

Preparedness System against Damage Earthquakes in Korea

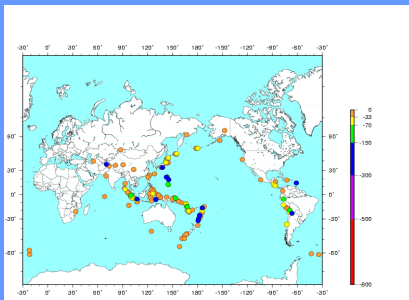
June 4, 2010
Kang, Ik Bum

Korea Society of Hazard Mitigation

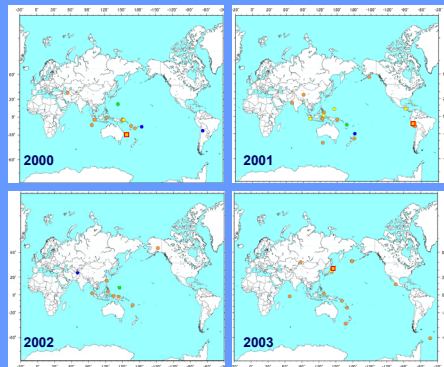
Contents

- Seismic Activities
- Tsunami by Earthquake
- Prepared System

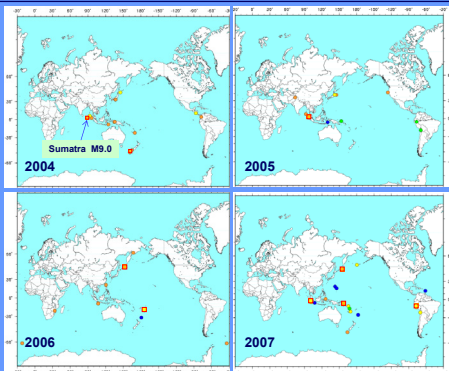
Seismic Activities in the World(>7.0)



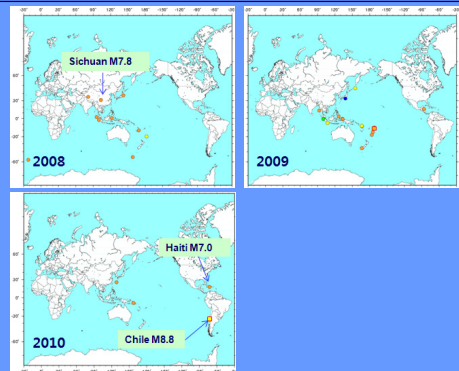
Seismic Activities in the World(>7.0)



Seismic Activities in the World(>7.0)



Seismic Activities in the World(>7.0)



Sumatra Earthquake in 2004

- Occurred : December 26, 2004
in northern offshore of Sumatra, Indonesia
- Magnitude : 9.0
- Casualties : More than 200,000 peoples
mostly caused by Tsunami

Sumatra Earthquake in 2004



Sichuan Earthquake in 2008

- Occurred : May 12, 2008
in Sichuan Province, China
- Magnitude : 7.8
- Casualties : About 100,000 peoples dead/missed

Sichuan Earthquake in 2008



Haiti Earthquake in 2010

- Occurred : January 12, 2010
at 15km southwestward from Port-au-Prince, Haiti
- Magnitude : 7.0
- Casualties : About 350,000 peoples dead/missed

