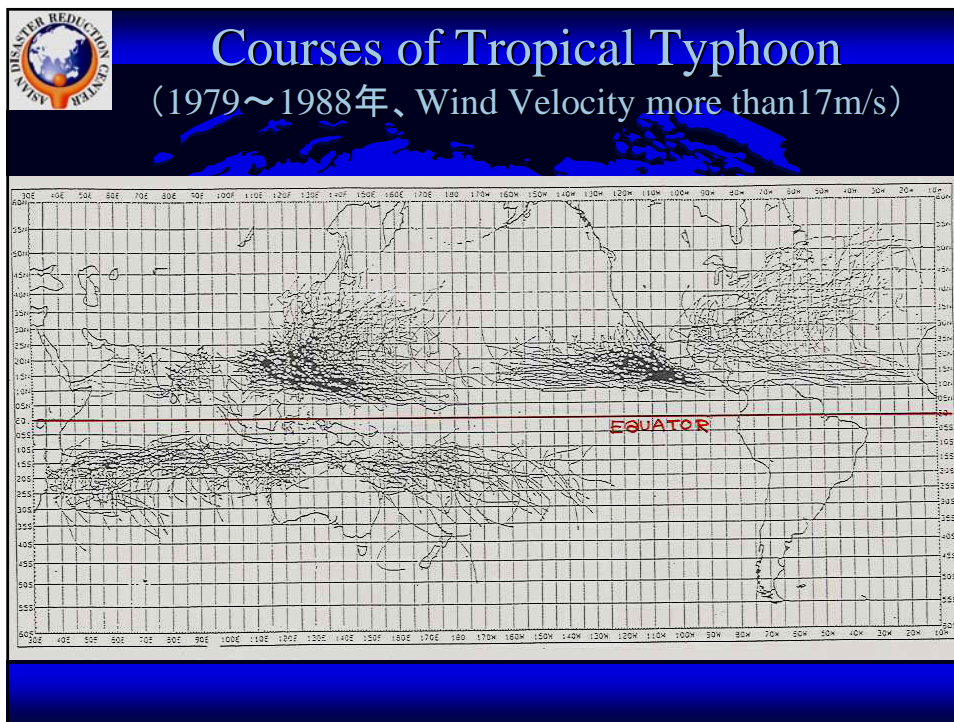


Lesson Learnt from Past Japanese Natural Disaster Experience

YUJIRO OGAWA

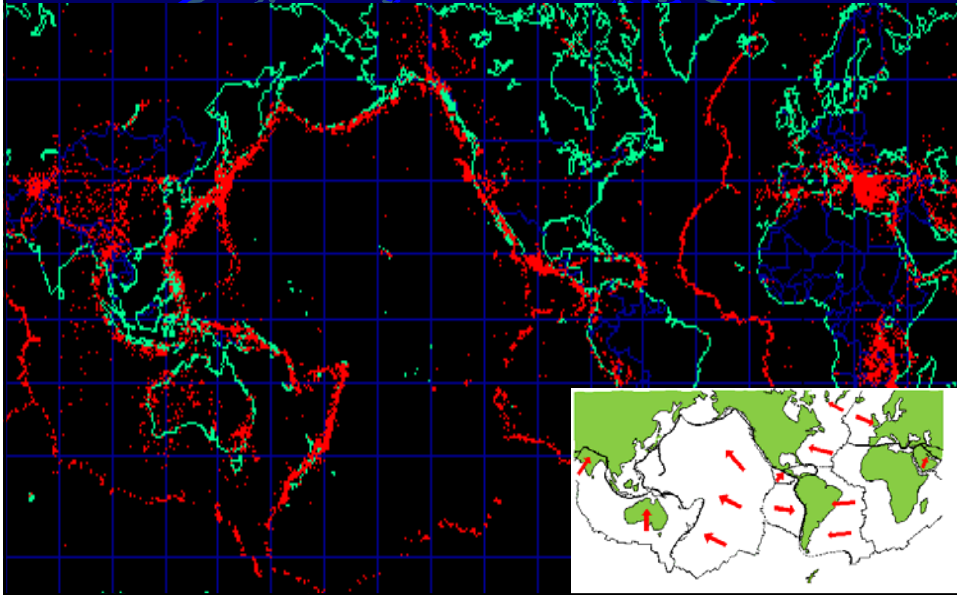
