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SEISMIC VERIFICATION: GLOBAL SEISMIC EVENT BULLETINS JULY - DECEMBER 1987

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BY

C.R.W. DUFF AND R.G. NORTH

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA
ENERGY, MINES AND RESOURCES CANADA



PROJECT REPORT 88/4

ARMS CONTROL AND DISARMAMENT DIVISION
DEPARTMENT OF EXTERNAL AFFAIRS

OTTAWA, CANADA

MARCH 1988

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**SEISMIC VERIFICATION:
GLOBAL SEISMIC EVENT BULLETINS
JULY - DECEMBER 1987**

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C.R.W. DUFF AND R.G. NORTH

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

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ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

OTTAWA, CANADA

Dept. of External Affairs
Min. des Affaires extérieures

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PREFACE

One of the central issues in developing a Comprehensive (Nuclear) Test Ban (CTB) is the ability to verify compliance on a global basis. While there are claims that a CTB is already verifiable, discussions which have been held at both the technical and political levels under the aegis of the Conference on Disarmament (CD) in Geneva suggest that these claims are premature.

Canada has been an active participant in discussions and negotiations on the possibility of a CTB for many years. Experts from the Department of Energy, Mines and Resources (EMR) have provided technical advice through their membership in the CD's Ad-hoc Group of Scientific Experts to consider international cooperative measures to detect and identify seismic events (GSE).

In 1986 Canada undertook two additional initiatives relating to seismic verification. The first was an announcement that the seismic array in Yellowknife NWT would receive a major upgrading over the next two years at an expenditure in excess of \$3,000,000. The second was the joint hosting by EMR and External Affairs of a workshop on the exchange of waveform data. Both of these undertakings are Canadian contributions to the development of an international seismic data exchange which would form a central verification element should a CTB come about.

The following monthly records of global seismic events cover the period July-December 1987. They continue the series, produced every six months, which began with Project Report 87/2 (February 1987) covering July-December 1986. This issue also includes a summary for 1987.

These monthly reports represent an initial effort by EMR to meet internal requirements for informational purposes only. It is recognized that this record is not as complete or accurate as others produced, for example, by the US Geological Survey. Moderately large events may well, on occasion, be missed and explosions unidentified. For the internal purposes required, however, it is a creditable bulletin which is completely independent and which can reasonably be expected to improve with additional allocation of time and resources.

GLOBAL SEISMIC EVENT BULLETIN - JULY 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.W. Duff and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - JULY 1987.

There were three nuclear explosions this month: one on the 7th at 00:00 in Central Siberia (USSR); one on the 16th at 19:00 in Nevada (US); and one on the 17th at 1:17 in East Kazakh (USSR).

There were many earthquakes in the Kurile Islands, especially in the early part of the month. The largest of these was magnitude 6.0 and occurred north-west of the Kurile Islands on the 14th. This was the largest earthquake this month.

Of the 296 events in this bulletin, the Yellowknife Array detected 93, which is 31% of the total. The Array detected all three nuclear explosions.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	1 0:58:15.1	19.87	93.27	33N	5	4.4	BURMA
A Y	1 8:39:12.0	54.28	-162.32	33N	6	4.4	ALASKA PENINSULA
	1 10:42:20.9	-4.02	142.48	107	7	4.5	PAPUA NEW GUINEA
	1 17:56:33.7	66.08	-12.95	33N	5	4.2	ICELAND REGION
	1 18:50:40.0	-24.80	-171.04	33N	5	4.5	SOUTH OF TONGA ISLANDS
	1 22:42:33.6	-9.93	118.09	33N	4		SUMBAWA ISLAND REGION
Y	2 1:12:43.3	45.85	143.69	33N	9	4.7	HOKKAIDO, JAPAN REGION
	2 11:38:48.8	36.55	142.63	33N	14	4.5	OFF EAST COAST OF HONSHU, JAPAN
U	2 13:10:38.6	43.33	148.66	24	32	5.0	KURILE ISLANDS REGION
	2 19:22: 3.8	-9.00	156.73	278	9	4.2	SOLOMON ISLANDS
U Y	3 1:18:50.4	36.41	71.49	33N	22	4.7	AFGHANISTAN-USSR BORDER REGION
	3 4:41:32.8	-6.21	154.89	33N	4	4.6	SOLOMON ISLANDS
	3 7:43:38.7	-34.09	178.64	33N	5	4.9	SOUTH OF KERMADEC ISLANDS
Y	3 9:52:50.1	22.61	-109.12	33N	29	5.0	OFF W COAST OF BAJA CALIFORNIA
Y	3 10:10:28.9	31.46	130.32	33N	41	5.8	KYUSHU, JAPAN
	3 10:22: 3.4	43.55	13.50	33N	27	4.9	CENTRAL ITALY
	3 10:46:55.3	45.17	7.30	33N	18		NORTHERN ITALY
	3 11:55:38.6	44.03	13.33	33N	18		ADRIATIC SEA
	3 15: 5:32.9	23.52	-109.35	33N	12	5.1	BAJA CALIFORNIA
	3 17:38: 5.7	43.26	13.99	33N	32		CENTRAL ITALY
	3 18: 4: 0.7	-6.87	72.32	33N	18	5.2	CHAGOS ARCHIPELAGO REGION
	3 20:44:50.0	-4.81	138.43	33N	6	4.8	WEST IRIAN
U	3 22: 4:51.3	44.09	147.46	33N	14	4.2	KURILE ISLANDS
U	3 22: 7:19.8	45.84	147.66	33N	10	4.8	KURILE ISLANDS
U	4 0:17:13.8	43.14	148.18	29	20	4.5	KURILE ISLANDS REGION
	4 2:15:29.7	37.90	135.31	107	7	4.2	SEA OF JAPAN
U	4 3:12:44.0	45.81	147.81	33N	15	4.5	KURILE ISLANDS
U	4 4:10:53.8	44.55	153.58	33N	4	4.0	KURILE ISLANDS REGION
Y	4 10:29:54.6	15.85	-92.78	33N	8	4.8	MEXICO-GUATEMALA BORDER REGION
Y	4 10:39:18.5	12.94	144.38	33N	4	4.6	SOUTH OF MARIANA ISLANDS
	4 13:35: 1.3	-14.34	167.26	33N	4	5.0	NEW HEBRIDES ISLANDS
U Y	4 15:14:20.7	43.73	147.61	33N	17	4.6	KURILE ISLANDS
U Y	4 15:31:38.9	43.46	147.97	33N	30	4.6	KURILE ISLANDS
Y	4 17:16:44.2	10.37	-62.88	33N	6	4.8	NEAR COAST OF VENEZUELA

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	4 20:45: 3.4	10.36	126.75	33N	5	4.2	PHILIPPINE ISLANDS REGION
	4 21:34:20.1	42.88	147.31	33N	14	4.2	OFF COAST OF HOKKAIDO, JAPAN
A	5 0: 6:12.6	52.00	-174.59	33N	27	4.9	ANDREANOF ISLANDS, ALEUTIAN IS
	5 2:42:11.9	30.08	131.26	33N	18	4.4	KYUSHU, JAPAN
	5 5:41:35.7	68.41	-145.35	33N	4	3.9	ALASKA
A	5 9:23: 1.6	51.87	-174.94	32	61	5.1	ANDREANOF ISLANDS, ALEUTIAN IS
U	5 10:20:27.3	44.32	147.13	33N	5	3.7	KURILE ISLANDS
U	5 11:14:28.1	43.35	147.96	33N	12	4.0	KURILE ISLANDS
U	5 13:44: 5.9	44.20	147.42	33N	10	4.8	KURILE ISLANDS
U	5 13:57:42.6	46.81	144.95	33N	11	4.5	SEA OF OKHOTSK
U	5 15:27:26.5	43.43	147.97	33N	26	4.6	KURILE ISLANDS
U Y	5 17:45:26.6	43.16	148.20	28	18	4.6	KURILE ISLANDS REGION
Y	5 18:18:50.9	15.97	-98.72	33N	7	4.5	OFF COAST OF GUERRERO, MEXICO
	5 19:39:21.1	-15.51	-174.82	33N	14	5.1	TONGA ISLANDS
U	5 23: 4: 9.9	43.86	147.47	33N	8	4.4	KURILE ISLANDS
	5 23:53:54.7	41.63	15.10	33N	26		SOUTHERN ITALY
A Y	6 0:23:26.7	51.78	-174.56	35	80	5.6	ANDREANOF ISLANDS, ALEUTIAN IS
U	6 0:36:27.9	75.73	-171.98	33N	4	4.1	EAST SIBERIAN SEA
	6 1: 6:13.0	-27.64	-107.86	33N	38	5.9	EASTER ISLAND REGION
Y	6 2:49:41.4	-14.14	167.73	33N	46	5.8	NEW HEBRIDES ISLANDS
	6 3: 5:40.7	-13.06	165.60	328	17	4.6	NEW HEBRIDES ISLANDS
A Y	6 4:14: 1.9	53.04	-168.29	33N	18	4.4	FOX ISLANDS, ALEUTIAN ISLANDS
	6 5:27:10.0	-6.76	148.20	439	5	4.1	NEW BRITAIN REGION
	6 5:36:17.2	-14.03	167.22	33N	7	4.8	NEW HEBRIDES ISLANDS
A Y	6 5:55:16.2	51.52	-174.66	33N	47	4.8	ANDREANOF ISLANDS, ALEUTIAN IS
	6 8:44:27.7	10.06	126.42	33N	6	4.4	PHILIPPINE ISLANDS REGION
U	6 8:57:49.7	55.53	162.13	33N	7	4.4	NEAR EAST COAST OF KAMCHATKA
	6 12:56:13.5	52.04	17.24	33N	14		POLAND
	6 12:56:18.4	-13.90	167.39	33N	5	4.5	NEW HEBRIDES ISLANDS
	6 16:22:17.9	-15.91	171.71	33N	3	4.3	NEW HEBRIDES ISLANDS REGION
A	6 16:44:52.1	51.95	-174.28	43	24	4.8	ANDREANOF ISLANDS, ALEUTIAN IS
	6 18:19:42.6	33.45	141.16	36	15	4.7	OFF EAST COAST OF HONSHU, JAPAN
A	6 20:22:44.9	51.33	-174.70	34	31	4.8	ANDREANOF ISLANDS, ALEUTIAN IS
	6 21:41:36.5	-17.09	-178.55	33N	7	5.8	WEST OF TONGA ISLANDS
	6 23:12:22.6	-29.58	-176.41	33N	8	4.8	KERMADEC ISLANDS REGION
U Y	6 23:21:54.1	53.67	158.22	33N	36	5.4	NEAR EAST COAST OF KAMCHATKA
N U Y	7 0: 0: 3.5	61.60	113.02	OG	31	4.9	CENTRAL SIBERIA
U	7 2:41:25.6	44.21	146.62	33N	10	4.4	KURILE ISLANDS
U	7 3: 6:48.7	45.68	146.67	33N	4	4.3	KURILE ISLANDS
U	7 9: 4:44.7	43.66	149.19	33N	3	4.2	KURILE ISLANDS REGION
	7 10:35:60.0	4.51	125.12	33N	27	5.5	TALAUD ISLANDS
	7 15: 4:45.5	-7.99	127.98	108	16	4.7	BANDA SEA
U Y	7 17: 7:31.8	56.88	120.74	33N	20	4.8	EASTERN USSR

GEOFYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

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 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	7 18:11:47.9	-24.71	176.45	33N	24	5.5	SOUTH OF FIJI ISLANDS
	7 18:14:31.2	-23.44	-177.17	33N	4		SOUTH OF FIJI ISLANDS
Y	8 1:48:12.9	18.73	-96.89	609	6	3.6	VERA CRUZ, MEXICO
Y	8 3:10:29.6	-1.51	-101.04	33N	12	4.7	NORTHERN EASTER I CORDILLERA
	8 3:28:18.3	36.88	141.54	33N	9	4.4	NEAR EAST COAST OF HONSHU, JAPA
	8 4:20:45.4	17.00	121.35	33N	8	4.5	LUZON, PHILIPPINE ISLANDS
	8 6:53:39.0	-16.01	-174.73	33N	4	5.6	TONGA ISLANDS
Y	8 7:42:57.1	1.09	-101.06	33N	8	4.6	EAST CENTRAL PACIFIC OCEAN
Y	8 8:56:30.3	13.04	-88.95	33N	10	4.3	EL SALVADOR
	8 11:50:20.5	-26.62	-107.77	33N	16	5.8	EASTER ISLAND REGION
U Y	8 12:43:12.7	37.17	72.11	33N	6	4.5	TADZHIK SSR
	8 14:34:35.1	-3.08	136.66	20	8	5.6	WEST IRIAN
	8 16:16:38.7	-5.96	129.79	24	9	4.9	BANDA SEA
	8 18: 3: 0.0	68.01	-151.49	33N	8	4.1	ALASKA
	8 19:21:47.8	-1.25	88.67	33N	3	3.8	SOUTH INDIAN OCEAN
	8 20:24:24.3	-14.13	167.40	33N	8	4.7	NEW HEBRIDES ISLANDS
Y	8 21:42:47.1	11.88	143.64	33N	10	4.7	SOUTH OF MARIANA ISLANDS
U Y	8 22:55:48.0	46.61	149.60	24	60	5.5	KURILE ISLANDS
	9 0:23: 8.3	2.32	97.15	33N	3	4.4	NORTHERN SUMATRA
Y	9 4: 7:31.8	-20.16	-68.41	33N	18	5.2	CHILE-BOLIVIA BORDER REGION
Y	9 4:31:28.5	4.11	126.43	79	15	5.2	TALAUD ISLANDS
U	9 19:49:42.4	42.58	78.35	33N	3	4.3	ALMA-ATA REGION
U	9 20:52:10.2	44.91	150.30	33N	14	4.5	KURILE ISLANDS REGION
Y	9 21: 0:42.5	15.86	-97.35	33N	5	4.2	NEAR COAST OF OAXACA, MEXICO
	9 22:18:53.7	-11.89	166.10	68	18	5.0	SANTA CRUZ ISLANDS
	10 1:25:54.8	-16.83	178.46	33N	5	4.7	FIJI ISLANDS
	10 7: 4:40.0	2.76	127.02	88	7	4.6	MOLUCCA PASSAGE
	10 8: 9:30.2	45.95	10.98	33N	18		NORTHERN ITALY
	10 8:17:32.3	27.27	97.12	33N	6	4.2	BURMA-INDIA BORDER REGION
U	10 8:20:42.6	61.87	142.45	33N	4	4.5	EASTERN SIBERIA
	10 10:22: 2.8	74.87	6.16	33N	8		GREENLAND SEA
	10 10:44:30.0	-12.71	-179.25	33N	4	5.1	NORTH OF FIJI ISLANDS
	10 14: 3:58.6	-9.57	118.17	33N	6	4.9	SUMBAWA ISLAND REGION
Y	10 16:35:50.8	12.90	144.00	33N	4	4.3	SOUTH OF MARIANA ISLANDS
U Y	10 18:49:54.3	55.14	165.40	44	50	5.8	KOMANDORSKY ISLANDS REGION
U Y	10 20:25:50.3	55.28	165.42	33N	13	4.4	KOMANDORSKY ISLANDS REGION
	10 21:17:14.1	13.13	147.00	33N	5	4.6	SOUTH OF MARIANA ISLANDS
U Y	10 23:26:41.7	54.63	161.03	33N	8	4.3	NEAR EAST COAST OF KAMCHATKA
Y	11 0:19:27.4	-22.39	-72.95	33N	11	5.0	OFF COAST OF NORTHERN CHILE
	11 1:46:50.0	44.51	11.49	33N	26		NORTHERN ITALY
U Y	11 5:13:10.8	50.25	156.10	38	38	5.1	KURILE ISLANDS
Y	11 6:15:55.9	82.24	-19.82	33N	37	5.4	NEAR NORTH COAST OF GREENLAND
Y	11 10: 2:27.9	83.76	-14.00	33N	5	4.6	NEAR NORTH COAST OF GREENLAND

GEOFYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	11 13:31:42.2	36.84	142.99	33N	22	5.0	OFF EAST COAST OF HONSHU, JAPAN
	11 13:55:31.8	36.00	28.79	33N	6	4.7	DODECANESE ISLANDS
U Y	11 14:52:27.6	55.32	165.41	33N	25	5.1	KOMANDORSKY ISLANDS REGION
	11 17:45:52.2	-20.57	-179.66	7	8		WEST OF TONGA ISLANDS
	11 19: 0:28.0	-2.76	137.33	33N	3	4.4	WEST IRIAN
Y	11 22:48:31.0	-4.59	152.04	691	9	3.9	NEW BRITAIN REGION
Y	11 23: 9:23.4	43.75	20.29	33N	22		YUGOSLAVIA
U Y	12 1:44: 0.4	45.70	146.57	33N	7	4.3	KURILE ISLANDS
	12 3:31:28.7	-14.50	-175.36	33N	4	4.1	SAMOA ISLANDS REGION
Y	12 4:31:25.5	36.13	139.98	33N	23	4.7	HONSHU, JAPAN
	12 8:18:55.8	2.06	126.46	33N	11	5.0	MOLUCCA PASSAGE
Y	12 9: 6:46.4	-24.12	-112.74	33N	5	5.0	EASTER ISLAND REGION
Y	12 10:25: 4.5	18.71	-93.82	328	10	4.1	GULF OF CAMPECHE
Y	12 12:19:24.8	34.25	73.24	33N	5	3.8	PAKISTAN
U Y	12 15:50:18.0	48.12	153.63	33N	4	4.1	KURILE ISLANDS
Y	12 16: 1:26.4	34.95	46.89	33N	17	4.5	WESTERN IRAN
Y	12 19: 7: 1.8	-26.13	-70.21	33N	4		NEAR COAST OF NORTHERN CHILE
	12 20:18:14.9	22.18	121.42	33N	7	4.1	TAIWAN REGION
	12 20:29: 2.8	2.30	126.47	33N	6	4.6	MOLUCCA PASSAGE
U Y	12 21: 1:56.1	37.71	71.95	33N	12	4.6	AFGHANISTAN-USSR BORDER REGION
	13 1:45:45.2	-25.52	-177.50	33N	19	4.9	SOUTH OF FIJI ISLANDS
	13 16:32:57.1	30.74	137.88	33N	5	4.8	SOUTH OF HONSHU, JAPAN
Y	13 19:14:35.8	-14.87	-69.56	33N	25	5.8	PERU-BOLIVIA BORDER REGION
A Y	13 21: 3:31.7	41.73	-130.09	33N	3	4.3	OFF COAST OF NORTHERN CALIFORNI
	13 23:45:44.9	-10.00	122.86	33N	6	4.5	SAWU SEA
	14 15:45:46.9	-2.18	138.80	33N	4	4.1	WEST IRIAN
U Y	14 23:44:54.6	46.84	147.51	33N	44	6.0	NORTHWEST OF KURILE ISLANDS
U	14 23:47: 7.7	49.63	148.35	33N	3	5.3	NORTHWEST OF KURILE ISLANDS
	15 0:44:55.3	-22.37	-172.89	33N	9		TONGA ISLANDS REGION
	15 4:13:35.7	29.07	131.08	33N	30	5.0	RYUKYU ISLANDS REGION
	15 6:23:47.6	-44.85	-164.36	33N	4	5.2	SOUTH PACIFIC OCEAN
Y	15 7:16:12.2	17.59	-96.89	49	116	5.7	OAXACA, MEXICO
	15 8:15:31.4	-4.63	106.53	163	6	4.2	SOUTHERN SUMATRA
	15 11: 5:29.2	28.56	132.06	33N	7	4.7	EAST OF RYUKYU ISLANDS
	15 11:36:24.2	10.53	-83.75	33N	13	4.9	COSTA RICA
	15 14:31:55.1	13.66	-79.36	33N	10	4.8	CARIBBEAN SEA
U	15 16:11: 3.1	47.09	154.07	33N	24	5.0	KURILE ISLANDS
	15 17:50:21.5	-18.67	168.95	33N	5	5.3	NEW HEBRIDES ISLANDS
	16 0:23: 8.5	-16.29	166.89	33N	15	4.5	NEW HEBRIDES ISLANDS
	16 1:29:36.4	29.29	130.64	33N	15	4.6	RYUKYU ISLANDS
Y	16 5:45:58.6	33.19	138.10	28	43	5.7	SOUTH OF HONSHU, JAPAN
	16 11:29:47.6	30.01	50.81	33N	6	4.3	IRAN
	16 14:21: 9.9	-2.15	138.46	33N	7	4.4	WEST IRIAN