Haiti Earthquake in 2010



Chile Earthquake in 2010

- Occurred : February 27, 2010

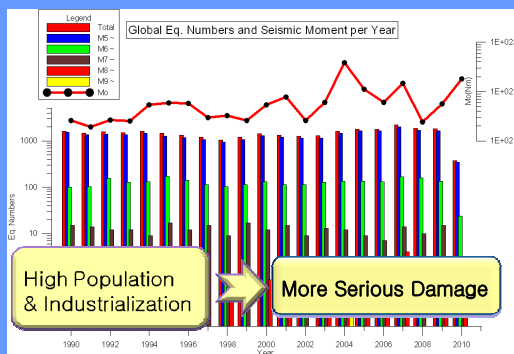
Offshore Maule, Chile

- Magnitude : 8.8
- Casualties : Several Hundred Peoples

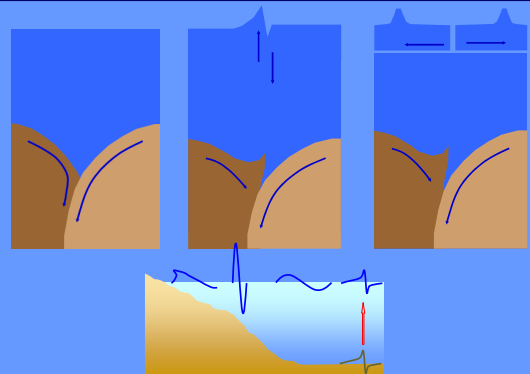
Chile Earthquake in 2010



Seismic Activities in the World



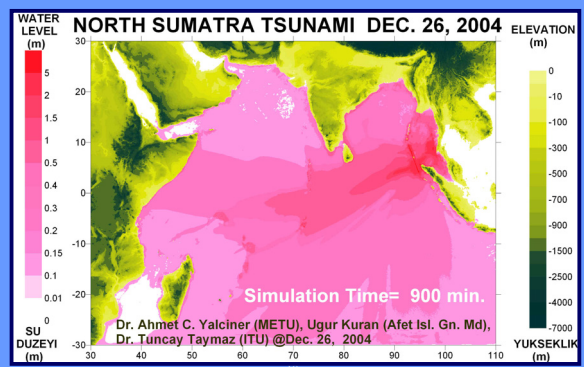
Occurrence of Tsunami by Earthquake



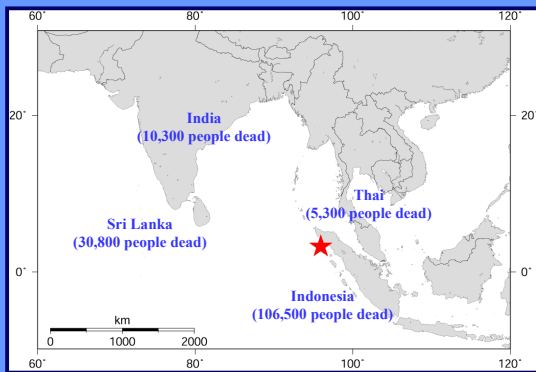
Sumatra Earthquake

Origin time	2004/12/26 07:58(local)
Magnitude	9.0
Location	Offshore West Sumatra Island, Indonesia
Dead	153,200
Missing	27,000

Sumatra Earthquake



Sumatra Earthquake

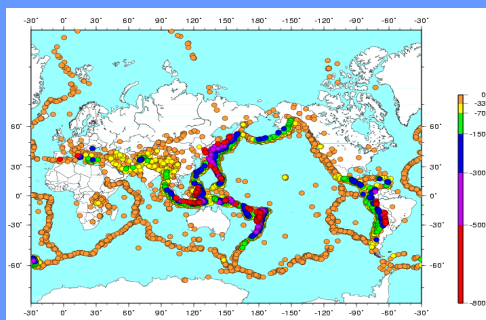


Lesson from Sumatra Earthquake

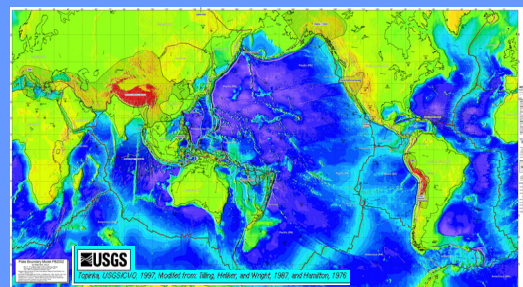
- Considerable power of Natural Earthquake of Magnitude 9.0
- International Cooperation against great Earthquake
- Counter-Measure against Tsunami or Powerful Earthquake

20

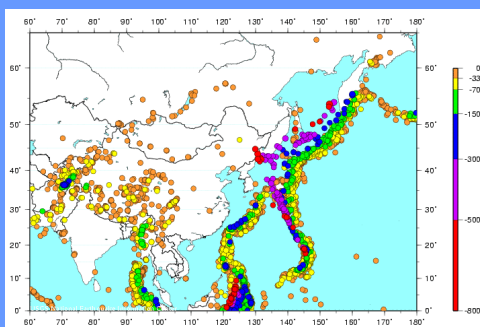
Seismic Activities in the World (>5.0)