DEAN, DEPARTMENT OF ENVIRONMENT AND DISASTER
RESEARCH
FUJI-TOKOHA-UNIVERSITY

2007.12.20



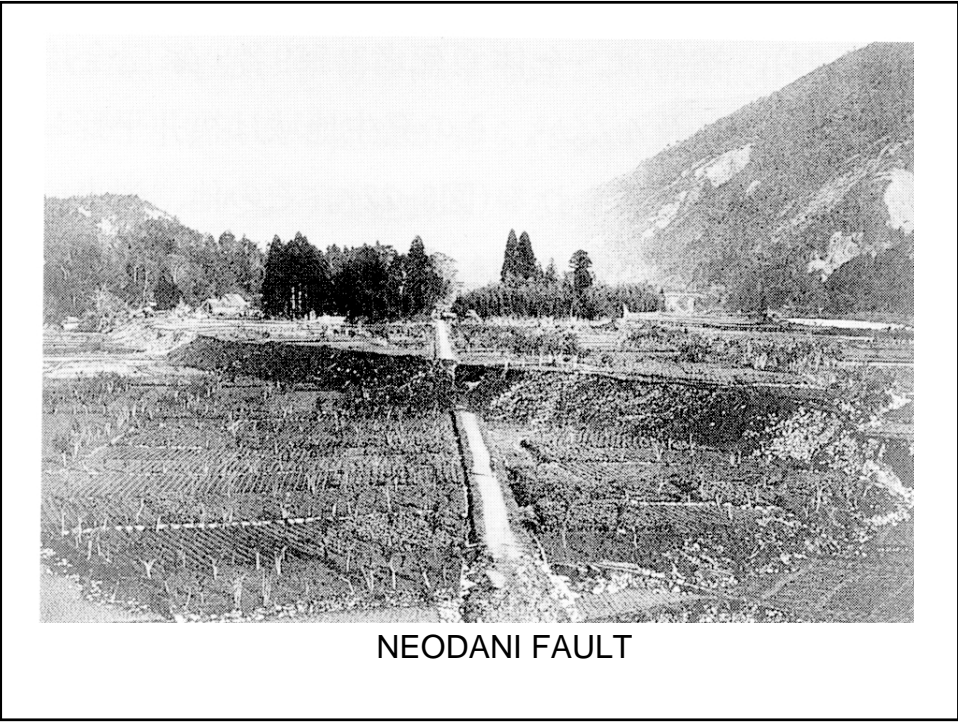
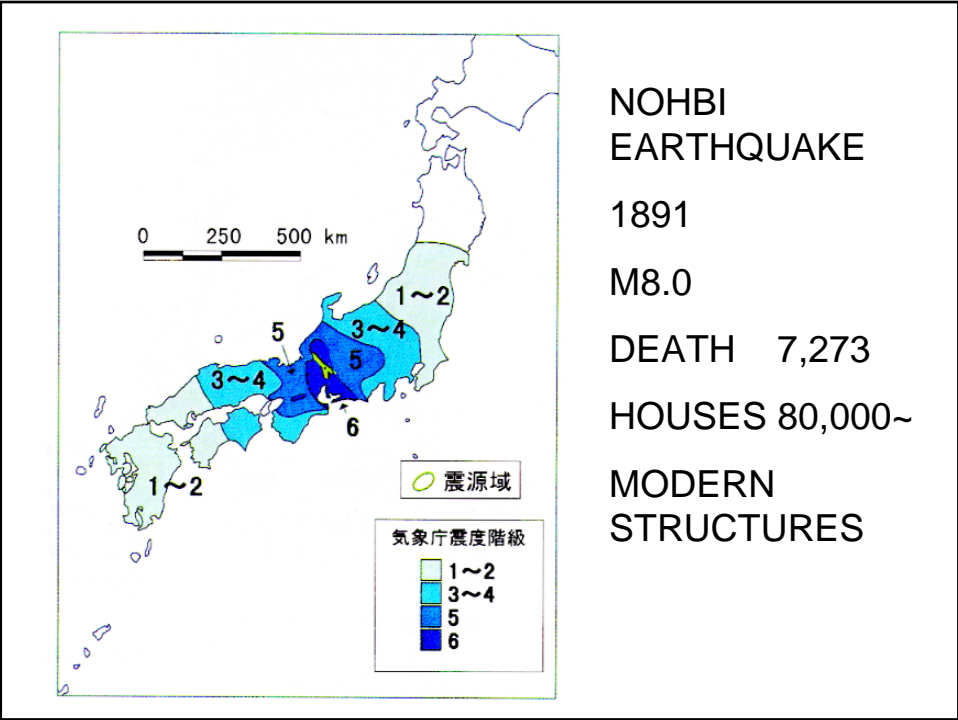


