
for Discrimination of Nuclear Tests

Seismic Event!!!

Expl.?

Earthq ?

Depth

Location of Event

If deep → Earthquake

Expl.?

Earthq.?

Magnitude (mb,Ms)

If Ms >> mb → Earthquake

Expl.?

Earthq.?

Short-Period Analysis

If Complex waveform → Earthquake

Depth

Earthq. Expl.

Source Mechanism

If pull first motion → Earthquake

Very Suspitious!!

Installation of UNIX and SAC (1 day)
Retrieval of Digital Seismic Data (1 day)
Reading Teleseismic Records (1 day)
Hypocenter Location (3 days)
Processing Array Data (3 days)
Seismicity and Tectonics (1 day)

Digital Filter (1 day)
Discrimination by mb–Ms (1 day)

Spectral Analysis (1 day)

Discrimination by Short-Period Data (1 day)

Source Mechanism (3 days)

General Discrimination Drill (3 days)

(Courtesy of Daisuke Suetsugu)

Drill of General Discrimination Technique (3 days)
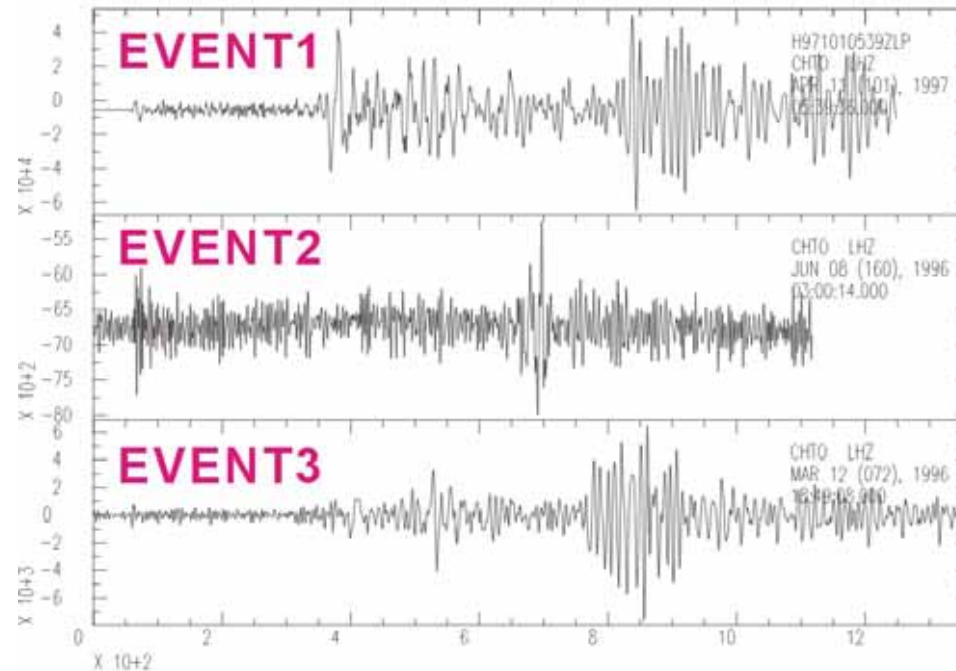
Determination of focal depth, maginitude(mb & Ms), and waveform complexity factor

Participants are requested to distinguish a nuclear exlosion from earthquakes.

(Courtesy of Daisuke Suetsugu)

Presentations by participants

- Inception report
- Design of Seismic Network
- Action Plan

Observation Trip (5 days)

Kansai region (3 days)
Matsushiro (2 days)

Matsushiro
Primary Station

Hiroshima
Atomic Bomb Site

IISEE, Tsukuba

Kyoto

Tokyo

Fault of
the 1995 Hyogo Earthquake

JAPAN

(Courtesy of Daisuke Suetsugu)

Access our home page for further information
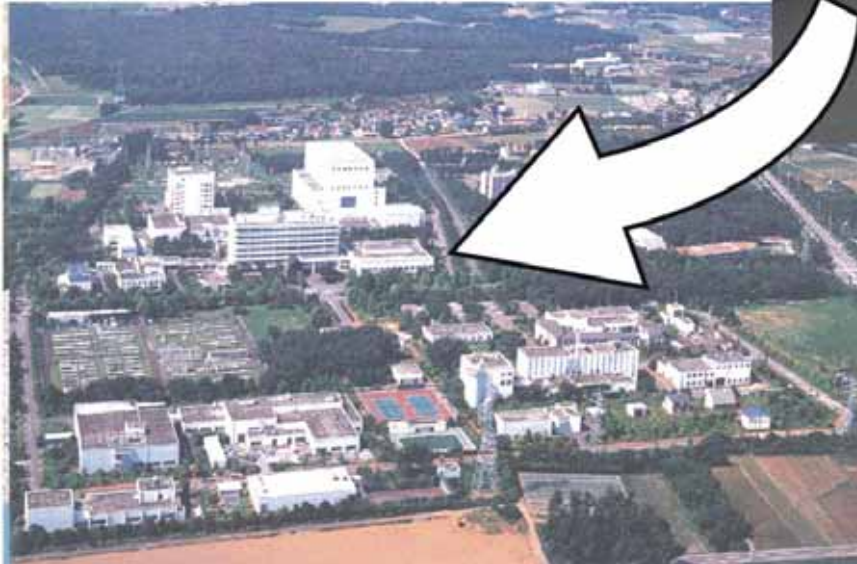
WWW address: http://iisee.kenken.go.jp/

