

EARTHQUAKES AND PREVENTIVE MEASURES

by

K. C. Makropoulos

**Human rights in Disasters: Search and Rescue Operations in disasters especially for vulnerable people
Hotel Electra, 5-6 November 2009**

EARTHQUAKES AND PREVENTIVE MEASURES

INSTRUMENTS

SEISMOSCOPE



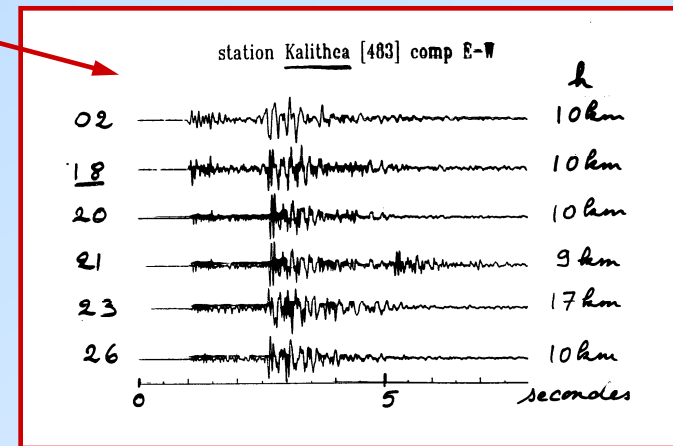
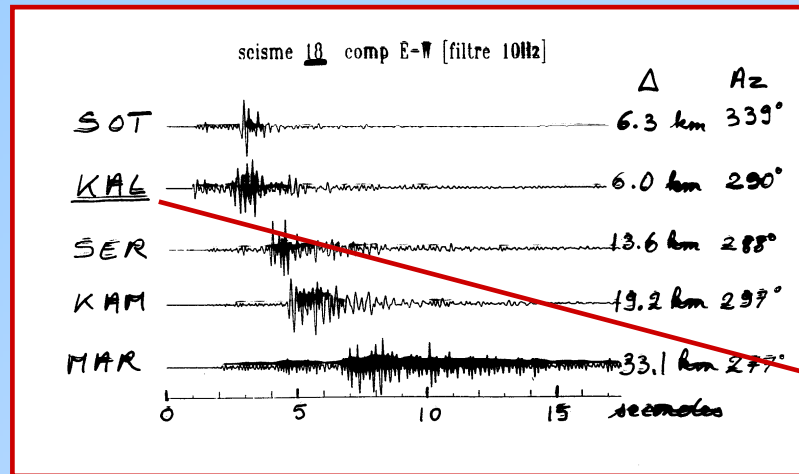
MODERN SEISMOGRAPH



EARTHQUAKES AND PREVENTIVE MEASURES

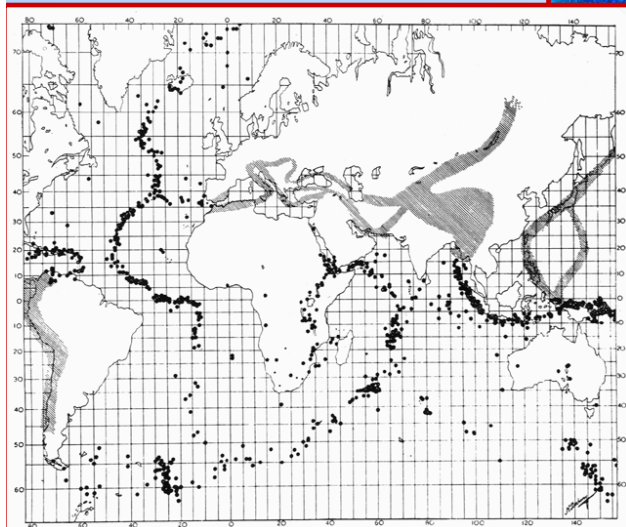
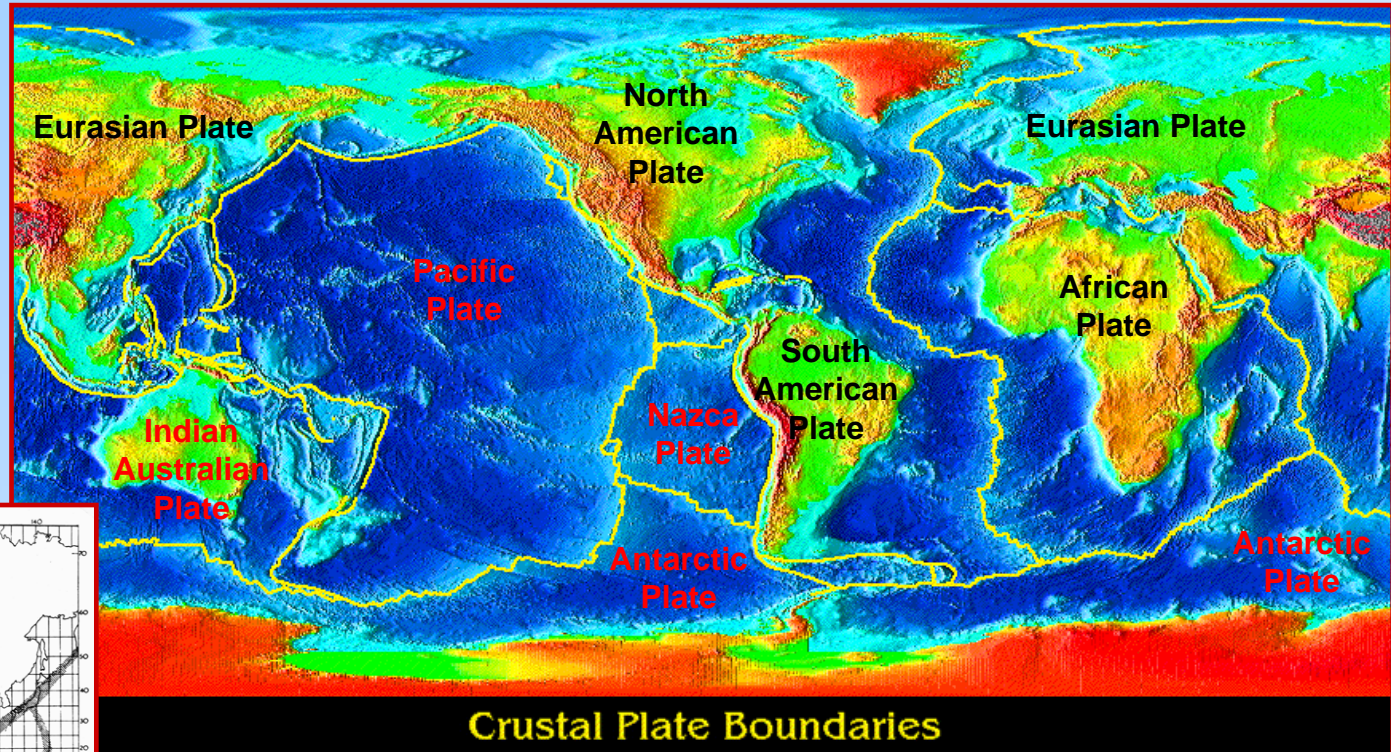
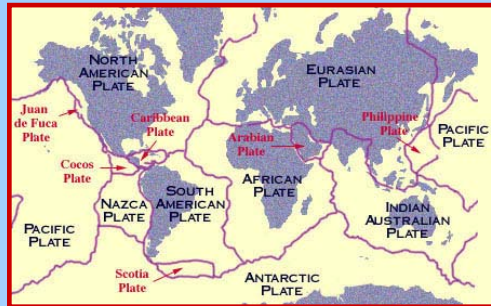
READINGS