Distribution of Epicenter



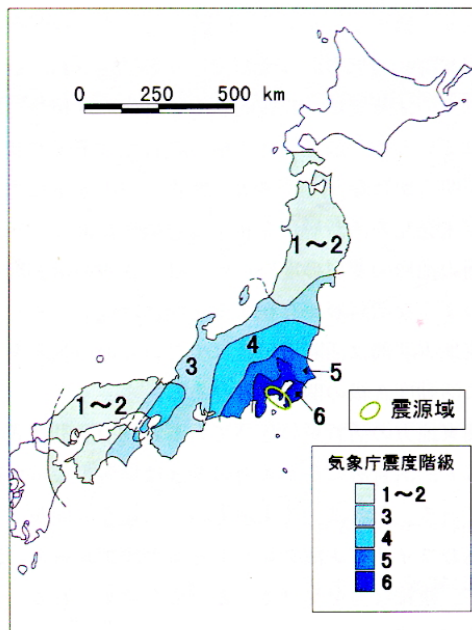
MAIN EARTHQUAKE
DISASTERS IN JAPAN

SINCE 20 CENTURY





BRICKS STRUCTURES



KANTOH EARTHQUAKE

1923,9.1

M7.9

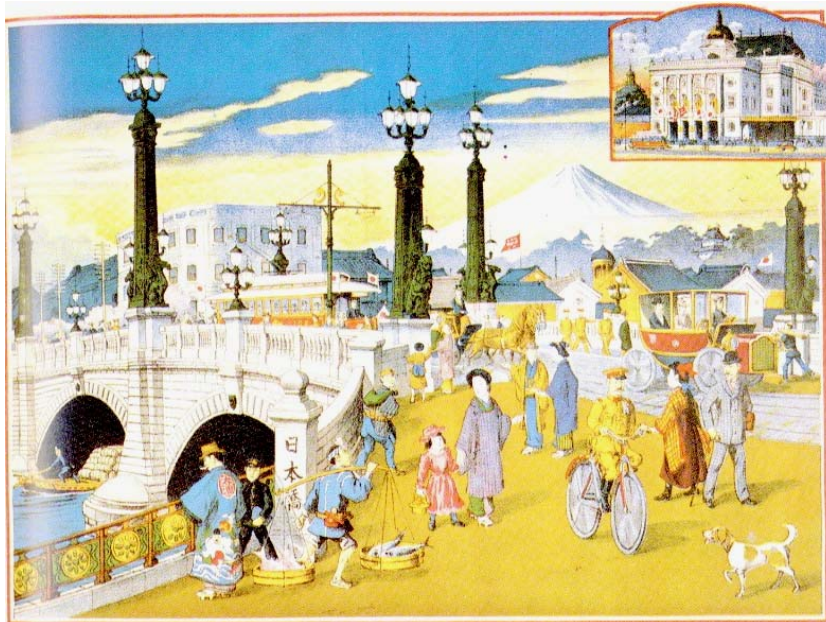
DEATH 142,000~

MOSTLY BY FIRE

HOUSES 254,000

SEISMIC CODE

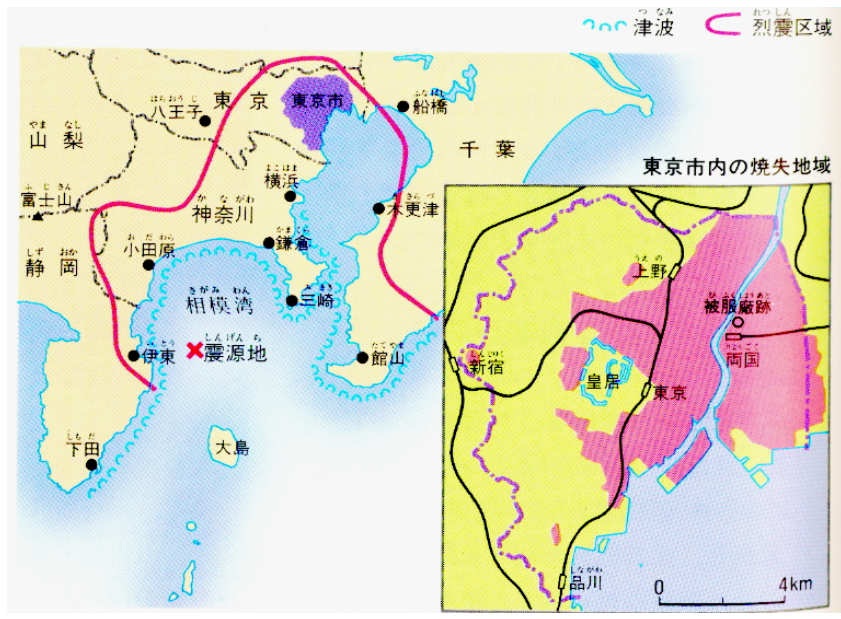
0.1 G



1911 NIHONBASHI BRIDGE



PEOPLE ON NIHONBASHI BRIDGE



EPICENTER and FIRE IN TOKYO