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
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 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
		16 15:23: 1.6	28.62	134.58	33N	4	4.7	EAST OF RYUKYU ISLANDS
N A Y		16 19: 0: 5.4	37.28	-115.74	OG	13	4.8	SOUTHERN NEVADA
		16 19: 6:18.0	44.87	12.33	33N	12		NORTHERN ITALY
		16 22:30: 7.6	-12.34	166.28	33N	5	4.8	SANTA CRUZ ISLANDS
		16 23:16:48.7	-6.77	154.48	33N	7	4.6	SOLOMON ISLANDS
		17 0:22:54.9	-7.49	108.85	33N	3	3.9	JAVA
Y		17 1: 3:31.0	-56.64	-28.94	33N	21		SOUTH SANDWICH ISLANDS REGION
N U Y		17 1:17:12.9	50.06	78.13	OG	24	5.6	EASTERN KAZAKH SSR
Y		17 1:58:21.2	2.93	-85.56	312	13	4.9	OFF COAST OF CENTRAL AMERICA
A Y		17 4:21:54.2	53.66	-165.02	33N	4		FOX ISLANDS, ALEUTIAN ISLANDS
U		17 7:35:44.0	48.74	112.82	33N	3	4.4	MONGOLIA
		17 7:47:49.6	-3.01	-88.41	33N	7	4.8	GALAPAGOS ISLANDS REGION
		17 13:42: 7.6	-22.56	-176.97	33N	8	5.1	SOUTH OF FIJI ISLANDS
		17 16:43:26.2	10.79	126.55	33N	8	4.6	PHILIPPINE ISLANDS REGION
Y		17 17:21:33.5	-17.63	-177.80	33N	14	5.5	WEST OF TONGA ISLANDS
U		17 17:23:27.9	39.28	71.20	33N	8	4.5	TADZHIK SSR
		17 21: 2: 6.7	-15.59	-74.03	33N	12	5.3	NEAR COAST OF PERU
		17 21:12:33.3	27.74	92.77	33N	6	4.4	INDIA-CHINA BORDER REGION
		17 21:26:46.6	-22.85	-179.89	33N	8	4.7	SOUTH OF FIJI ISLANDS
		17 23: 7:53.8	-16.11	175.37	81	5	4.0	FIJI ISLANDS REGION
		18 2:59:20.1	49.48	11.16	33N	5		GERMANY
C		18 4: 8:54.7	41.22	97.35	33N	3	4.0	NORTHERN CHINA
		18 6:17:35.7	21.31	142.95	33N	3	4.4	MARIANA ISLANDS REGION
		18 10:12:52.5	5.30	124.10	33N	4	4.9	MINDANAO, PHILIPPINE ISLANDS
		18 12:14: 3.6	12.73	143.51	33N	12	5.1	SOUTH OF MARIANA ISLANDS
		18 14:30: 8.4	32.47	28.93	33N	4	3.8	EASTERN MEDITERRANEAN SEA
C		18 14:38:56.6	38.75	76.35	33N	6	4.8	SOUTHERN SINKIANG PROV, CHINA
		18 15: 0:21.9	28.61	134.65	33N	3	4.4	EAST OF RYUKYU ISLANDS
Y		18 15:32:18.4	13.43	142.61	33N	6	5.2	SOUTH OF MARIANA ISLANDS
C		18 16:29:16.3	31.26	78.05	33N	3	4.4	TIBET-INDIA BORDER REGION
		18 17: 1:57.6	40.23	141.59	33N	12	4.5	NEAR EAST COAST OF HONSHU, JAPA
		18 19:18:32.2	49.43	-30.20	33N	8	4.4	NORTH ATLANTIC RIDGE
		19 3:58:32.0	-5.27	129.65	192	6	4.3	BANDA SEA
		19 10:22:24.5	29.44	130.31	33N	6	4.2	RYUKYU ISLANDS
Y		19 10:48:40.2	22.40	120.48	33N	14	4.8	TAIWAN
Y		19 14: 0:18.6	-16.59	-69.74	33N	11	5.2	PERU-BOLIVIA BORDER REGION
		19 22:48:57.9	22.53	92.33	33N	4	4.6	INDIA-BANGLADESH BORDER REGION
U		20 0:29:17.5	51.69	153.94	33N	6	4.2	NORTHWEST OF KURILE ISLANDS
A		20 1:27:59.7	54.13	-164.31	33N	12	4.6	UNIMAK ISLAND REGION
		20 7:53:46.1	4.11	126.62	86	9	4.8	TALAUD ISLANDS
U		20 8:13:58.0	45.85	146.95	33N	9	4.7	KURILE ISLANDS
		20 16:47:49.5	34.09	57.03	33N	15	4.8	IRAN
		20 18:36: 1.2	36.03	135.39	33N	7	4.3	SEA OF JAPAN

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

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 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
Y	20 21:54:35.4	-6.53	155.16	33N	20	5.0	SOLOMON ISLANDS
	20 22:25:28.8	53.75	23.03	33N	9		POLAND
	21 1:55:54.6	-22.46	-176.66	33N	5	4.7	SOUTH OF FIJI ISLANDS
Y	21 3:52:36.1	15.82	147.19	33N	21	5.1	MARIANA ISLANDS REGION
	21 7:53: 6.1	1.79	-32.53	33N	9	4.0	CENTRAL MID-ATLANTIC RIDGE
Y	21 7:53:33.8	3.71	-34.95	33N	3		CENTRAL MID-ATLANTIC RIDGE
	21 12:13:15.6	-23.59	-177.45	33N	7	4.8	SOUTH OF FIJI ISLANDS
	21 13:47: 8.2	10.10	126.43	33N	8	4.4	PHILIPPINE ISLANDS REGION
U	21 14: 7:31.8	54.16	108.76	33N	6	4.3	LAKE BAIKAL REGION
	22 1:35:21.3	-5.46	151.67	33N	15	4.9	NEW BRITAIN REGION
	22 1:40:31.7	-1.34	71.91	33N	3	4.1	MALDIVE ISLANDS REGION
	22 4:17:56.8	-5.73	152.09	33N	14	4.9	NEW BRITAIN REGION
	22 5:54:41.5	-42.86	89.27	33N	5	4.2	SOUTHEAST INDIAN RISE
	22 6:59:12.7	-9.25	110.39	57	5	4.1	SOUTH OF JAVA
Y	22 8: 3:19.2	3.90	125.78	76	17	5.3	TALAUD ISLANDS
	22 8: 3:52.7	-20.58	169.31	33N	15	4.9	NEW HEBRIDES ISLANDS
Y	22 8:22:48.9	14.58	-93.83	33N	16	5.2	NEAR COAST OF CHIAPAS, MEXICO
	22 8:32:47.9	-4.56	149.61	329	6	4.4	BISMARCK SEA
	22 11: 2:32.5	51.62	15.68	33N	10		POLAND
	22 14: 3:25.7	4.07	125.53	33N	4	4.7	TALAUD ISLANDS
	22 15:57:43.4	1.02	139.75	33N	3	4.1	WEST IRIAN
	22 18: 5:11.0	38.48	47.20	33N	5	4.0	NORTHWESTERN IRAN
Y	23 0:58:56.6	-7.62	121.18	433	10	4.7	FLORES SEA
U	23 2:47:56.9	51.31	157.36	33N	5	4.2	NEAR EAST COAST OF KAMCHATKA
	23 3:57: 6.7	-22.81	-179.18	33N	10	5.2	SOUTH OF FIJI ISLANDS
U	23 5:27:59.3	37.62	70.16	33N	5	4.1	AFGHANISTAN-USSR BORDER REGION
	23 12:21:26.5	-14.13	167.85	33N	3	4.0	NEW HEBRIDES ISLANDS
U Y	23 19:28: 1.2	46.46	153.66	33N	32	4.9	KURILE ISLANDS
U Y	24 2: 0: 0.9	61.46	113.08	33N	24	4.9	CENTRAL SIBERIA
	24 4: 8:29.3	-22.78	-177.21	33N	6	4.7	SOUTH OF FIJI ISLANDS
A Y	24 5:25: 7.3	55.91	-153.96	33N	12	5.5	SOUTH OF ALASKA
	24 10:54:35.7	-7.85	122.07	33N	6	4.5	FLORES SEA
A Y	24 16:50:12.9	55.53	-155.18	33N	5	4.5	SOUTH OF ALASKA
	25 1: 8:21.5	40.22	135.72	33N	6	4.5	SEA OF JAPAN
A Y	25 1:11:29.9	59.82	-155.90	33N	22	4.9	SOUTHERN ALASKA
Y	25 3: 6:15.3	-33.59	77.76	33N	4	4.4	MID-INDIAN RISE
C	25 3:53:48.0	37.73	98.78	33N	4	4.2	TSINGHAI PROVINCE, CHINA
	25 5: 0:11.7	-12.38	120.02	33N	4		SOUTH OF SUMBA ISLAND
Y	25 6: 0:34.6	4.13	-102.07	253	5	4.6	EAST CENTRAL PACIFIC OCEAN
Y	25 6:45:22.7	10.55	125.66	33N	3	3.7	LEYTE, PHILIPPINE ISLANDS
	25 14:50: 6.0	10.33	126.54	33N	4	4.2	PHILIPPINE ISLANDS REGION
	25 16:16: 3.4	-30.16	-73.22	367	8	4.7	OFF COAST OF CENTRAL CHILE
	25 18:12:10.7	-11.90	166.96	33N	18	4.8	SANTA CRUZ ISLANDS

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	Y	25 22: 9:18.7	5.74	-73.30	33N	10	4.6	COLOMBIA
	Y	26 0:22:37.5	19.26	-101.01	33N	10	4.9	MICHOACAN, MEXICO
A	Y	26 16: 1:44.4	51.07	174.93	33N	9	4.2	NEAR ISLANDS, ALEUTIAN ISLANDS
		26 18:41:46.1	29.56	129.55	33N	4	4.2	RYUKYU ISLANDS
		26 19:12:52.6	-2.92	102.06	142	9	4.0	SOUTHERN SUMATRA
		26 20:11:43.2	-13.41	-73.95	33N	4	4.8	PERU
		26 21:59:53.1	-28.53	164.57	33N	20	5.2	EAST OF AUSTRALIA
		26 22:29: 7.3	-18.03	-173.07	33N	7	4.4	TONGA ISLANDS
		26 23:18: 3.1	-58.97	-127.48	33N	6	4.3	SOUTH PACIFIC CORDILLERA
	Y	27 3:20:38.9	13.97	-62.40	33N	7	4.1	WINDWARD ISLANDS
		27 7: 6:46.6	36.10	139.99	71	4	3.9	HONSHU, JAPAN
	Y	27 19:42:53.6	12.62	-87.81	33N	13	4.8	NEAR COAST OF NICARAGUA
		27 20:32:44.2	-9.18	113.25	33N	8	4.5	SOUTH OF JAVA
A		27 23:15:47.0	54.28	-163.79	33N	11	4.8	UNIMAK ISLAND REGION
		27 23:35: 8.1	11.57	126.13	33N	3	3.7	PHILIPPINE ISLANDS REGION
		28 1:44:30.7	3.99	-26.62	33N	12	4.8	CENTRAL MID-ATLANTIC RIDGE
U	Y	28 3:19:28.7	36.42	71.26	33N	6	3.8	AFGHANISTAN-USSR BORDER REGION
		28 8:39:35.0	6.02	-39.53	33N	10	4.9	CENTRAL MID-ATLANTIC RIDGE
U	Y	28 10:55: 6.3	43.60	146.40	33N	7	4.5	KURILE ISLANDS
		28 15:38:13.6	-2.17	67.88	33N	4	4.3	CARLSBERG RIDGE
		28 19:57:53.7	-32.56	-178.33	33N	5	4.4	SOUTH OF KERMADEC ISLANDS
	Y	28 21:33: 5.5	14.36	144.15	33N	5	4.2	MARIANA ISLANDS
	Y	29 0:35:48.1	18.68	145.69	33N	9	5.0	MARIANA ISLANDS
		29 14:23:45.0	1.31	126.86	33N	4	5.0	MOLUCCA PASSAGE
		29 14:36:14.1	-19.32	-178.11	33N	8	4.5	WEST OF TONGA ISLANDS
		29 16:39:23.5	-42.13	120.03	33N	9	5.1	SOUTH OF AUSTRALIA
		29 20:36: 7.9	-17.99	-176.51	33N	22	5.3	WEST OF TONGA ISLANDS
		29 21:14:56.9	2.90	128.44	190	7	4.4	HALMAHERA
	Y	29 21:32:32.0	-18.01	-178.44	631	30	4.7	WEST OF TONGA ISLANDS
		29 21:53:50.7	-23.63	-177.01	33N	6	4.8	SOUTH OF FIJI ISLANDS
U	Y	29 22:20:40.9	82.39	100.68	33N	4	3.7	NORTH OF SEVERNAYA ZEMLYA
		30 6:23:51.0	-6.51	147.13	50	5	4.2	EAST PAPUA NEW GUINEA REGION
	Y	30 11: 2:35.5	21.38	144.75	33N	4	4.1	MARIANA ISLANDS REGION
		30 12:32: 7.3	8.03	125.20	51	6	4.5	MINDANAO, PHILIPPINE ISLANDS
U		30 17:46:21.5	44.53	146.48	33N	5	4.4	KURILE ISLANDS
	Y	30 19:37:50.4	21.40	144.06	33N	10	4.4	MARIANA ISLANDS REGION
		30 21:37:20.7	28.97	98.93	33N	3	4.3	BURMA-CHINA BORDER REGION
		30 22:12:52.9	35.47	23.00	33N	8	4.5	CRETE
		31 0:27: 9.1	-1.04	123.78	33N	10	5.4	SULAWESI
		31 1:24: 9.8	0.76	100.06	33N	4	4.3	NORTHERN SUMATRA
		31 3:10:51.4	-29.90	-178.39	33N	4	4.0	KERMADEC ISLANDS
		31 3:17:17.6	-8.69	120.06	33N	4		FLORES ISLAND REGION
Y	31	8:23:15.2	2.81	-84.41	33N	6	4.7	OFF COAST OF CENTRAL AMERICA

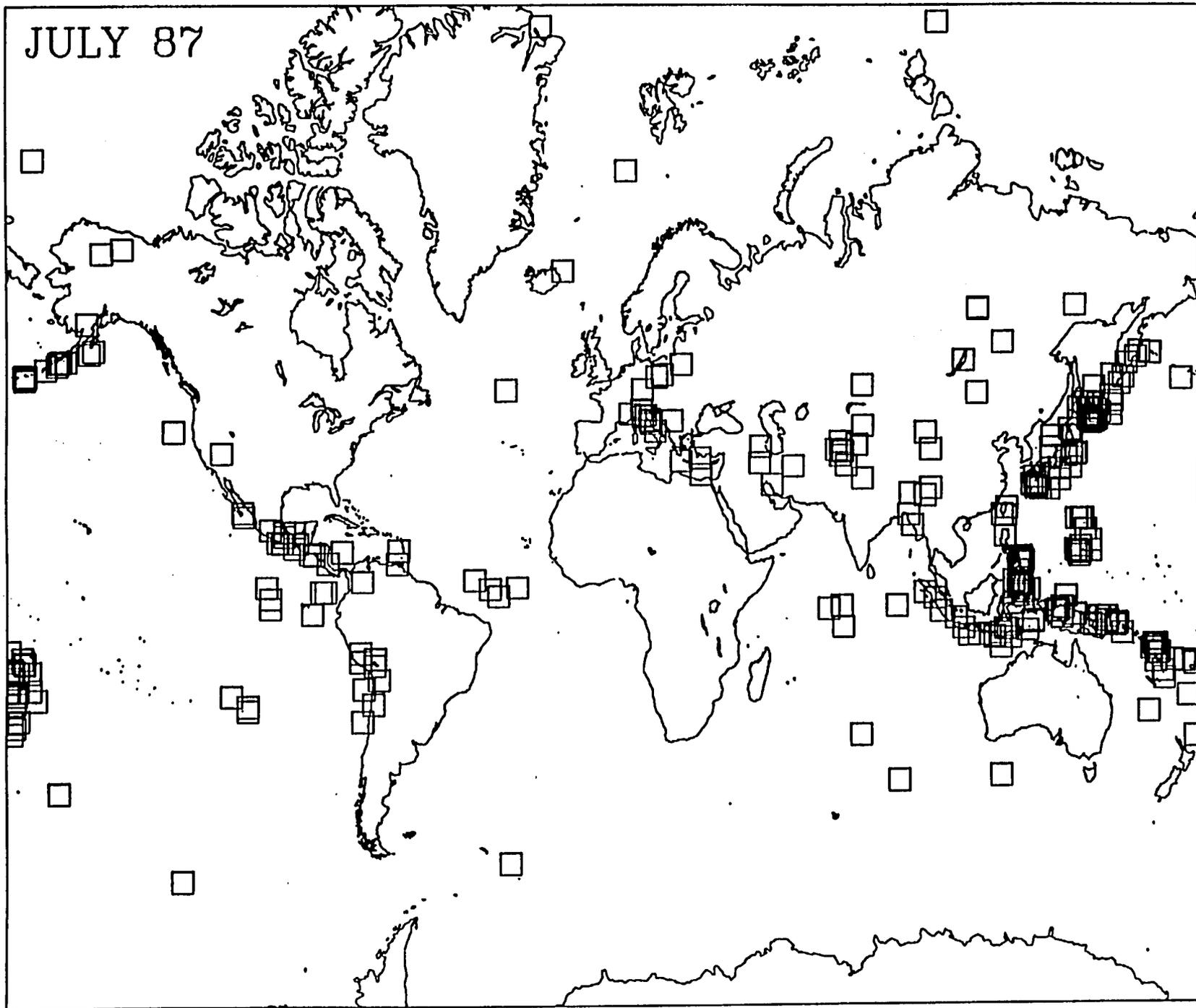
GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

JULY 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	31 11:13:46.9	-31.04	-177.43	33N 4	4.3		KERMADEC ISLANDS REGION
U Y	31 12:53: 8.4	45.50	149.08	33N 15	4.6		KURILE ISLANDS
Y	31 16:34:43.7	24.15	121.96	33N 10	4.6		TAIWAN
	31 19: 4: 1.6	41.68	140.90	33N 19	4.8		HOKKAIDO, JAPAN REGION

JULY 87



GLOBAL SEISMIC EVENT BULLETIN - AUGUST 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.W. Duff and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

1 Observatory Crescent, Ottawa K1A 0Y3

INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - AUGUST 1987.

There were four nuclear explosions this month. Three of these were among the larger-magnitude seismic events of the month. An explosion on the 2nd in Eastern Kazakh (USSR) was of magnitude 5.7. One in Novaya Zemlya (USSR) on the 2nd and one in Nevada (USA) on the 13th were both of magnitude 5.6. A smaller explosion (magnitude 4.8) occurred in Central Siberia (USSR) on the 12th.

The largest two seismic events occurred near the coast of Chile, on the 8th and on the 15th. These were magnitude 6.3 and 6.4, respectively. The first killed at least four people; the second caused damage.

