AVANCES EN PREVENCION DE DESASTRES SISMICOS EN JAPON

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PREFACIO

Esta publicación tiene por objetivo presentar algunos aspectos y avances sobre prevención de desastres sísmicos en Japón. Un programa de cooperación técnica se ha venido desarrollando en el Centro Nacional de Prevención de Desastres entre México y Japón, desde el 1° de abril de 1990, en materia de prevención de desastres sísmicos. Esta cooperación, sin embargo, no contempla en su esquema de cooperación ninguna actividad en protección civil. A pesar de esta situación, existe un interés innegable de parte de los expertos mexicanos sobre los conocimientos de protección general y las tecnologías de vanguardia en prevención de desastres enfocadas a protección civil, de allí el motivo de esta publicación. Esperamos que sean de utilidad para los expertos mexicanos interesados las informaciones que aquí se exponen.

CONTENIDO

OUTLINE OF COUNTERMEASURES FOR THE TOKAI EARTHQUAKE (INGLES)

PLANNING AND PRESENT STATUS OF EMERGENCY COUNTERMEASURES CONCERNED WITH BUILDINGS AGAINST EARTHQUAKE HAZARD (INGLES)

CONCEPTO DE LA REGULACION DEL DISEÑO SISMICO DE CONSTRUCCIONES EN JAPON (ESPAÑOL)

SISTEMA DE EVALUACION DE DAÑOS EN CASOS DE EMERGENCIA (ESPAÑOL)

IMMEDIATE EARTHQUAKE INFORMATION SYSTEM FOR ASSISTING EMERGENCY RESPONSES (INGLES)

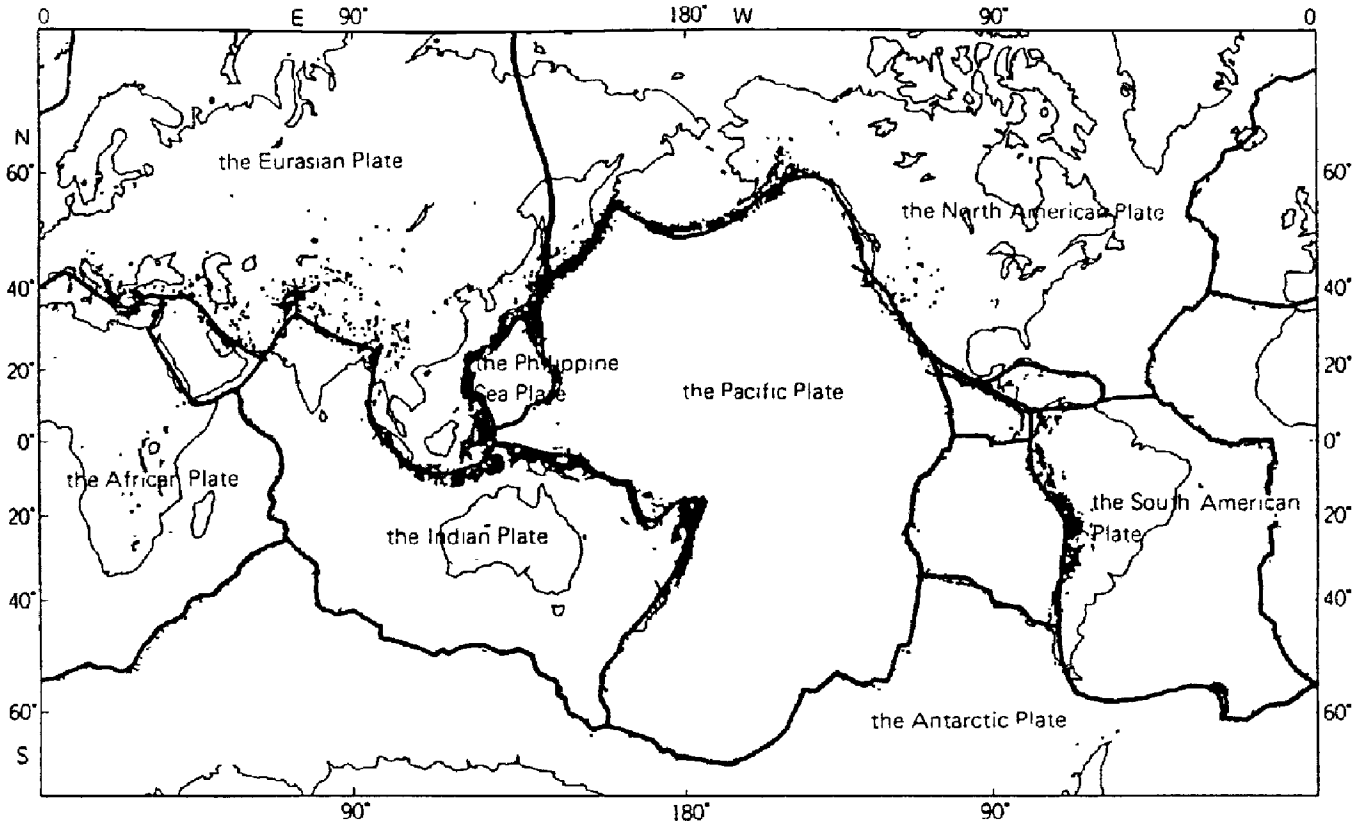
DEVELOPMENT OF SOFTWARE FOR EARTHQUAKE EDUCATION FOR SCHOOL TEACHERS USING A PERSONAL COMPUTER (INGLES)