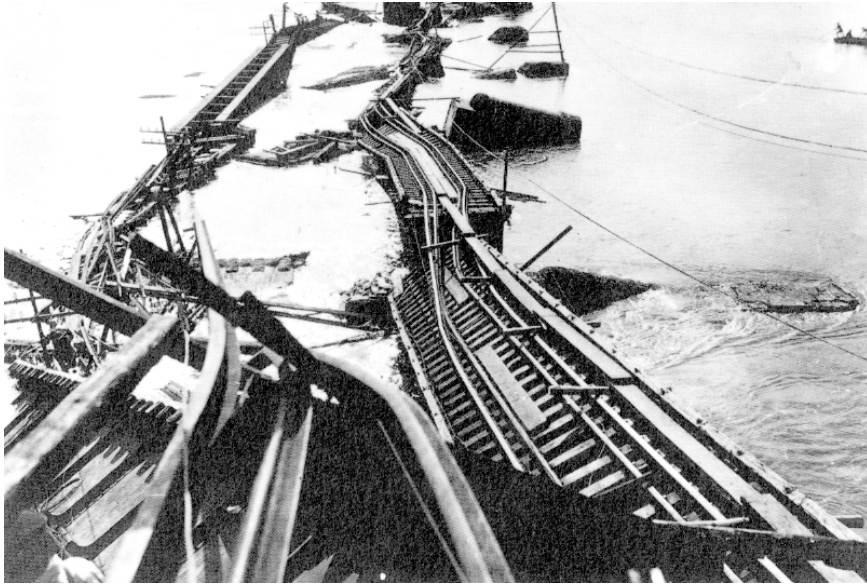
FIRE AFTER EARTHQUAKE



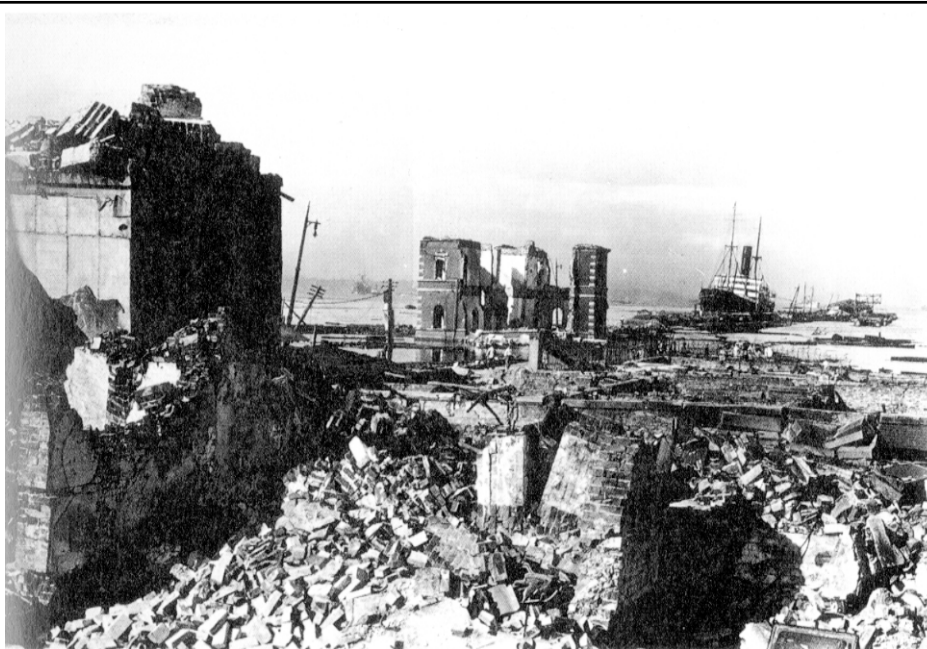
40,000 KILLED BY FIRE



12 FLOORS BRICKS BUILDNIG



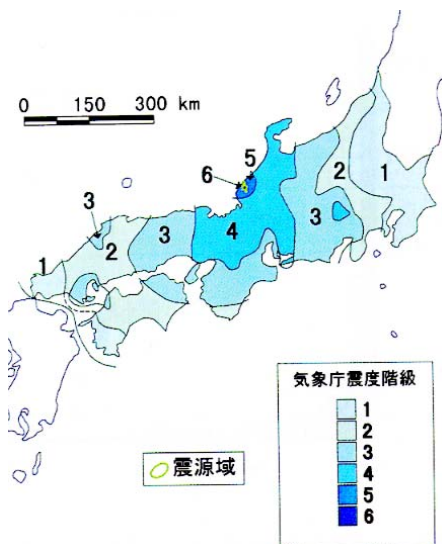
RAILROAD BRIDGE IN YOKOHAMA



BRICKS BUILDINGS and FIRE IN YOKOHAMA



DERAIL OF S.L.TRAIN



FUKUI EARTHQUAKE

1948.6

M 7.3

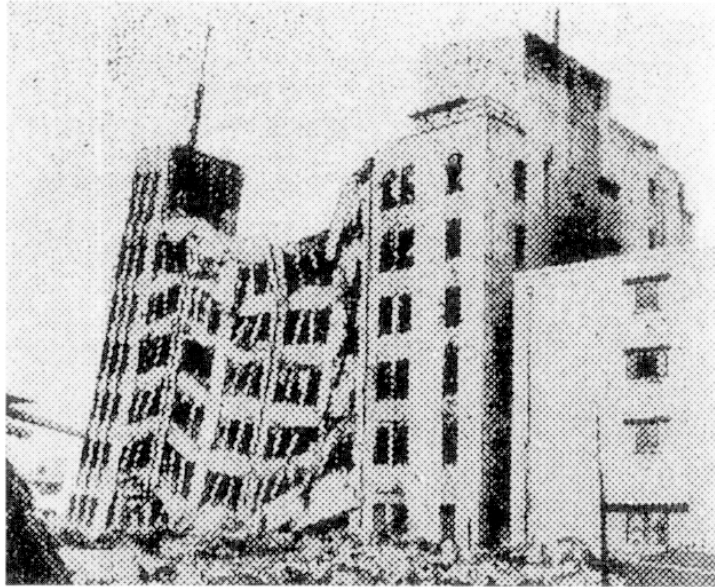
DEATH 3,700

HOUSES 36,000

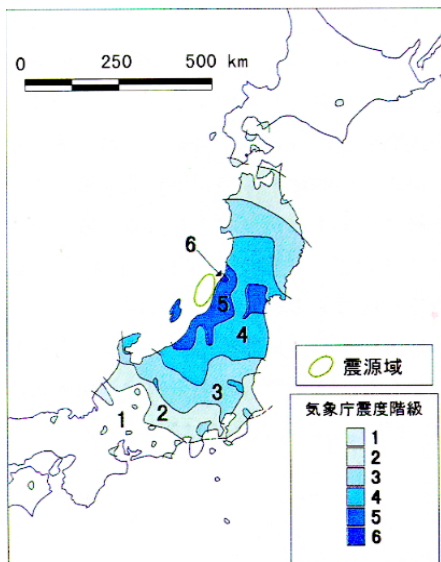