Of the 258 events in this bulletin, the Yellowknife Array detected 77, which is 30% of the total. The Array detected two of the four nuclear explosions.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

AUGUST 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	31	23:57: 3.0	40.86	-124.00	38	61	5.4	NEAR COAST OF NORTHERN CALIF
A	1	2:43:25.4	52.27	-171.62	33N	6	4.3	FOX ISLANDS, ALEUTIAN ISLANDS
	1	10:59:47.0	51.88	-30.98	33N	6	4.4	NORTH ATLANTIC RIDGE
	1	13:43:22.8	30.30	57.91	33N	7	4.2	IRAN
	1	13:55:18.5	29.95	57.81	33N	10	4.2	SOUTHERN IRAN
	1	19:44: 0.1	29.52	142.46	33N	6	4.3	SOUTH OF HONSHU, JAPAN
	1	23: 5:45.9	-7.02	129.64	33N	3	4.0	BANDA SEA
N U Y	2	0:58:11.6	50.02	79.16	OG	17	5.7	EASTERN KAZAKH SSR
N U Y	2	2: 0: 5.3	73.35	54.86	OG	51	5.6	NOVAYA ZEMLYA
	2	2:12:28.3	32.37	131.90	33N	6	4.3	KYUSHU, JAPAN
	2	2:20:28.2	-3.35	125.81	468	4	3.6	CERAM SEA
Y	2	4: 0:20.6	22.36	143.54	33N	9	4.5	VOLCANO ISLANDS REGION
C	2	9: 7:37.7	25.91	115.21	14	25	4.8	EASTERN CHINA
U	2	12:55:31.0	36.49	71.29	33N	4	4.6	AFGHANISTAN-USSR BORDER REGION
	2	14:47:29.1	21.48	143.71	33N	7	4.8	MARIANA ISLANDS REGION
Y	2	18:26:45.1	20.89	144.20	33N	12	4.8	MARIANA ISLANDS
	2	18:53:53.2	21.37	143.97	33N	14	5.2	MARIANA ISLANDS REGION
	2	19:47:40.2	15.00	146.66	33N	10	4.9	MARIANA ISLANDS
Y	2	19:57:10.7	21.23	144.09	33N	10	4.8	MARIANA ISLANDS REGION
	2	22: 4: 0.2	26.86	65.94	33N	5	3.8	PAKISTAN
	2	22:15:13.7	27.88	66.54	33N	11	4.3	PAKISTAN
	3	2:23:26.9	-11.31	165.72	422	6	4.4	SANTA CRUZ ISLANDS
Y	3	3: 8:32.8	8.25	-77.84	226	27	4.5	PANAMA-COLOMBIA BORDER REGION
Y	3	5:20:59.0	13.58	144.79	33N	15	5.2	MARIANA ISLANDS
	3	7:37:43.2	86.73	59.30	33N	15	4.7	NORTH OF FRANZ JOSEF LAND
Y	3	10: 0:15.4	18.66	146.52	33N	3	4.3	MARIANA ISLANDS
	3	13: 7:48.4	20.87	120.47	33N	4	4.3	PHILIPPINE ISLANDS REGION
Y	3	14:55: 4.4	13.44	144.82	33N	15	5.2	MARIANA ISLANDS
Y	3	15:42: 1.6	16.43	146.84	33N	6	4.5	MARIANA ISLANDS
Y	3	16:32:49.2	20.15	146.61	33N	5	4.8	MARIANA ISLANDS REGION
Y	3	22:37:17.2	21.14	144.58	33N	5	4.7	MARIANA ISLANDS REGION
C	4	12: 5:42.1	39.85	75.38	33N	5	4.2	SOUTHERN SINKIANG PROV, CHINA
	4	16: 0:29.9	42.14	142.49	33N	11	4.5	HOKKAIDO, JAPAN REGION
	4	19:13:16.6	2.97	127.09	33N	3	4.5	MOLUCCA PASSAGE

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
Y	4 19:51:49.6	-15.17	167.59	39	14	4.6	NEW HEBRIDES ISLANDS
	4 22:15:53.1	-30.46	-178.47	33N	5	4.9	KERMADEC ISLANDS
C	5 10:24:24.2	41.96	82.19	33N	13	4.7	SOUTHERN SINKIANG PROV, CHINA
A	5 11:40:19.1	50.39	179.26	33N	4	4.0	RAT ISLANDS, ALEUTIAN ISLANDS
Y	5 15:46:27.4	22.10	142.88	33N	14	5.1	VOLCANO ISLANDS REGION
C	5 20: 4: 4.4	29.86	99.60	33N	3	4.6	SZECHWAN PROVINCE, CHINA
U	6 3: 6:29.7	55.08	165.40	33N	4	4.1	KOMANDORSKY ISLANDS REGION
	6 6:21:39.9	37.05	20.22	33N	5	4.5	IONIAN SEA
U Y	6 9: 6:47.6	40.02	72.64	33N	19	4.9	KIRGIZ SSR
Y	6 9:51: 0.3	-14.15	169.60	33N	7	5.1	NEW HEBRIDES ISLANDS
	6 11:25:58.0	-12.84	169.34	618	9	4.3	SANTA CRUZ ISLANDS REGION
	6 13: 9:39.9	-7.52	127.74	198	5	4.5	BANDA SEA
Y	6 15:15:40.3	-4.95	-104.71	33N	18	5.5	NORTHERN EASTER I CORDILLERA
	6 16:33: 7.2	-16.84	-176.06	33N	19	5.3	WEST OF TONGA ISLANDS
U Y	6 16:55:17.9	45.27	147.96	33N	7	4.5	KURILE ISLANDS
	6 17:48:35.0	24.50	95.73	33N	4	4.4	BURMA
Y	6 18:39:19.0	-18.40	-174.49	33N	14	4.6	TONGA ISLANDS
	6 19:28:35.3	-8.86	108.92	182	8	4.3	JAVA
	6 19:57:38.4	24.16	122.33	33N	5	4.2	TAIWAN REGION
	6 23:11:30.1	1.39	-28.60	33N	24	4.9	CENTRAL MID-ATLANTIC RIDGE
	7 4:39:14.2	-20.28	-174.34	33N	10	5.0	TONGA ISLANDS
	7 4:39:22.4	-20.84	-174.40	33N	7	5.2	TONGA ISLANDS
	7 10:56: 1.6	-14.75	166.16	33N	3	3.8	NEW HEBRIDES ISLANDS
	7 12:16: 0.9	-20.00	168.42	33N	18	4.7	NEW HEBRIDES ISLANDS
	7 12:53:29.2	-7.00	129.11	99	5	4.7	BANDA SEA
	7 15:21:43.1	33.95	141.69	33N	5	4.2	OFF EAST COAST OF HONSHU, JAPAN
	7 20:32:56.7	0.08	123.27	160	-13	4.8	NORTHERN CELEBES
U	8 0:10: 3.1	51.95	131.51	33N	6	4.3	EASTERN USSR
	8 0:39:40.3	-8.48	155.25	33N	3	4.6	SOLOMON ISLANDS
A	8 6:43:14.5	52.74	-168.47	33N	6	4.9	FOX ISLANDS, ALEUTIAN ISLANDS
	8 7:48: 3.9	-36.75	178.43	33N	19	5.3	OFF E COAST OF N. ISLAND, N.Z.
U	8 12: 2:13.7	39.03	71.55	33N	6	4.5	TADZHIK SSR
	8 12: 8:35.4	-20.06	-176.94	33N	4	4.9	WEST OF TONGA ISLANDS
Y	8 15:48:53.0	-18.84	-69.90	33N	55	6.3	NORTHERN CHILE
A	8 17:54:14.8	53.63	-167.75	33N	5	4.3	FOX ISLANDS, ALEUTIAN ISLANDS
	9 6:37:23.8	41.12	142.09	33N	9	4.4	HOKKAIDO, JAPAN REGION
	9 6:44:18.6	3.39	126.63	33N	3	4.7	TALAUD ISLANDS
	9 9:13: 3.0	13.46	124.17	33N	5	4.6	LUZON, PHILIPPINE ISLANDS
Y	9 15:32: 7.8	10.60	-74.32	33N	24	4.9	NEAR NORTH COAST OF COLOMBIA
Y	9 21:14:59.2	29.21	83.31	40	45	5.2	NEPAL
	9 23:10: 7.0	35.80	135.81	33N	5	4.6	SOUTHERN HONSHU, JAPAN
	10 0:20:27.0	-18.06	-173.88	33N	6	5.0	TONGA ISLANDS
	10 4:34:48.2	-16.75	-176.27	33N	12		WEST OF TONGA ISLANDS

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	10 5:21:59.3	0.00	122.84	187	11	4.6	NORTHERN CELEBES
Y	10 9:15:39.1	16.06	146.99	33N	24	5.5	MARIANA ISLANDS
	10 9:36:54.2	-23.63	-179.34	33N	12	5.4	SOUTH OF FIJI ISLANDS
Y	10 9:57:39.5	5.11	125.89	33N	21	5.3	MINDANAO, PHILIPPINE ISLANDS
	10 10:10:41.6	19.59	121.23	33N	6	4.3	PHILIPPINE ISLANDS REGION
Y	10 10:52: 5.4	30.02	64.15	33N	35	5.7	SOUTHWESTERN AFGHANISTAN
	10 11:17:49.9	41.48	141.94	33N	5	4.2	HOKKAIDO, JAPAN REGION
C	10 12:12:17.7	38.08	106.28	33N	28	4.9	NORTHERN CHINA
C	10 12:26:50.1	34.73	100.72	33N	4	4.3	TSINGHAI PROVINCE, CHINA
Y	10 15:28:29.3	-8.44	-78.55	120	10	4.6	NEAR COAST OF NORTHERN PERU
	10 16:37:55.5	5.85	126.97	33N	3	3.9	MINDANAO, PHILIPPINE ISLANDS
Y	10 16:54:29.4	-60.96	-56.14	33N	6		SOUTH SHETLAND ISLANDS
U	Y 10 17:57:51.0	45.43	146.86	30	11	4.9	KURILE ISLANDS
Y	10 18:15:44.5	-6.22	104.89	33N	17	5.3	SUNDA STRAIT
	10 20:13:49.8	-0.55	130.16	33N	3		WEST IRIAN
	11 0:27:51.6	44.55	10.42	33N	16		NORTHERN ITALY
Y	11 2:14:38.0	24.45	123.12	33N	10	5.1	SOUTHWESTERN RYUKYU ISLANDS
Y	11 4:34:44.9	-18.11	-178.36	448	28	5.1	WEST OF TONGA ISLANDS
	11 8:14:30.7	-8.65	157.60	33N	4	4.4	SOLOMON ISLANDS
Y	11 9:55:43.1	15.17	-91.93	33N	6	4.6	MEXICO-GUATEMALA BORDER REGION
	11 10:31:54.3	-5.49	147.76	75	8	4.9	EAST PAPUA NEW GUINEA REGION
A	Y 11 12:13:53.4	51.29	179.12	33N	16	4.6	RAT ISLANDS, ALEUTIAN ISLANDS
Y	11 17:44:46.9	-6.09	154.48	12	15	5.1	SOLOMON ISLANDS
	11 20:36:17.6	-22.83	-174.05	33N	4	4.0	TONGA ISLANDS REGION
U	11 23: 5: 0.4	45.09	148.15	33N	12	4.6	KURILE ISLANDS
	12 0: 6:20.2	-12.33	166.77	33N	34	5.3	SANTA CRUZ ISLANDS
	12 0:27:23.8	13.48	124.48	33N	4	4.1	LUZON, PHILIPPINE ISLANDS
N	U 12 1:30: 1.1	61.42	113.13	OG	20	4.8	CENTRAL SIBERIA
Y	12 3:10: 5.6	15.65	-59.05	29	103	5.5	LEEWARD ISLANDS
U	Y 12 4:34:29.9	55.02	163.21	33N	33	5.1	OFF EAST COAST OF KAMCHATKA
	12 6: 1:10.6	-19.86	173.09	33N	9	4.3	NEW HEBRIDES ISLANDS REGION
Y	12 6:18:44.1	-31.60	58.75	33N	30	5.5	ATLANTIC-INDIAN RISE
	12 11:16:43.7	-19.37	172.80	33N	8	4.7	NEW HEBRIDES ISLANDS REGION
U	12 12:14:47.8	54.89	162.88	33N	4	4.5	NEAR EAST COAST OF KAMCHATKA
U	12 16:43:16.2	45.18	148.27	33N	6	3.9	KURILE ISLANDS
	13 7:22:13.7	38.24	14.85	33N	16	4.5	SICILY
	13 8:21:18.2	20.70	145.54	33N	8	4.3	MARIANA ISLANDS
	13 8:44:10.2	-31.37	-178.91	33N	6	4.8	KERMADEC ISLANDS REGION
	13 8:58: 9.9	56.87	-34.00	33N	5	4.1	NORTH ATLANTIC OCEAN
Y	13 9:21:20.1	14.32	-90.63	33N	20	4.9	GUATEMALA
N	A 13 14: 0: 5.8	37.28	-115.60	OG	43	5.6	SOUTHERN NEVADA
Y	13 15:23: 9.6	-17.43	-70.41	33N	42	6.0	NEAR COAST OF PERU
	13 19:28:57.1	10.45	144.69	33N	3	4.0	SOUTH OF MARIANA ISLANDS

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	13 20:32:50.7	-10.96	165.22	33N 15	5.4		SANTA CRUZ ISLANDS
Y	13 21:46:51.0	-15.71	168.12	33N 26	5.4		NEW HEBRIDES ISLANDS
	14 0:50:20.1	-9.17	118.80	33N 5	4.0		SUMBAWA ISLAND REGION
	14 2:29:51.2	21.45	143.86	33N 5	4.5		MARIANA ISLANDS REGION
	14 2:59:39.2	36.75	137.83	33N 12	4.7		HONSHU, JAPAN
	14 4:16:41.2	-6.65	105.93	33N 5	4.2		SUNDA STRAIT
	14 4:41:47.0	26.11	128.36	33N 3	4.0		RYUKYU ISLANDS
	14 4:44:29.3	25.99	128.31	33N 3	4.0		RYUKYU ISLANDS
Y	14 5:59:19.6	-12.99	166.48	167 37	5.0		SANTA CRUZ ISLANDS
Y	14 6:24: 8.6	43.97	20.36	33N 37	4.5		YUGOSLAVIA
	14 7:48:34.6	-11.17	126.53	33N 3			TIMOR SEA
	14 8:24:50.6	-16.66	-173.00	33N 18	5.1		SAMOA ISLANDS REGION
	14 9:18:22.4	-6.57	128.25	33N 5			BANDA SEA
A Y	14 9:41:42.5	29.66	-93.73	33N 3	4.8		LOUISIANA
	14 12:53: 8.3	1.64	121.67	33N 4	3.9		NORTHERN CELEBES
A Y	14 17:39:25.3	53.57	-169.10	54 59	5.6		FOX ISLANDS, ALEUTIAN ISLANDS
	14 21:37: 1.0	2.84	128.47	59 6	4.3		HALMAHERA
C	14 22: 9:52.8	34.84	107.01	33N 3	3.8		EASTERN CHINA
Y	14 22:19:39.9	-19.76	-63.92	33N 33	5.6		SOUTHERN BOLIVIA
	14 23:22:40.0	36.31	143.52	33N 7	4.7		OFF EAST COAST OF HONSHU, JAPAN
U Y	15 0:31: 3.0	53.41	152.11	33N 30	5.3		SEA OF OKHOTSK
	15 9:12: 8.4	34.30	26.69	33N 21	4.6		CRETE
	15 11:34:57.8	43.48	20.63	33N 18			YUGOSLAVIA
Y	15 12:51:38.4	15.12	-61.40	33N 29	5.2		LEEWARD ISLANDS
Y	15 13:36:10.4	-9.63	117.99	33N 5	4.4		SUMBAWA ISLAND REGION
Y	15 13:46:18.4	-4.49	-79.28	33N 6	4.7		PERU-ECUADOR BORDER REGION
	15 13:48:45.7	-18.63	-174.60	33N 21	5.0		TONGA ISLANDS
	15 16: 8:56.3	41.53	140.13	33N 6	4.7		HOKKAIDO, JAPAN REGION
	15 17:43:50.8	-6.61	130.38	232 7	4.7		BANDA SEA
	15 18: 4:23.8	-26.69	-72.32	33N 25	6.4		OFF COAST OF NORTHERN CHILE
	16 0:44:13.6	-18.17	-173.97	33N 11	4.8		TONGA ISLANDS
Y	16 1: 2:46.1	13.34	-88.42	33N 12	5.0		EL SALVADOR
	16 3:51:48.9	-1.48	134.96	33N 3	4.8		WEST IRIAN
	16 20: 7:25.8	33.31	137.71	33N 9	4.5		NEAR S COAST OF HONSHU, JAPAN
	16 21:38:43.8	-34.46	179.71	33N 25	5.2		SOUTH OF KERMADEC ISLANDS
Y	16 22:41:56.7	21.33	144.22	33N 8	4.9		MARIANA ISLANDS REGION
	17 5:26:41.3	-9.95	118.35	33N 3	3.9		SUMBAWA ISLAND REGION
	17 5:41:52.3	-2.97	140.77	33N 5			NEAR N COAST OF WEST IRIAN
Y	17 6:29: 7.5	-16.63	-178.76	33N 13	4.6		WEST OF TONGA ISLANDS
	17 17:12:43.9	13.74	-87.84	33N 7	4.4		HONDURAS
	17 18:45:19.5	6.24	125.27	33N 4	4.5		MINDANAO, PHILIPPINE ISLANDS
	17 19:54:20.9	7.11	126.38	33N 5	4.5		MINDANAO, PHILIPPINE ISLANDS
Y	18 1:50:18.0	-7.30	129.30	132 20	5.0		BANDA SEA

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	18 1:56: 8.2	-7.44	122.94	33N	3		FLORES SEA
U Y	18 2:13:54.7	36.45	71.44	33N	33	5.1	AFGHANISTAN-USSR BORDER REGION
	18 2:18:49.4	-5.63	151.84	33N	32	5.2	NEW BRITAIN REGION
U	18 2:57:57.7	46.76	148.89	33N	3		NORTHWEST OF KURILE ISLANDS
	18 8:36: 9.0	-0.17	128.57	33N	3	4.0	HALMAHERA
U Y	18 9: 5:40.2	56.02	164.15	33N	10	4.5	KOMANDORSKY ISLANDS REGION
	18 16:45:12.6	-6.16	148.85	33N	6	4.8	NEW BRITAIN REGION
Y	18 17:52: 5.9	9.08	126.53	33N	15	5.1	MINDANAO, PHILIPPINE ISLANDS
	18 20:54:18.4	8.91	126.54	33N	3	4.7	MINDANAO, PHILIPPINE ISLANDS
	19 0:23:30.3	44.85	11.87	33N	19		NORTHERN ITALY
U Y	19 4:49:27.5	47.12	147.39	33N	7	4.1	NORTHWEST OF KURILE ISLANDS
	19 6:54: 1.5	-6.67	131.94	33N	3		TANIMBAR ISLANDS REGION
Y	19 7:52:30.7	-23.99	-66.94	33N	13	5.5	JUJUY PROVINCE, ARGENTINA
	19 17: 3:46.3	-26.95	-178.03	33N	4	4.2	SOUTH OF FIJI ISLANDS
	19 19:57: 3.6	-18.45	-175.63	33N	6	4.8	TONGA ISLANDS
	20 5:47:24.2	31.15	137.63	33N	4	5.0	SOUTH OF HONSHU, JAPAN
Y	20 8:51:31.2	11.91	142.33	33N	4	4.2	SOUTH OF MARIANA ISLANDS
	20 21:14:46.1	22.05	144.33	33N	11	4.7	VOLCANO ISLANDS REGION
	21 4:52:57.1	-13.21	166.60	33N	6	4.7	NEW HEBRIDES ISLANDS
	21 4:56:18.7	3.28	98.50	138	4	3.8	NORTHERN SUMATRA
U	21 8:46: 1.7	45.37	153.66	33N	5	4.6	KURILE ISLANDS REGION
	21 15:31:27.0	18.24	120.59	33N	6	4.4	LUZON, PHILIPPINE ISLANDS
	21 15:55: 4.5	26.31	141.99	33N	5	4.6	BONIN ISLANDS REGION
	21 18:20: 9.8	-5.25	151.77	33N	16	5.0	NEW BRITAIN REGION
	21 18:22:38.8	-5.69	151.46	33N	29	5.2	NEW BRITAIN REGION
U	21 19:35: 8.8	49.87	156.28	33N	4	3.9	KURILE ISLANDS
Y	21 19:44:16.1	-6.49	154.88	33N	32	5.5	SOLOMON ISLANDS
	21 20:29:20.5	-21.40	-175.60	33N	3	4.8	TONGA ISLANDS
	21 21: 9: 0.6	46.34	10.58	33N	14		NORTHERN ITALY
	21 21:38:59.3	-47.62	99.74	33N	7		SOUTHEAST INDIAN RISE
Y	21 23: 0:56.5	23.88	-109.86	33N	18	5.2	BAJA CALIFORNIA
	22 1:22:31.7	51.49	16.07	33N	22		POLAND
	22 3:39: 2.1	15.69	-60.39	33N	23	4.6	LEEWARD ISLANDS
A	22 4:59:44.6	52.06	179.02	33N	5	4.2	RAT ISLANDS, ALEUTIAN ISLANDS
A Y	22 5: 9:14.7	52.28	173.89	33N	42	5.3	NEAR ISLANDS, ALEUTIAN ISLANDS
	22 10:42:44.2	49.43	-129.71	33N	6		VANCOUVER ISLAND REGION
U Y	22 15:13:59.0	46.83	151.79	33N	12	4.5	KURILE ISLANDS
	22 18:45:22.2	-16.32	-173.07	33N	9	4.3	TONGA ISLANDS
	23 7:36: 7.0	-26.28	71.75	33N	3	5.0	MID-INDIAN RISE
U	23 14:15:22.4	47.94	143.13	33N	4	4.4	SAKHALIN ISLAND
U	23 23: 8: 8.5	46.48	153.45	41	22	4.7	KURILE ISLANDS
U	23 23:54:13.8	48.66	151.83	33N	11	4.7	KURILE ISLANDS
	24 3:24:15.7	16.90	-61.97	33N	7	4.5	LEEWARD ISLANDS

