GEOSS: Intergovernmental Planning to Provide Earth Observation to Benefit Society

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Global Issues

- **CO_2 concentration in the air in 1999 increased about 31% than 1750.**
- **Global Mean surface temperature increased 0.6oC±0.2oC in the 20th Century.**
- **Desertification is affecting about ¼ of total land area in the world.**
- **Forest Areas equivalent to ¼ of total land area of Japan are lost each year.**
- **Disaster Increase.**

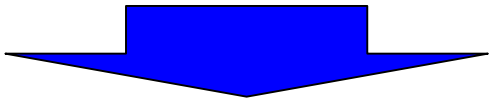
International conferences and Conventions to take appropriate measures for global issues

- **United Nations Conference on Environment and Development (UNCED, in Brazil, 1992)**
- **Third Conference of Parties to the U.N. Framework Convention on Climate Change (COP3, in Kyoto, Japan, 1997)**
- **World Summit on Sustainable Development (WSSD, South Africa, 2002)**
- **Evian G8 Summit (France, 2003)**
- **Earth Observation Summit (1st: USA, 2003, 2nd Japan, 2004, 3rd Belgium, 2005)**
- **World Conference on Disaster Reduction (WCDR, in Kobe, Japan, 2005)**

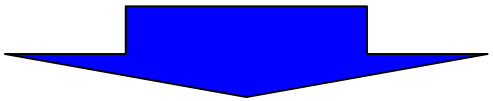
Earth Observation Summit (EOS)

The importance of global Earth observation has been widely recognized. It has been considered as the key issue for solving global issues.

- **The 1st Earth Observation Summit, Washington D.C., July 2003**
  The Declaration was adopted, and the ad-hoc Group on Earth Observations (GEO) was established.



- **The 2nd Earth Observation Summit, Tokyo, April 2004**
  The Framework Document for a 10-year Implementation Plan for Global Earth Observation System of Systems (GEOSS) was adopted.



- **The 3rd Earth Observation Summit, Brussels, February 2005**
  The 10-year Implementation Plan for GEOSS will be adopted

The *ad-hoc* Group on Earth Observations (GEO)

- Established at the First Earth Observation Summit (EOS), held in Washington, D.C. on 31 July 2003;
- GEO is developing a 10-Year Implementation Plan for the Global Earth Observation System of Systems (GEOSS), by the third Earth Observation Summit, held on 16 February 2005;
- GEO Co-Chairs:
  - Dr Achilleas Mitsos, Director-General of the European Commission's Directorate-General: Research;
  - Mr. Tetsuhisa Shirakawa, Japan's Deputy Minister of Education, Culture, Sports, Science and Technology;
  - Dr Rob Adam, Director-General of the South African Department of Science and Technology.
  - Vice Admiral Conrad Lautenbacher, the United States' Undersecretary of Commerce for Oceans and Atmosphere;

GEO Member Governments
(As of December 2004, 53 countries and the EC)