APPENDIX
Application to training course and
Training facilities

Training Facilities

Building Research Institute

International Institute of
Seismology and Earthquake
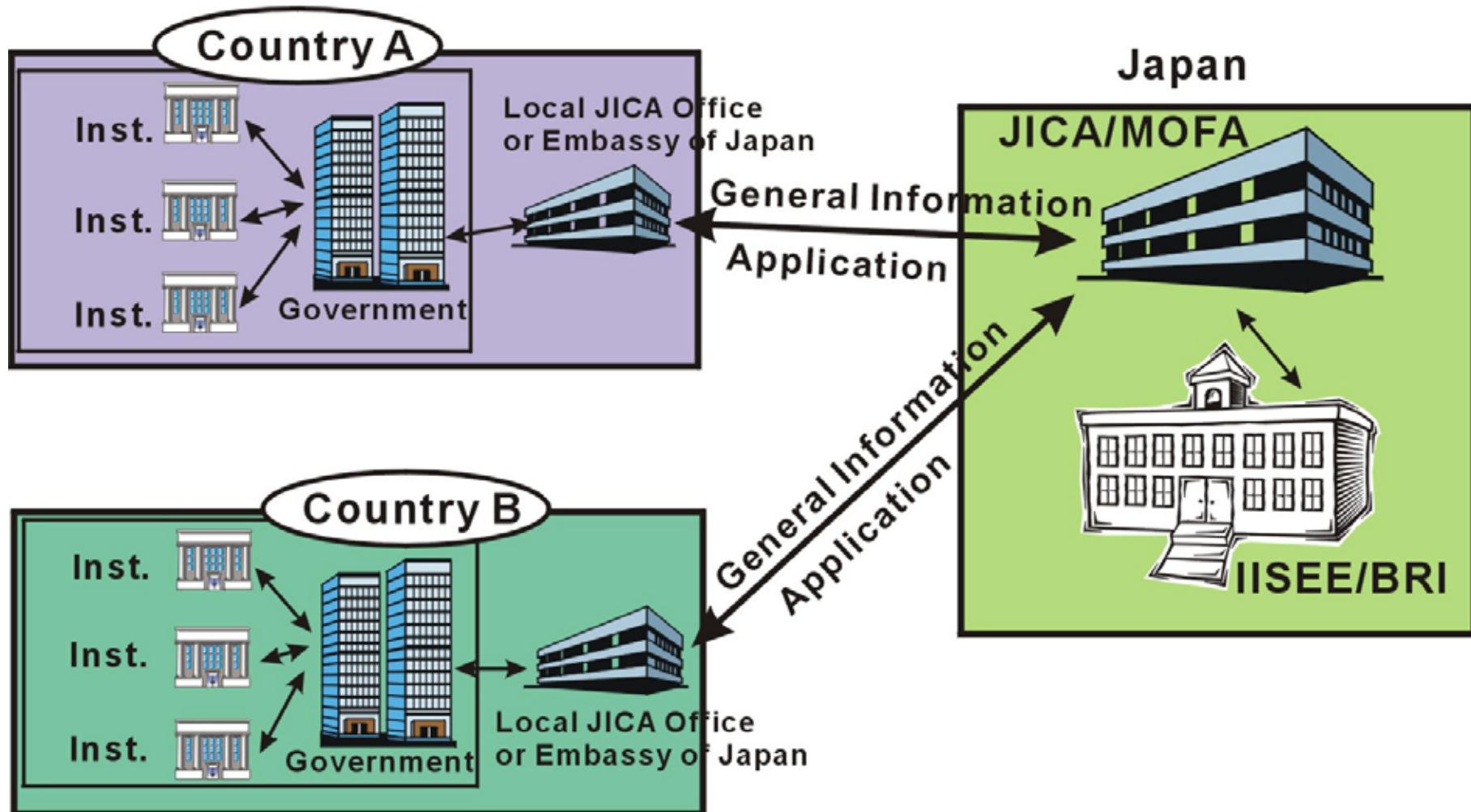Engineering(IISEE)

(Courtesy of Daisuke Suetsugu)

Training facilities

- Lectures and practices of data analyses are given in a class room.

- Practices on seismic observations are given in our seismological observation laboratory.

Application to Training Courses

(Courtesy of Daisuke Suetsugu)