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	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	24	3:57:40.5	20.90	144.94	33N	10	4.8	MARIANA ISLANDS
	24	4: 6:55.2	21.10	143.33	33N	4	4.3	MARIANA ISLANDS REGION
Y	24	4:18:31.1	20.90	144.19	33N	10	4.7	MARIANA ISLANDS
Y	24	6: 9:44.1	-19.67	-69.88	33N	9	5.0	NORTHERN CHILE
	24	9:24:33.6	23.16	94.54	33N	8	5.3	BURMA-INDIA BORDER REGION
U	24	10:35:28.0	37.33	71.57	33N	6	4.6	AFGHANISTAN-USSR BORDER REGION
A	24	23:43: 1.6	51.61	-174.75	33N	8	4.4	ANDREANOF ISLANDS, ALEUTIAN IS
	25	3: 8:44.3	-6.42	147.23	33N	5	4.8	EAST PAPUA NEW GUINEA REGION
	25	3:26:23.7	34.32	25.95	33N	15	4.4	CRETE
Y	25	6:36:59.9	10.52	151.83	33N	3	4.1	CAROLINE ISLANDS REGION
	25	9:46:56.6	43.54	145.65	32	19	4.8	HOKKAIDO, JAPAN REGION
	25	18: 5:59.2	20.04	-103.60	33N	5	4.4	JALISCO, MEXICO
	25	18: 8:26.3	19.11	-104.22	33N	4	4.7	NEAR COAST OF JALISCO, MEXICO
	25	21:16:53.0	-19.95	176.68	33N	3	4.0	SOUTH OF FIJI ISLANDS
	26	1:40:31.5	9.26	122.44	33N	13	4.9	NEGROS, PHILIPPINE ISLANDS
Y	26	1:44:41.0	8.02	122.12	33N	6	4.7	MINDANAO, PHILIPPINE ISLANDS
	26	2: 0:39.2	9.38	122.62	33N	6	4.5	NEGROS, PHILIPPINE ISLANDS
	26	4:37:47.1	8.63	122.13	33N	5	4.0	MINDANAO, PHILIPPINE ISLANDS
Y	26	5: 9:19.8	14.11	-87.13	33N	4		HONDURAS
	26	6:33:16.7	-21.63	-175.35	33N	9	5.0	TONGA ISLANDS
Y	26	6:56:41.9	-20.89	-178.53	523	50	5.2	WEST OF TONGA ISLANDS
Y	26	6:59:59.1	9.61	-179.01	33N	3		NORTH PACIFIC OCEAN
Y	26	9:46:27.2	15.07	-90.93	33N	12	4.7	GUATEMALA
	26	10:10:56.2	-3.70	135.65	61	6	4.3	WEST IRIAN
	26	13: 1:26.4	-37.05	-93.24	33N	5	5.2	WEST CHILE RISE
	26	13:24:38.9	42.60	138.82	33N	3	3.9	EASTERN SEA OF JAPAN
	26	19:32:58.8	2.38	126.54	125	9	5.0	MOLUCCA PASSAGE
Y	26	21: 6: 3.4	-19.80	-66.90	33N	5		SOUTHERN BOLIVIA
A	27	1:13:14.1	51.69	-170.48	33N	7	4.5	FOX ISLANDS, ALEUTIAN ISLANDS
	27	4: 3: 1.3	-24.51	70.60	33N	3	4.5	MID-INDIAN RISE
	27	7:45:41.6	-6.50	125.28	33N	3		BANDA SEA
	27	10: 7: 9.3	47.64	-27.19	33N	13	4.4	NORTH ATLANTIC RIDGE
A	27	10:15:20.1	51.46	-175.07	33N	3		ANDREANOF ISLANDS, ALEUTIAN IS
U	27	16:41:36.2	38.09	72.85	33N	5	4.4	TADZHIK SSR
	27	16:46:50.8	38.67	22.83	33N	13	5.3	GREECE
	27	18: 8: 6.8	-6.51	130.20	147	7	4.2	BANDA SEA
	27	23: 0:11.7	2.07	127.21	33N	7	5.2	MOLUCCA PASSAGE
Y	28	1:48:51.6	19.17	144.97	33N	4	4.5	MARIANA ISLANDS
A Y	28	4:46:16.8	21.70	-70.85	33N	9	4.4	BAHAMA ISLANDS
	28	7:47:32.7	-6.36	128.02	285	5	4.7	BANDA SEA
	28	13: 1:13.1	-11.01	161.34	33N	7	4.7	SOLOMON ISLANDS
	29	0:31:42.5	-3.98	152.10	83	16	4.9	NEW IRELAND REGION
	29	8: 5:47.0	19.25	-101.79	33N	3	4.5	MICHOACAN, MEXICO

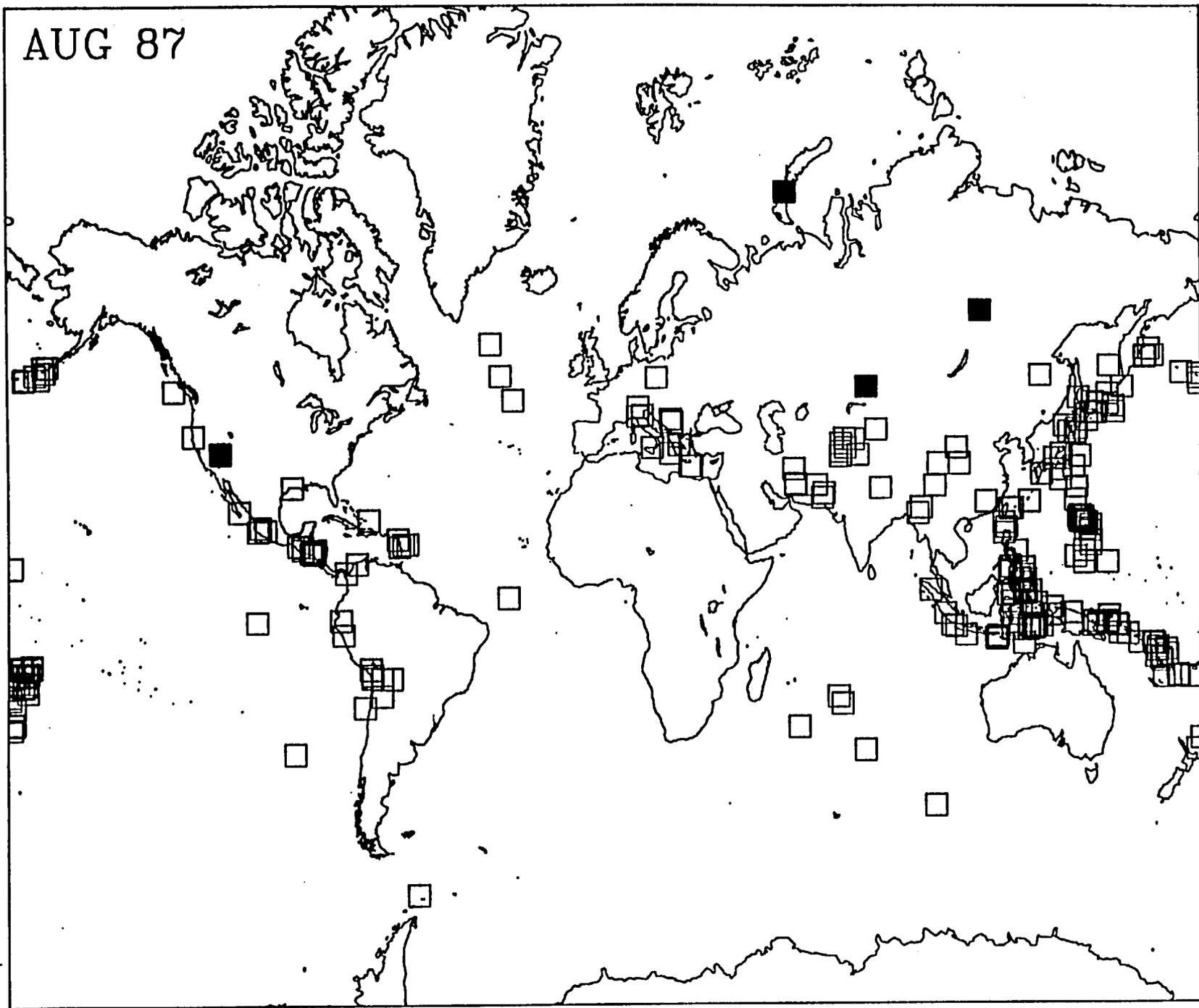
GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

AUGUST 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	29	12:51:33.4	2.32	122.89	33N	4	4.8	CELEBES SEA
A Y	29	22:12:10.3	52.76	-169.02	33N	17	4.9	FOX ISLANDS, ALEUTIAN ISLANDS
	30	2:38:41.2	-36.73	78.62	33N	4	4.6	MID-INDIAN RISE
	30	5:57:52.9	33.51	57.32	33N	10	4.5	IRAN
	30	12:15:33.1	-30.29	-178.16	33N	10		KERMADEC ISLANDS
	31	6:52:28.7	-24.54	-179.26	33N	17	5.0	SOUTH OF FIJI ISLANDS
C	31	8:52: 1.4	36.78	76.66	33N	4	4.7	KASHMIR-SINKIANG BORDER REGION
	31	10:50: 9.8	-3.12	102.79	33N	5	3.5	SOUTHERN SUMATRA
Y	31	22:34:57.0	13.02	-87.45	33N	8	5.0	HONDURAS

AUG 87



GLOBAL SEISMIC EVENT BULLETIN - SEPTEMBER 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.W. Duff and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

1 Observatory Crescent, Ottawa K1A 0Y3

INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - SEPTEMBER 1987.

There was a nuclear explosion in Nevada, on the 24th at 15:00 UT. It was detected by the Yellowknife Array.

The largest earthquake this month was in Jujuy Province, Argentina, on Sept. 1 at 04:25. It was felt in several South American countries.

The most seismically active areas this month were the Philippine Islands region, the Kurile Islands region, the Aleutian Islands region, the New Hebrides Islands region and the Kermadec Islands region.

Of the 248 events in this bulletin, the Yellowknife Array detected 88, which is 35% of the total.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	1 0:14:20.7	53.87	-167.00	33N	12	4.6	FOX ISLANDS, ALEUTIAN ISLANDS
A Y	1 4:15:42.3	54.36	-166.77	33N	17	4.8	FOX ISLANDS, ALEUTIAN ISLANDS
A Y	1 4:22:14.4	54.09	-167.80	33N	7	4.3	FOX ISLANDS, ALEUTIAN ISLANDS
Y	1 4:25:46.6	-23.40	-66.73	33N	28	6.3	JUJUY PROVINCE, ARGENTINA
A	1 7:11:52.0	53.73	-166.68	33N	7	4.2	FOX ISLANDS, ALEUTIAN ISLANDS
	1 13:36:42.5	33.07	140.87	33N	8	4.6	SOUTH OF HONSHU, JAPAN
	1 13:51:22.9	16.56	-95.72	33N	12	4.8	OAXACA, MEXICO
	1 18: 1:43.7	-35.58	78.44	33N	3	4.5	MID-INDIAN RISE
	1 21:39:21.4	33.63	67.44	600	4	3.5	AFGHANISTAN
	1 22:45:51.3	-21.53	-178.66	33N	16	5.4	WEST OF TONGA ISLANDS
Y	2 0:37:10.6	25.24	122.95	33N	16	4.7	TAIWAN REGION
	2 5:22:42.8	-41.23	176.40	33N	7	4.9	OFF E COAST OF N. ISLAND, N.Z.
	2 12:35:24.8	15.66	116.82	33N	3	4.7	SOUTH CHINA SEA
Y	2 14:55:58.0	-8.56	158.73	157	6	4.2	SOLOMON ISLANDS
	2 19: 0: 8.5	8.82	121.83	33N	3	4.1	MINDANAO, PHILIPPINE ISLANDS
	2 22:49:53.1	-12.62	166.12	33N	4	4.6	SANTA CRUZ ISLANDS
Y	3 0: 4:54.9	19.99	-71.42	33N	27	4.7	DOMINICAN REPUBLIC REGION
U Y	3 0: 4:55.5	36.46	71.06	33N	4	4.2	AFGHANISTAN-USSR BORDER REGION
Y	3 0:52:47.2	20.24	94.14	33N	11	4.8	BURMA
Y	3 3:59: 4.8	4.00	125.94	33N	7	4.7	TALAUD ISLANDS
Y	3 4:10:10.6	9.25	122.29	33N	13	5.0	NEGROS, PHILIPPINE ISLANDS
Y	3 6:40:13.7	-57.54	159.11	33N	33	5.4	MACQUARIE ISLAND REGION
C Y	3 9: 8: 8.7	38.46	75.62	33N	11	4.5	SOUTHERN SINKIANG PROV, CHINA
Y	3 10: 5:10.5	11.97	-63.80	33N	3		CARIBBEAN SEA
	3 11: 8:24.9	-59.39	158.40	45	19	5.2	MACQUARIE ISLAND REGION
	3 12:21:59.2	35.69	140.20	33N	5	4.4	NEAR EAST COAST OF HONSHU, JAPA
Y	3 12:39:51.5	35.83	31.07	33N	30	5.1	CYPRUS
	4 1:19:30.6	22.41	119.65	33N	5	4.1	TAIWAN REGION
	4 1:40:20.7	45.85	27.57	98	16	4.0	RUMANIA
Y	4 2: 5:40.2	33.79	137.35	33N	5	4.3	NEAR S COAST OF HONSHU, JAPAN
U Y	4 4:27: 6.4	48.63	157.14	28	55	5.7	KURILE ISLANDS REGION
Y	4 7:35: 8.2	15.74	-46.72	33N	10	4.4	NORTH ATLANTIC RIDGE
	4 11: 6:30.1	16.24	-46.74	33N	9	4.7	NORTH ATLANTIC RIDGE
Y	4 11:23:27.5	-23.51	-66.10	33N	7	5.0	JUJUY PROVINCE, ARGENTINA

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
Y	4	14:34:37.5	-5.04	151.87	33N	10	4.6	NEW BRITAIN REGION
U Y	4	16:10:38.7	50.45	154.23	33N	6	4.5	KURILE ISLANDS
	4	16:42:53.6	43.78	14.64	33N	28	4.6	ADRIATIC SEA
	4	20:47:36.9	3.25	127.01	46	5	4.6	TALAUD ISLANDS
	4	20:57:44.3	3.43	127.06	20	4	4.2	TALAUD ISLANDS
	4	21:28:40.2	3.42	127.07	32	5	4.7	TALAUD ISLANDS
Y	4	22:39:19.5	11.59	-90.46	33N	8	4.6	OFF COAST OF CENTRAL AMERICA
U	4	23:31:14.9	43.38	146.39	33N	7	4.2	KURILE ISLANDS
	5	11:32:57.4	28.62	140.74	33N	4	4.5	BONIN ISLANDS REGION
	5	13:50:39.1	2.93	126.52	33N	5	4.7	MOLUCCA PASSAGE
	5	14:43:45.5	21.67	121.38	33N	3	3.9	TAIWAN REGION
	5	15: 4:28.4	3.07	127.06	33N	3	4.0	TALAUD ISLANDS
	5	15:58:16.7	-8.43	166.03	33N	3	4.8	SANTA CRUZ ISLANDS REGION
	5	19:48:39.8	-3.32	149.99	33N	3	4.3	BISMARCK SEA
Y	5	20:46:24.7	24.50	117.89	33N	22	4.7	NEAR SOUTHEASTERN COAST OF CHIN
	5	22:30:16.4	33.47	141.62	33N	6	4.3	OFF EAST COAST OF HONSHU, JAPAN
Y	6	2:33:40.9	18.18	-91.69	61	19	4.8	GULF OF CAMPECHE
	6	7:46:36.0	41.17	141.78	33N	5	3.7	HOKKAIDO, JAPAN REGION
	6	12:56: 0.9	-8.33	154.85	33N	3	4.2	DENTRECASTEAUX ISLANDS REGION
U Y	6	15:27:20.0	49.14	156.29	33N	35	5.5	KURILE ISLANDS
	6	20:41:46.4	-5.56	146.85	33N	4	4.9	EAST PAPUA NEW GUINEA REGION
U Y	6	21:54: 6.9	49.95	156.13	55	26	5.1	KURILE ISLANDS
	6	23:38:50.5	26.62	93.33	33N	16	5.0	EASTERN INDIA
	7	2:39:12.0	-30.26	-177.08	33N	4	4.6	KERMADEC ISLANDS
	7	5:44:32.5	8.53	121.46	33N	3	4.3	MINDANAO, PHILIPPINE ISLANDS
U Y	7	10: 5:30.5	36.98	71.14	33N	7	4.6	AFGHANISTAN-USSR BORDER REGION
Y	7	11:31:45.5	33.12	56.52	33N	21	5.4	IRAN
Y	7	11:57:11.4	-31.15	-178.64	33N	33	5.3	KERMADEC ISLANDS REGION
	7	14:59:51.5	21.48	120.09	33N	4	4.0	TAIWAN REGION
	7	19:44:36.7	-24.88	-177.94	33N	4	4.6	SOUTH OF FIJI ISLANDS
	7	21: 9:38.2	22.21	119.66	33N	5	4.4	TAIWAN REGION
Y	8	2:58:53.5	6.47	-82.55	33N	26	5.1	SOUTH OF PANAMA
	8	3: 8:13.6	7.04	-82.57	33N	20	5.3	SOUTH OF PANAMA
	8	7:11: 0.4	7.05	-81.92	33N	6	4.6	PANAMA
	8	9: 4:58.4	35.89	24.61	33N	5	4.5	CRETE
U Y	8	13:35:13.3	49.86	156.34	52	30	5.4	KURILE ISLANDS
	8	19:28:31.0	17.96	120.28	33N	8		LUZON, PHILIPPINE ISLANDS
	8	21:36:55.0	-31.39	-177.28	33N	9	5.1	KERMADEC ISLANDS REGION
	9	3: 8:45.2	-17.42	-177.61	35	9	4.6	WEST OF TONGA ISLANDS
Y	9	3:28:42.2	16.44	-60.49	33N	6		LEEWARD ISLANDS
	9	5: 5:30.8	-17.98	-177.71	33N	16	5.1	WEST OF TONGA ISLANDS
	9	6:34:59.6	-28.88	-178.04	33N	3	4.3	KERMADEC ISLANDS REGION
Y	9	11:42:42.2	5.78	-72.91	33N	6		COLOMBIA