OUTLINE OF COUNTERMEASURES FOR THE TOKAI EARTHQUAKE

1. INTRODUCTION

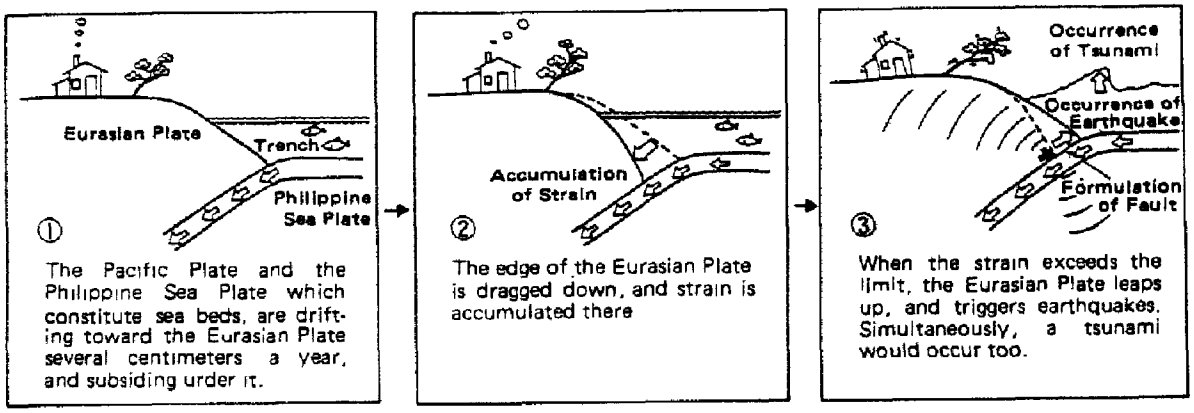
Earthquakes occur frequently in Japan and its surrounding areas, being said that about one tenth of the all earthquakes occurred in the world are concentrated in this area.

Earthquakes don't occur evenly everywhere in the world, but are limited in some specific areas as shown in the following figure.



Earthquakes more than Magnitude 4.5 occurred between 1963 - 1977

Earthquakes can be roughly classified into two types, oceanic type and inland type. The mechanism of occurrence of the oceanic type can be explained by a modern leading theory "plate tectonics". According to this theory, the surface of the earth is covered by seven big plates such as the Pacific Plate, the Eurasian Plate, etc., and some other smaller plates such as the Philippine Sea Plate, etc. Oceanic plates floating on the mantle which is moving convectionally inside of the earth, are dragged and drifted several centimeters a year by the mantle convection, and hit against other plates. This causes strain along boundaries of those plates, and one would subsides under others. When the strain exceeds the limit, the part would be destroyed, and triggers off an earthquake. This mechanism is of oceanic large-scale earthquakes such as the Great Kanto Earthquake and the Tonankai Earthquake, and is illustrated in the following figure.