100% COLLUPSE IN
15km × 8km

BRIDGE MOVE, LEAN

RIVER BANK SINK



7 FLOORS RC BUILDING



NIIGATA EARTHQUAKE

1964,6

M7.7

DEATH 26

HOUSES 2,300

TSUNAMI 4m

LONG TERM
INAUDATION IN CITY

OIL TANK FIRE and
FIRE SPREAD IN CITY



OIL TANK
FIRE

SINGLE SPAN
GARDER
BRIDGE
COLLUSPE

1964年新潟地震 新潟空港の液状化





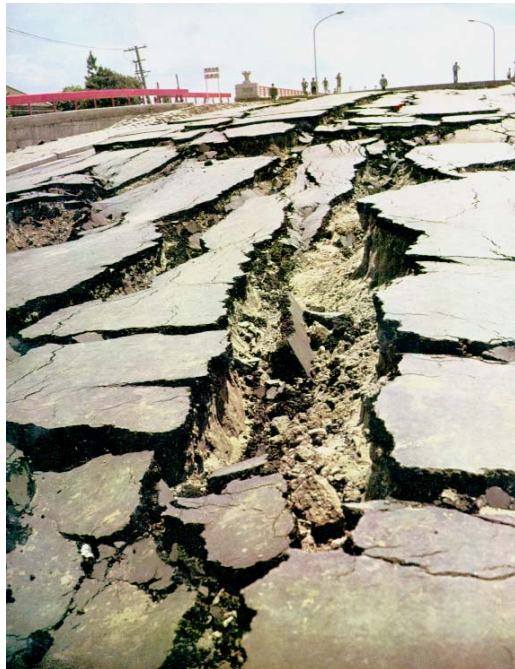
Leaned RC Structures by Liquefaction



Up lifted Manhole by Liquefaction