SEISMOGRAMS



EARTHQUAKES AND PREVENTIVE MEASURES

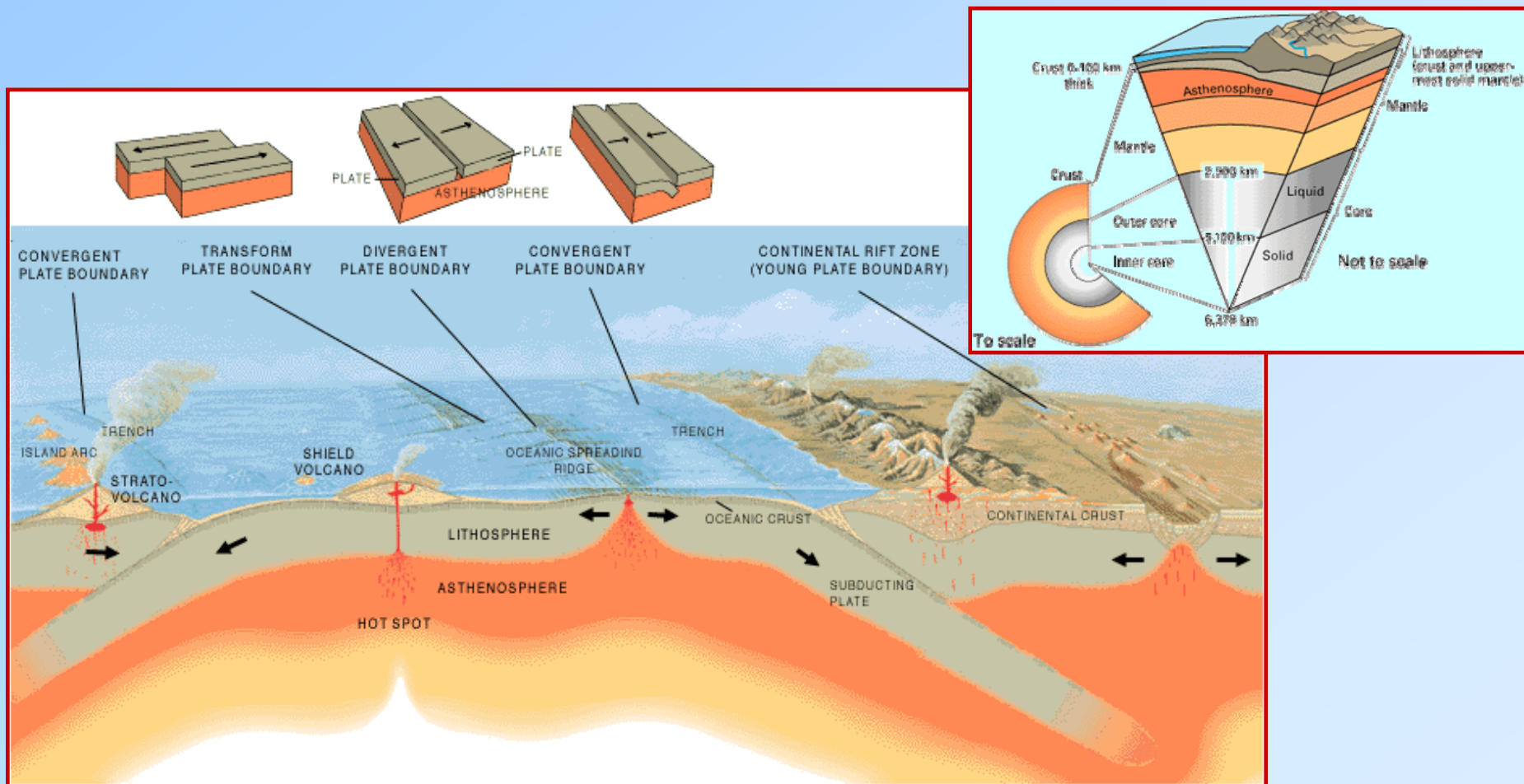
THEORIES ABOUT THE ORIGIN PLATE TECTONICS



