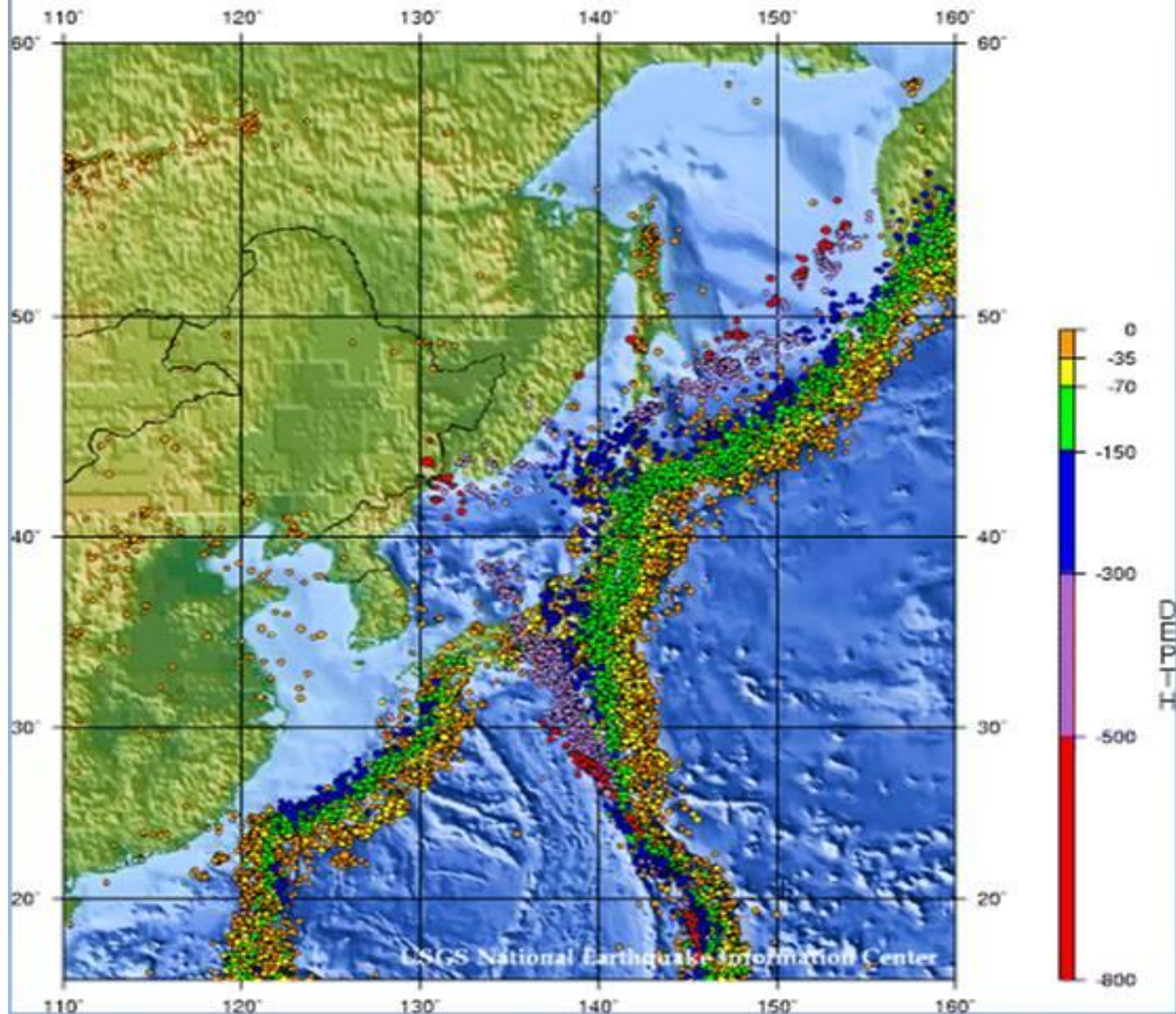


Seismic Hazard Analysis in Korea

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Seismicity of Japan and Kuril Islands: 1990 - 2000



After 1978 Hongsung Eq (M5.0)