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	9 12:45:50.3	27.31	95.54	33N	6	4.7	BURMA-INDIA BORDER REGION
	9 16:54:28.4	11.50	127.11	33N	4	4.0	PHILIPPINE ISLANDS REGION
Y	9 18:29:12.3	22.96	142.09	33N	5	4.0	VOLCANO ISLANDS REGION
	9 23:29:26.8	33.78	47.28	33N	5	4.6	WESTERN IRAN
Y	10 0:45: 8.2	80.44	-6.89	17	21	4.8	NORTH OF SVALBARD
Y	10 0:47:14.6	25.14	128.85	170	11	4.6	RYUKYU ISLANDS
A Y	10 3:48:42.4	51.83	-175.78	33N	25	5.2	ANDREANOF ISLANDS, ALEUTIAN IS
	10 4: 3:25.2	32.37	19.21	33N	11		NEAR COAST OF LIBYA
	10 7:19: 5.7	-3.67	132.48	33N	4		WEST IRIAN
Y	10 10:33:22.5	8.75	-73.04	573	8	4.0	NORTHERN COLOMBIA
	10 13:24: 8.2	42.09	14.73	33N	16		CENTRAL ITALY
	10 14:43:44.5	3.39	126.69	45	11	5.0	TALAUD ISLANDS
	10 17:58:10.2	3.34	127.06	33N	8	5.1	TALAUD ISLANDS
	10 21:20:45.2	49.39	6.53	33N	11		GERMANY
U Y	10 21:53:17.1	45.16	146.75	33N	13	4.4	KURILE ISLANDS
Y	11 0:34:42.6	-22.10	-68.36	33N	10	5.3	NORTHERN CHILE
	11 1:29:50.4	-30.24	-179.84	33N	4	4.3	KERMADEC ISLANDS REGION
	11 4: 1:58.8	-30.58	-70.87	33N	6	4.9	CHILE-ARGENTINA BORDER REGION
	11 13:18:48.2	-20.51	-174.83	33N	4	4.0	TONGA ISLANDS
U	12 0:18: 5.4	45.37	149.23	33N	5	4.2	KURILE ISLANDS
C	12 0:40:13.6	38.98	100.47	33N	6	4.2	KANSU PROVINCE, CHINA
Y	12 6:18:50.4	11.22	-125.19	33N	4	4.4	SAMAR, PHILIPPINE ISLANDS
U Y	12 8:14:40.5	41.61	51.92	33N	6	4.4	CASPIAN SEA
Y	12 10: 5:55.7	-5.43	146.08	33N	5		EAST PAPUA NEW GUINEA REGION
	12 11:11:57.2	51.51	15.14	33N	11		POLAND
	12 11:36:45.2	-21.47	168.74	33N	7	4.4	LOYALTY ISLANDS
A Y	12 12: 2:36.4	61.62	-153.21	33N	6	4.4	SOUTHERN ALASKA
	12 18:59:40.1	3.21	126.86	33N	6	4.8	TALAUD ISLANDS
	12 22: 1: 1.2	35.62	24.74	33N	16	4.6	CRETE
U Y	13 0:43:17.9	49.23	156.04	33N	18	4.5	KURILE ISLANDS
	13 11: 9: 3.1	14.24	-89.11	33N	5		GUATEMALA
Y	13 11:20:37.5	13.41	-90.00	33N	32	5.6	NEAR COAST OF GUATEMALA
	13 14: 7:44.9	39.51	144.55	43	45	5.3	OFF EAST COAST OF HONSHU, JAPAN
	13 14:55:35.7	39.41	144.93	33N	5	4.1	OFF EAST COAST OF HONSHU, JAPAN
	14 4:52:55.0	-17.03	-178.14	33N	23	5.6	WEST OF TONGA ISLANDS
	14 10: 2:23.0	-9.53	117.55	33N	5	4.4	SUMBAWA ISLAND REGION
Y	14 10:16:59.7	30.75	139.64	33N	44	5.7	SOUTH OF HONSHU, JAPAN
U	14 10:19:49.3	48.91	131.05	33N	5	5.2	E USSR-N.E. CHINA BORDER REGION
	14 15:51:45.0	36.38	31.20	33N	21	4.6	TURKEY
	15 2: 4:33.4	23.84	114.48	33N	4	4.2	NEAR SOUTHEASTERN COAST OF CHIN
	15 8:50: 8.2	-4.53	153.00	33N	25	4.8	NEW BRITAIN REGION
	15 13:26:46.3	25.75	137.10	33N	4	4.5	VOLCANO ISLANDS REGION
	15 13:40: 8.1	-17.42	-175.53	33N	4	4.5	TONGA ISLANDS

GEOFYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
16	0: 7:52.7	-31.51	-177.54	33N	4	4.6	KERMADEC ISLANDS REGION
16	1:18:15.7	37.14	21.96	33N	16	4.5	SOUTHERN GREECE
16	5:41:35.8	-10.82	-176.53	33N	10	4.4	NORTH OF FIJI ISLANDS
16	12:15: 9.4	-5.31	129.34	73	5	4.2	BANDA SEA
16	12:29:26.7	-28.41	-178.61	33N	4	4.5	KERMADEC ISLANDS REGION
16	12:42: 5.7	11.79	125.44	33N	5	5.2	SAMAR, PHILIPPINE ISLANDS
U	16 15:49:10.3	47.53	147.79	33N	4	4.1	NORTHWEST OF KURILE ISLANDS
U	16 16: 6: 3.0	37.28	57.12	33N	7	4.4	IRAN-USSR BORDER REGION
U	16 17:57:25.1	52.38	95.82	17	23	4.6	CENTRAL USSR
16	18:36: 4.3	46.28	10.50	33N	8		NORTHERN ITALY
16	19:43:50.5	-26.12	-176.86	33N	8	4.9	SOUTH OF FIJI ISLANDS
16	19:58:20.3	40.85	143.91	33N	10	4.3	OFF EAST COAST OF HONSHU, JAPAN
16	21:42: 6.1	-10.04	118.53	33N	4		SOUTH OF SUMBAWA ISLAND
16	22: 0:39.2	37.31	3.26	33N	15		WESTERN MEDITERRANEAN SEA
C	17 1:34:56.8	29.30	91.67	33N	12	4.7	TIBET
17	4:47:15.5	-4.23	146.18	56	10	4.9	EAST PAPUA NEW GUINEA REGION
Y	17 10: 7: 9.5	10.59	-86.48	33N	5	4.2	OFF COAST OF COSTA RICA
17	14:21: 3.6	8.76	128.21	33N	9	4.9	EAST OF PHILIPPINE ISLANDS
A	17 16:47:44.4	51.78	-172.68	33N	3	3.9	ANDREANOF ISLANDS, ALEUTIAN IS
17	21:24:31.7	-17.97	-175.85	33N	15	5.5	TONGA ISLANDS
18	2:38:51.1	17.08	-99.07	33N	5	4.4	GUERRERO, MEXICO
A	18 7:25:43.0	51.28	-178.74	33N	11	4.3	ANDREANOF ISLANDS, ALEUTIAN IS
18	8:43:39.3	-21.29	-71.25	33N	8	5.6	OFF COAST OF NORTHERN CHILE
18	10:26:47.7	13.44	120.95	33N	5	5.0	MINDORO, PHILIPPINE ISLANDS
A	18 11:12:46.0	53.47	-167.54	33N	8	4.6	FOX ISLANDS, ALEUTIAN ISLANDS
18	17:28: 1.8	8.61	151.51	33N	3	4.3	CAROLINE ISLANDS REGION
18	21: 6:19.8	51.43	-129.29	33N	7	4.2	QUEEN CHARLOTTE ISLANDS REGION
U	18 21:58:46.3	48.72	90.07	33N	35	5.0	MONGOLIA
18	23: 0: 5.9	2.55	128.31	33N	5	4.9	HALMAHERA
18	23:18: 4.0	-40.36	42.84	33N	3	4.2	ATLANTIC-INDIAN RISE
19	3: 4:21.3	-19.77	-176.11	33N	5	4.4	WEST OF TONGA ISLANDS
19	6:20:45.1	52.00	16.81	33N	11		POLAND
Y	19 9:21:50.4	-13.36	-75.65	33N	13	4.8	PERU
Y	19 11:42:44.3	-53.55	117.58	33N	7	4.8	SOUTH OF AUSTRALIA
Y	19 11:55:18.9	16.13	-98.52	33N	3	4.8	NEAR COAST OF GUERRERO, MEXICO
Y	19 16:38: 2.9	41.56	141.84	33N	19	4.6	HOKKAIDO, JAPAN REGION
C	19 18:59:38.8	30.39	94.81	33N	7	4.2	TIBET
19	19:56:29.8	11.61	92.73	33N	3	3.9	ANDAMAN ISLANDS REGION
Y	19 21:19:15.8	-8.10	-79.15	492	31	5.1	NEAR COAST OF NORTHERN PERU
U Y	19 21:57:56.9	49.82	156.05	44	44	5.0	KURILE ISLANDS
U	20 1:35:55.8	43.97	147.66	33N	5	4.2	KURILE ISLANDS
C Y	20 3:32: 6.0	42.97	83.64	33N	3	3.8	NORTHERN SINKIANG PROV, CHINA
U Y	20 3:54: 5.9	43.10	77.89	33N	10	4.5	ALMA-ATA REGION

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
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 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG		
	Y	20	5: 8:28.7	9.69	-33.39	33N	13	4.9 NORTH ATLANTIC OCEAN	
	Y	20	5:57:10.4	-8.62	-78.50	33N	13	4.7 NEAR COAST OF NORTHERN PERU	
	Y	20	6:35:49.4	10.73	124.26	33N	4	4.7 LEYTE, PHILIPPINE ISLANDS	
	Y	20	10: 1:50.4	17.30	-59.94	33N	4	LEEWARD ISLANDS	
	Y	20	11:41: 6.4	33.87	24.80	33N	27	5.1 MEDITERRANEAN SEA	
		20	11:54: 1.5	46.37	7.23	33N	16	SWITZERLAND	
	Y	20	17:50:40.1	5.99	-72.89	33N	5	4.6 COLOMBIA	
U	Y	20	18:42: 8.2	43.55	146.41	33N	13	4.5 KURILE ISLANDS	
		21	1:46:54.5	30.51	26.21	33N	5	3.9 UNITED ARAB REPUBLIC	
		21	3:54:40.7	24.15	141.50	33N	6	4.3 VOLCANO ISLANDS REGION	
		21	7:22:21.2	-23.14	-179.12	33N	4	4.4 SOUTH OF FIJI ISLANDS	
		21	10: 3:27.6	-9.63	111.86	33N	3	4.1 SOUTH OF JAVA	
		21	14:14:45.0	-29.91	-177.03	33N	4	4.3 KERMADEC ISLANDS	
C	Y	22	1:26: 9.6	38.42	78.49	33N	7	4.8 SOUTHERN SINKIANG PROV, CHINA	
		22	4:25:10.1	44.01	13.20	33N	15	ADRIATIC SEA	
	Y	22	7:17:27.3	-0.03	84.99	33N	28	5.4 SOUTH INDIAN OCEAN	
		22	7:17:29.5	-0.92	84.17	26	7	5.2 SOUTH INDIAN OCEAN	
		22	12:52:36.0	-14.97	167.32	33N	7	4.6 NEW HEBRIDES ISLANDS	
	Y	22	13:43:39.8	-1.33	-78.29	38	44	5.9 ECUADOR	
		22	14:24:28.8	28.57	56.03	33N	7	4.5 SOUTHERN IRAN	
	Y	22	15:54:38.6	2.34	126.00	89	14	4.9 MOLUCCA PASSAGE	
		22	16:12:46.0	-0.92	122.61	249	9	3.7 NORTHERN CELEBES	
		22	16:21:38.1	-1.11	-78.57	33N	19	5.7 ECUADOR	
		22	18:44:44.0	-22.48	-179.68	33N	4	4.6 SOUTH OF FIJI ISLANDS	
U	Y	22	22: 5:17.6	76.28	134.43	37	58	5.3 LAPTEV SEA	
U	Y	23	7:15:31.4	46.16	149.06	33N	56	5.8 KURILE ISLANDS	
		23	14:42: 6.9	30.24	131.38	33N	5	4.0 KYUSHU, JAPAN	
		23	15:15: 1.7	-50.64	138.94	33N	39	5.5 SOUTH OF AUSTRALIA	
C		23	15:21: 9.9	29.56	115.57	33N	3	EASTERN CHINA	
		23	15:22:53.7	-49.94	140.17	33N	18	4.9 SOUTH OF AUSTRALIA	
		23	17: 1:45.6	-62.96	172.12	33N	4	4.6 BALLENY ISLANDS REGION	
U	Y	23	19:19:43.0	36.28	71.06	33N	8	4.8 AFGHANISTAN-USSR BORDER REGION	
C		23	22:10:19.2	31.64	110.61	33N	4	4.0 EASTERN CHINA	
		23	22:34:49.4	-24.45	-177.58	33N	5	5.1 SOUTH OF FIJI ISLANDS	
	Y	23	23:41:36.2	45.67	145.77	33N	4	4.3 HOKKAIDO, JAPAN REGION	
		24	1:46:40.7	0.44	126.42	113	10	4.9 MOLUCCA PASSAGE	
		24	3:35:34.6	-17.93	-178.61	625	7	4.3 WEST OF TONGA ISLANDS	
	Y	24	4:55:18.9	36.54	141.49	29	49	5.4 NEAR EAST COAST OF HONSHU, JAPA	
		24	6: 2:23.6	-21.57	-178.71	33N	22	5.7 WEST OF TONGA ISLANDS	
	U	24	7:54:11.0	49.17	156.35	33N	11	4.4 KURILE ISLANDS	
N	A	Y	24	15: 0: 7.7	38.16	-116.56	OG	33	5.3 NEVADA
U		24	19:23:31.3	50.75	150.79	33N	5	3.9 NORTHWEST OF KURILE ISLANDS	
	Y	24	21:17:20.2	-59.61	-26.57	432	6	SOUTH SANDWICH ISLANDS REGION	

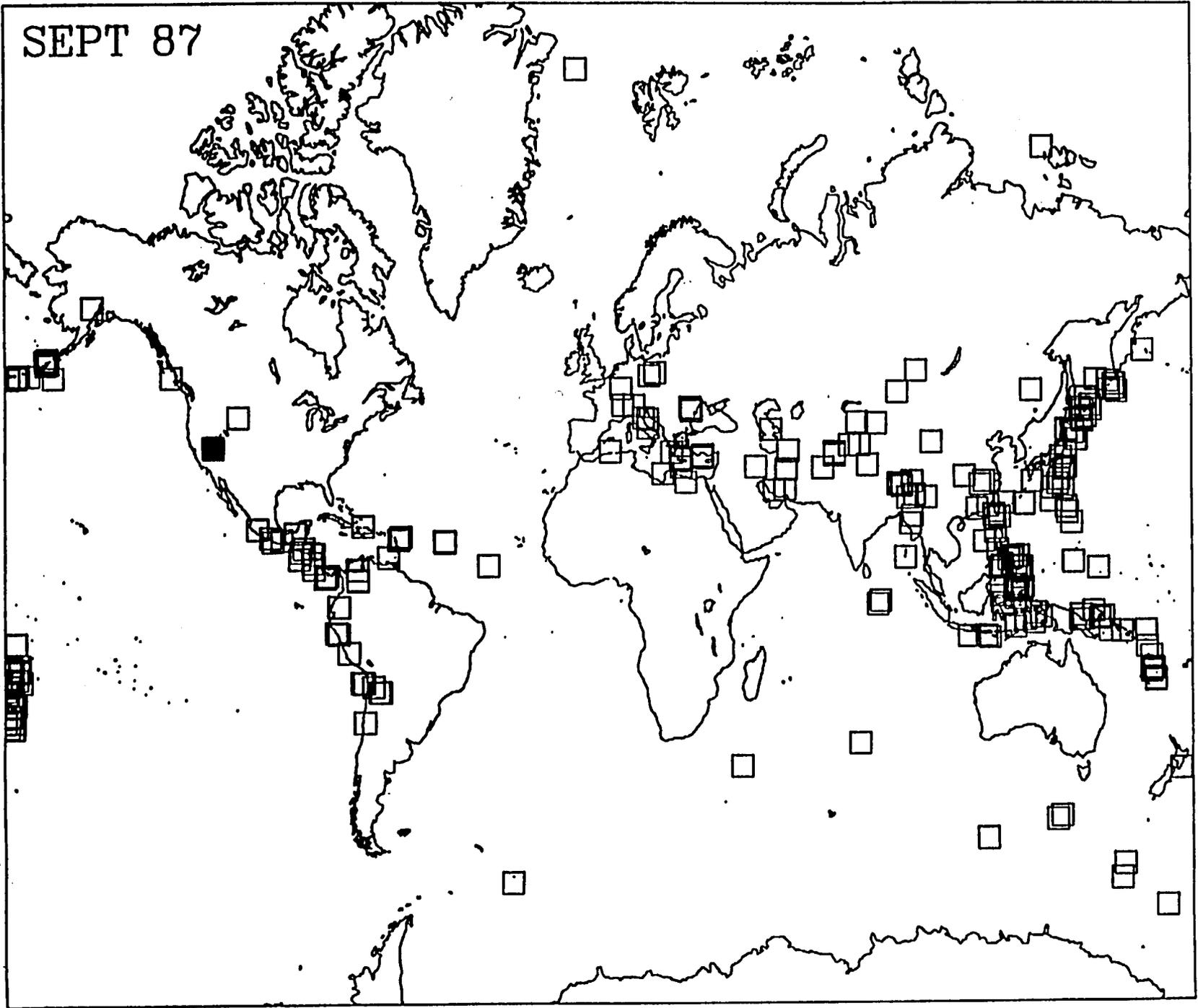
GEOFYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

SEPTEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
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 Column 3: Y - Detected at Yellowknife Array :

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	25 4:28:27.0	44.35	-108.89	33N	7	4.5	WYOMING
Y	25 7:54:59.6	45.31	27.99	33N	19	4.3	RUMANIA
A Y	25 8: 1:39.5	51.61	-176.18	33N	11	4.5	ANDREANOF ISLANDS, ALEUTIAN IS
	25 9: 9:18.9	29.71	139.06	33N	4	4.2	SOUTH OF HONSHU, JAPAN
	25 17: 1:30.4	3.47	128.77	165	5	4.3	NORTH OF HALMAHERA
C	25 23:16:23.0	29.71	91.34	12	20	4.8	TIBET
Y	26 0:24:21.4	-21.00	-71.85	33N	6	4.8	OFF COAST OF NORTHERN CHILE
C	26 1: 3: 2.3	29.72	90.26	33N	4	4.1	TIBET
	26 1:12:20.9	-6.17	132.00	118	4	4.2	TANIMBAR ISLANDS REGION
U Y	26 5:30:37.8	55.38	164.95	44	36	4.9	KOMANDORSKY ISLANDS REGION
A	26 10:40:53.2	51.38	-165.22	33N	7	4.7	ALEUTIAN ISLANDS REGION
	26 13: 7:18.3	22.23	94.80	33N	5	3.9	BURMA
Y	26 13: 7:26.9	20.33	143.28	33N	3	4.0	MARIANA ISLANDS REGION
	26 15: 8:13.7	7.40	127.66	33N	6	4.4	PHILIPPINE ISLANDS REGION
U Y	26 21:22:57.7	48.88	154.66	33N	26	5.1	KURILE ISLANDS
Y	27 3:40:11.1	-4.61	134.17	35	12	4.9	WEST IRIAN
C Y	27 6:12:43.3	34.30	80.99	33N	13	4.6	TIBET
Y	27 8:30: 7.8	19.24	-103.09	33N	17	5.0	JALISCO, MEXICO
	27 12:23: 7.7	43.00	146.75	33N	4	4.3	OFF COAST OF HOKKAIDO, JAPAN
	27 21:19:16.8	12.81	-86.24	33N	8	4.4	NICARAGUA
	27 21:22:39.4	-20.86	169.00	33N	18	4.7	NEW HEBRIDES ISLANDS
	27 21:52:32.0	8.95	-86.05	33N	5	4.3	OFF COAST OF COSTA RICA
A Y	28 1:16:16.2	51.40	-176.69	33N	14	4.6	ANDREANOF ISLANDS, ALEUTIAN IS
	28 2:58:53.9	10.16	143.84	33N	6	4.6	SOUTH OF MARIANA ISLANDS
	28 7:15:41.1	-18.45	167.52	33N	30	5.1	NEW HEBRIDES ISLANDS
	28 8:36: 7.7	-20.38	-177.89	33N	6	5.2	WEST OF TONGA ISLANDS
	28 10:11:42.5	-21.37	-177.74	33N	13	5.1	WEST OF TONGA ISLANDS
	28 11:47: 8.1	-19.00	167.72	33N	19	5.5	NEW HEBRIDES ISLANDS REGION
	28 12:16:55.0	-18.86	167.61	33N	14	4.9	NEW HEBRIDES ISLANDS
C	28 13: 1: 4.0	26.69	99.05	33N	3	4.4	YUNNAN PROVINCE, CHINA
	28 13:46:15.8	-18.56	168.18	33N	35	5.6	NEW HEBRIDES ISLANDS
	28 15: 1: 1.9	-18.45	167.59	33N	15	4.6	NEW HEBRIDES ISLANDS
	28 23: 9:39.5	-18.32	167.59	33N	18	4.9	NEW HEBRIDES ISLANDS
	29 0:40:34.3	2.27	127.10	45	13	5.1	MOLUCCA PASSAGE
	29 1: 9:10.3	28.85	137.30	33N	4	4.3	BONIN ISLANDS REGION
Y	29 8:19: 6.4	9.07	126.57	33N	10	4.9	MINDANAO, PHILIPPINE ISLANDS
C	29 17:30:27.8	29.99	90.65	33N	4	4.7	TIBET
C Y	29 18:31:19.4	30.41	116.51	33N	13	4.2	EASTERN CHINA
Y	29 18:36:12.6	28.45	52.86	33N	14	4.9	SOUTHERN IRAN
	30 1:39:26.8	-18.10	167.91	33N	23	4.6	NEW HEBRIDES ISLANDS
	30 18:59:25.8	1.23	121.82	33N	4	4.5	NORTHERN CELEBES
	30 22:14:40.9	-7.30	126.39	285	6	3.9	BANDA SEA

SEPT 87



GLOBAL SEISMIC EVENT BULLETIN - OCTOBER 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.W. Duff and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

1 Observatory Crescent, Ottawa K1A 0Y3

INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - OCTOBER 1987.