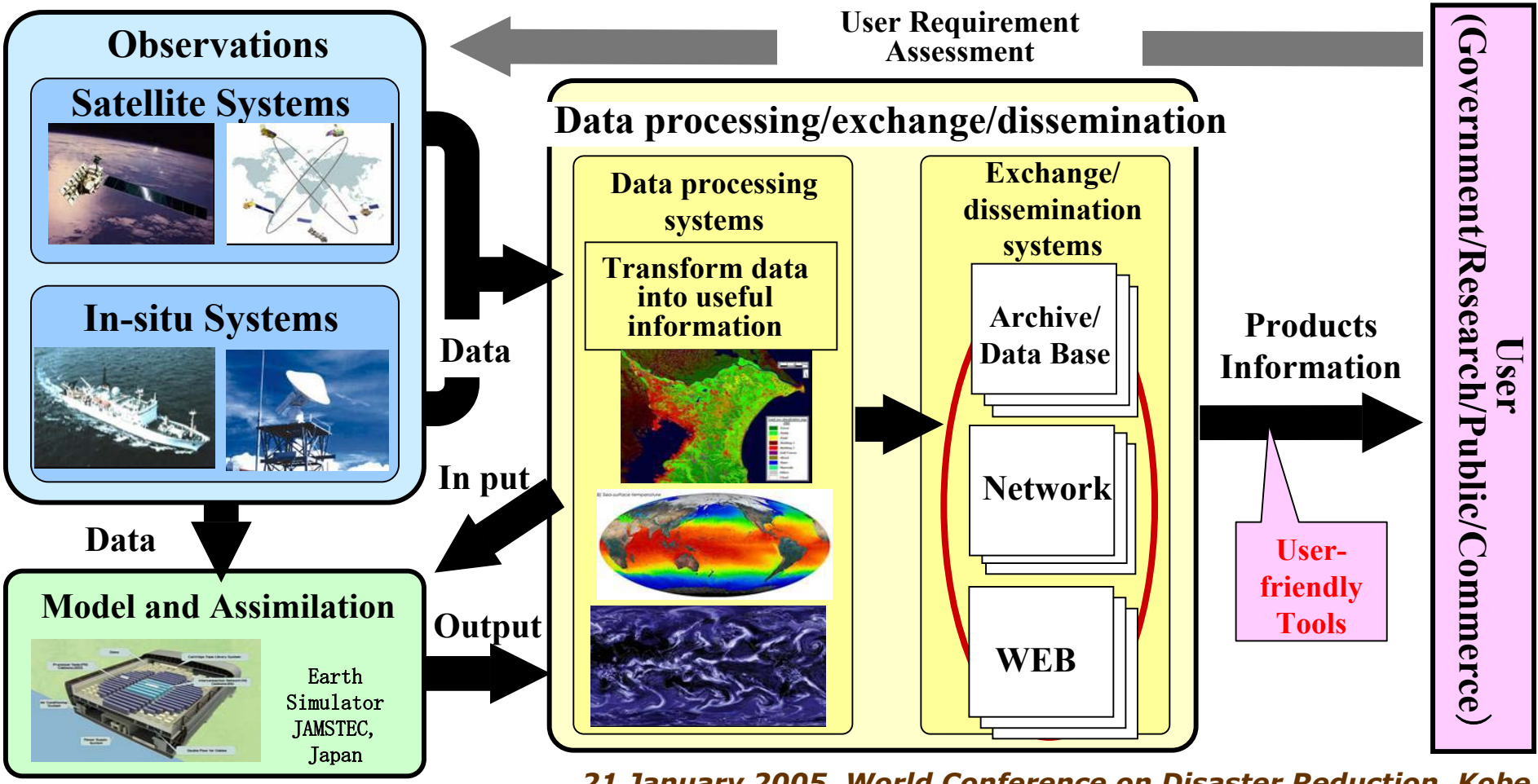
- Argentina
- Algeria
- Australia
- Belgium
- Belize
- Brazil
- Cameroon
- Canada
- Central African Republic
- Chile
- China
- Croatia
- Cyprus
- Denmark
- Egypt
- European Commission, co-chair
- Finland
- France
- Gabon
- Germany
- Guinea-Bissau
- Greece
- India
- Indonesia
- Iran
- Ireland
- Israel
- Italy
- Japan, co-chair
- Kazakhstan
- Luxembourg
- Mali
- Mexico
- Morocco
- Mozambique
- Nepal
- Netherlands
- New Zealand
- Nigeria
- Norway
- Portugal
- Republic of the Congo
- Republic of Korea
- Russian Federation
- South Africa, co-chair
- Spain
- Sudan
- Sweden
- Switzerland
- Thailand
- Ukraine
- United Kingdom
- United States, co-chair
- Uzbekistan

Participating International Organizations (33)

- Association for the Development of Environmental Information (ADIE)
- Central American Commission for the Environment and Development (SICA/CCAD)
- Committee on Earth Observation Satellites (CEOS)
- European Centre for Medium-Range Weather Forecasts (ECMWF)
- European Environmental Agency (EEA)
- European Space Agency (ESA)
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)
- Food and Agriculture Organization of the United Nations (FAO)
- Federation of Digital Broad-Band Seismograph Networks (FDSN)
- Global Climate Observing System (GCOS)
- Global Ocean Observing System (GOOS)
- Global Terrestrial Observing System (GTOS)
- Institute of Electrical and Electronic Engineers (IEEE)
- Integrated Global Observing Strategy Partnership (IGOS-P)
- Intergovernmental Oceanographic Commission (IOC)
- International Association of Geodesy (IAG)
- International Council for Science (ICSU)
- International Geosphere-Biosphere Program (IGBP)
- International Group of Funding Agencies for Global Change Research (IGFA)
- International Institute of Space Law (IISL)
- International Steering Committee for Global Mapping (ISCGM)
- International Strategy for Disaster Reduction (ISDR)
- Network of European Meteorological Services/Composite Observing System (EUMETNET/EUCOS)
- Partnership for Observation of the Global Ocean (POGO)
- UN Convention on Biodiversity (UNCBD)
- UN Convention to Combat Desertification (UNCCD)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- United Nations Environment Programme (UNEP)
- United Nations Framework Convention on Climate Change (UNFCCC)
- United Nations Office for Outer Space Affairs (UNOOSA)
- World Bank (IBRD)
- World Climate Research Programme (WCRP)
- World Meteorological Organization (WMO)