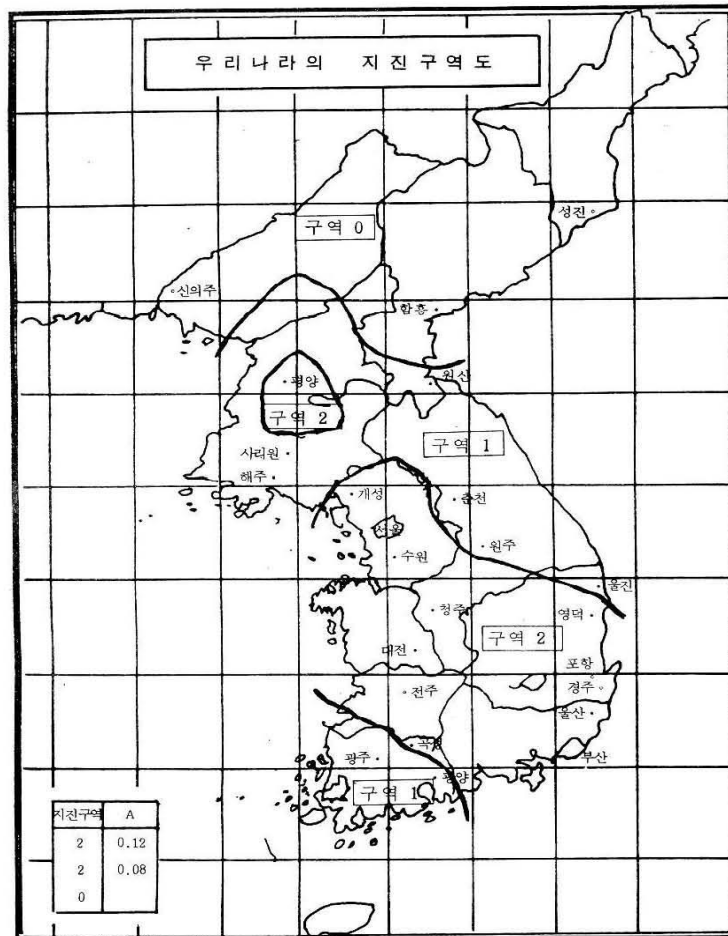
- **Dam** Since 1979 against M5.4 – 6.2
- **Tunnel** Since 1985 against M5.7 – 6.4
- **Building** Since 1988 against 5.5 – 6.5
- **Railroad** Since 1991 against M5.7 – 6.3
- **Express Railroad** Since 1991 against M5.5 – 7.0
- **Bridge** Since 1992 against M5.7 – 6.3

After 1985 Mexico EQ(M8.1)

- Ministry of Construction Propose the 3-Level of Seismic Design for the Korean Peninsula

Zone 0	
Zone I	0.08G
Zone II	0.14G

Seismic Zoning Map (1987)



After 1995 Kobe Eq (M7.2)