There were three nuclear explosions in October: in Western Kazakh (USSR) on the 3rd at 15:14; at the Nevada test site (USA) on the 23rd at 16:00; and at the French test site in the Tuamotu Archipelago, on the 23rd at 16:50. All three of these explosions were detected by the Yellowknife Array.

The largest event in this bulletin is an earthquake in the Banda Sea on the 3rd, with a magnitude of 6.6. A large earthquake on the 12th near the Solomon Islands was followed by a series of aftershocks. An earthquake on the 25th in West Irian also had a series of aftershocks. This bulletin also contains one foreshock of each of these events.

This bulletin contains 275 events. Of these, 69 were detected by the Yellowknife Array, which is 25% of the total.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

OCTOBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
U Y	1 3:16:26.5	49.56	156.15	33N 27	4.9		KURILE ISLANDS
U	1 3:24:54.4	54.98	162.19	33N 13	4.4		NEAR EAST COAST OF KAMCHATKA
Y	1 5:51:32.4	13.66	-88.20	33N 10	4.8		EL SALVADOR
	1 7:29:20.1	-11.40	166.21	33N 10	5.7		SANTA CRUZ ISLANDS
A	1 14:42:23.6	34.41	-117.72	33N 26	5.6		SOUTHERN CALIFORNIA
U	1 17:26:13.7	54.64	161.84	33N 5	4.5		NEAR EAST COAST OF KAMCHATKA
Y	2 7:37:36.0	26.39	139.82	33N 36	6.0		BONIN ISLANDS REGION
	2 11:27: 8.2	0.12	-28.08	33N 10	4.8		CENTRAL MID-ATLANTIC RIDGE
	2 20:15:53.3	-13.53	-174.91	33N 4	4.1		SAMOA ISLANDS REGION
Y	2 22:14:52.6	-7.53	-78.62	33N 9	4.8		NORTHERN PERU
Y	2 22:27:58.2	-8.13	-78.14	33N 15	5.3		NEAR COAST OF NORTHERN PERU
U Y	3 0:21: 5.3	43.38	147.49	33N 9	4.5		KURILE ISLANDS
U	3 0:42:33.8	38.00	73.03	33N 10	4.5		TADZHIK-SINKIANG BORDER REGION
U Y	3 0:58:58.1	44.24	147.30	33N 6	4.3		KURILE ISLANDS
Y	3 3:35: 3.4	-17.89	-69.11	81 48	5.9		PERU-BOLIVIA BORDER REGION
Y	3 9:15:45.4	12.48	-88.49	33N 15	4.8		OFF COAST OF CENTRAL AMERICA
Y	3 10:16:22.5	-5.61	131.27	33N 35	6.6		BANDA SEA
U Y	3 11: 0:11.1	38.45	71.62	70 49	5.7		AFGHANISTAN-USSR BORDER REGION
U	3 15:15: 6.3	48.15	57.49	33N 7	4.8		WESTERN KAZAKH SSR
Y	3 18:22:28.9	22.32	142.36	33N 6	4.7		VOLCANO ISLANDS REGION
C Y	4 0:51:44.8	36.93	75.59	33N 4	4.6		KASHMIR-SINKIANG BORDER REGION
Y	4 2:47:21.4	15.81	-92.90	33N 17	5.3		MEXICO-GUATEMALA BORDER REGION
C Y	4 3: 4:47.7	40.13	75.18	33N 5	4.5		KIRGIZ-SINKIANG BORDER REGION
Y	4 8:15:15.7	10.67	-85.86	33N 39	5.5		COSTA RICA
A	4 8:40:40.9	51.91	175.96	33N 5	4.4		RAT ISLANDS, ALEUTIAN ISLANDS
Y	4 10:27:23.5	38.38	141.62	33N 35	5.6		NEAR EAST COAST OF HONSHU, JAPA
U	4 10:49:37.2	38.00	72.06	33N 6	4.7		TADZHIK SSR
A	4 10:59:41.3	34.12	-117.69	33N 14	5.1		SOUTHERN CALIFORNIA
U	4 11: 7:12.6	48.06	155.04	33N 7	4.5		KURILE ISLANDS
	4 12:26:17.0	-4.95	151.70	33N 5	4.9		NEW BRITAIN REGION
U Y	4 18:34:27.4	56.30	161.86	66 46	5.8		NEAR EAST COAST OF KAMCHATKA
	4 21:26: 8.4	38.37	142.19	33N 5	4.7		NEAR EAST COAST OF HONSHU, JAPA
U	5 0:35: 3.1	36.48	71.49	33N 4	3.7		AFGHANISTAN-USSR BORDER REGION
Y	5 0:50: 5.7	24.06	142.78	33N 9	4.5		VOLCANO ISLANDS REGION

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

OCTOBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	5 7:24:23.5	4.70	97.49	33N	3	3.7	NORTHERN SUMATRA
	5 9:27:0.7	35.97	28.44	33N	32	4.7	EASTERN MEDITERRANEAN SEA
	5 15:08:52.6	-21.82	-174.95	33N	5	4.5	TONGA ISLANDS
	5 18:58:2.5	0.31	129.67	46	8	5.1	HALMAHERA
	5 22:41:25.7	1.83	127.13	29	8	4.8	HALMAHERA
Y	6 0:50:3.4	19.06	145.50	33N	18	5.4	MARIANA ISLANDS
	6 0:51:16.8	15.09	137.43	33N	4	4.8	WEST OF MARIANA ISLANDS
Y	6 4:19:10.1	-17.71	-172.72	33N	45	6.0	TONGA ISLANDS REGION
	6 6:10:33.1	-17.22	-172.62	33N	5	4.5	TONGA ISLANDS REGION
	6 11:28:24.4	35.99	28.30	33N	15		EASTERN MEDITERRANEAN SEA
C	6 13:06:19.7	43.53	88.59	33N	11	4.6	NORTHERN SINKIANG PROV, CHINA
	6 14:29:7.4	5.66	125.80	33N	7	4.5	MINDANAO, PHILIPPINE ISLANDS
	6 15:52:29.5	-40.82	-70.47	33N	4		ARGENTINA
	6 16:07:43.9	-21.63	-178.79	33N	20	5.2	WEST OF TONGA ISLANDS
	6 16:53:24.4	-19.70	-170.80	33N	3	4.5	TONGA ISLANDS REGION
U Y	6 20:11:33.4	52.91	159.98	26	59	6.0	OFF EAST COAST OF KAMCHATKA
U	6 21:38:1.4	60.33	122.22	33N	4	4.1	CENTRAL SIBERIA
	6 22:01:56.3	6.59	126.96	166	5	4.1	MINDANAO, PHILIPPINE ISLANDS
C	6 22:18:19.9	29.82	90.39	33N	5	4.2	TIBET
	6 23:13:41.0	-6.09	154.51	93	6	4.7	SOLOMON ISLANDS
Y	7 0:51:27.7	-22.91	-67.23	33N	16	5.9	CHILE-BOLIVIA BORDER REGION
U	7 3:21:35.3	43.62	77.19	33N	5	4.3	ALMA-ATA REGION
U	7 6:18:56.0	44.68	150.40	32	55	5.3	KURILE ISLANDS REGION
	7 6:42:36.7	27.47	129.44	33N	10	4.6	RYUKYU ISLANDS
	7 19:54:21.5	28.80	53.28	138	15	4.8	SOUTHERN IRAN
	7 21:15:29.3	12.59	125.08	33N	4	4.6	SAMAR, PHILIPPINE ISLANDS
Y	8 2:30:25.3	43.43	142.22	33N	37	5.4	HOKKAIDO, JAPAN REGION
Y	8 3:21:26.9	-19.21	-171.67	371	27	5.8	TONGA ISLANDS REGION
	8 3:25:39.6	11.60	115.04	33N	5	4.9	SOUTH CHINA SEA
U	8 4:36:37.5	53.21	159.54	33N	3	4.2	NEAR EAST COAST OF KAMCHATKA
U	8 4:42:13.5	52.91	160.08	33N	13	5.0	OFF EAST COAST OF KAMCHATKA
U	8 6:19:20.2	73.56	118.12	33N	3	4.4	NEAR COAST OF CENTRAL SIBERIA
	8 8:51:11.8	14.25	124.41	33N	5	4.5	LUZON, PHILIPPINE ISLANDS
U Y	8 10:48:2.9	55.59	160.51	33N	7	4.2	KAMCHATKA
A	8 13:28:46.7	55.15	-162.08	33N	13	4.7	ALASKA PENINSULA
U	9 1:13:43.1	36.94	71.77	33N	7	4.8	AFGHANISTAN-USSR BORDER REGION
	9 4:38:08.2	-14.98	-174.44	33N	6	4.4	SAMOA ISLANDS REGION
	9 5:37:54.8	-2.43	141.38	33N	3	4.5	NEAR NORTH COAST OF PAPUA NEW G
	9 10:17:38.1	-7.83	105.42	33N	12	4.9	JAVA
	9 20:24:15.5	51.39	15.87	33N	19		POLAND
	9 23:41:52.4	-17.72	-172.77	33N	3	4.9	TONGA ISLANDS REGION
U	10 0:04:13.4	36.50	70.96	33N	4	3.8	HINDU KUSH REGION
Y	10 3:47:56.3	-6.69	-73.24	33N	6	4.3	PERU-BRAZIL BORDER REGION

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

OCTOBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	10 14:22:42.2	-3.82	153.76	33N	4	3.5	NEW IRELAND REGION
Y	10 14:26:37.2	-6.14	113.15	581	41	5.0	JAVA
	10 15:58:46.3	-5.15	153.34	33N	7	4.3	NEW IRELAND REGION
Y	10 23:41: 3.3	18.31	146.90	33N	4	4.2	MARIANA ISLANDS
Y	11 0:13:52.5	10.59	-90.29	33N	8	4.8	OFF COAST OF CENTRAL AMERICA
	11 0:15:10.6	21.03	-90.25	33N	7	5.7	YUCUTAN PENINSULA
	11 3:41:13.5	8.85	125.38	629	4	3.7	MINDANAO, PHILIPPINE ISLANDS
	11 6:26:56.7	42.08	142.59	33N	5	4.1	HOKKAIDO, JAPAN REGION
	11 9: 0:44.5	-12.76	165.75	33N	6	4.3	SANTA CRUZ ISLANDS
	11 18: 3: 0.8	-33.07	178.45	33N	8	5.6	SOUTH OF KERMADEC ISLANDS
Y	11 22:45:40.7	-6.21	146.57	33N	25	5.3	EAST PAPUA NEW GUINEA REGION
	12 0: 4:53.1	-6.46	127.98	306	5		BANDA SEA
	12 8: 6:12.2	34.57	23.61	33N	11	4.3	CRETE
	12 10:43:31.3	-2.31	107.85	142	6	4.3	JAVA SEA
Y	12 13:57: 7.3	-7.25	154.29	33N	50	5.7	SOLOMON ISLANDS
Y	12 14:10:31.6	-7.11	154.15	387	6	4.1	SOLOMON ISLANDS
Y	12 14:21: 3.2	-7.37	154.43	33N	10	4.9	SOLOMON ISLANDS
	12 14:49:29.7	-7.83	153.74	33N	4	4.4	NEW BRITAIN REGION
	12 15:13: 5.9	-7.21	154.32	33N	4	4.4	SOLOMON ISLANDS
	12 19:34:53.3	-7.33	154.07	33N	5	4.5	SOLOMON ISLANDS
	12 20:48:51.3	-7.56	153.41	33N	4	4.3	NEW BRITAIN REGION
	12 21:41:38.7	41.46	139.12	33N	16	4.7	HOKKAIDO, JAPAN REGION
	12 22: 9:11.5	32.63	138.11	33N	11	5.0	SOUTH OF HONSHU, JAPAN
	13 2:42:25.2	-21.05	-177.60	33N	6	4.9	WEST OF TONGA ISLANDS
	13 5:36:25.2	-19.08	166.65	33N	5	4.5	NEW HEBRIDES ISLANDS REGION
U	13 6:41: 7.7	45.25	149.48	33N	17	4.6	KURILE ISLANDS
	13 10:40:37.8	-7.40	154.59	33N	3	4.4	SOLOMON ISLANDS
	13 13:54:43.1	-7.72	155.65	92	12	5.1	SOLOMON ISLANDS
Y	13 13:54:45.2	-7.73	155.37	33N	12	5.1	SOLOMON ISLANDS
Y	13 17:43:29.2	-34.14	56.49	33N	4	4.5	SOUTH INDIAN OCEAN
	14 2:11:12.5	-34.90	179.71	33N	19	5.5	SOUTH OF KERMADEC ISLANDS
	14 2:48:54.8	-8.18	110.55	165	6	3.9	JAVA
Y	14 7:37:18.7	21.28	121.81	33N	21	5.2	TAIWAN REGION
Y	14 8:38:27.0	5.63	133.29	33N	15	5.4	WEST CAROLINE ISLANDS
	14 9: 0:52.9	44.08	12.29	33N	20		NORTHERN ITALY
A	14 9:58:27.0	50.12	166.63	33N	5	5.1	ALEUTIAN ISLANDS REGION
	14 11:39:39.0	-7.33	154.35	33N	8	4.7	SOLOMON ISLANDS
U	Y 14 12:18: 4.5	36.76	70.71	33N	8	4.8	HINDU KUSH REGION
	14 17: 4:59.2	19.46	126.81	33N	5	5.3	EAST OF PHILIPPINE ISLANDS
Y	14 19: 6: 2.1	14.16	-89.27	43	31	5.0	GUATEMALA
	14 19:32:19.7	1.85	97.35	33N	3	4.5	NORTHERN SUMATRA
U	Y 14 20:13:43.9	47.29	152.27	33N	7	4.3	KURILE ISLANDS
Y	14 22:26:34.4	3.74	128.27	162	15	5.0	NORTH OF HALMAHERA

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG		
14	23:23:41.7	-12.35	150.66	33N	7	4.8	CORAL SEA	
14	23:30:14.7	5.49	95.29	33N	7	5.2	NORTHERN SUMATRA	
14	23:30:28.0	5.55	95.39	33N	8	4.9	NORTHERN SUMATRA	
15	1: 6: 1.1	-6.84	129.11	22	14	5.2	BANDA SEA	
15	5:11:45.7	28.88	-111.62	33N	5	4.6	GULF OF CALIFORNIA	
15	6: 7: 3.0	-15.08	-175.41	33N	15	5.3	TONGA ISLANDS	
A	15	7:26:57.5	51.69	-175.19	33N	28	5.0	ANDREANOF ISLANDS, ALEUTIAN IS
	15	14: 8:18.1	1.15	122.82	33N	7	4.8	NORTHERN CELEBES
	15	18:11:45.2	-18.90	-175.90	33N	4	4.4	TONGA ISLANDS
Y	16	6:53: 8.8	-21.05	-69.41	33N	11	4.9	NORTHERN CHILE
	16	16:48:25.0	12.74	-87.15	33N	4	4.2	NEAR COAST OF NICARAGUA
C	16	18:30:52.7	44.63	84.77	33N	4	4.3	NORTHERN SINKIANG PROV, CHINA
	16	19: 8:56.1	-5.76	146.23	360	6	4.1	EAST PAPUA NEW GUINEA REGION
	16	20:19:53.6	-24.80	-178.50	33N	4	5.0	SOUTH OF FIJI ISLANDS
	16	20:48: 1.9	-5.94	148.63	33N	27	5.4	NEW BRITAIN REGION
	17	0:45:58.5	-5.38	147.45	186	4	4.8	EAST PAPUA NEW GUINEA REGION
U Y	17	1:13:21.1	35.97	69.53	33N	9	5.1	HINDU KUSH REGION
	17	2:35:42.1	51.27	16.06	33N	14		POLAND
	17	7:44:17.9	-5.79	146.30	362	4	4.3	EAST PAPUA NEW GUINEA REGION
A	17	8:12:34.5	44.23	-123.55	33N	11	4.7	OREGON
	17	10:52:24.4	-5.87	149.01	33N	4	4.6	NEW BRITAIN REGION
	17	11:38: 2.2	-30.31	-175.55	33N	4	4.1	KERMADEC ISLANDS REGION
	17	13: 8:48.3	-5.82	148.55	33N	4	4.6	NEW BRITAIN REGION
	17	14:36:52.6	9.58	122.86	33N	9	4.6	NEGROS, PHILIPPINE ISLANDS
	17	17:35:22.7	-7.24	149.37	33N	5	4.4	NEW BRITAIN REGION
	17	18:41: 7.3	35.48	139.18	33N	17	4.9	NEAR S COAST OF HONSHU, JAPAN
A	17	18:51:31.5	54.44	-164.23	33N	5	4.5	UNIMAK ISLAND REGION
	18	2:37:51.2	24.87	123.22	33N	4	4.7	SOUTHWESTERN RYUKYU ISLANDS
	18	2:49:48.9	15.63	-89.54	447	9	4.1	GUATEMALA
U Y	18	3:13:51.3	36.60	70.22	33N	14	4.6	HINDU KUSH REGION
U	18	14:17:38.6	46.61	146.48	33N	3	4.2	NORTHWEST OF KURILE ISLANDS
	18	14:24:47.0	-6.62	149.42	33N	9	4.9	NEW BRITAIN REGION
	18	19:27:53.5	-6.24	147.33	244	4		EAST PAPUA NEW GUINEA REGION
A Y	18	22:23:49.1	52.30	-169.32	33N	18	4.7	FOX ISLANDS, ALEUTIAN ISLANDS
	19	0:38:13.7	1.97	127.07	33N	5	4.3	HALMAHERA
	19	2: 0:10.1	27.16	128.63	33N	10	4.6	RYUKYU ISLANDS
	19	4:42:31.8	62.30	-123.41	33N	3		NORTHWEST TERRITORIES, CANADA
	19	6:54:50.8	-2.55	102.28	149	14	4.8	SOUTHERN SUMATRA
U Y	19	8:15:52.4	55.43	162.93	33N	18	4.5	NEAR EAST COAST OF KAMCHATKA
	19	12:52:47.1	13.92	121.01	33N	3	4.5	MINDORO, PHILIPPINE ISLANDS
A	19	22: 3: 6.6	53.00	-169.63	33N	10	4.5	FOX ISLANDS, ALEUTIAN ISLANDS
	20	0:33:30.4	46.37	12.73	33N	20		NORTHERN ITALY
	20	3:52: 3.4	41.45	144.51	33N	21	4.5	HOKKAIDO, JAPAN REGION