EARTHQUAKES AND PREVENTIVE MEASURES

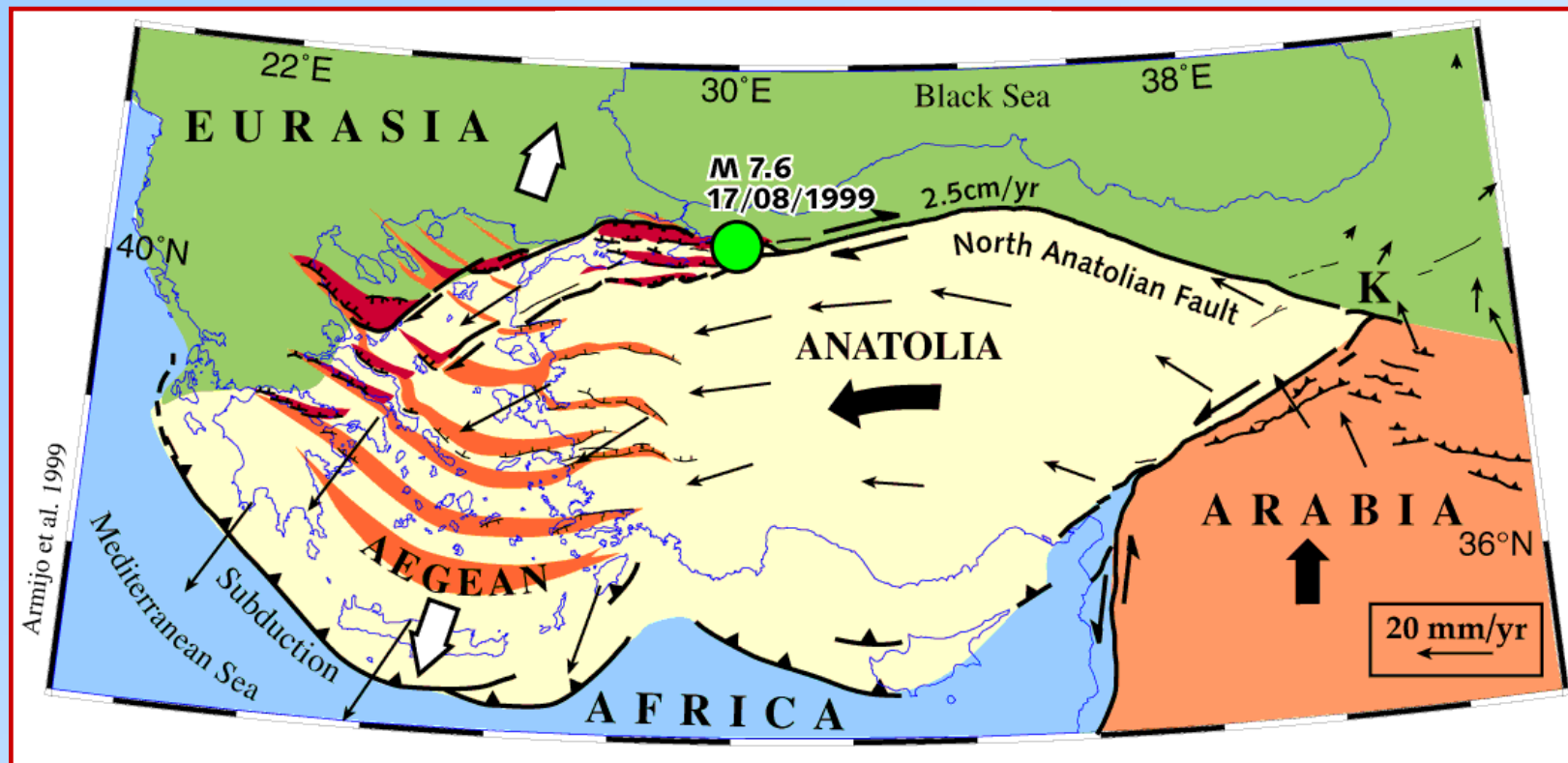
THEORIES ABOUT THE ORIGIN

PLATE TECTONICS



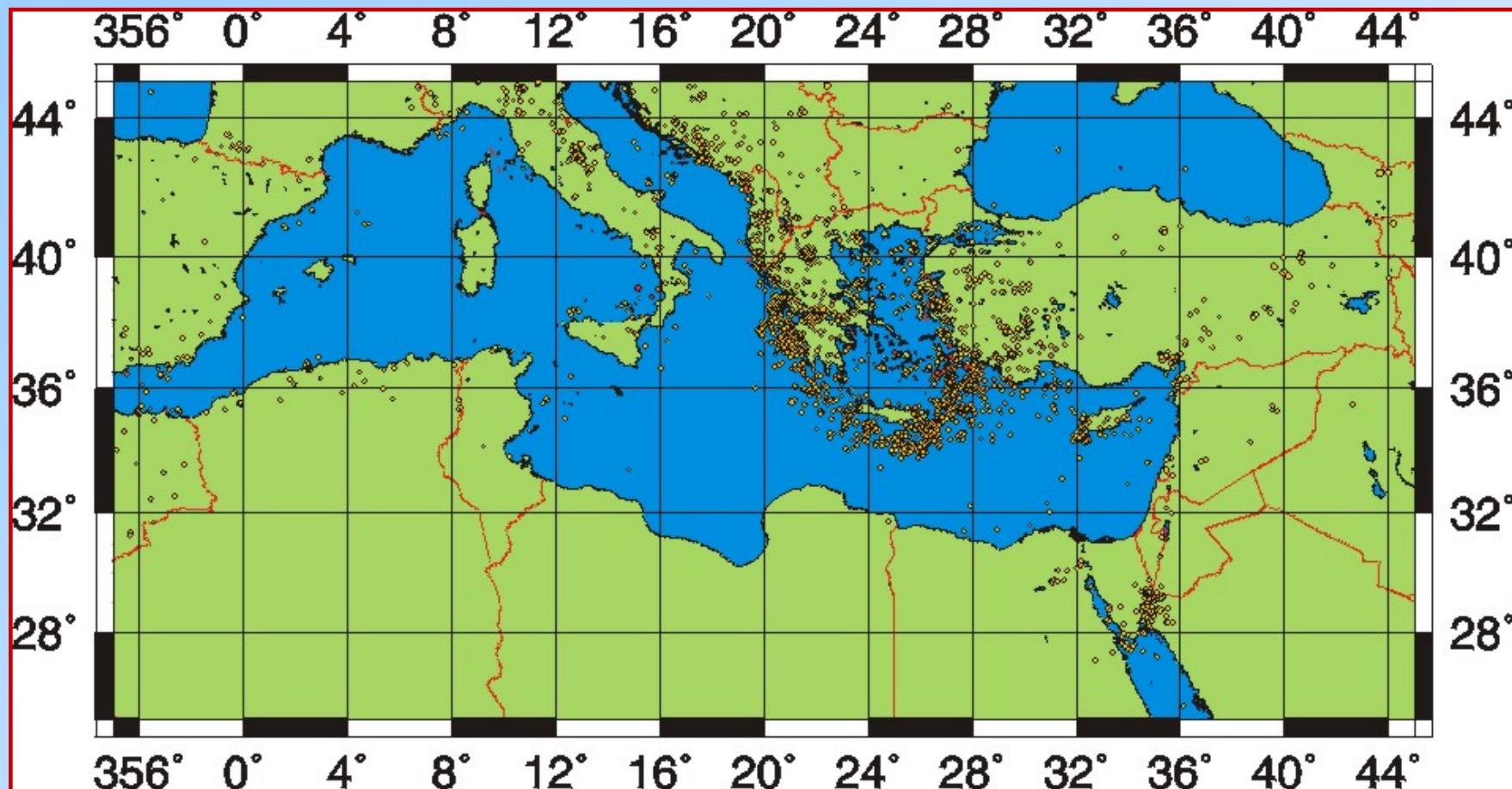
EARTHQUAKES AND PREVENTIVE MEASURES

PLATE TECTONICS IN THE AEGEAN



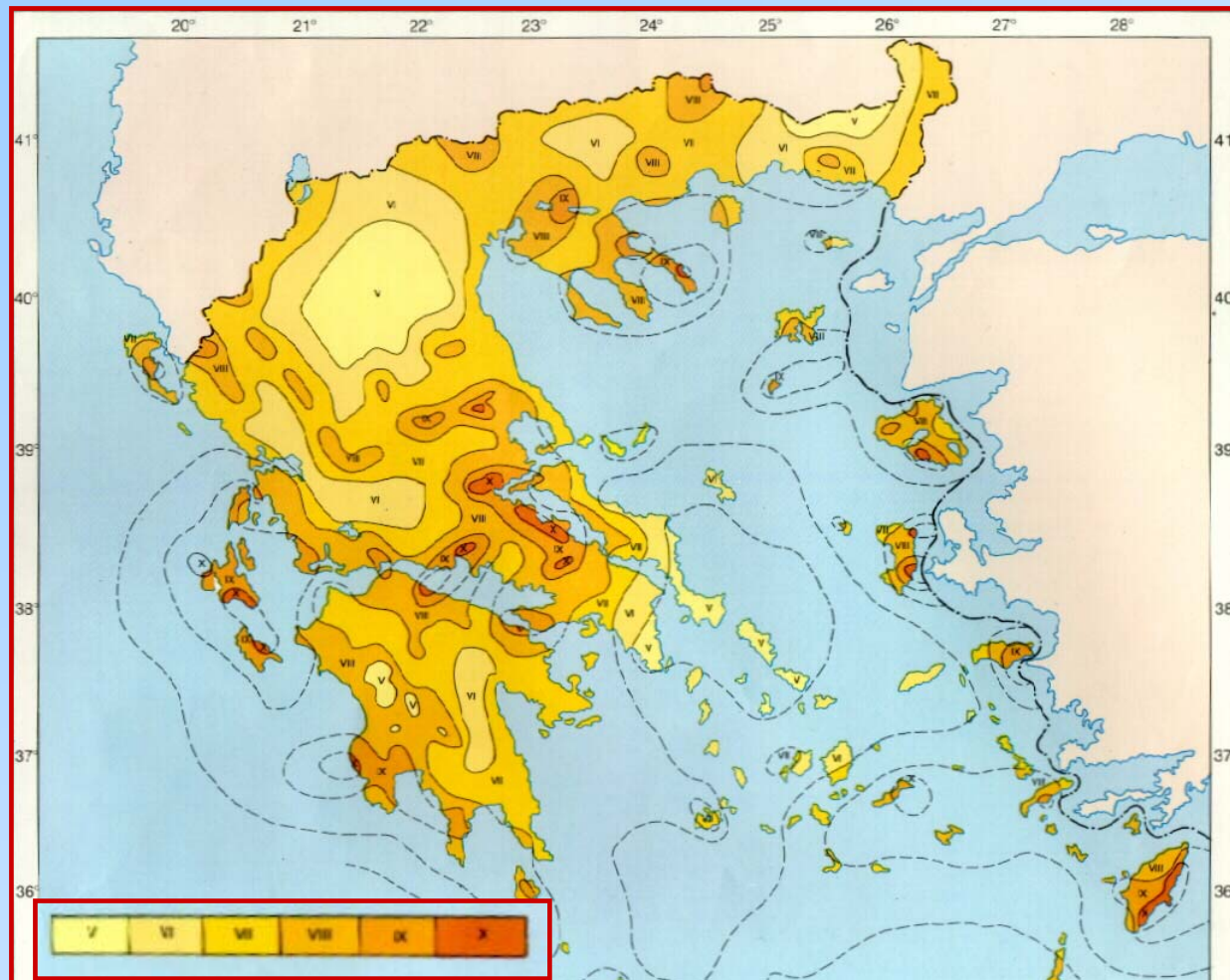
EARTHQUAKES AND PREVENTIVE MEASURES

SEISMICITY OF THE MEDITERRANEAN AREA



EARTHQUAKES AND PREVENTIVE MEASURES