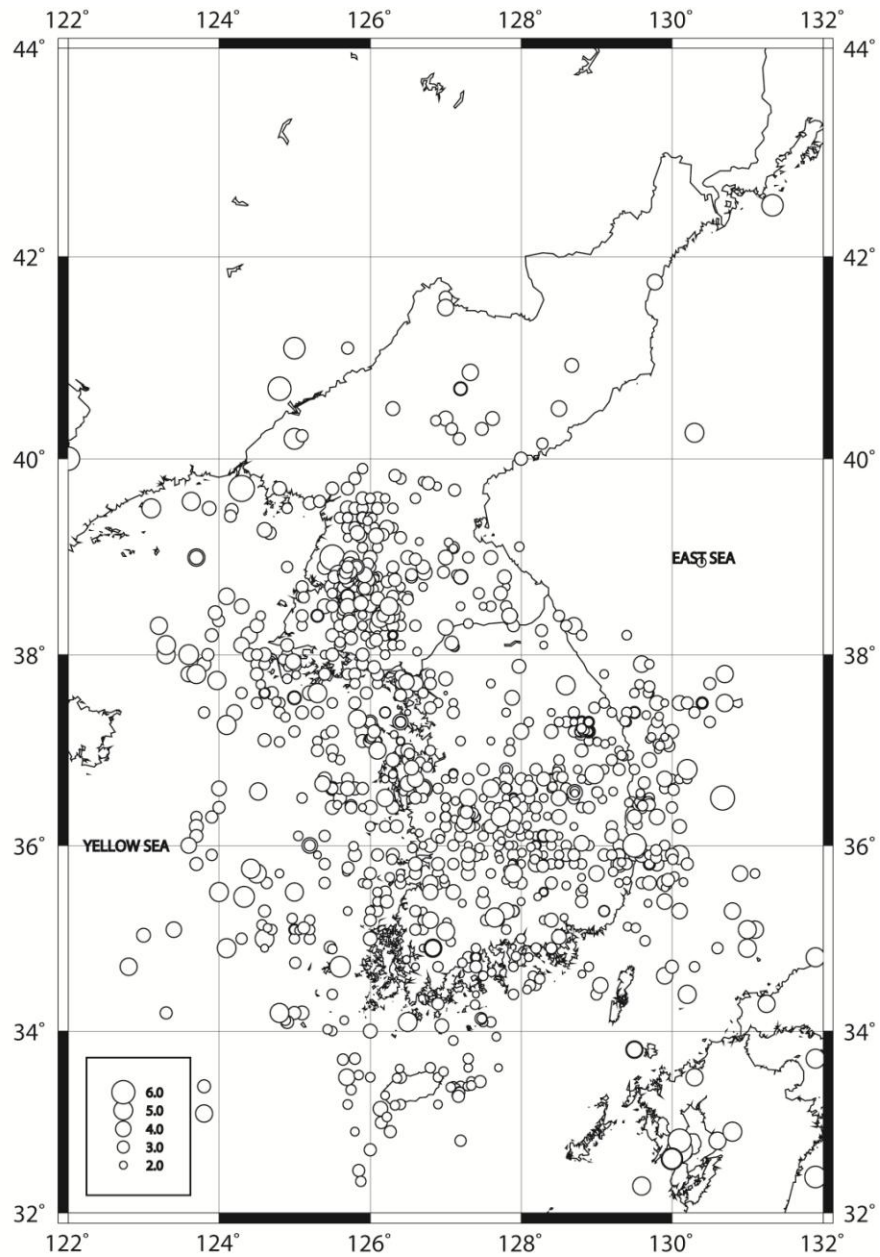
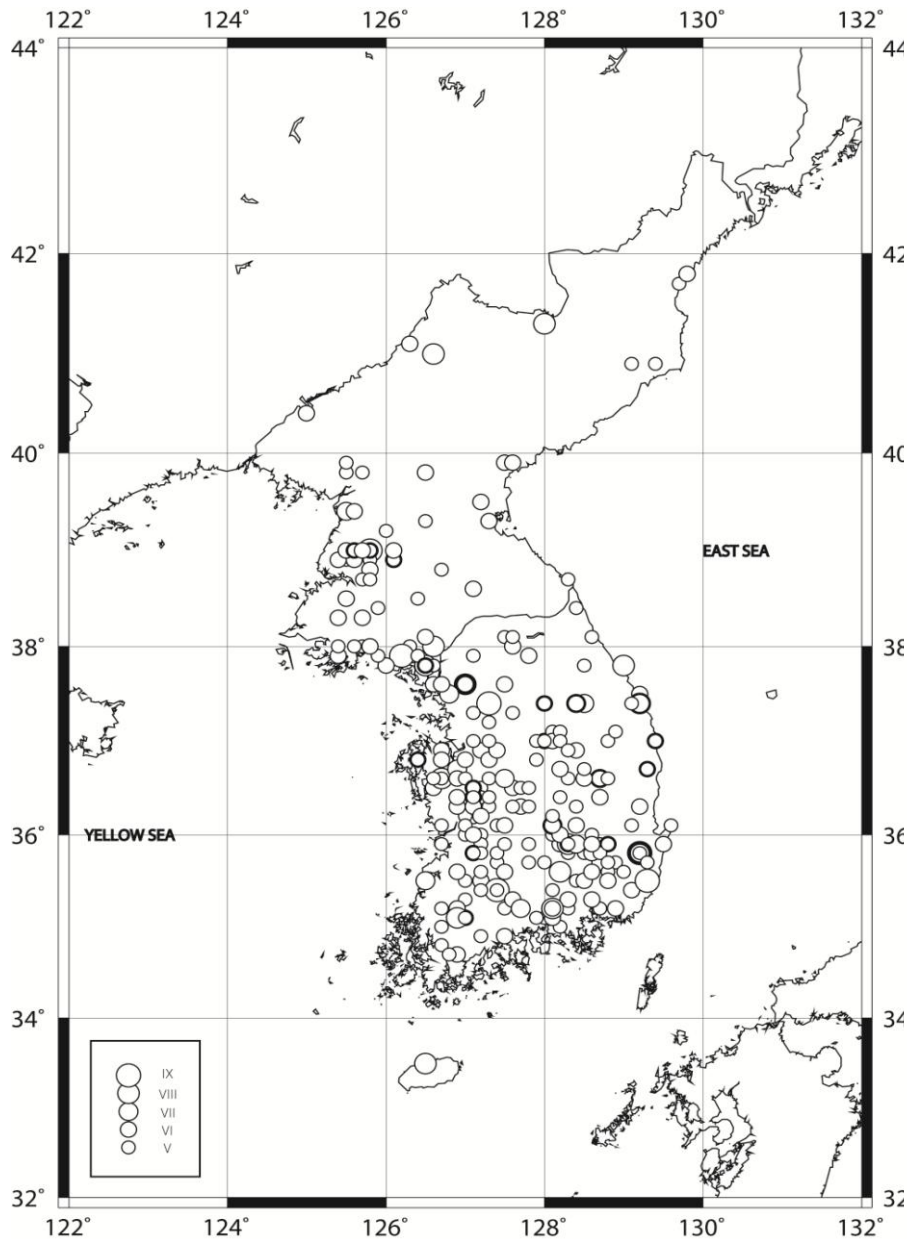
- **Water Gate** Since 2000 against M5.7 – 6.1
- **Underground Structure** Since 2000 against M5.5 – 6.0
- **Airport** Since 2004 against M5.5 – 6.0
- **Subway** Since 2005 against M5.7 – 6.3