Global Earth Observation System of Systems（GEOSS）

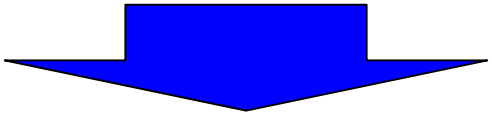
Comprehensive, coordinated, and sustained Earth Observation System of Systems to maintain existing observation systems, to develop new observation systems which will fill gaps, and to integrate in-situ and satellite observations, based the international cooperation.
Driven by user requirements.
Capacity Building.



Prospect for the next 10 years

EOS & GEO will:

- Establish a Global Corporative Mechanism;
- Gain maximum benefits through participation of member countries, including both developed and developing countries and participating international organizations.
- Develop a sustainable global earth observation system of systems (GEOSS).

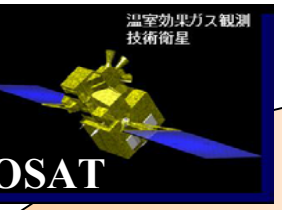


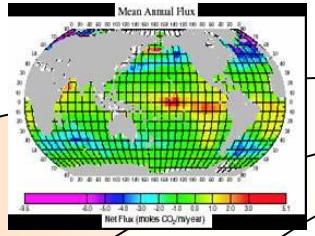
Realization of 9 Socio-Economic Benefits:

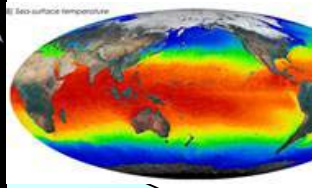
- Reducing loss of life and property from natural and human-induced **disasters**;
- Understanding environmental factors affecting human **health** and well being;
- Improving management of **energy** resources;
- Understanding, assessing, predicting, mitigating, and adapting to **climate** variability and change;
- Improving water resource management through better understanding of the **water cycle**;
- Improving **weather** information, forecasting, and warning;
- Improving the management and protection of terrestrial, coastal, and marine **ecosystems**;
- Supporting sustainable **agriculture and combating desertification**;
- Understanding, monitoring, and conserving **biodiversity**.

Need for improvement of Earth Observations

- **Maximum use of scientific and technological potential.**
- **Contribute to overcome the shortcomings including technical issues, gaps in time and space, and lack of systems for transforming data into useful information.**







Adaptation to Global Warming and Carbon Cycle

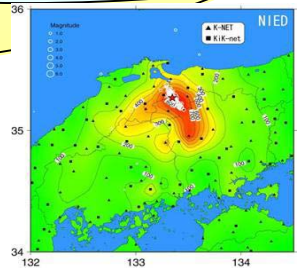
arget (example):
ntensify greenhouse gas
bservations including the
arbon cycle.

Adaptation to Climate Variations and Water Cycle

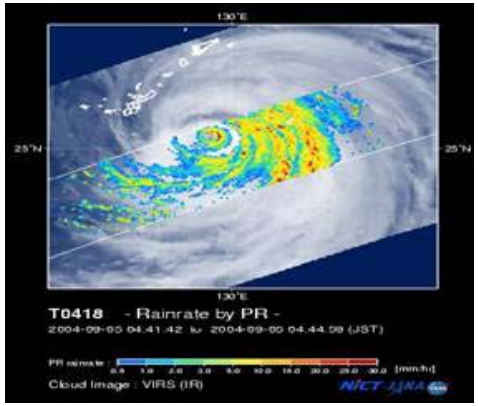
Target (example):
•Intensify observations
climate variability and
water cycle.