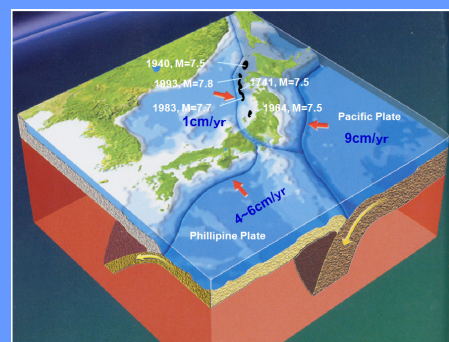
Seismic Activities with Plate Tectonics



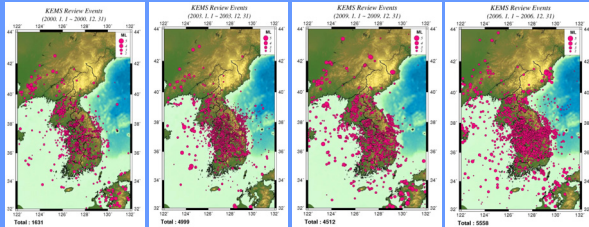
Seismic Activities around Korea (>5.0) (2000. 1. 1 ~ 2010. 4. 15)



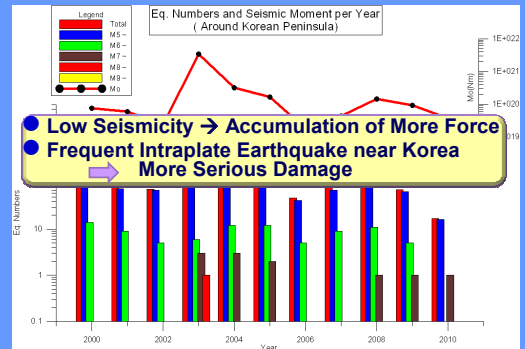
Seismic Activities around Korea With Plate Tectonics



Seismic Activities in Korea (Mag>2) Since 2000



Seismic Activities in Korea



Historical Earthquake Lists in Korea

- 779 in Shilla Dynasty
- Kyungju in South East Korea
- M=6.8
- 100 People Died

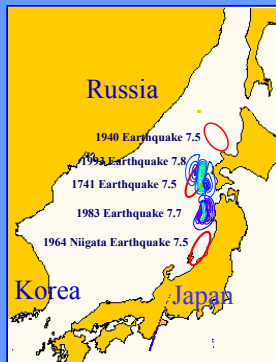
27

Hongsung Earthquake

- Origin Time : 1978/Oct./7 18:19(local)
- Magnitude : 5.0
- Damage
 - Injury : 2 people
 - Buildings(partially destroyed/cracks) : about 1000
 - No communication & Cracks in road
 - 30 M US\$ in loss

