

The Collaboration Between Hydro-Meteorological Agencies and Disaster Management Agencies for Disaster Damage Reduction in Korea

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- II. Process of Disaster Risk Management
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I. Natural Disasters in Korea

1. Environments of Korea

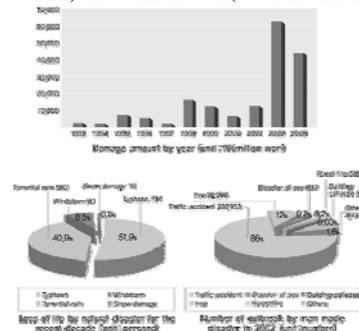
- The Republic of Korea is located in the east part of the Asian continent(33-43°N, 124-132°E) as a peninsula.
- The east side elevation of Korean peninsula is high with steep gradient while western coastal areas are gradually sloping.
- Korea has four distinct seasons with dry spring(Yellow dust and wild fire), hot-humid summer(heavy rain and typhoon), pleasant fall, and cold-snowy winter(winter-storm).
- The average annual rainfall is 1,274mm, and the approximately 50-60 percent of annual rainfall drops in summer season.
- About 2-3 typhoons annually pass the Korean peninsula from southwest to northeast.

2. Natural Disasters in Korea

- Types of natural disasters in Korea
 - Flood by Heavy Rain
 - Typhoon(July-October)
 - Storm
 - Landslide(with flood, typhoon, and storm)
 - Winter Storm and Heavy Snowfall
 - Yellow dust
 - Drought
 - Earthquake
 - Tsunami/Storm surge
 - Others : Wild fire, Volcanic eruption

2. Natural Disasters in Korea

- The average annual cost of natural disaster damage is 131 casualties and 1,924.8 billion Won(about 2 billion dollars).



II. Process of Disaster Risk Management

1. Laws and Regulations

- **Basic Laws**
 - Disaster and Safety Management Basic Act passed in 2004
 - Natural disasters
 - Human-caused Disasters
 - Critical Infrastructure Protection against Social Disasters
 - Natural Disaster Countermeasures Act passed in 1995, and revised in 2005
- **Related Laws**
 - Act on Countermeasures against Agricultural and Fishery Disaster Damage first passed in 1995
 - Disaster Relief Act enacted in 1962
 - Meteorological Act revised in 2005
- **More than seventy laws/regulations of the Korean government are related to disaster countermeasure actions.**

2. Organizations of the Korean Central Government

- **3-Layer Government**
 - National: 22 Ministries, 19 Agencies
 - Provincial: 7 MCGs and 9 Provinces
 - Local: 234 Cities and Counties
- **Disaster-related Organizations**
 - National Security Council
 - Emergency Planning Commission
 - National Emergency Management Agency(NEMA) under MGAHA
 - Meteorological Administration under MST



3. National Emergency Management Agency(NEMA)

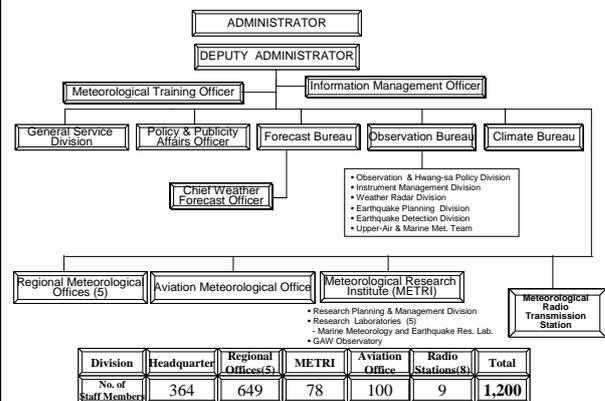
- **Brief History**
 - 2003.03.04 - Improvement of disaster management systems was ordered at a Cabinet council
 - 2003.03.17 - The National Disaster Management System Planning Team was established.
 - 2004.03.11 - The revised bill for the Governmental Organization Law and the Disaster and Safety Management Basic Law was announced.
 - 2004.06.01 - The NEMA was opened.



4. Korea Meteorological Administration(KMA)

- **Brief History**
 - 1949 - Central Meteorological Office(CMO) was established.
 - 1990 - KMS was elevated to the Korea Meteorological Administration (KMA).
 - 1996 - The Earthquake Division was newly established.
 - 2005 - The Administrator of KMA was promoted to the under-secretary level in the central government.