MAXIMUM OBSERVED INTENCITIES IN GREECE

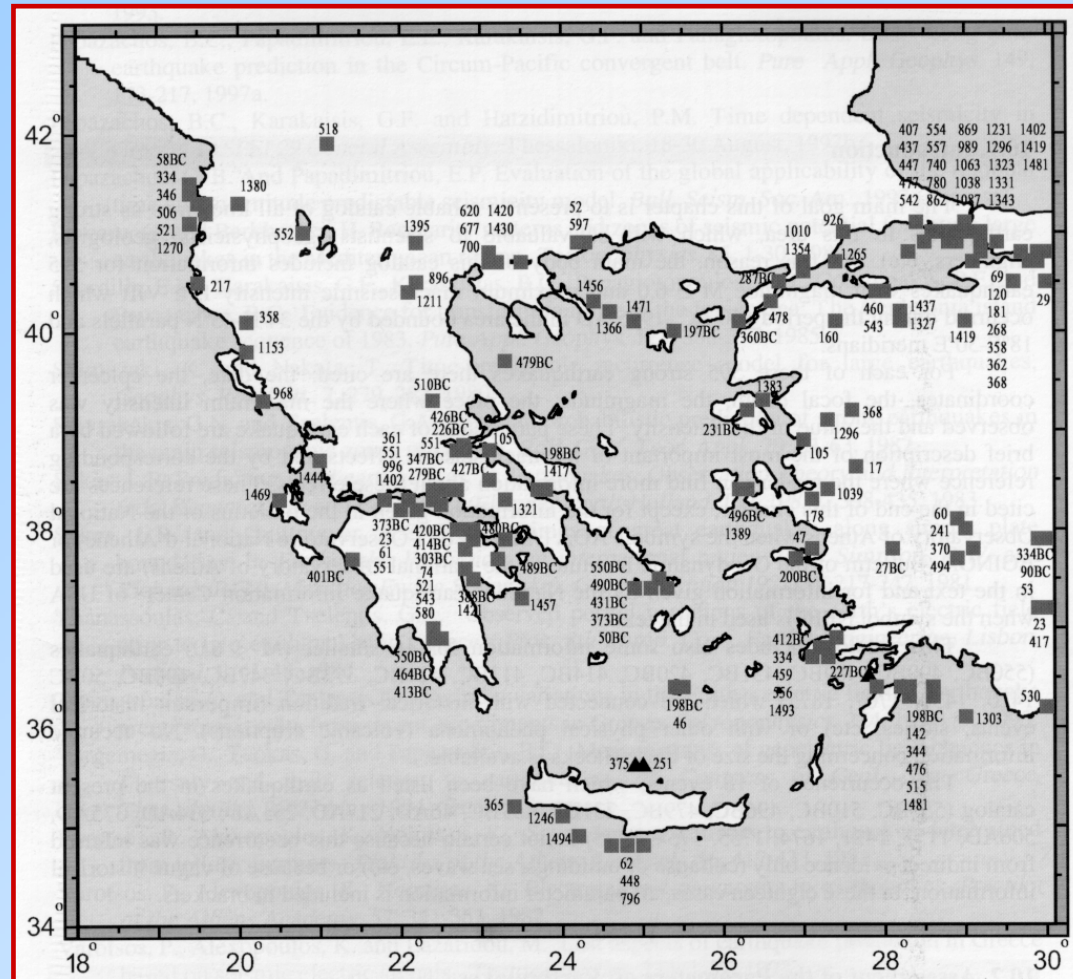


Human rights in Disasters, 2009

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SEISMICITY IN GREECE

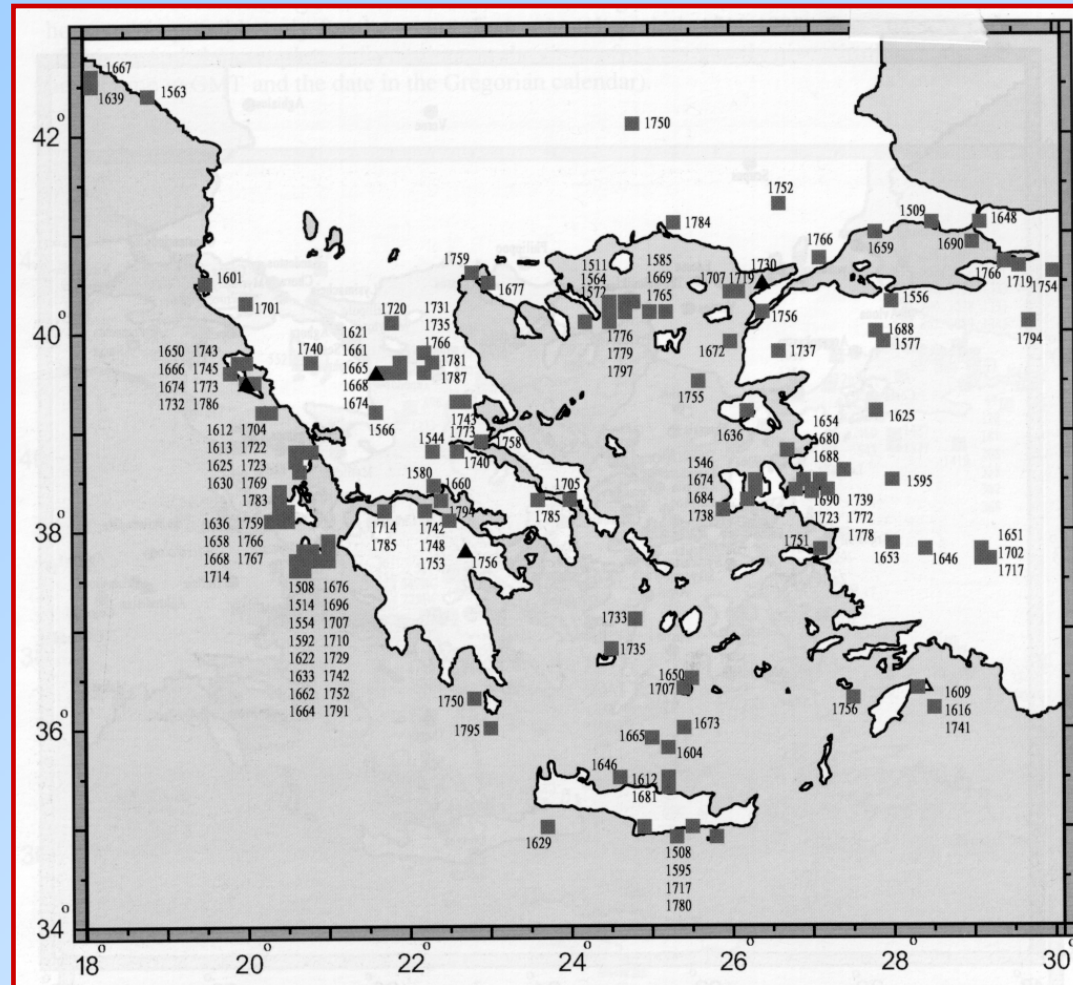
550 BC – 1500 AD



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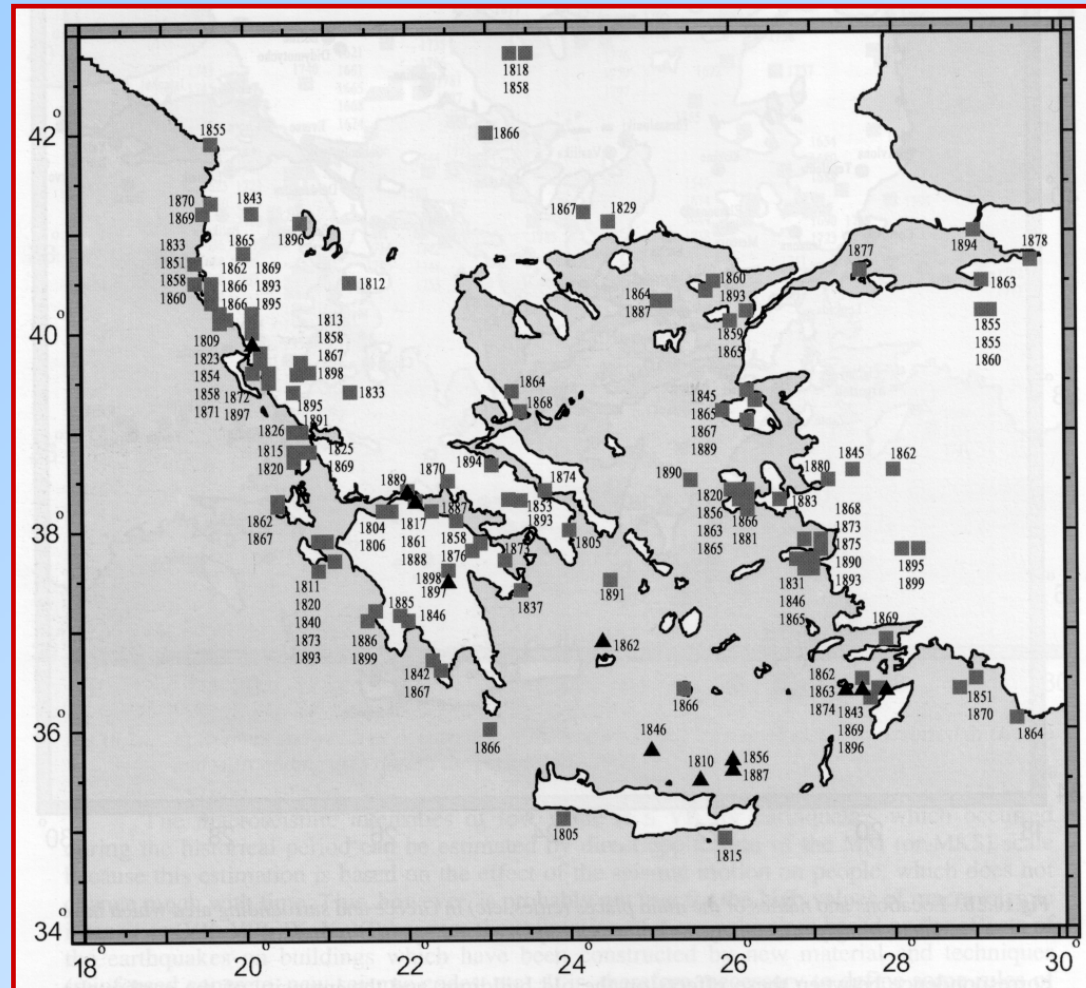
SEISMICITY IN GREECE 1501 – 1800 AD