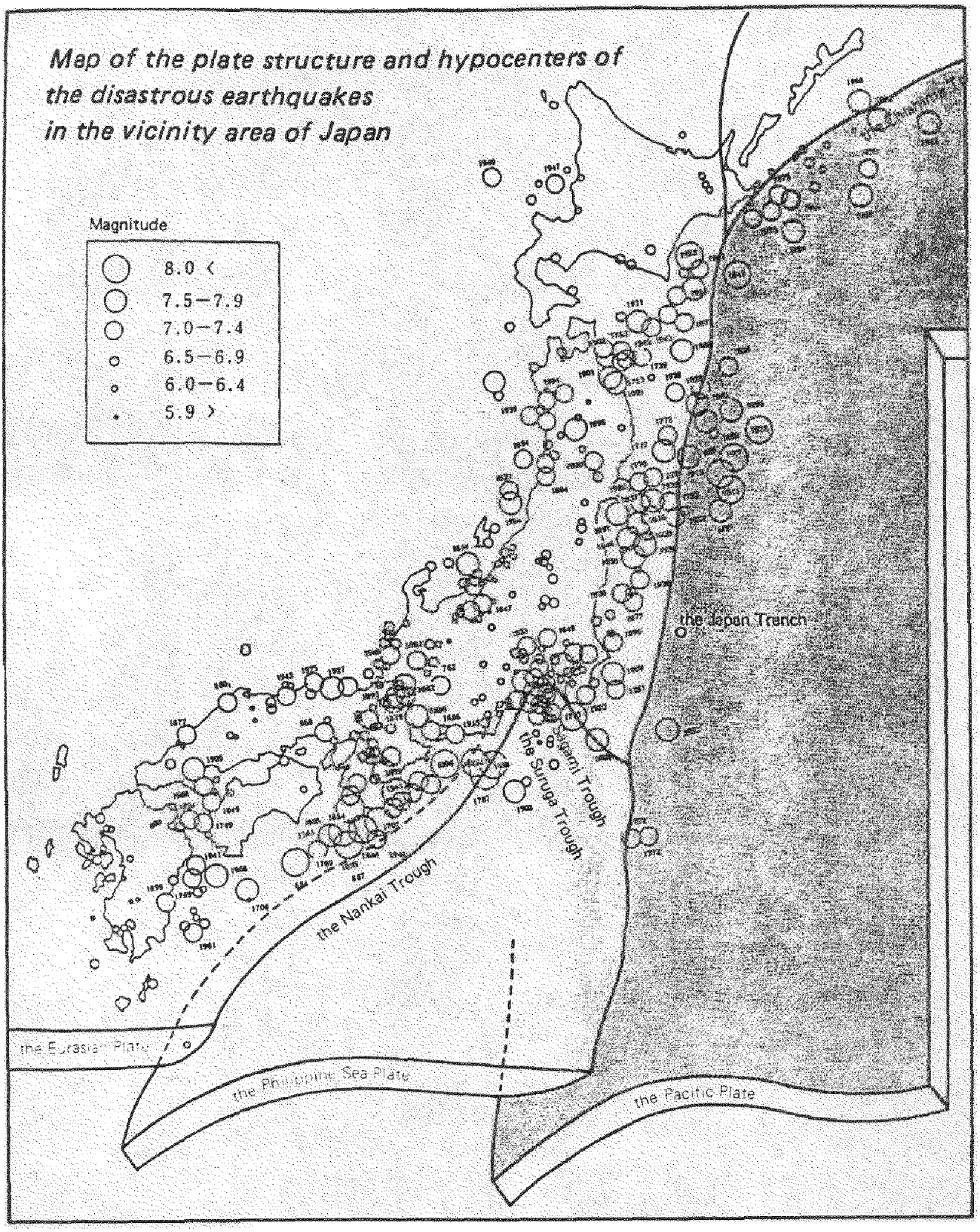


Mechanism of occurrence of oceanic type earthquakes

The Japan Islands are situated in the eastern most end of the Eurasian Plate, which encounters with the Pacific and the Philippine Sea Plates in the east offshore of the Japan Islands. The latter two plates subside under the former plate, and the east edge of the Eurasian Plate is dragged down into the mantle. Due to this movement, strain has been accumulated in the part for several hundred years. When the strain exceeds the limit, this zone would be destroyed and leaped up, and triggering off an earthquake.

This is a leading theory to explain the mechanism of occurrence of oceanic type earthquakes in the Pacific Ocean Coast side of the Japan Islands.