4. Korea Meteorological Administration(KMA)



| Division | Headquarter | Regional Offices(S) | METRI | Aviation Office | Radio Stations(S) | Total |
|----------------------|-------------|---------------------|-------|-----------------|-------------------|-------|
| No. of Staff Members | 364 | 649 | 78 | 100 | 9 | 1,200 |

5. Disaster Management Planning

- **Disaster Mitigation Planning**
 - National Safety Management Plan
 - Civil Defense Plan
 - Natural Disaster Mitigation Plan
 - Pre-Evaluation Process for Natural Disaster Impacts
 - Area-Based Flood Management Standards
- **Disaster Response Planning**
 - Emergency Support System and Plan(National, Local)
 - Emergency Action Plan for Natural Disasters
- **Disaster Recovery Planning**
 - Natural Disaster Recovery Plan

III. Agency Roles and Collaboration in Korea

3. Purpose of NDMS

○ Background of business



○ Purpose of business

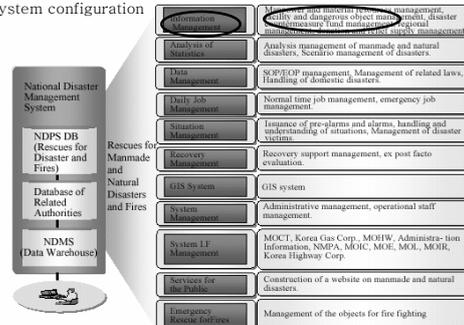
1. Prevention and preparation for natural disasters and danger factors
2. rapid response in the events of actual occurrences
3. establishment of recovery and support systems

○ Project Details (software construction Phase)

| Division | Infrastructure and Expansion step | | Advanced step (2004 ~ 2008) |
|--------------------------|---|--|--|
| | Infrastructure step(~ 2000) | Expansion step (2004 ~ 2008) | |
| Installation of Software | <ul style="list-style-type: none"> ●System with 12 functions ●infra system for information interchange between authorities ●Information system toward the Public ●Draft of design for data warehouse ●Draft of design for integration with fire fighting systems | <ul style="list-style-type: none"> ●Software for integrated management ●Application modules for statistic analysis ●Draft of design for data warehouse ●Prediction and analysis module ●Work flow | <ul style="list-style-type: none"> ●Application modules for prediction and analysis ●Modules for management of moving vehicles |