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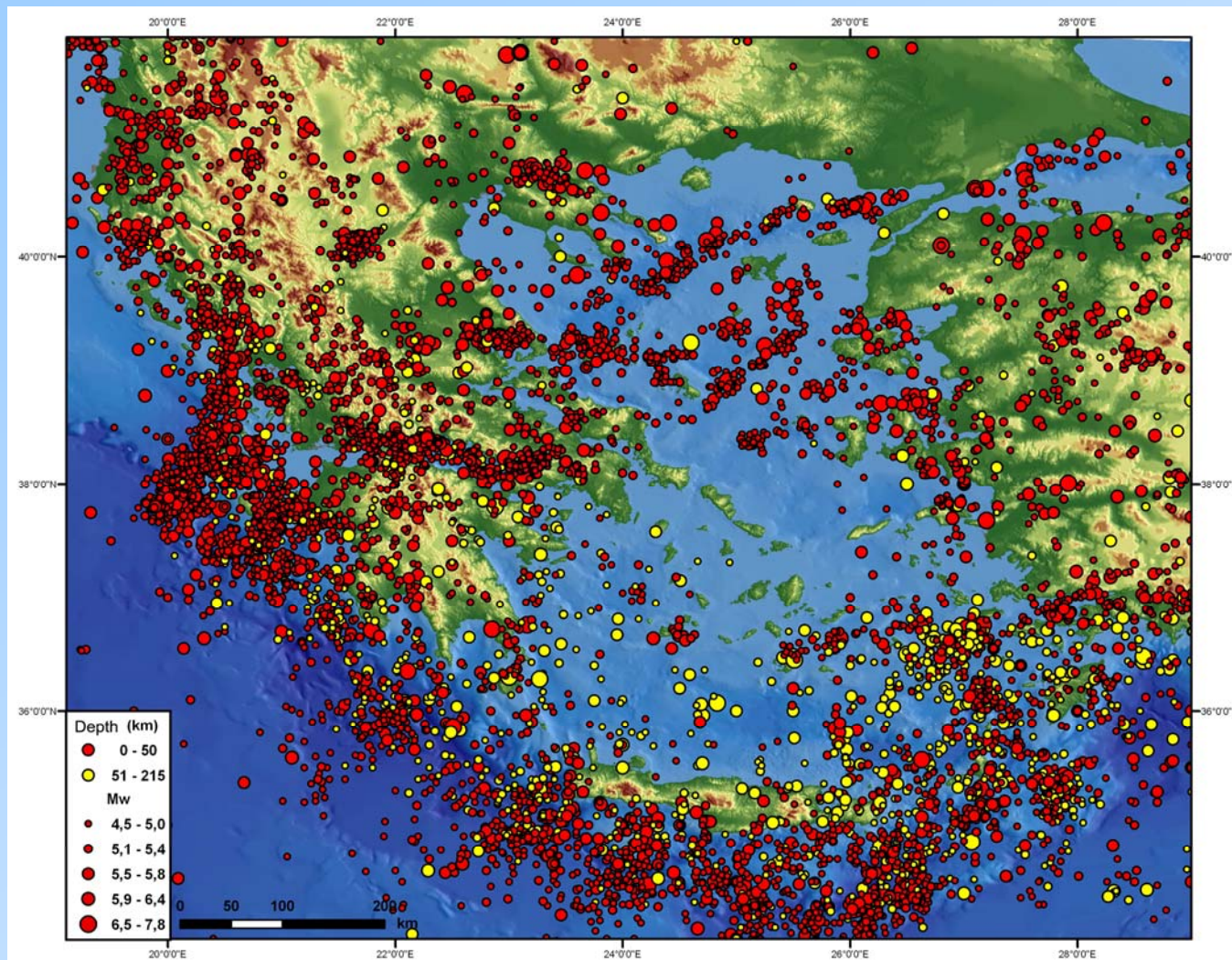
SEISMICITY IN GREECE 1801 – 1900 AD



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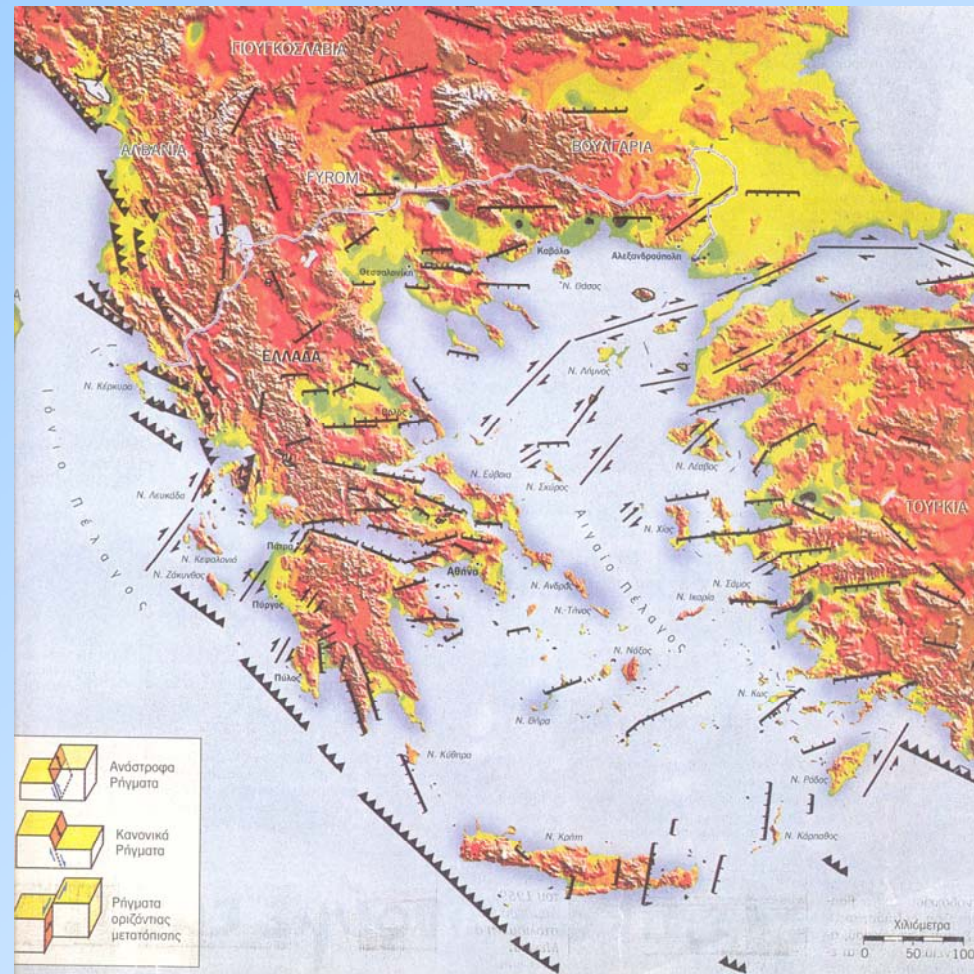
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SEISMICITY (1900-2009)