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	20 9:23:35.8	52.62	172.42	31	53	5.3	NEAR ISLANDS, ALEUTIAN ISLANDS
A	20 9:33:25.4	52.67	172.21	33N	9	4.6	NEAR ISLANDS, ALEUTIAN ISLANDS
	20 12:10:44.0	-23.89	-176.29	33N	5	4.2	SOUTH OF FIJI ISLANDS
	20 14:18:59.5	27.77	139.66	116	12	4.6	BONIN ISLANDS REGION
Y	20 21:11: 7.9	1.52	-87.12	33N	13	5.3	GALAPAGOS ISLANDS REGION
	20 21:30:12.4	-36.64	-174.87	33N	4	4.1	EAST OF NORTH ISLAND, NZ.
	21 2:52: 6.2	-15.79	166.87	33N	17	4.7	NEW HEBRIDES ISLANDS
	21 6:11:37.1	-23.26	-113.66	33N	5	4.6	EASTER ISLAND REGION
	21 7:25: 7.6	-7.32	129.25	40	38	5.5	BANDA SEA
Y	21 10: 3:40.3	17.17	145.82	33N	8	4.8	MARIANA ISLANDS
A Y	21 17:47:22.3	51.70	179.63	33N	22	5.1	RAT ISLANDS, ALEUTIAN ISLANDS
Y	21 17:47:49.2	0.86	163.99	33N	4	4.9	CAROLINE ISLANDS REGION
Y	21 23:25:49.5	-20.53	-68.13	46	24	5.3	CHILE-BOLIVIA BORDER REGION
	22 0:21:17.3	-5.96	103.71	33N	14	5.2	SOUTHERN SUMATRA
Y	22 0:32: 5.9	49.05	-129.08	33N	7		VANCOUVER ISLAND REGION
	22 0:42: 0.6	-12.74	99.52	97	6	4.9	SOUTH INDIAN OCEAN
	22 4:59: 0.1	30.90	130.43	33N	15	5.0	KYUSHU, JAPAN
	22 12:12:15.5	-26.54	-175.80	33N	18	5.1	SOUTH OF TONGA ISLANDS
	22 13:10:34.0	-18.88	-174.65	33N	16	5.0	TONGA ISLANDS
U Y	22 14:20:26.1	50.67	155.08	72	13	4.5	KURILE ISLANDS
	22 15:49:16.2	2.53	99.29	191	6	3.9	NORTHERN SUMATRA
	22 16:44:22.2	-18.75	168.98	33N	28	5.7	NEW HEBRIDES ISLANDS
	22 17:52: 7.1	33.12	27.11	33N	5	4.3	EASTERN MEDITERRANEAN SEA
U	23 0:59:43.8	53.07	160.02	33N	42	5.2	NEAR EAST COAST OF KAMCHATKA
	23 4:53:21.3	5.99	126.40	11	16	5.1	MINDANAO, PHILIPPINE ISLANDS
U	23 6:50:37.5	42.42	43.29	32	33	4.2	WESTERN CAUCASUS
	23 7:36:46.3	-22.78	-178.30	33N	5	4.5	SOUTH OF FIJI ISLANDS
	23 8:43:57.6	-13.52	108.66	45	6	4.1	NORTHWEST OF AUSTRALIA
Y	23 10:12:49.6	5.99	-72.87	33N	7	4.5	COLOMBIA
	23 14: 2:56.1	-6.56	130.04	146	5	4.3	BANDA SEA
	23 14:17:32.4	-15.28	-174.14	33N	4	3.8	TONGA ISLANDS
A	23 16: 0: 5.6	37.29	-115.88	33N	27	5.0	SOUTHERN NEVADA
F Y	23 16:50: 6.8	-22.05	-136.35	33N	21	5.5	TUAMOTU ARCHIPELAGO REGION
	23 18:51:51.9	7.61	125.60	641	5	3.7	MINDANAO, PHILIPPINE ISLANDS
	23 19:38:47.5	29.19	128.13	33N	5	4.8	EAST CHINA SEA
	24 1:26:59.5	27.82	66.06	30	24	4.5	PAKISTAN
A	24 2:49:46.3	64.26	-147.98	33N	10	4.3	CENTRAL ALASKA
	24 4: 3: 4.4	3.06	126.65	33N	6	5.3	TALAUD ISLANDS
	24 10:24:54.6	-1.95	103.79	33N	7	4.8	SOUTHERN SUMATRA
Y	24 14:37: 0.6	-10.76	166.29	33N	26	5.4	SANTA CRUZ ISLANDS
U	24 18:13:18.2	50.03	151.56	33N	4	4.6	NORTHWEST OF KURILE ISLANDS
C	24 19:12:40.4	35.19	104.89	33N	8	4.7	KANSU PROVINCE, CHINA
	25 1: 1:17.4	-0.24	124.46	33N	7	4.7	MOLUCCA SEA

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	25 4:15:28.7	51.66	16.20	33N	20		POLAND
	25 8:26:46.0	-3.19	101.79	33N	4	4.4	SOUTHERN SUMATRA
C	25 8:54:28.0	35.42	93.33	33N	3	3.8	TSINGHAI PROVINCE, CHINA
	25 13: 1:19.0	33.85	32.17	33N	13	4.5	EASTERN MEDITERRANEAN SEA
	25 16:26:48.8	-2.45	137.24	33N	3	4.3	WEST IRIAN
	25 16:28:51.8	-6.59	155.49	33N	4	4.5	SOLOMON ISLANDS
	25 16:46:15.8	5.63	36.75	18	36	5.5	ETHIOPIA
	25 16:54: 6.8	-2.39	138.17	33N	38	5.8	WEST IRIAN
	25 19:37:49.8	-2.30	133.78	33N	3		WEST IRIAN
Y	25 19:49:21.3	12.12	143.97	33N	9	4.8	SOUTH OF MARIANA ISLANDS
	25 22:25:38.9	-1.71	140.22	76	4	4.6	WEST IRIAN
	25 22:52:47.8	-7.32	130.05	102	11	4.7	TANIMBAR ISLANDS REGION
	26 0:18:16.8	-1.92	139.45	33N	4	4.2	NEAR N COAST OF WEST IRIAN
	26 2:21:27.9	-2.52	138.18	33N	3	4.1	WEST IRIAN
	26 2:53:51.8	-2.60	138.16	73	5	4.6	WEST IRIAN
	26 4:15: 2.0	-1.60	140.63	33N	3	4.2	WEST IRIAN
	26 4:26:15.5	-1.88	140.07	33N	5	4.3	WEST IRIAN
	26 4:49:59.6	-2.96	136.30	33N	4	4.4	WEST IRIAN
	26 5: 7:12.3	29.49	68.35	33N	4	4.7	PAKISTAN
	26 6: 3:49.3	-2.64	137.81	33N	4	4.4	WEST IRIAN
	26 18:34:29.4	-1.96	139.81	33N	3	4.3	NEAR N COAST OF WEST IRIAN
	26 18:46:12.4	-6.39	130.76	101	8	4.6	BANDA SEA
Y	26 18:56:14.2	18.92	146.34	33N	10	5.1	MARIANA ISLANDS
Y	26 18:59:16.7	40.89	143.24	33N	3	3.9	OFF EAST COAST OF HONSHU, JAPAN
	27 3:15: 2.0	-42.23	172.74	33N	6	4.2	SOUTH ISLAND, NEW ZEALAND
Y	27 3:15:36.3	41.39	29.88	33N	9	3.7	TURKEY
Y	27 5: 1:55.0	12.31	-87.05	33N	7	4.8	NEAR COAST OF NICARAGUA
U	27 5:15:42.5	48.46	28.02	33N	3	5.1	SOUTHWESTERN USSR
Y	27 7:30:46.0	14.32	-96.35	33N	3		OFF COAST OF OAXACA, MEXICO
	27 10:10:19.0	4.33	126.00	33N	3	4.4	TALAUD ISLANDS
Y	27 10:22:44.5	12.31	144.23	37	19	5.0	SOUTH OF MARIANA ISLANDS
	27 11:44:54.7	-22.25	169.53	33N	8	4.1	LOYALTY ISLANDS REGION
	27 12: 6:54.0	-3.87	150.69	33N	3	4.1	NEW IRELAND REGION
	27 12:57: 3.4	-20.46	-177.34	33N	34	5.7	WEST OF TONGA ISLANDS
	27 15:34:50.0	-9.47	121.47	33N	5	4.2	SAWU SEA
	27 17:17:22.0	-2.55	137.98	33N	3	4.3	WEST IRIAN
	27 18:19:48.0	36.65	17.14	33N	12	5.0	MEDITERRANEAN SEA
	27 21:57:10.1	-27.97	-66.45	33N	14		CATAMARCA PROVINCE, ARGENTINA
	28 4:24:25.1	-17.14	-172.40	33N	5	4.5	TONGA ISLANDS REGION
A Y	28 6:36: 9.6	52.34	-170.73	33N	21	4.8	FOX ISLANDS, ALEUTIAN ISLANDS
	28 6:53:27.8	-1.81	139.93	33N	4	4.1	NEAR N COAST OF WEST IRIAN
U	28 8: 5: 4.6	45.64	152.21	33N	6		KURILE ISLANDS REGION
	28 8:58:35.8	5.88	36.80	62	24	4.9	ETHIOPIA

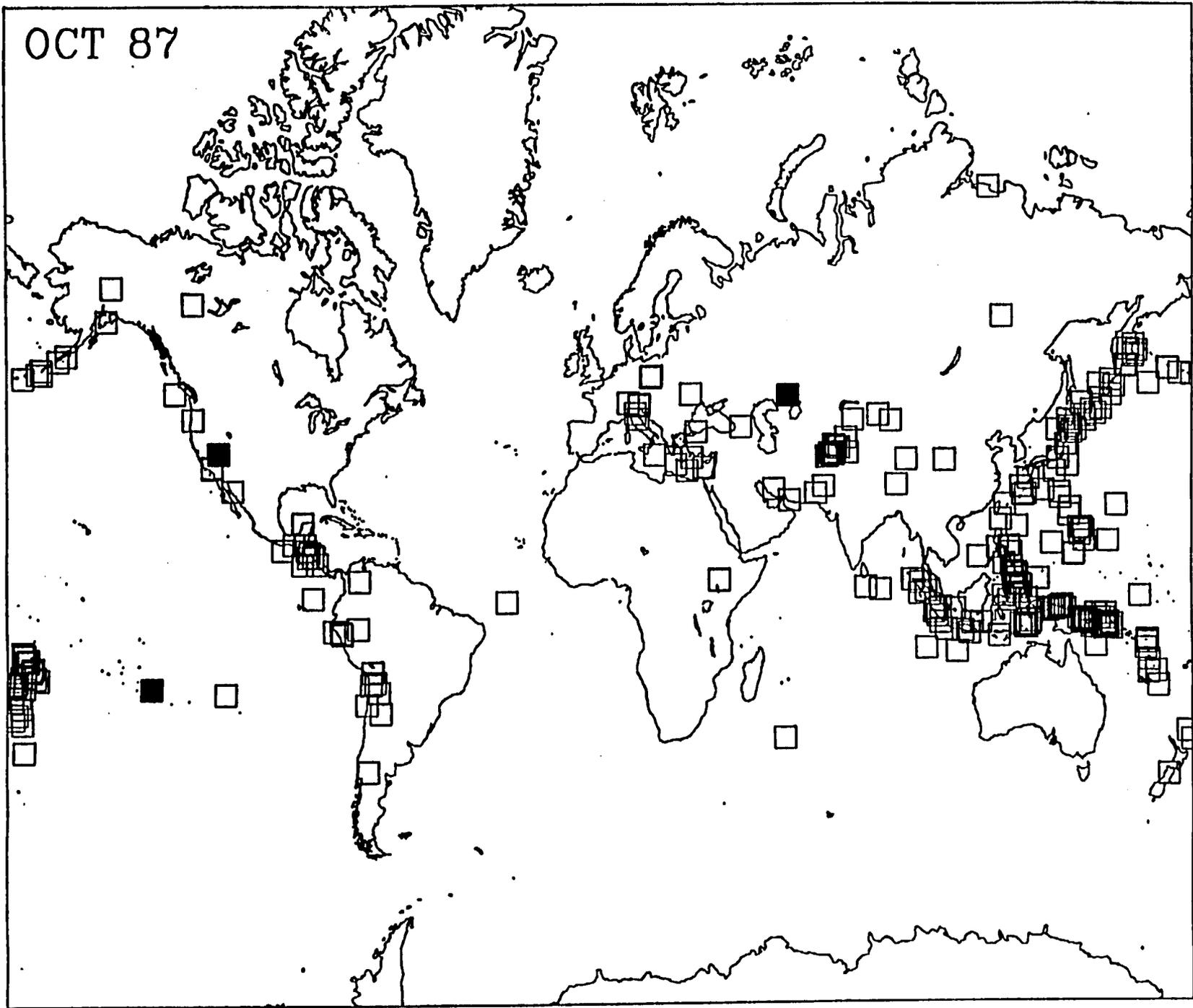
GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

OCTOBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	28 17:56:38.4	-8.71	112.41	33N	7	4.1	JAVA
	28 18:21:29.5	-28.06	-177.08	33N	13	5.1	KERMADEC ISLANDS REGION
	28 21:47: 7.1	26.01	57.88	33N	13	4.5	SOUTHERN IRAN
	28 22:42: 1.7	-29.10	-178.01	33N	5	4.7	KERMADEC ISLANDS
	28 23: 2:53.7	-4.12	102.90	78	7	4.5	SOUTHERN SUMATRA
	28 23:49: 0.3	46.97	9.18	33N	27		SWITZERLAND
	29 6:32:49.8	33.96	142.27	33N	4	3.7	OFF EAST COAST OF HONSHU, JAPAN
	29 14:22: 2.5	15.53	147.07	33N	9	4.4	MARIANA ISLANDS REGION
	29 20: 7:55.1	7.18	126.49	33N	10	4.8	MINDANAO, PHILIPPINE ISLANDS
Y	29 20:23:24.0	4.11	127.90	33N	32	6.1	TALAUD ISLANDS
	30 1:20:40.8	44.95	11.33	33N	19		NORTHERN ITALY
	30 4:32:31.1	-12.75	-175.25	33N	6	4.4	SAMOA ISLANDS REGION
	30 5:42:57.2	2.97	85.41	182	13	4.5	NORTH INDIAN OCEAN
	30 12:58:37.4	-14.72	-173.87	33N	5	4.2	SAMOA ISLANDS REGION
	30 14:55:46.0	-15.29	-173.69	33N	18	5.2	TONGA ISLANDS
	31 0:49:27.9	-4.98	145.48	33N	7	5.0	NEAR NORTH COAST OF PAPUA NEW G
A Y	31 1:27:56.8	60.04	-149.64	25	29	4.8	KENAI PENINSULA, ALASKA
Y	31 5:11:14.8	-25.89	-70.78	33N	7	5.1	NEAR COAST OF NORTHERN CHILE
	31 6:13:57.3	3.56	81.09	33N	3	3.9	NORTH INDIAN OCEAN
	31 8:52:29.5	-7.30	-80.46	33N	16	5.2	OFF COAST OF NORTHERN PERU
	31 9: 1:58.8	24.65	156.90	33N	4	4.1	NORTH PACIFIC OCEAN
	31 13: 9:50.4	46.74	12.48	33N	12		NORTHERN ITALY
	31 15:55:34.2	28.32	134.85	33N	4	4.2	EAST OF RYUKYU ISLANDS
U	31 18:35: 6.0	36.05	69.29	33N	4	4.2	HINDU KUSH REGION
	31 22:10: 3.8	-6.13	115.89	33N	4	3.3	BALI SEA
	31 23:33:27.2	15.64	154.26	33N	6	4.3	NORTH PACIFIC OCEAN

OCT 87



GLOBAL SEISMIC EVENT BULLETIN - NOVEMBER 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R. Woodgold and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

1 Observatory Crescent, Ottawa K1A 0Y3

INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - NOVEMBER 1987.

There were four nuclear explosions this month. One of these was in Eastern Kazakh (USSR), on the 15th at 03:31. The other three were at the French Mururoa test site: on the 5th at 17:29, on the 19th at 16:30, and on the 29th at 17:59. The explosion on the 29th does not appear in this bulletin, since it was not detected by enough of the stations used to make this bulletin. All four explosions, however, were detected by the Yellowknife Array.

The two largest events this month were two earthquakes in the Gulf of Alaska, magnitude 6.2 on the 17th and magnitude 6.0 on the 30th. There were several smaller shocks within the two days following the first of these. One aftershock of the second appears in this bulletin; these probably continue into the beginning of the next month.

There are 264 events in this bulletin, of which 96 (36%) were detected by the Yellowknife Array.

MAP

The attached map shows the seismic events listed in this bulletin. The solid squares are nuclear explosions; the open squares are earthquakes.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	1 7:46:21.3	14.77	124.03	33N	3	3.9	LUZON, PHILIPPINE ISLANDS
	1 8:12:58.6	-13.88	165.68	33N	5	4.4	NEW HEBRIDES ISLANDS
Y	1 8:42: 4.4	-28.86	-176.85	33N	52	5.7	KERMADEC ISLANDS REGION
	1 9:52:37.7	-5.23	151.67	33N	4	4.6	NEW BRITAIN REGION
	1 10: 2: 3.3	-25.33	-177.03	33N	5	3.8	SOUTH OF FIJI ISLANDS
	1 16:59:46.7	28.12	25.18	33N	4		UNITED ARAB REPUBLIC
	1 21: 3:11.6	5.78	-73.18	33N	4	4.8	COLOMBIA
	1 23: 6:41.7	-16.38	-177.63	33N	23	4.9	WEST OF TONGA ISLANDS
U	2 6:20:39.2	36.24	69.91	33N	4	4.4	HINDU KUSH REGION
	2 18: 7:20.9	12.51	-12.04	33N	3	4.0	NORTHWEST AFRICA
	2 21:43:35.5	-24.60	-70.43	33N	7		NEAR COAST OF NORTHERN CHILE
	3 0: 7:42.7	30.37	129.53	33N	3	4.3	KYUSHU, JAPAN
	3 1: 2: 5.2	-11.93	166.47	33N	6	4.6	SANTA CRUZ ISLANDS
	3 3:44:30.9	-46.85	33.37	33N	6	4.3	PRINCE EDWARD ISLANDS REGION
Y	3 8:14:58.8	-16.87	-174.02	62	57	5.9	TONGA ISLANDS
	3 9:24:22.1	8.81	94.84	33N	4	4.6	NICOBAR ISLANDS REGION
	3 10:12:44.6	17.53	-70.08	33N	10	4.5	DOMINICAN REPUBLIC REGION
C	3 18:24:48.8	33.14	87.07	33N	9	4.8	TIBET
	3 23: 9:26.1	-8.72	160.45	33N	10	5.2	SOLOMON ISLANDS
A Y	4 0:33:20.8	61.64	-149.85	33N	10	4.9	SOUTHERN ALASKA
	4 23: 7:42.0	-5.88	130.68	33N	3	4.5	BANDA SEA
Y	5 3:19:39.5	-55.89	-28.18	33N	8	5.3	SOUTH SANDWICH ISLANDS REGION
Y	5 5:27:33.0	5.38	-62.82	33N	9	4.9	VENEZUELA
	5 9: 8:34.2	1.77	-101.79	33N	6	5.0	EAST CENTRAL PACIFIC OCEAN
	5 9:12:18.0	-14.64	167.19	33N	15	4.8	NEW HEBRIDES ISLANDS
	5 10: 9:55.0	42.74	142.94	12	5	4.4	HOKKAIDO, JAPAN REGION
	5 11:44: 1.8	-16.24	176.07	33N	3	4.2	FIJI ISLANDS REGION
	5 13:44: 3.2	36.51	-34.11	33N	5	4.4	AZORES ISLANDS REGION
	5 15: 6:41.4	-14.84	-174.51	33N	3	4.2	SAMOA ISLANDS REGION
N F Y	5 17:30: 4.0	-21.79	-138.28	OG	32	5.1	TUAMOTU ARCHIPELAGO REGION
	5 18:31: 8.5	35.39	22.51	33N	5	4.0	MEDITERRANEAN SEA
	5 18:41:47.0	-21.05	-179.05	472	4	4.2	WEST OF TONGA ISLANDS
	5 19: 1:20.1	-5.55	152.05	33N	12	4.8	NEW BRITAIN REGION
Y	5 20:52:45.5	36.34	-33.96	33N	5	4.8	AZORES ISLANDS REGION