4. Function of NDMS

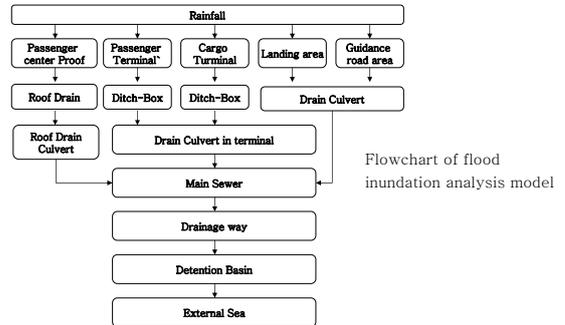
○ System configuration



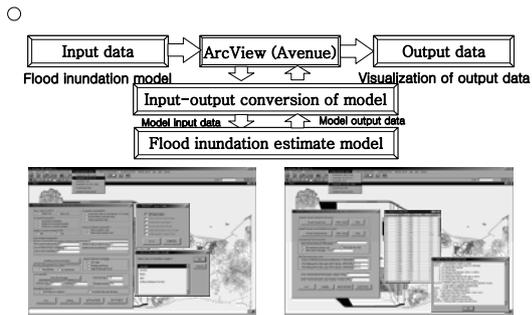
IV. Case Studies-1

1. Incheon International Airport Case

□ Application example of internal inundation in Incheon international airport



2. GIS Application for Mitigation Plan