Reduction and Prevention of Disasters

Target (example):
•Enhance observation networks for earthquakes and volcanoes around Asia and the Western Pacific region.



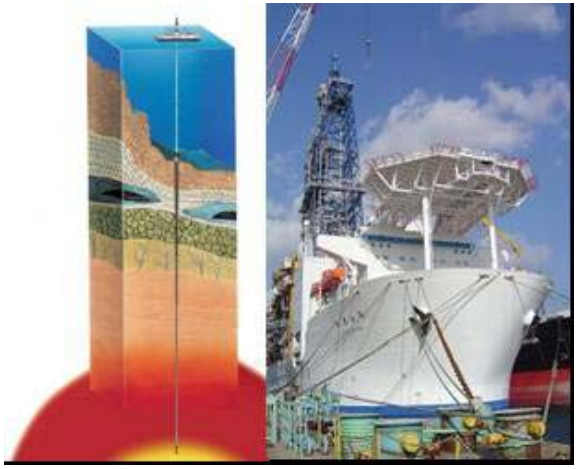
Japanese Experience and potential for realizing GEOSS



TRMM PR-VIRS

R/V Shirase - Antarctic

R/V Mirai



IODP - Chikyu

International Steering Committee for Global Mapping

Global Mapping

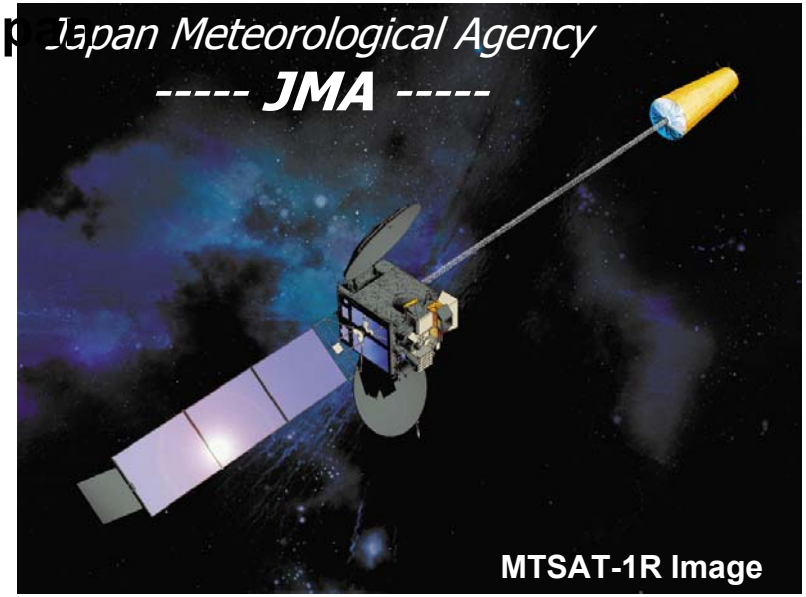
The Committee of Science and Technology Policy (CSTP) of Cabinet Office of the Government of Japan authorized "The Basic Strategy for Efforts Regarding Future Earth Observation" so as to consolidate political priority in Japan, in last December.

Contribution of Japan to GEOSS

(Example 1)

MTSAT-1R

The next-generation meteorological satellite of Jap



Courtesy of JAXA

Scheduled for lau
on February 24, 20

Succeeds the GMS-5, covering East Asia and the Western Pacific
Deploys a new high-resolution imager which
- ✓ Provides imagery for the Northern Hemisphere every 30 min
- ✓ Detects low-level cloud/fog at night

Enables closer monitoring of torrential downpour, typhoon, fog, etc., for preventing natural disaster, e.g. flood damage & distress

JMA will continue to exert maximum effort for ensuring sophisticated satellite system to meet global need for natural disaster mitigation

Contribution of Japan to GEOSS

(Example 2)

Advanced Land Observing Satellite (ALOS)

ALOS is one of the largest Earth observing satellites, which is scheduled to be launch in FY 2005. It enables global observation on day-and-night and all-weather basis. Satellite data is available to the public.

ALOS Mission

○ **Disaster Monitoring**

Before disaster （Prevention）

・Supporting development of various Hazard Maps

Post disaster （Measures）

・Prompt/accurate understanding of disaster

Geographical change caused by earthquakes, volcano eruptions, landslide, etc.