EARTHQUAKES AND PREVENTIVE MEASURES

SEISMICALLY ACTIVE FAULTS



EARTHQUAKES AND PREVENTIVE MEASURES

KEFALLINIA EARTHQUAKE, 1953



EARTHQUAKES AND PREVENTIVE MEASURES

KEFALLINIA EARTHQUAKE, 1953



Η Κοίμηση
της Θεοτόκου,
Λειβαθινάτα

Church of the
Assumption of the
Virgin Mary,
Livathinata

EARTHQUAKES AND PREVENTIVE MEASURES

ATHENS EARTHQUAKE SEPTEMBER 7, 1999

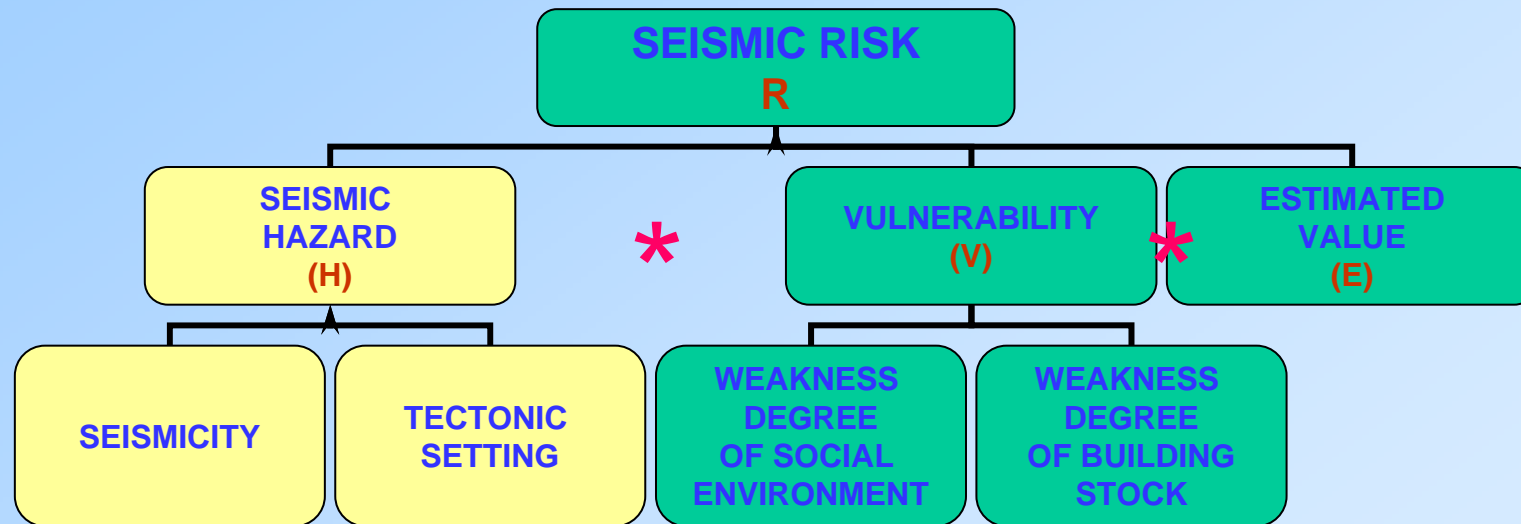


EARTHQUAKES AND PREVENTIVE MEASURES

ATHENS EARTHQUAKE SEPTEMBER 7, 1999



EARTHQUAKES AND PREVENTIVE MEASURES



$$R=H*V*E$$

EARTHQUAKES AND PREVENTIVE MEASURES

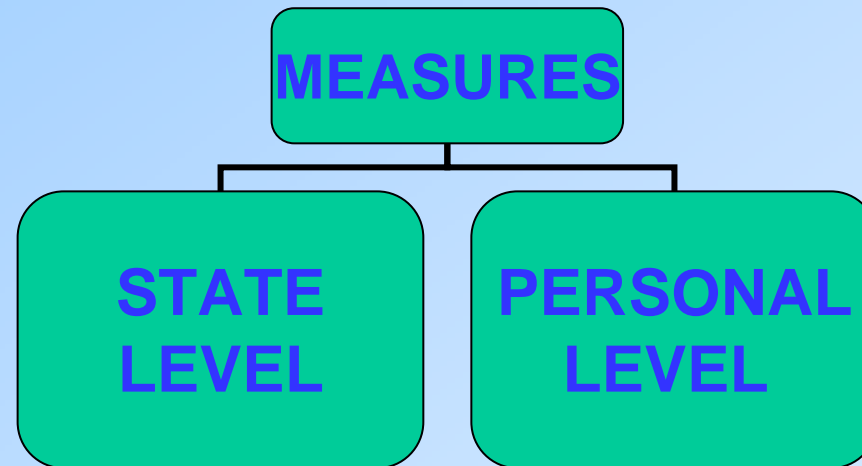
$$R=H*V*E$$



Reduction of Vulnerability

EARTHQUAKES AND PREVENTIVE MEASURES

PREVENTION MEASURES



EARTHQUAKES AND PREVENTIVE MEASURES

EARTHQUAKE PLANNING AND PROTECTION ORGANIZATION (E.P.P.O.)



EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

- 1. Strengthening of the seismic capacity of the structures**
- 2. Sector of seismology, seismotectonics - study and estimation of seismic risk:**
 - Ensuring of reliable seismological data.**
 - Enactment of specifications and recommendations for the elaboration of studies related to seismic hazard.**
 - Emphasis in the local ground conditions.**
- 3. Briefing of Citizens**
- 4. Emergency Planning**
- 5. Scientific programs - studies**
- 6. Confrontation of earthquakes**

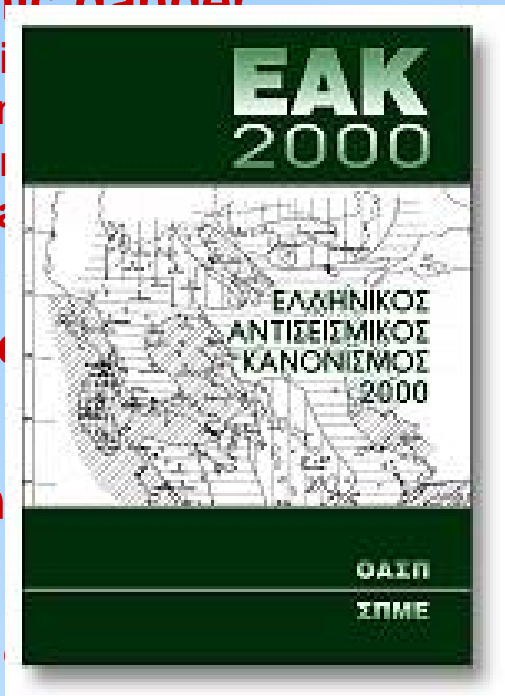
EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

1. Strengthening of the seismic capacity of the structures

2. Sector of seismology, seismotectonics and seismic danger:

- Ensuring
- Enacting
- to seismic
- Emphasizing



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onditions.

3. Bridges

4. Emergency

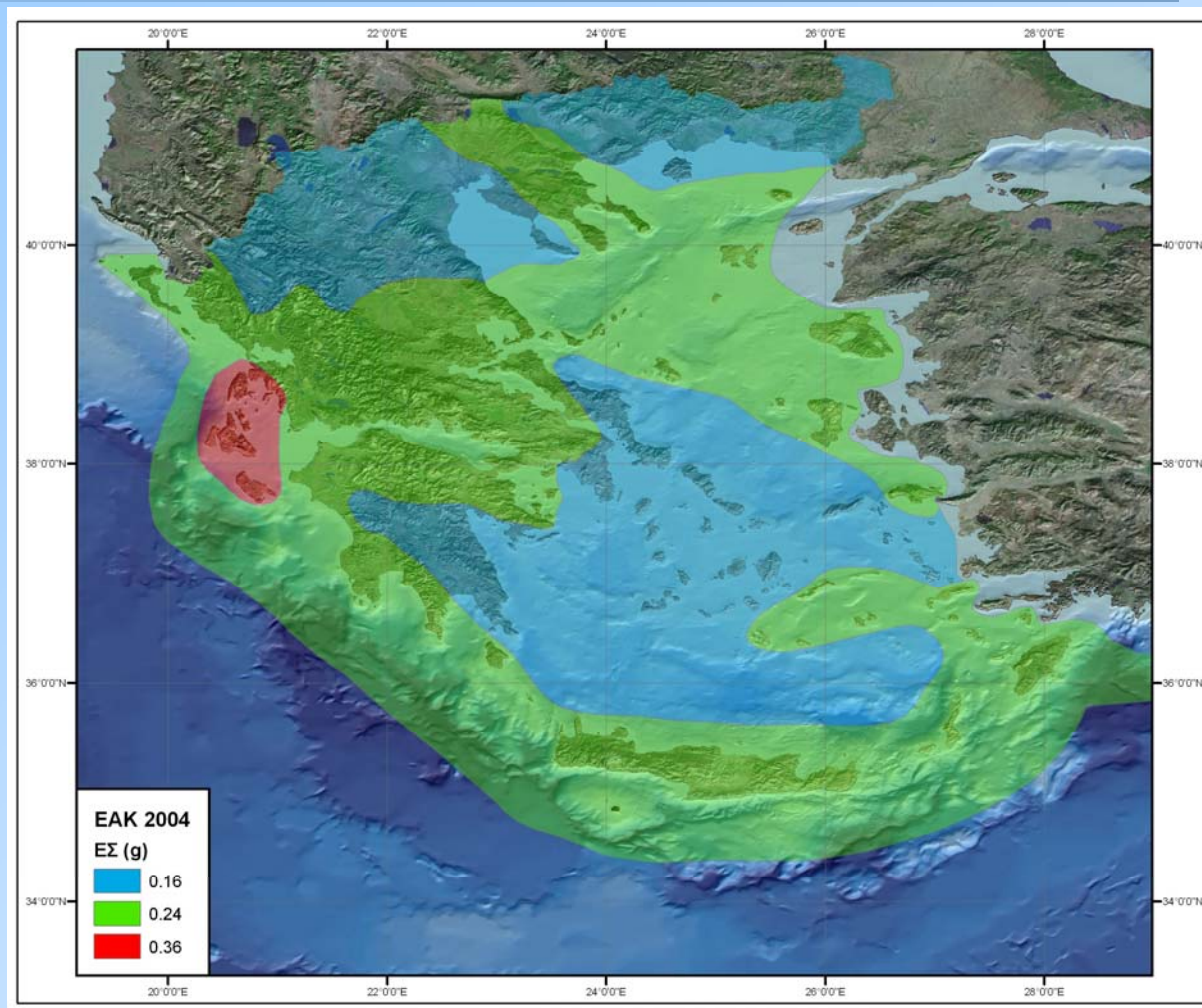
5. Scientific studies

6. Confrontation of earthquakes

1. Greek Seismic Design Code (EAK –2000)
2. Greek Design Code of Reinforced Concrete (EKOS – 2000)
3. Regulation of Repair and Strengthening of Buildings
4. Pre-earthquake Inspection of Public Buildings
5. Pre-earthquake Inspection of Bridges