28

Tsunami caused by Earthquakes in Korea



Tsunami in Imwon in East Coast of Korea in 1983



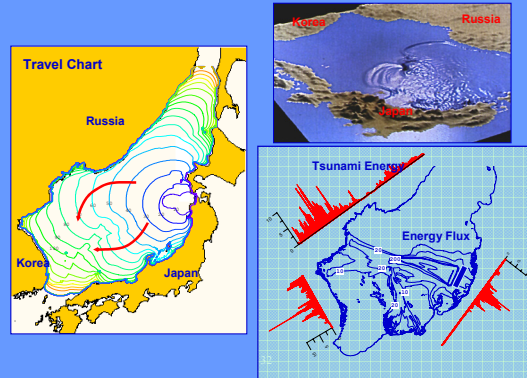
30

Tsunami in Imwon in East Coast of Korea in 1983

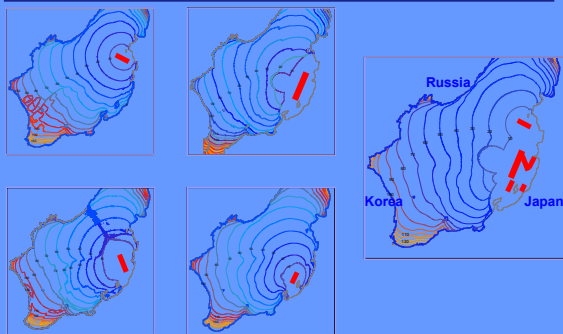


31

Path of Tsunami to Korea

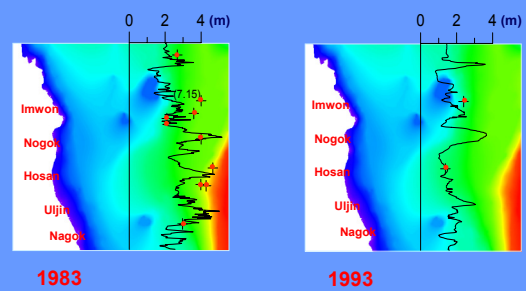


Modeling on Arrival Time of Tsunami



33

Comparison of Two Tsunami in 1983 & 1993

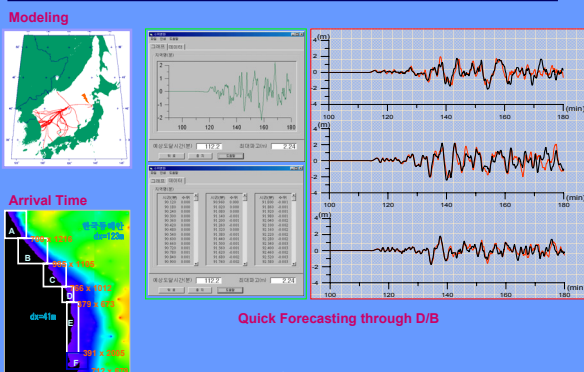


1983

1993

34

Forecasting System against Tsunami in Korea



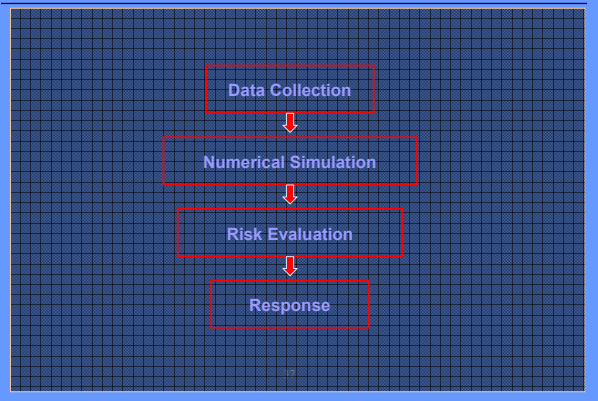
35

Counter-Measure against Tsunami by Earthquake

- | | |
|------------------------------|--|
| Structural Measure | <ul style="list-style-type: none"> ▪ Re-organization of Coastal Structure ▪ : economically infeasible |
| Nonstructural Measure | <ul style="list-style-type: none"> ▪ Analysis of historical tsunami ▪ : Evaluation of tsunami potential ▪ Tsunami Numerical Investigation ▪ : Evaluation of tsunami risk ▪ Life safety ▪ : Education, escape and safety function ▪ Tsunami forecasting system ▪ Local coastal disaster mitigation plan |

36

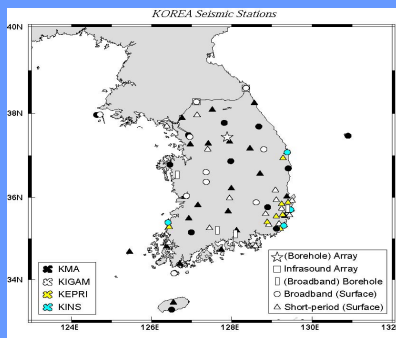
Establishment of Coastal Disaster Mitigation



Local Coastal Disaster Mitigation Plan



Seismic Stations in Korea



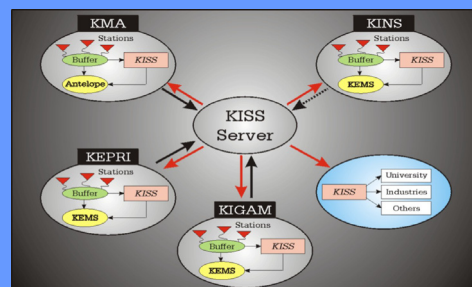
Seismic Stations in Korea

- Owned by
 - **KMA** (Korea Meteorological Agency) making public to People
 - **KEPRI** (Korea Electrical Power Research Institute), **KINS** (Korea Institute for Nuclear Safety) monitoring safety of Nuclear Power Plant
 - **KIGAM** (Korea Institute of Geoscience and Mineral Resources) making Bulletin and Discrimination
 - **Universities**

Seismic Stations in Korea

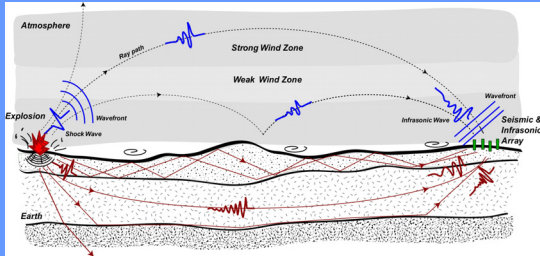
- **KMA**
Short-Period, Broad-Band 3-C Velocity Sensors
3-C Acceleration Sensors
- **KEPRI, KINS**
3-C Acceleration Sensors
- **KIGAM**
Borehole Array including 3-C Short-Period & Broad-Band Velocity, Infrasound,
3-C Acceleration Sensors
- **Universities**
3-C Short-Period Velocity Sensors