Large-scale fire events

Maritime disasters, such as oil spills caused by tanker accidents

・International cooperation through "the International Charter on Space and Major Disasters"

Contributing support for emergency situation, rehabilitation, etc., through providing satellite data.

Contribution to prevention and disaster reduction

○ Land Management/Mapping
(Producing and updating global map)

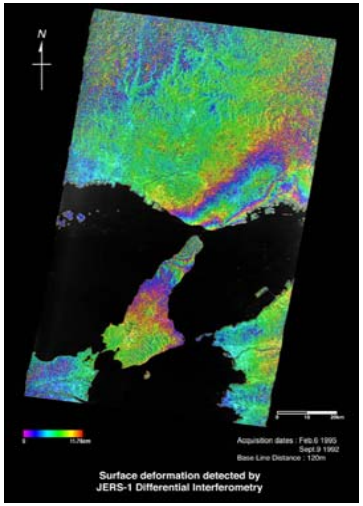
○ Regional Observation (Monitoring environment problems, measures for preventing global warming, etc.)

○ Resource Management/Surveying (Mineral, farming produce)

Images of information obtained from the ALOS data

Enabling collection of global high resolution data

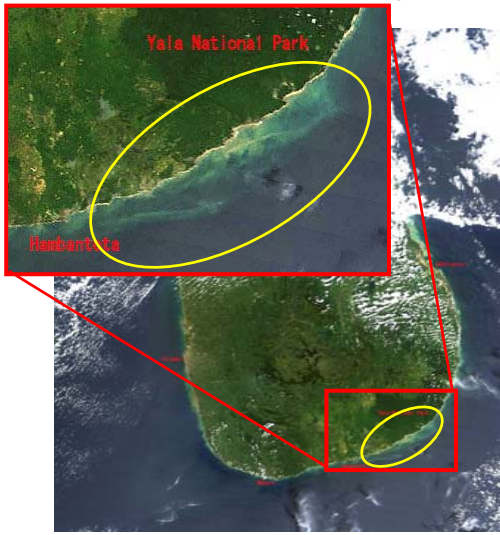
Ex.1 Crustal deformation



Produced by: METI/JAXA, Satellite image: JERS-1

Crustal deformation in Kansai district caused by the Great Hanshin-Awaji Earthquake (areas denoted by drastic color changes indicate large crustal deformation.)

Ex.2 Tsunami damage



Produced by: RESTEC, Satellite image: NASA Terra/MODIS

East Coast of Sri Lanka, immediately after the Sumatra Earthquake (discolored areas along the shore indicate muddy sea water.)

Only ALOS enables understanding of crustal deformation situation in the world, regardless of weather, day and night, and existence of forest.

Contribution of Japan to GEOSS

(Example 3)

Deployment of Asia-Pacific-Indian Ocean Hazard-mitigation Network for Earthquakes and Volcanoes (DAPHNE Project)

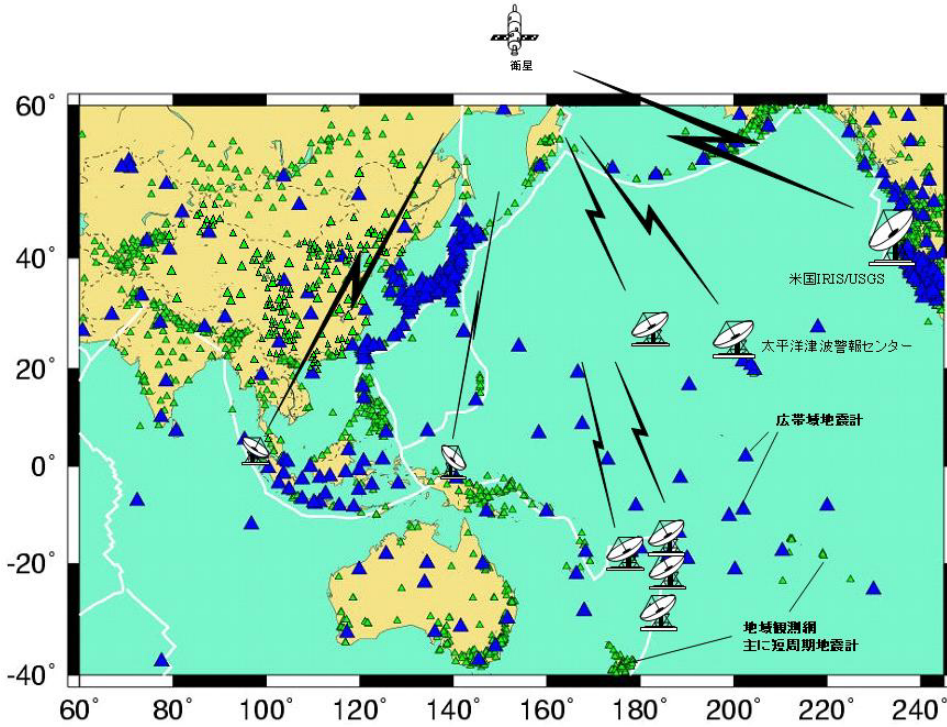
ummary of Project :