EARTHQUAKES AND PREVENTIVE MEASURES

SEISMIC ZONES (FROM 1-1-2004)



EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

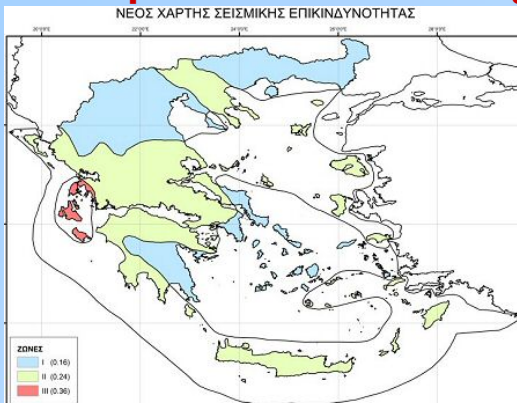
1. Strengthening of the seismic capacity of the structures

2. Sector of seismology, seismotectonics - study and estimation of seismic danger:

-Ensuring of reliable seismological data.

-Enactment of specifications to seismic hazard.

-Emphasis in the local ground



1. New Map of Seismic Risk of Greece.

2. Study related to the geotechnical profile of Attica

3. Forming and maintenance of a Net of Seismographs

5. Scientific programs - studies

6. Confrontation of earthquakes

EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

1. Study of the seismic capacity of the structures

2. Seismology, seismic technology, seismic protection, determination of seismic risk

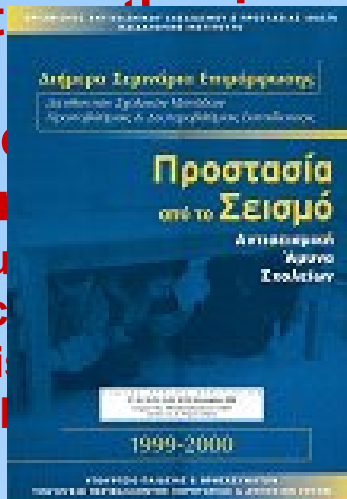
-Ensure the use of seismicological data
-Enable the use of seismic data and recommendations
-Employ seismic ground conditions

3. Briefing of Citizens

4. Emergency Planning

5. Scientific programs - studies

6. Confrontation of earthquakes



1. School Educational Programs

2. Educational Seminars to school teachers

3. Briefing of the citizens in subjects related to earthquakes

4. Forming and Training of groups of volunteers

EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

1. Strengthening of the seismic capacity of the structures

2. Seismology, seismotectonics - study and estimation of

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4. Emergency Planning

5. Scientific programs - studies

6. Confrontation of earthquakes



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ns and recommendations for the elaboration of studies related

und conditions.

1. Design of Plan «Xenokratis- Earthquakes»
2. Construction of rescue equipment for trapped persons

EARTHQUAKES AND PREVENTIVE MEASURES

E.P.P.O. - ACTIVITIES

1. Strengthening of the seismic capacity of the structures

2. Seismology, seismotectonics, seismotectonics

seism

-Ensure the quality of seismological data.

-Enact regulations and recommendations

to seis

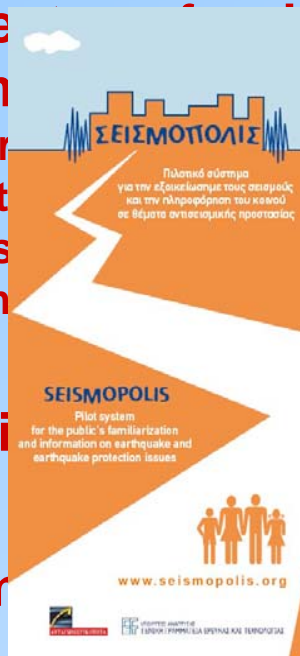
-Emphasize the importance of ground conditions.

3. Bridging the gap between citizens

4. Emergency planning

5. Scientific programs - studies

6. Confrontation of earthquakes

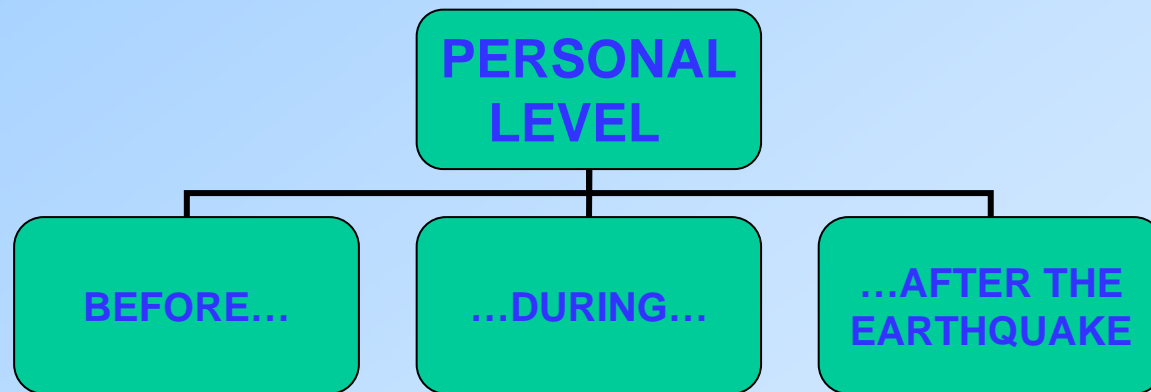


EPPO announced a Coordinated Project of Applied Research in the field of Earthquake Technology, Seismology, Seismotectonics, and Social Earthquake Defense.

From the 191 proposals after the 1999 Athens earthquake, 74 were approved and completed. The coordination and the supervision of the projects were assigned from EPPO to carefully selected scientific committees.

EARTHQUAKES AND PREVENTIVE MEASURES

MEASURES



EARTHQUAKES AND PREVENTIVE MEASURES

SAFETY MEASURES (BEFORE)

Check for hazards in the home.

Fasten shelves securely to walls.

Place large or heavy objects on lower shelves.

Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.

Hang heavy items such as pictures and mirrors away from beds, couches, and anywhere people sit.

Brace overhead light fixtures.

Repair defective electrical wiring and leaky gas connections. These are potential fire risks.

Secure a water heater by strapping it to the wall studs and bolting it to the floor.

Repair any deep cracks in ceilings or foundations. Get expert advice if there are signs of structural defects.

Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.

Identify safe places in each room.

Under sturdy furniture such as a heavy desk or table.

Against an inside wall.

Away from where glass could shatter—around windows, mirrors, pictures, or where book-cases or other heavy furniture could fall over.

Locate safe places outdoors.

In the open, away from buildings, trees, telephone and electrical lines, overpasses, or elevated expressways.

Make sure all family members know how to respond after an earthquake.

Teach all family members how and when to turn off gas, electricity, and water.

Teach children how and when to call 9-1-1, police, or fire department and which radio station to tune to for emergency information.

Contact local emergency management office or Red Cross chapter for information on earthquakes.

Have disaster supplies on hand.