Korea Integrated Seismic System (KISS)



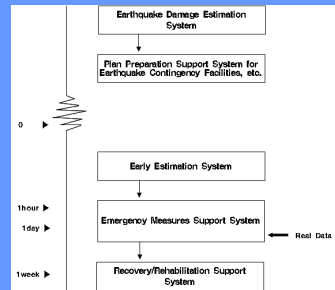
Korea Institute of Geoscience and Mineral Resources (KIGAM)
Korea Meteorological Administration (KMA)
Korea Institute of Nuclear Safety (KINS)
Korea Electric Power Research Institute (KEPRI)

Basic Principle of Infrasound Technology



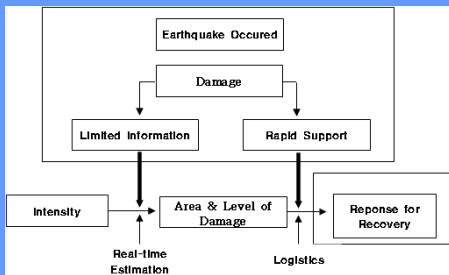
Preparedness System(Japan)

● DIS/Earthquake under Ministry of Land & Transport



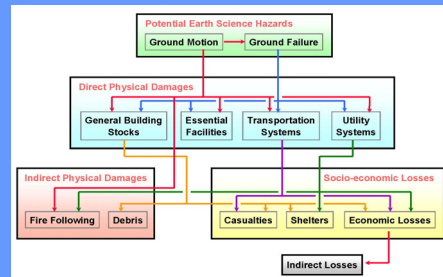
Preparedness System(Japan)

● DIS/Earthquake under Ministry of Land & Transport



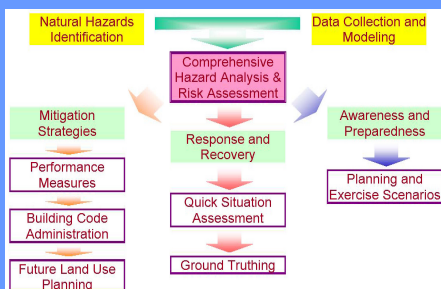
Preparedness System(USA)

● HAZUS Program under FEMA



Preparedness System(USA)

● HAZUS Program under FEMA



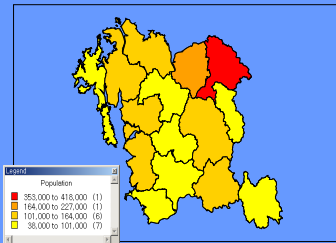
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



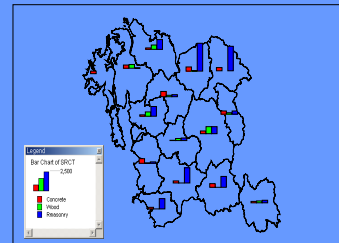
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



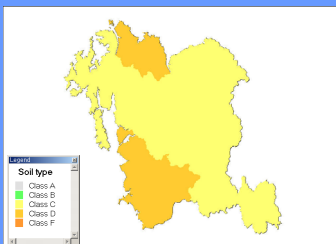
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



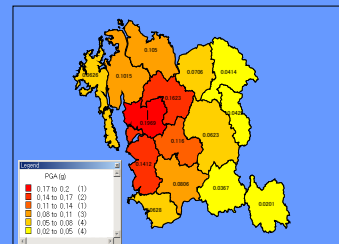
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



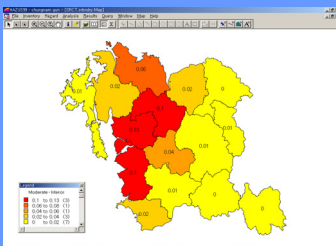
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



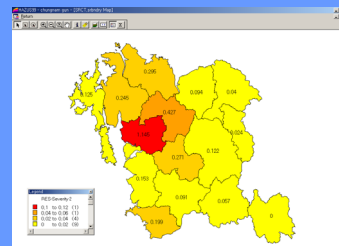
Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



Preparedness System(Korea)

● Application of HAZUS to Korean Peninsula under KIGAM



Summary

- High population & industrialization cause more serious damage by big Earthquakes.
- In Korea low seismicity relative to surrounding countries occurred but low seismicity may accumulate more force and more seismic sensor monitor more seismic events.
- Korea experienced several tsunamis through numerical modeling on arrival time & tide heights of tsunami and Korea establish counter-measure against tsunami.
- Among prepared system against damage earthquake adopted by other countries Korea is applying the HAZUS program to Korean peninsula.