Fall down Simple Girder Bridge 伯野



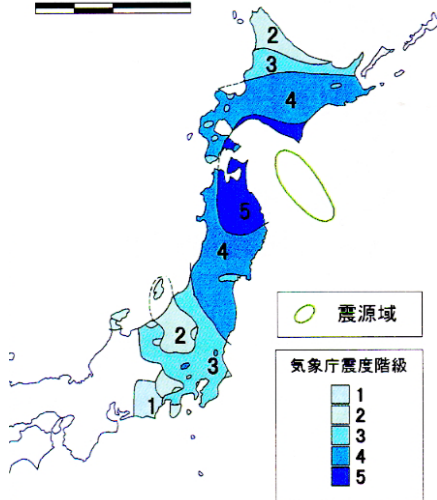
Filled Soil near
Bridge

10 days after
construction
finished



Niigata City attacked by Fire, Spilled Oil, Tsunami

0 250 500 km



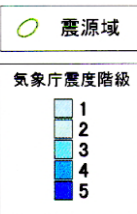
Tokachi off shore Earthquake

1968.5

M7.9

Death 52

Houses 646

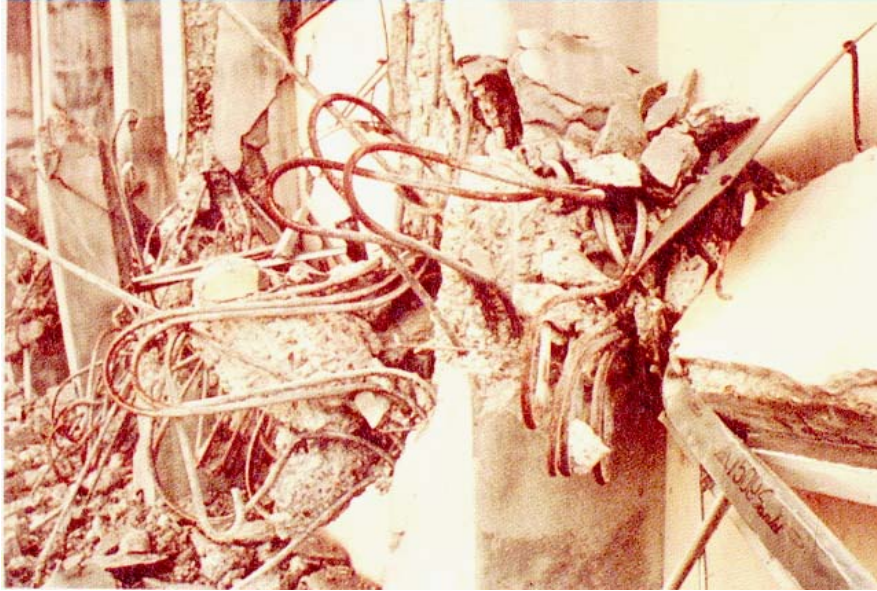




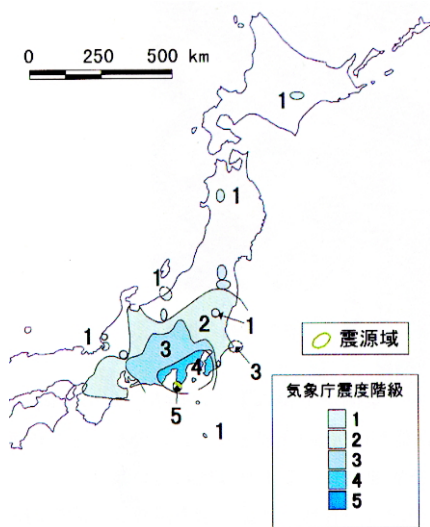
First Floor Damage in University Building