Flashlight and extra batteries

Portable, battery-operated radio and extra batteries

First aid kit and manual

Emergency food and water

Non-electric can opener

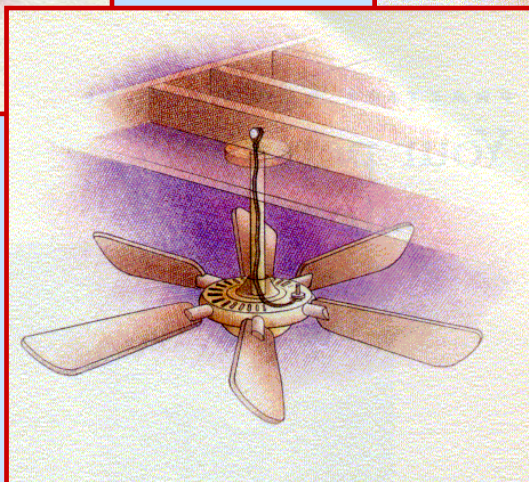
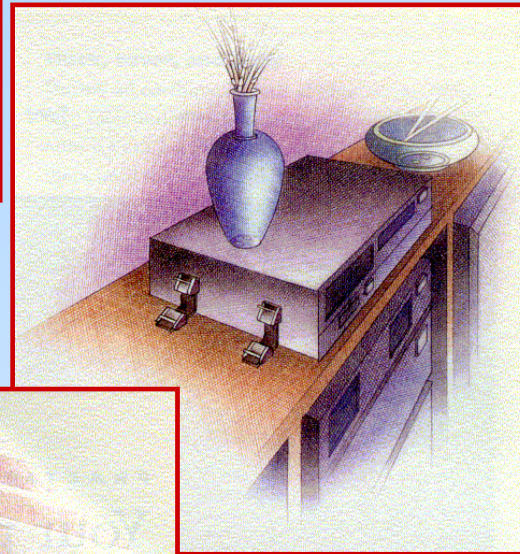
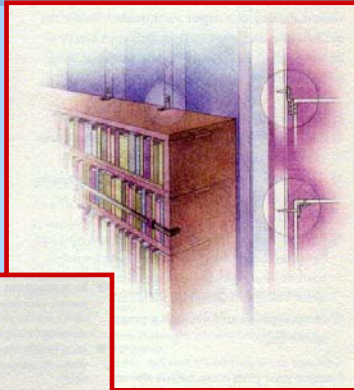
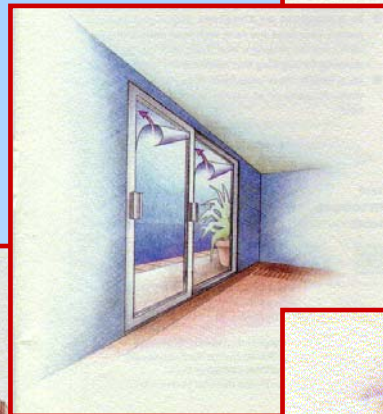
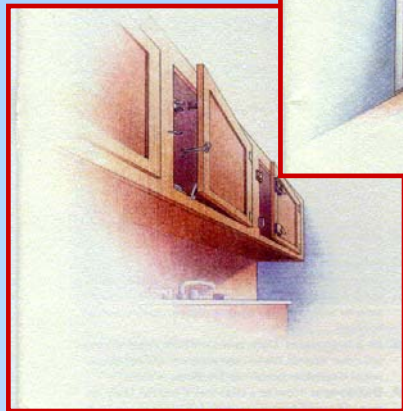
Essential medicines

Cash and credit cards

Sturdy shoes

T EARTHQUAKES AND PREVENTIVE MEASURES

PREVENTION



**Before the
Earthquake**

EARTHQUAKES AND PREVENTIVE MEASURES

SAFETY MEASURES (DURING)

Develop an emergency communication plan.

In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.

Ask an out-of-state relative or friend to serve as the “family contact.” After a disaster, it’s often easier to call long distance. Make sure everyone in the family knows the name, address and phone number of the contact person.

If indoors:

Take cover under a piece of heavy furniture or against an inside wall and hold on.

Stay inside.

The most dangerous thing to do during the shaking of an earthquake is to try to leave the building because objects can fall on you.

If outdoors:

Move into the open, away from buildings, street lights, and utility wires.

Once in the open, stay there until the shaking stops.

If in a moving vehicle:

Stop quickly and stay in the vehicle.

Move to a clear area away from buildings, trees, overpasses, or utility wires.

Once the shaking has stopped, proceed with caution. Avoid bridges or ramps that might have been damaged by the quake.

Stay out of damaged buildings. Return home only when authorities say it is safe.

Use the telephone only for emergency calls.

Clean up spilled medicines, bleaches or gasoline or other flammable liquids immediately. Leave the area if you smell gas or fumes from other chemicals.

Open closet and cupboard doors cautiously.

Inspect the entire length of chimneys carefully for damage. Unnoticed damage could lead to a fire.

Be prepared for aftershocks.

Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

Help injured or trapped persons.

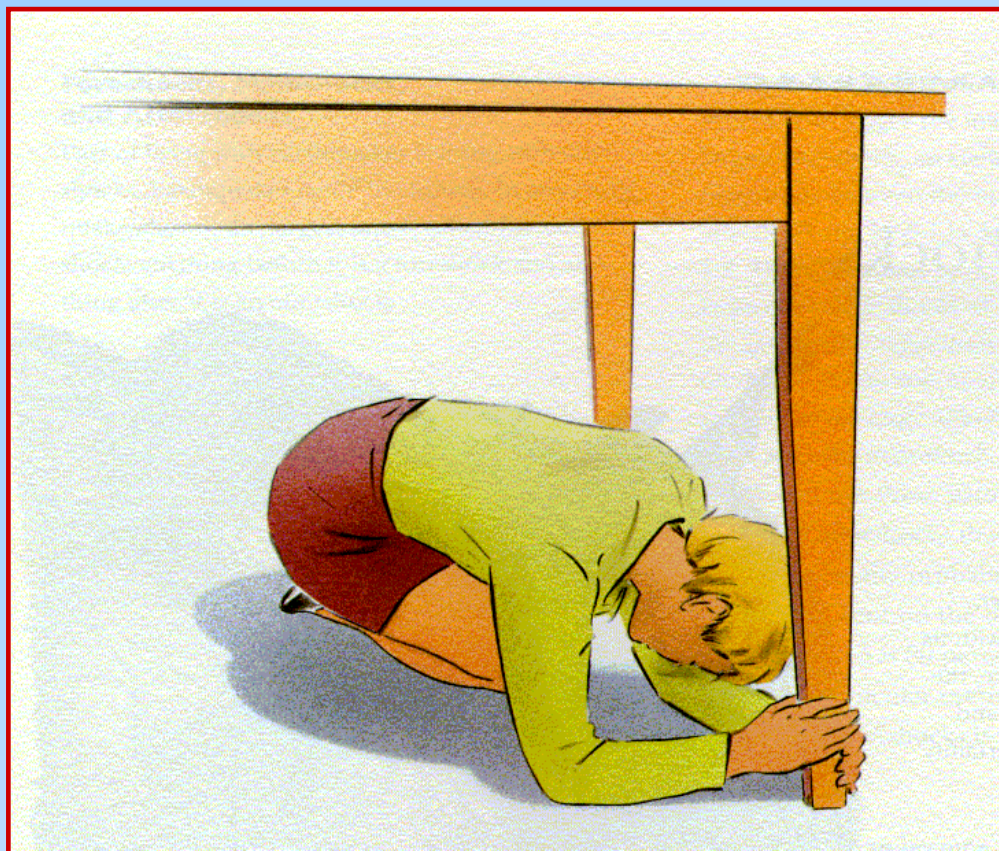
Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.

Listen to a battery-operated radio or television for the latest emergency information.

Remember to help your neighbours who may require special assistance — infants, the elderly, and people with disabilities.

EARTHQUAKES AND PREVENTIVE MEASURES

PREVENTION



**During the
Earthquake**

EARTHQUAKES AND PREVENTIVE MEASURES

SAFETY MEASURES (AFTER)

Pets after an Earthquake

The behaviour of pets may change dramatically after an earthquake. Normally quiet and friendly cats and dogs may become aggressive or defensive. Watch animals closely. Leash dogs and place them in a fenced yard.

Pets may not be allowed into shelters for health and space reasons. Prepare an emergency pen for pets in the home that includes a 3-day supply of dry food and a large container of water.

Inspection Utilities in a Damaged Home

Check for gas leaks — If you smell gas or hear a blowing or hissing noise, open a window and quickly leave the building. Turn off the gas at the outside main valve if you can and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.

Look for electrical system damage — If you see sparks or broken or frayed wires, or if you smell hot insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice.

Check for sewage and water lines damage — If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap. You can obtain safe water by melting ice cubes.

EMERGENCY INFORMATION

- ✓ The best protection during an earthquake is to get under heavy furniture such as a desk, table, or bench.
- ✓ The greatest danger exists directly outside buildings, at exits, and alongside exterior walls. Many injuries and fatalities occur when people run outside of buildings only to be hit by falling debris from collapsing walls.
- ✓ Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

THANK YOU