The mechanism of occurrence of inland type earthquakes has not yet been illustrated clearly. In any event, the Japan Islands are situated in the conjunction area of several plates, and are destined to envisage occasional earthquakes. The following table shows the historical record of the earthquakes and the disasters caused by them.


Map of the plate structure and hypocenters of the disastrous earthquakes in the vicinity area of Japan
Magnitude
8.0 <
7.5—7.9
7.0—7.4
6.5—6.9
6.0—6.4
5.9 >
the Japan Trench
the Sagami Trough
the Suruga Trough
the Nankai Trough
the Eurasian Plate
the Philippine Sea Plate
the Pacific Plate

Damage from the principal earthquake since the Great Kanto Earthquake

Year Month day of occurrence	Earthquake (Epicenter area name)	Magni-tude	Death	Missing	Damages							
					Houses Completely destroyed	Houses partially destroyed	Houses burnt down	Flood	Land-slide	House carried away	Roads damaged	Ships damage & carried away
1923.9.1	The Great Kanto Earthquake	7.9	99,331	43,476	126,266	126,233	447,128					
1927.3.7	Kitatango Earthquake	7.5	2,925		12,584		3,711					
1930.11.26	Kitaizu Earthquake	7.0	272		2,166							
1933.3.3	Sanriku-oki Earthquake	8.3	3,008		2,346			4,329		4917		7303
					Wave height 23.0 m in Shirahama, Iwate Pref							
1943.9.10	Tottori Earthquake	7.4	1,083		7,485	6,158						
1944.12.7	To-nankai Earthquake	8.0	998		26,130	46,950				3,059		
1945.1.13	Mikawa Earthquake	7.1	1,961		5,539	11,706						
1946.12.12	Nankai Earthquake	8.1	1,330	102	11,591	23,487	2598	33,093				2,991
1948.6.2	Fukui Earthquake	7.3	3,895		35,420	11,449	3091					
1960.5.23	Tsunami caused by the Chile Earthquake	8.5	119	20	1,571	2,183				1,259		
					Wave height 5 to 6 m in Sanriku Coast							
1946.6.16	Niigata Earthake	7.5	26		2,134	6,293		15,334				
1968.5.16	Tokachi-oki 1968 Earthquake	7.9	50	2	928	4,969						117
					Tsunami Wave height 3 to 5, Erimo-misaki 3 m							
1974.5.9	Izu-hanto-oki 1974 Earthquake	6.9	26	4	134	240			101			
1978.1.14	Izu-oshima-kinkai 1978 Earthquake	7.0	25		96	616			193		1,143	
1978.6.12	Miyagi-ken oki 1978 Earthquake	7.4	28		1,383	6,190			467		2,338	
1982.3.21	Urakawa-oki 1982 Earthquake	7.1	167		13	28					39	
1983.526	Nihonkai-chubu 1983 Earthquake	7.7	101		1,584	3,505					1,388	2,598
1984.9.14	Nagano-ken Seibu 1984 Earthquake	6.8	29		14	73						

Sources 1 In and before 1961, after "Scientific Year Book".
2 After 1962, magnitudes by the Meteorological Agency, damage surveyed by the Fire Defence Agency

2. PREDICTION OF THE TOKAI EARTHQUAKE

2.1 Promotion of researches for earthquake prediction

A systematic research for earthquake prediction in Japan started in 1964 based on a recommendation made by the Geodetic Council, one of councils for the Minister of Education, and successively, the second plan (1969 to 1973), the third plan (1974 to 1978), and the forth plan (1979 to 1983) were recommended by the council, then the research works have been significantly progressed. In May 1983, the fifth plan (1984 to 1988) was recommended to intensify observation researches for long-term and short-term prediction, specially concentrating to the intensified observation areas, and researches for clarification of the mechanism of occurrence of earthquakes were specially suggested to conduct in the plan.

In 1969, based on the second earthquake prediction plan, the Coordination Committee for Earthquake Prediction was established in the Geographical Survey Institute, the Ministry of Construction, to coordinate information exchanges among relating organs, and to make integrated judgement of those informations. The Committee designated two areas as intensified observation areas, and eight areas as specified observation areas (P.5). In the intensified observation areas, the relating administrative organs formulated some plans to intensify the observation systems by concentrated introduction of various observation instruments. Especially, the Tokai area is given the first priority to be prepared an observation system, due to its very high potential for a large-scale earthquake.