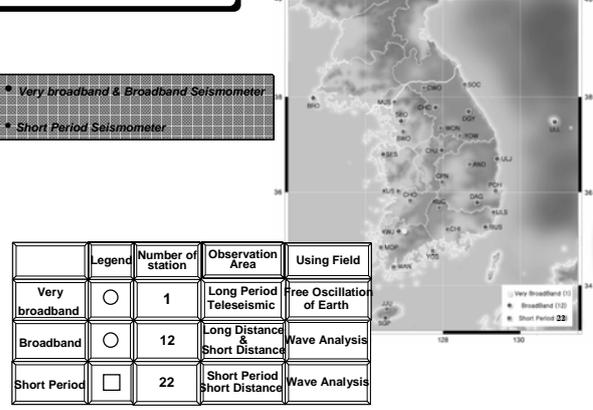


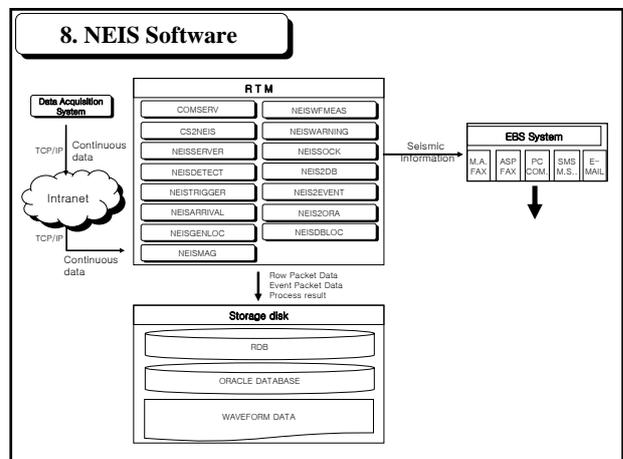
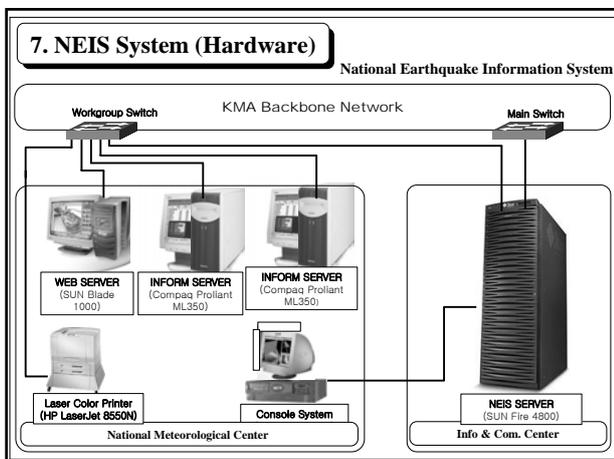
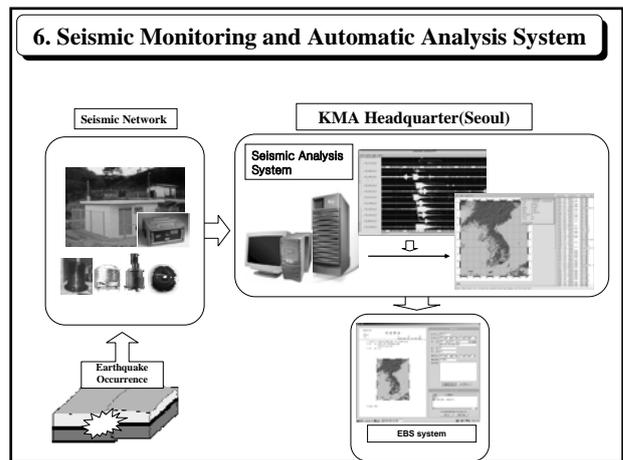
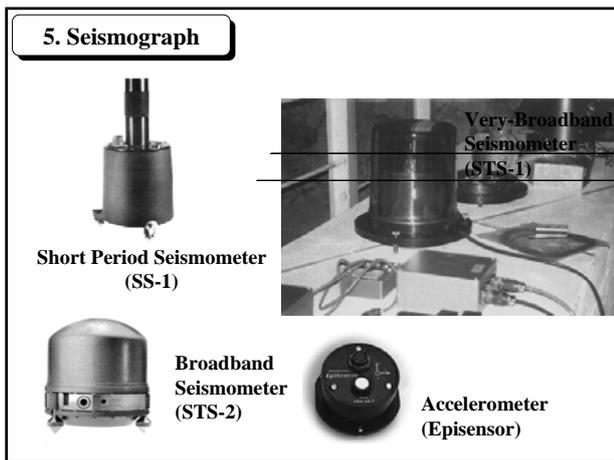
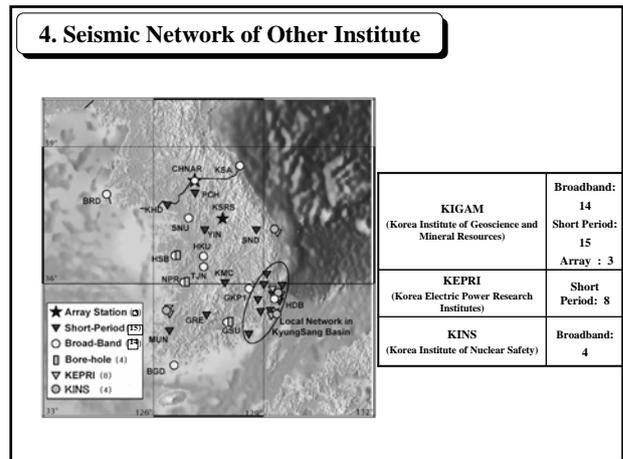
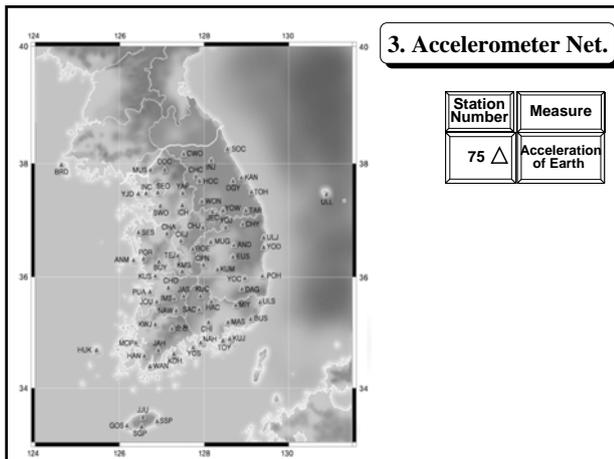
IV. Case Studies-2