Share Failure of Short Colum



Compression Failure by Insufficient Star-lap



Izu Peninsula Near Shore Earthquake

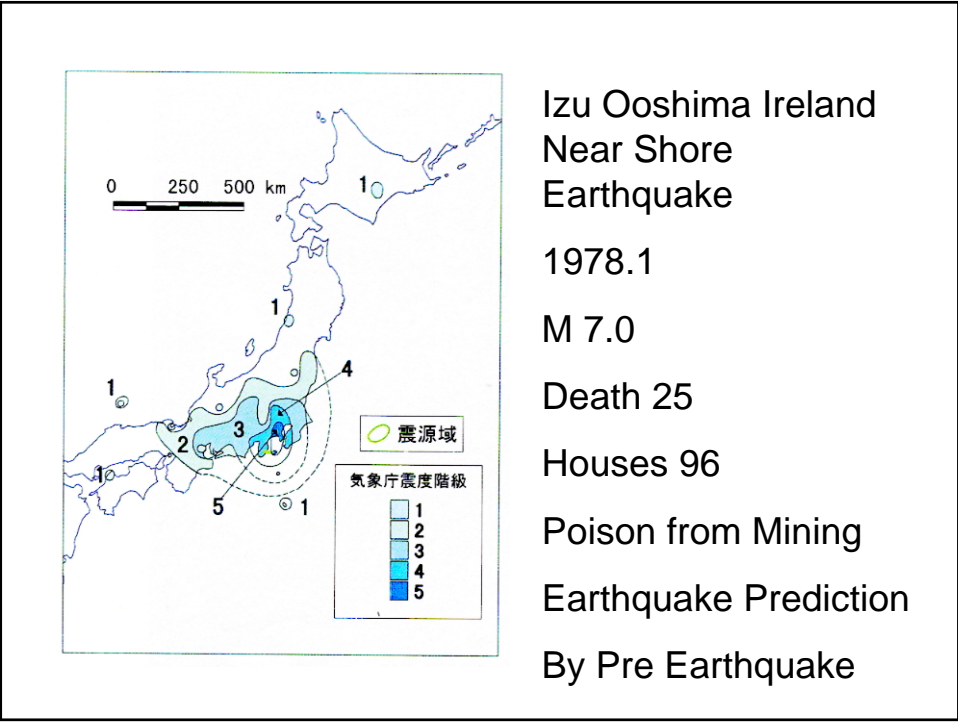
1974.5

M 6.9

Death 30 persons

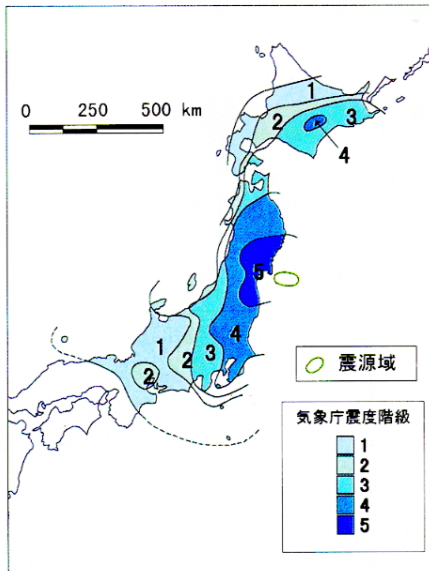
Houses 134

Land Slide 27 persons





Railway Tunnel which Earthquake Fault passed



Miyagi-Ken Off Shore Earthquake

1978.6

M 7.4

Death 28

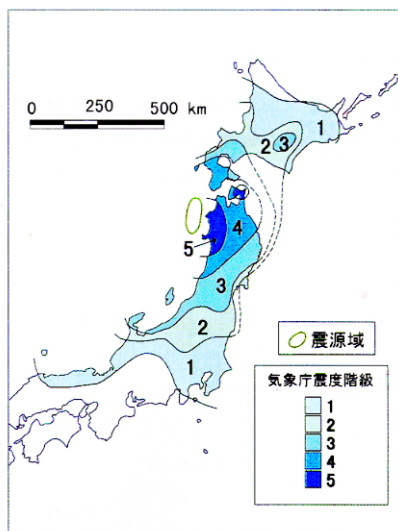
Houses 1,180

Damage in modern City

Lifeline Function Failed



Floating Roof Petroleum Tank



Mid Japan Sea
Earthquake

1983.5

M7.7

Death 104 (100 by
Tsunami)