Earthquake Engineering Society of Korea(1997)

- Peak Acceleration (%g) with 10% Probability of Exceedance in 50, 100, 200, 500, 1000, 2400 & 4800 Years
- Peak Ground Acceleration (%g) corresponding to the administrative districts

Data Used

- For Historical Earthquake using Intensity
 - Magnitude relationship from eastern US **$M = 1.75 + 0.5I$**
- Historical Earthquakes > M4.5
- Instrumental Earthquakes > M3.5



Applied Method

- Spatially-smoothed seismicity-rate gridding Method (A. Frankel, 1995)

Different weight for input parameter

Researcher	Weight				Attenuation Equation
	Historical data (2~1904)	Chosun Dynasty (1392~1904)	Chosun Dy+ Instrumental (1392~1996)	Instrumental Only (1905~1996)	
1	0.1	0.6	0.3		1
2	0.3	0.7			1
3			1.0		1
4		1.0			2
5		0.7		0.3	2, 3
6			1.0		3

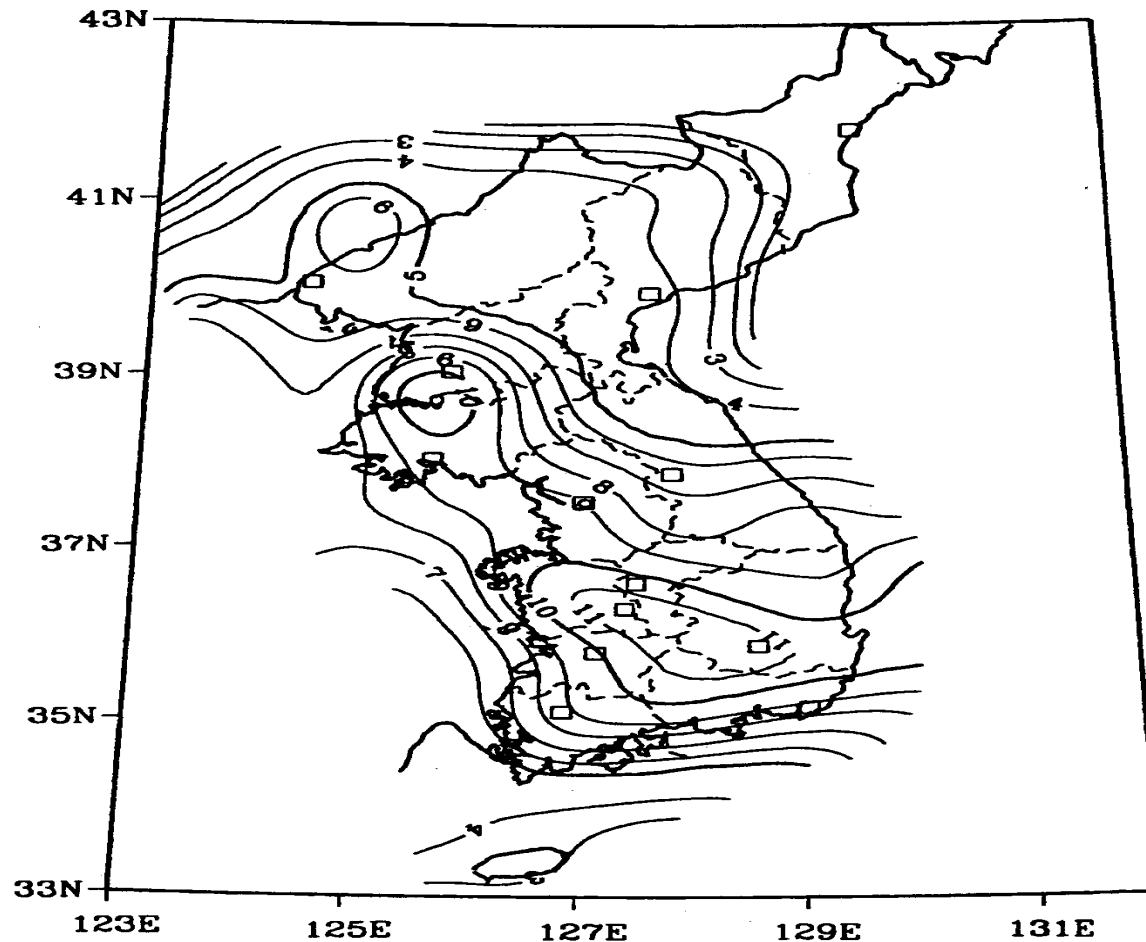
Attenuation Equation

Equation	Parameters				Standard Deviation	Researcher
	C ₀	C ₁	C ₂	C ₃		
1	0.4854	1.2	-0.8416	-0.0061	0.8036	1,2,3
2	0.5577	1.2	-0.8587	-0.0062	0.7629	4,5
3	5.0244	0.5442	-1.0020	0.0	0.1	5,6

In $a(cm/sec^2) = c_0 + c_1 M + c_2 \ln R(km) + c_3 R(km)$
a : Acceleration, *M* : Magnitude, *R* : Hypocentral Distance

Current Seismic Hazard Map(1997)

Peak Acceleration(%g) with 10%
Probability of Exceedance in 50 Years



Regionalization According to Administrative District

- 2 Seismic Zones
- Maximum Ground Acceleration for each Zone
- 500 Years Average return Period
- Zone I – 0.11G
- Zone II – 0.07G

Seismic Zone	Peak Gound Acceleration (500Years)	District	
I	0.11g	City	Seoul, Incheon, Busan, Gwangju, Daejeon, Daegu, Ulsan
		Province	Gyunggi, Chungcheong, Jeola-bukDo, Kyungsang, Sothern part of Gangwon-Do, Northern part of Jeola-namdo
II	0.07g	Province	Northen part of Gangwon-Do, Southern part of Jeola-namdo, Jeju

Seismic Sources

- Point Earthquake Sources – Not consider the Active or Potential Faults
- Using Earthquake Catalogue – No Geological, Geophysical, Tectonic Information
- Not complete Earthquake catalogue – Historical & Instrumental data

Path & Site Effects

- Attenuation – Frequency & Geology were not considered & Western US relationship was used
- Results are considered on Bedrocks – Site Amplification was not considered