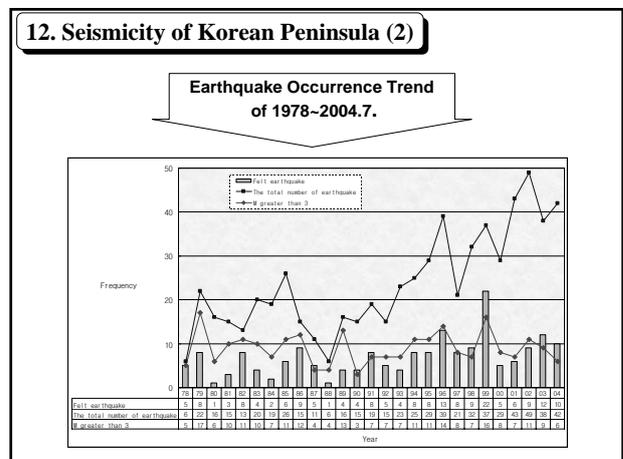
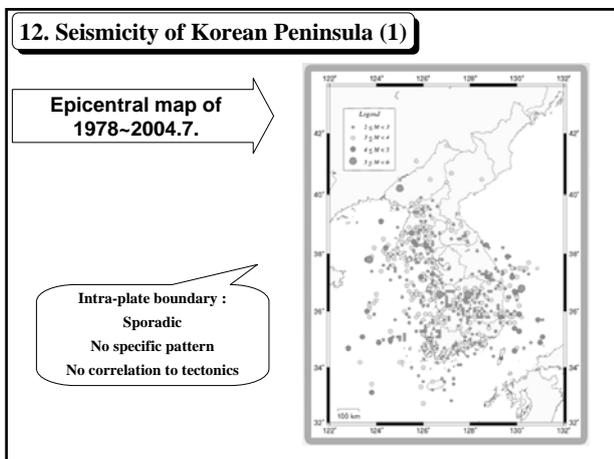
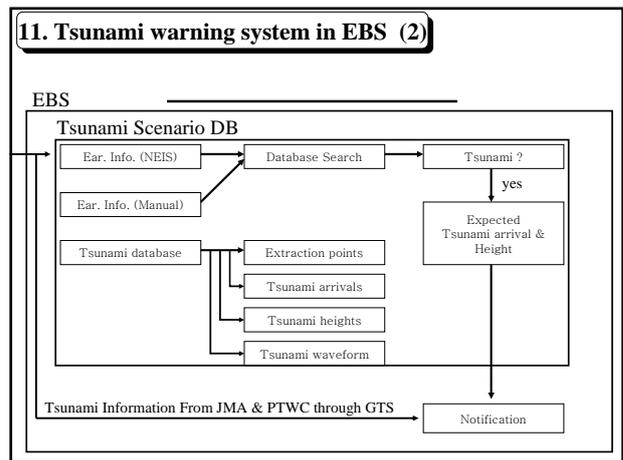
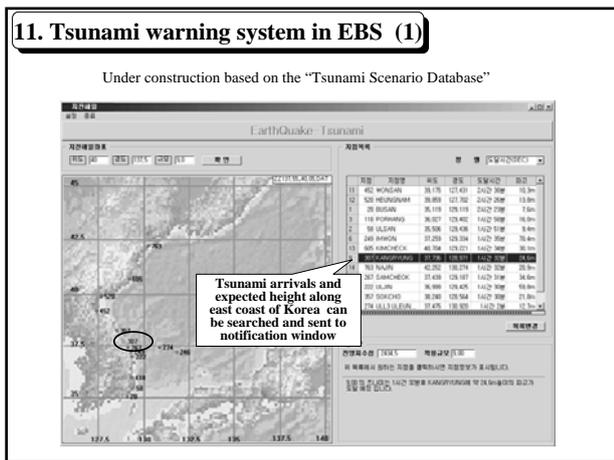
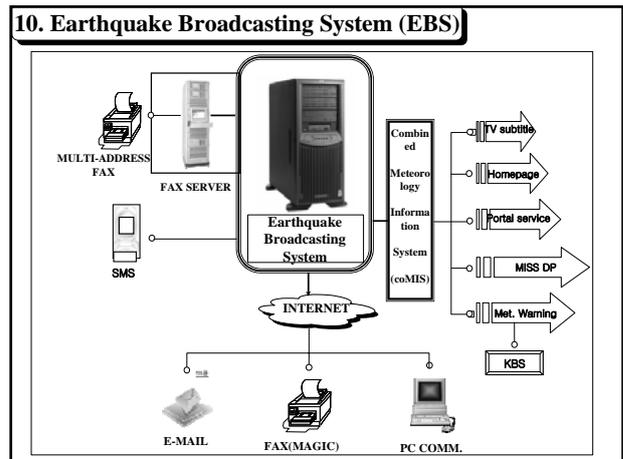
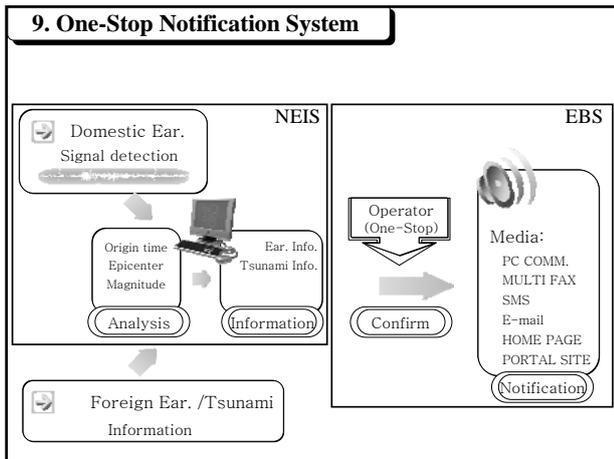
1. Brief History of Seismological Service