○**Observation Network in Southeast, East, and South Asian regions :** Observation and Research on earthquakes and volcano eruptions by broad-band seismograph, strong-motion seismograph, GPS, etc. in Indonesia, Philippines, India, Thailand, etc. and exchanging data with neighboring countries, etc.

○**Observation Network in the Pacific and Indian Ocean regions :** Observation and Research by broad-band seismograph, GPS, barometer, geomagnetism meter, etc. at the island and seabed of the Pacific Ocean and the Indian Ocean region, and exchanging data with neighboring countries, etc.

○**Data Center :** On-line and off-line processing and long-tern archiving of data from the Observation Network in Asian and the Pacific and Indian Ocean regions, and providing the information to the North-Western Pacific Ocean Tsunami Information Center

○**Provision of opportunity of Education and Training to developing countries**



Earthquake observation stations in the Asia and Western Pacific regions.

In response to the Sumatra Earthquake and the Tsunami of the Indian Ocean, the South Asian and the Indian Ocean regions are newly added to the targeted regions.

Contribution of Japan to Reducing disasters

Collaboration Researches on Earthquake-proof utilizing the 3-D Full-Scale Earthquake Testing Facility (E-Defense)

Great Earthquake Damage




sualties 1995 Hanshin-Awaji : 6,400
2003 Iran Bam: more than 50,000

onomic 1995 Hanshin-Awaji : 12 trillion yen
s Probable Tokai : 37 trillion yen

Prevention of the collapse of structures is the most urgent countermeasure

Construction of E-Defense

Construction: 1998～2005

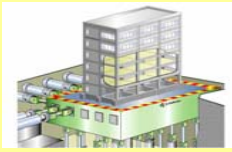
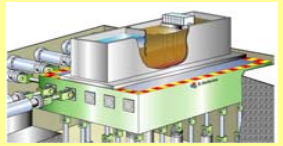
2005: E-Defense starts its operation

Full-scale destructive experiments are to be conducted

Part of the Dai-Dai-Toku Project (Special Project for Earthquake Disaster Mitigation in Urban Areas)

Researches to mitigate the damage caused by earthquakes in urban areas

Reinforced Concrete Structures | Foundation and Geotechnical Structures | Wooden Structures

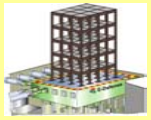




Research Topics: ■ Understanding failure processes of structures ■ Understanding the effects of earthquake on aging structures ■ Verifying seismic retrofitting technologies ■ Developing countermeasures against liquefaction

US-Japan Collaboration Research utilizing E-Defense

E-Defense/NEES Collaboration Research on Common Subjects

Bridges | Steel structures

Research Topics:
- ■ Understanding failure processes of structures
- ■ Verifying seismic retrofitting technologies
- ■ Developing seismic isolation & control technologies

Expected Outcomes～

ification of seismic isolation technology
ontribution to the development of technical standard regarding ous structures
evelopment of seismic retrofitting technologies with low cost and motion of retrofitting aged structures
valuation of the long period seismic waves on city infrastructures

king experiments using full scale models and actual seismic waves are ired

・・・This can not be conducted by using existing facilities

Summary

- Global Earth Observation is the key to solve global issues
- 10-Year Implementation Plan for the Global Earth Observation System of Systems (GEOSS)
- Realization of Socio-Economic Benefits: Disaster Reduction
- Japanese Contribution to GEOSS and Disaster Reduction