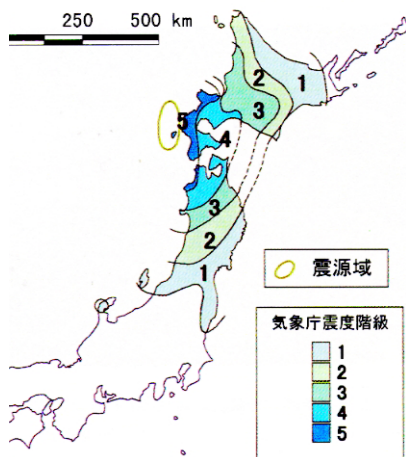
Houses 167

Lessons

Risk of Tsunami in
Japan Sea Side



7 minutes after Earthquake

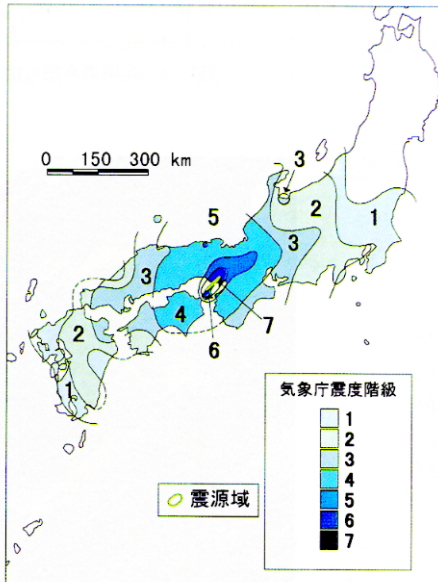


South West Off-Shore of Hokkaido Earthquake

1993.7
 M7.8
 Death 340
 (Most by Tsunami)
 Houses 601
 Tsunami hight 29m
 Warning issued after
 Tsunami, System was
 improved that warning is
 issued in 1 to 2 minutes



街の中に進入した津波



Hanshin Awaji Earthquake

1995.1.17
M 7.2
Death 6,396
Houses 436,000
Fully Collapsed 105,000
Burned 7,000



Collapse of Middle Floor



ピロティー形式構造の崩壊 朝日



Japanese Style Houses (Heavy Roof)



Narrow Pass



One Column Highway Bridge



One Column Highway Bridge



Rokko Oohashi Bridge



Side Slip of Pier



Side Slip of Pier



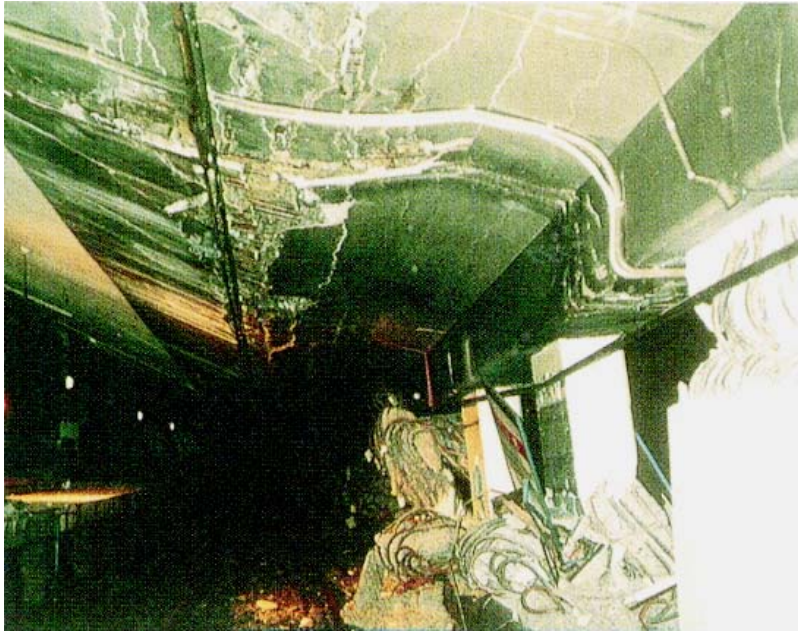
Rail Road Bridge



Shinkansen Ballet Train



Subway, Column



Subway, Open Cut Column



Urban Fire



1995.1.17
被災後の長田区の様子を
神戸市職員が撮影

24時間以内に290件の火災が発生した。



空から NHK提供