- 1905 Earthquake observation began
- 1944-1962 Suspension of observation
- 1963 World-Wide Standardized Seismograph Network installed in Seoul
- 1978 Analog seismic network constructed
- 1996 Earthquake division newly established
- 1999 Digital seismic network constructed
- 2005 Earthquake Planning Division & Earthquake Detection Division established
 - two divisions, one laboratory
 - Seismic stations: 34, Accelerometer stations: 75

2. Seismic Network







13. Earthquakes in historical documents

死者百餘人

增補文獻備考 二

○新羅王二年二月麻州地震地縱橫五十餘尺水色青黑忽行
 鯉魚五相繼而南大浦亦隨六年六月地震四年六月地震岸如
 雷六年十一月京都地震十二年二月地震四月亦如之十五年二月
 京都地震民屋陷自餘人○元年二年

新羅, 惠恭王
 15年 3月 (A.D. 779)

慶州地震
 京都地震 壞民屋
 死者百餘人
 (Private Houses collapsed.
 More than 100 people died.)

14. Tsunami Damage

□1993 July 12 (M=7.8)

- Casualty : None
- Ship Damage : 35

□1983 May 26 (M=7.7)

- Death : 1 Missing : 2
- Ship Damage : 81

Damage of Tsunami(Imwon port)

15. Tsunami at Imwon Port



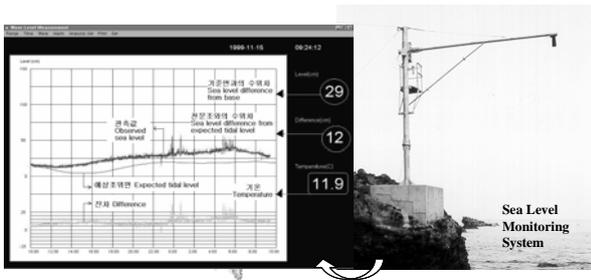
Damage by Akita tsunami at Imwon port (1983. 5. 26 Akita, Japan earthquake)

16. Tsunami at Samcheok Port

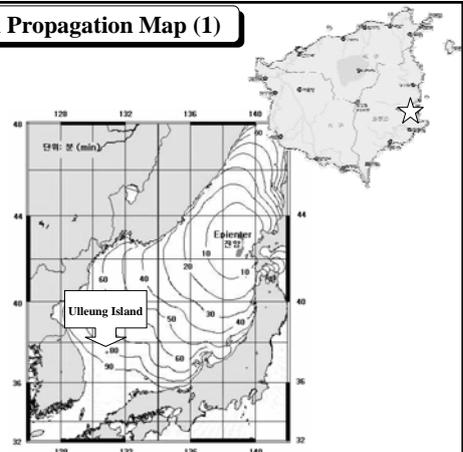


Pictures at Samcheok Port before and after 1993 tsunami arrival

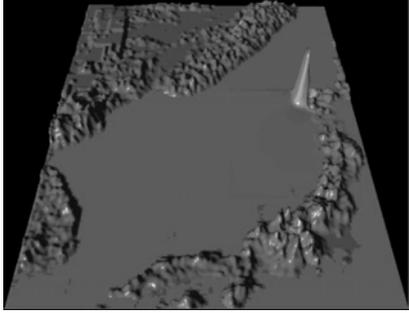
17. Tsunami Monitoring System



18. Tsunami Propagation Map (1)



18. Tsunami Propagation Map (2)



19. Hardware Reinforcement

Enhancement of seismic network

Reinforcement of seismic network ('07)
 - 34 stations \Rightarrow 43 stations
 Enhancement of station environment
 - Moving seismic 10 stations ('07)

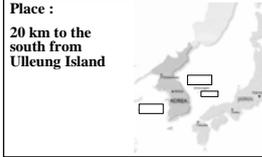
Installation of Wave height Meter

New wave-height meter in Ulleung ('06)
 - Change to new ultra-sonic meter

Installation of OBS (2006)

Acceleration seismic network

Place :
 20 km to the south from Ulleung Island



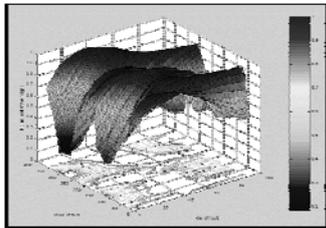
Reinforcement of Acc. network ('07)
 - 75 stations \Rightarrow 105 stations

20. Tsunami Scenario Database (1)

Establishment on tsunami DB

Sea between Korea and Japan ('05)
 - Will be included in EBS of KMA
 Yellow Sea and South Sea ('06)

Tsunami source : West sea of Japan, Station : Eastern coast of Korea



Variation on maximum wave height due to variation of focal mechanism

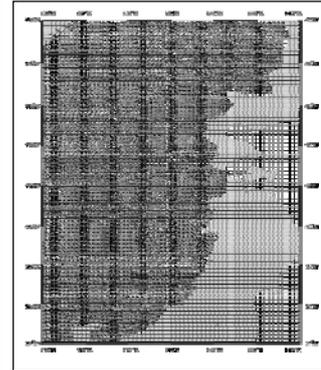
20. Tsunami Scenario Database (2)

Source assumption :

- 10,000 earthquake source points
- Sea between Korea and Japan
- Grid interval with 0.1 degree

Focal mechanism assumption :

- From previous studies
- From fault information
- Area with no information
 - strike : parallel to Korean coastline
 - dip : 45 degree
 - rake : 90 degree



V. For A Better Society

Lessons from Collaboration of Korean Agencies

- What kind and level of information is required to share among agencies?
- What information is needed in disaster mitigation, preparedness, response, and recovery planning and action?
- How can Korea meteorological administration improve the provision of information to NEMA and other disaster-related agencies?
- How can agencies standardize meteorological information?
- What kind of feed-back process is considered for information sharing?