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
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 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	5	22: 6:59.1	46.10	8.07	33N	21		SWITZERLAND
	5	22:44:14.4	16.81	-87.06	33N	7	4.4	CARIBBEAN SEA
	5	22:47:37.0	-5.86	105.22	33N	5	4.5	SUNDA STRAIT
U Y	6	7:56:48.8	45.32	149.98	33N	9	4.3	KURILE ISLANDS
	6	16: 8:57.2	32.71	74.45	33N	3	4.6	SOUTHWESTERN KASHMIR
	6	18:33:26.7	-23.60	-63.51	33N	23	5.4	SALTA PROVINCE, ARGENTINA
	6	20:23:45.9	13.28	142.51	33N	4	4.9	SOUTH OF MARIANA ISLANDS
	6	20:26:23.3	37.14	152.06	33N	4	4.0	NORTH PACIFIC OCEAN
U	6	22:27:10.1	43.39	146.43	45	44	5.0	KURILE ISLANDS
	7	1:25: 9.6	3.99	129.64	33N	7	4.7	NORTH OF HALMAHERA
	7	7:34:11.3	-11.99	64.58	33N	16	4.9	SOUTH INDIAN OCEAN
	7	15:54:42.4	-14.22	167.51	33N	22	4.7	NEW HEBRIDES ISLANDS
	7	16:23:50.9	5.81	126.70	33N	39	5.8	MINDANAO, PHILIPPINE ISLANDS
	7	17: 3:48.0	70.66	-1.41	33N	4	4.1	JAN MAYEN ISLAND REGION
	7	18:45:22.2	51.31	15.87	33N	21		POLAND
	8	2:41:14.2	-44.53	97.57	33N	5	4.3	SOUTHEAST INDIAN RISE
	8	6: 6: 6.7	-18.36	167.80	33N	14	4.6	NEW HEBRIDES ISLANDS
	8	9:59:47.7	32.51	136.66	33N	9	4.8	SOUTHEAST OF SHIKOKU, JAPAN
	8	12: 5:38.6	-7.24	125.29	521	5	4.3	BANDA SEA
	8	14:39:12.1	-3.45	138.94	209	5	5.0	WEST IRIAN
	8	16:39:25.7	-6.48	130.86	33N	3	4.2	BANDA SEA
	8	22:43:58.0	44.85	15.78	33N	30		YUGOSLAVIA
	9	3:14:41.4	-10.43	163.49	33N	8	4.4	SOLOMON ISLANDS
	9	6:10:35.9	17.18	120.28	33N	8	4.4	LUZON, PHILIPPINE ISLANDS
	9	14: 7:11.1	47.08	9.13	33N	10		GERMANY
	9	16:43:40.9	32.89	47.88	33N	6	4.8	IRAN-IRAQ BORDER REGION
	9	17:29:14.2	31.09	50.12	33N	4	4.2	IRAN
	9	17:46:21.7	-21.82	-67.52	33N	22	5.5	CHILE-BOLIVIA BORDER REGION
	9	23:37: 6.2	49.42	21.98	33N	6		POLAND
	10	3:21: 2.0	12.63	144.13	33N	12	4.7	SOUTH OF MARIANA ISLANDS
A Y	10	4:27:22.9	52.15	172.33	33N	13	4.5	NEAR ISLANDS, ALEUTIAN ISLANDS
	10	4:33: 8.4	24.48	122.29	32	24	4.9	TAIWAN REGION
U Y	10	12:51: 3.3	50.41	157.53	33N	15	5.0	KURILE ISLANDS
	10	14:38:52.8	-4.28	121.73	33N	3		SULAWESI
Y	10	16:15:34.1	6.45	-75.44	33N	6	4.1	NORTHERN COLOMBIA
	10	17:38: 4.1	35.99	144.91	33N	7	4.7	OFF EAST COAST OF HONSHU, JAPAN
	10	17:38:11.8	36.15	142.16	183	10	4.6	OFF EAST COAST OF HONSHU, JAPAN
	10	20:17:53.3	-5.62	113.34	33N	14	5.0	JAVA SEA
Y	11	3:15: 8.0	-14.83	174.59	33N	23	5.1	FIJI ISLANDS REGION
Y	11	4:13:21.3	27.23	140.93	33N	10	4.7	BONIN ISLANDS REGION
	11	5:55:44.0	46.14	12.51	33N	20		NORTHERN ITALY
U	11	8: 9:49.0	36.10	69.35	33N	6	4.2	HINDU KUSH REGION
	11	10:26:24.3	-17.61	-177.59	33N	6	5.0	WEST OF TONGA ISLANDS

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	11 10:41:32.4	-5.41	153.29	33N	13	5.1	NEW IRELAND REGION
Y	11 15: 5: 3.6	6.33	-77.00	145	24	4.9	NORTHERN COLOMBIA
	11 15:27:38.3	34.61	137.11	33N	5	4.6	NEAR S COAST OF HONSHU, JAPAN
	11 15:32:13.5	19.06	-105.35	33N	11	4.9	NEAR COAST OF JALISCO, MEXICO
Y	11 16:10:56.1	8.95	-76.89	581	10	3.9	NEAR NORTH COAST OF COLOMBIA
Y	12 0:24:39.3	-17.09	-177.39	385	49	5.3	WEST OF TONGA ISLANDS
	12 1: 0: 0.0	-49.84	163.62	33N	13	5.0	AUCKLAND ISLANDS REGION
	12 4: 9:23.1	-21.00	-175.78	33N	3	4.1	TONGA ISLANDS
U	12 9:35:60.0	38.00	68.18	33N	3	4.0	AFGHANISTAN-USSR BORDER REGION
	12 11:50:40.0	-8.65	119.12	33N	3	4.3	FLORES ISLAND REGION
	12 12:52:32.8	42.06	153.83	33N	5	5.3	NORTH PACIFIC OCEAN
U	12 12:52:56.5	49.23	146.00	33N	40	5.2	SEA OF OKHOTSK
	12 13:35:37.1	-7.21	156.53	33N	3	4.0	SOLOMON ISLANDS
	12 13:48:32.1	-4.46	143.31	209	8	4.5	PAPUA NEW GUINEA
	13 3:42: 4.3	-21.95	-178.31	33N	5	4.3	WEST OF TONGA ISLANDS
	13 10: 6:38.5	39.98	142.52	33N	4	3.9	NEAR EAST COAST OF HONSHU, JAPA
	13 13:54:44.6	-31.92	179.81	33N	4	4.5	KERMADEC ISLANDS REGION
	13 16:48: 2.7	21.50	103.40	33N	5	4.1	SOUTHEAST ASIA
	13 20:37:33.4	-5.58	133.65	33N	8	4.8	AROE ISLANDS REGION
	13 22:38:35.1	-19.72	-177.75	33N	11	4.9	WEST OF TONGA ISLANDS
	14 2:16:57.9	37.61	137.09	33N	20	5.0	NEAR WEST COAST OF HONSHU, JAPA
	14 6:56:17.5	-28.76	-177.77	33N	5	4.5	KERMADEC ISLANDS REGION
	14 13:21:51.4	7.34	93.75	33N	3	3.6	NICOBAR ISLANDS REGION
Y	14 13:51:39.6	28.86	129.98	33N	15	4.6	RYUKYU ISLANDS
Y	14 15: 7:57.3	5.15	-72.86	33N	13	4.9	COLOMBIA
A Y	14 15:48:34.0	59.03	-135.01	33N	28	4.9	SOUTHEASTERN ALASKA
	14 21:20:39.4	-0.09	125.14	33N	21	5.3	MOLUCCA SEA
	14 22:16:10.5	20.05	-109.02	33N	20	5.3	REVILLA GIGEDO ISLANDS REGION
Y	14 22:23: 4.4	20.39	-109.02	33N	14	5.5	REVILLA GIGEDO ISLANDS REGION
Y	15 -2:43: 1.6	16.49	-90.80	33N	5	3.6	MEXICO-GUATEMALA BORDER REGION
N U Y	15 3:31:10.8	49.88	78.94	0G	55	5.9	EASTERN KAZAKH SSR
	15 6:14:58.4	20.17	-109.29	33N	5	4.5	REVILLA GIGEDO ISLANDS REGION
	15 7:20:14.3	-21.02	-177.81	33N	8	4.7	WEST OF TONGA ISLANDS
Y	15 9:28:19.1	19.47	-109.12	33N	8	4.8	REVILLA GIGEDO ISLANDS REGION
	15 15:13:23.8	26.65	92.76	33N	4	3.7	EASTERN INDIA
	15 22: 1:15.9	-9.76	-73.39	269	13	4.9	PERU-BRAZIL BORDER REGION
	16 3:26:11.7	14.43	96.09	33N	32	4.9	ANDAMAN ISLANDS REGION
	16 4:27:26.2	-10.68	122.96	33N	6		SAWU SEA
Y	16 5:59:49.2	7.72	125.83	33N	17	5.2	MINDANAO, PHILIPPINE ISLANDS
	16 6:28:28.3	5.32	96.06	33N	3	4.1	NORTHERN SUMATRA
A	16 11:18:18.2	54.04	-163.48	33N	18	4.8	UNIMAK ISLAND REGION
	16 11:36:35.4	12.13	144.29	33N	3	4.0	SOUTH OF MARIANA ISLANDS
	16 12: 7:22.0	34.30	136.99	33N	10	4.9	SOUTHERN HONSHU, JAPAN

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
U Y	16 14:24:17.0	46.27	61.45	33N	8	4.9	WESTERN KAZAKH SSR
U	16 14:51:10.7	48.64	144.12	33N	6	4.0	SEA OF OKHOTSK
U Y	16 21:34: 5.4	40.24	63.27	33N	9	4.3	UZBEK SSR
	17 1:36:45.7	30.77	144.77	33N	3	3.9	NORTH PACIFIC OCEAN
	17 2: 0:49.3	47.08	9.42	33N	19		GERMANY
Y	17 3:40: 3.0	12.02	-87.07	51	151	5.5	NEAR COAST OF NICARAGUA
	17 4:28:26.0	51.63	16.19	33N	11		POLAND
	17 8:38:30.0	5.62	94.94	53	27	5.1	NORTHERN SUMATRA
A	17 8:46:53.3	58.75	-143.02	36	45	6.2	GULF OF ALASKA
	17 9:32: 7.6	-8.57	111.35	33N	4	4.7	JAVA
A Y	17 9:38:13.2	59.02	-142.98	33N	26	5.2	GULF OF ALASKA
	17 9:43:29.1	25.90	96.35	33N	4	4.1	BURMA
U	17 9:51:47.4	36.43	71.15	33N	5	4.4	AFGHANISTAN-USSR BORDER REGION
A	17 13:26:16.6	59.16	-134.70	33N	14	4.7	SOUTHEASTERN ALASKA
	17 15:57:30.8	35.38	131.03	33N	7	4.2	SEA OF JAPAN
Y	17 20:40:43.0	10.40	-79.20	33N	8	4.5	NORTH OF PANAMA
	17 20:59:40.9	36.41	-34.13	33N	4	4.5	AZORES ISLANDS REGION
U Y	18 0: 7: 3.8	48.31	151.20	33N	32	5.1	KURILE ISLANDS
	18 1:34:38.8	-9.24	113.44	33N	3	5.0	SOUTH OF JAVA
Y	18 2:23:28.8	6.39	-72.95	33N	4	4.4	NORTHERN COLOMBIA
Y	18 5:24:43.7	13.69	120.88	33N	13	4.7	MINDORO, PHILIPPINE ISLANDS
A Y	18 6:18:54.8	59.03	-142.86	33N	27	4.8	GULF OF ALASKA
A Y	18 7:13:25.1	59.08	-142.62	33N	11	4.7	GULF OF ALASKA
Y	18 11:39:11.4	10.98	-90.75	33N	7	4.6	OFF COAST OF CENTRAL AMERICA
Y	18 12: 4:43.4	25.92	123.69	33N	26	4.9	NORTHEAST OF TAIWAN
	18 12:27:59.5	-18.82	169.31	33N	6	4.9	NEW HEBRIDES ISLANDS
Y	18 12:46:46.6	-25.78	-70.70	33N	13	5.4	NEAR COAST OF NORTHERN CHILE
A Y	18 13: 2: 0.6	58.92	-142.08	32	31	5.0	GULF OF ALASKA
Y	18 16:27: 8.1	12.80	124.75	48	49	5.8	SAMAR, PHILIPPINE ISLANDS
A	18 17: 4:19.5	51.35	-174.15	33N	6	4.3	ANDREANOF ISLANDS, ALEUTIAN IS
	18 22:19:57.9	-16.19	-173.78	33N	8	4.6	TONGA ISLANDS
	19 4: 8:10.3	-0.96	133.96	168	4	4.0	WEST IRIAN
	19 6:27:59.6	28.94	140.00	33N	3	4.3	BONIN ISLANDS REGION
U	19 10:23: 2.0	40.79	63.94	33N	4	4.3	UZBEK SSR
	19 11:27:38.2	-19.06	-75.57	33N	6	4.6	OFF COAST OF NORTHERN CHILE
Y	19 16: 2:28.8	10.76	-84.79	33N	14	4.6	COSTA RICA
Y	19 16:15:33.2	24.28	142.72	32	44	5.6	VOLCANO ISLANDS REGION
N F Y	19 16:31: 4.8	-21.70	-138.76	0G	28	5.4	TUAMOTU ARCHIPELAGO REGION
U	19 17:30: 1.1	47.15	84.88	33N	4	4.6	KAZAKH-SINKIANG BORDER REGION
Y	19 21: 5:57.2	24.11	142.66	33N	3	4.0	VOLCANO ISLANDS REGION
	19 22:24: 5.2	-3.34	147.51	33N	9	5.0	BISMARCK SEA
Y	19 23:39:17.1	24.19	142.83	33N	12	4.5	VOLCANO ISLANDS REGION
Y	20 4: 8:10.9	11.92	140.48	33N	4	4.9	WEST CAROLINE ISLANDS

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
Y	20	6:43:41.2	14.81	-92.73	33N	6	4.5	NEAR COAST OF CHIAPAS, MEXICO
	20	11:41:29.0	40.71	145.25	33N	5	3.9	OFF EAST COAST OF HONSHU, JAPAN
U Y	20	16: 4: 7.2	40.33	63.10	33N	19	4.9	UZBEK SSR
	20	16:26:35.4	10.05	126.98	33N	4	4.6	PHILIPPINE ISLANDS REGION
	20	16:56:56.5	5.78	125.62	120	9	4.7	MINDANAO, PHILIPPINE ISLANDS
	20	19: 3:50.7	-21.58	-175.31	33N	6	4.7	TONGA ISLANDS
	20	21:48:34.5	-27.78	-179.48	33N	4	4.4	KERMADEC ISLANDS REGION
U	21	3:59:36.4	36.80	71.64	33N	6	4.4	AFGHANISTAN-USSR BORDER REGION
Y	21	13:47:56.7	41.92	130.71	33N	16	5.0	NORTH KOREA
	21	19: 7: 1.1	1.61	128.02	84	6	4.3	HALMAHERA
	21	19:23: 7.0	-9.16	119.06	33N	4	4.7	SUMBA ISLAND REGION
	21	22:12:28.2	-5.83	147.05	33N	8		EAST PAPUA NEW GUINEA REGION
U Y	22	3:36:56.3	46.44	153.50	33N	33	5.2	KURILE ISLANDS
Y	22	5:29: 9.3	-10.36	161.19	33N	5	4.8	SOLOMON ISLANDS
	22	7:52:58.5	-7.39	157.21	33N	4	4.2	SOLOMON ISLANDS
Y	22	11:57:58.8	14.85	146.57	33N	13	4.9	MARIANA ISLANDS
	22	19:38:22.0	42.66	138.67	33N	7	4.5	EASTERN SEA OF JAPAN
Y	23	0:17:56.8	21.91	143.18	33N	12	4.6	MARIANA ISLANDS REGION
	23	3:52:23.7	44.13	17.71	33N	11		YUGOSLAVIA
Y	23	7:18:32.9	62.61	-138.08	14	44	5.5	SOUTHERN YUKON TERRITORY, CANAD
	23	11:55:49.8	1.98	120.85	1	8	4.9	NORTHERN CELEBES
	23	13:39:25.8	-2.30	139.29	141	5	4.4	NEAR N COAST OF WEST IRIAN
Y	23	18:59:51.3	15.67	120.27	33N	6	4.7	LUZON, PHILIPPINE ISLANDS
	23	23: 9:42.2	-7.53	148.19	33N	4	4.1	EAST PAPUA NEW GUINEA REGION
A Y	24	1:54:25.4	33.69	-115.24	33N	33	5.6	SOUTHERN CALIFORNIA
	24	3:27: 6.5	22.02	143.09	33N	8	4.8	VOLCANO ISLANDS REGION
Y	24	8:38:25.7	-13.96	-179.66	33N	5	5.6	FIJI ISLANDS REGION
A	24	8:50:21.1	52.85	-167.31	33N	5	4.3	FOX ISLANDS, ALEUTIAN ISLANDS
	24	9:23:58.8	-5.50	149.65	33N	9	5.7	NEW BRITAIN REGION
Y	24	11:23:17.6	32.81	59.13	45	29	5.1	IRAN
Y	24	11:31:51.6	24.61	141.98	33N	9	4.4	VOLCANO ISLANDS REGION
	24	12:38:19.3	-23.28	-179.68	33N	8	5.3	SOUTH OF FIJI ISLANDS
A Y	24	13:15:60.0	32.16	-115.49	33N	35	5.8	CALIFORNIA-MEXICO BORDER REGION
	24	15: 5:52.0	-16.30	-173.71	33N	33	5.4	TONGA ISLANDS
	24	17:38:58.0	-1.27	134.64	11	6	4.7	WEST IRIAN
A	24	18:37:57.3	56.46	-152.61	33N	8	4.9	OFF COAST OF SOUTHEASTERN ALASK
Y	24	21:25:20.5	8.10	122.56	33N	7	4.4	MINDANAO, PHILIPPINE ISLANDS
	25	4:57:37.4	-4.81	151.86	33N	4	4.3	NEW BRITAIN REGION
Y	25	9:15:41.8	23.61	123.89	33N	4	4.1	SOUTHWESTERN RYUKYU ISLANDS
	25	11:18: 6.3	-20.54	-176.46	33N	5	4.5	WEST OF TONGA ISLANDS
	25	12:46:55.6	41.22	145.79	33N	4	4.0	HOKKAIDO, JAPAN REGION
Y	25	16: 8:27.2	-5.60	149.54	61	30	5.4	NEW BRITAIN REGION
U Y	25	17:28: 6.5	74.04	118.50	33N	18	4.7	NEAR COAST OF CENTRAL SIBERIA

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

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	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	Y	25 22:53:30.0	28.21	56.74	33N	12	4.3	SOUTHERN IRAN
	Y	26 1:43:13.0	-8.47	124.26	36	30	5.5	TIMOR
		26 2:10:21.4	-8.39	124.51	50	6	4.5	TIMOR
		26 4:41: 5.2	1.88	126.68	42	5	4.0	MOLUCCA PASSAGE
		26 12:10:41.2	8.89	93.87	33N	3	3.9	NICOBAR ISLANDS REGION
U	Y	26 13:58:52.0	49.60	153.10	33N	6	3.7	KURILE ISLANDS
	Y	26 17:28:57.3	-17.48	167.86	33N	29	5.3	NEW HEBRIDES ISLANDS
		26 18:13:17.8	-10.51	119.15	33N	4		SUMBA ISLAND REGION
		26 19:32:14.6	1.70	127.05	79	5	4.4	HALMAHERA
		26 23: 0:30.9	36.08	30.88	309	5	3.6	TURKEY
	Y	27 0: 2:40.6	1.05	124.73	270	20	5.5	NORTHERN CELEBES
		27 0:51:21.5	15.13	-94.09	33N	7	4.4	NEAR COAST OF OAXACA, MEXICO
	Y	27 1:36:27.9	28.26	138.96	33N	8	4.6	BONIN ISLANDS REGION
		27 4:17:57.5	-19.52	-177.24	33N	11	5.1	WEST OF TONGA ISLANDS
		27 5: 3: 4.2	21.26	-106.66	33N	6	5.2	OFF COAST OF CENTRAL MEXICO
	Y	27 6:14:29.3	7.99	-39.68	24	33	5.1	CENTRAL MID-ATLANTIC RIDGE
	Y	27 8:26:44.9	32.79	59.00	33N	18	4.4	IRAN
A		27 12:27: 3.7	51.63	-173.74	33N	11	4.7	ANDREANOF ISLANDS, ALEUTIAN IS
	Y	27 13: 5:53.9	-16.02	167.88	33N	21	5.0	NEW HEBRIDES ISLANDS
	Y	27 13:11:22.1	-16.69	168.24	33N	7	4.6	NEW HEBRIDES ISLANDS
	Y	27 13:33:20.0	-16.77	167.97	39	29	5.0	NEW HEBRIDES ISLANDS
	Y	27 14:32:56.2	-16.93	-67.73	33N	9	4.6	BOLIVIA
	Y	27 17: 5:16.4	35.02	139.63	33N	13	4.5	NEAR S COAST OF HONSHU, JAPAN
		27 17:30:58.3	-15.93	167.41	33N	4	4.3	NEW HEBRIDES ISLANDS
		27 17:35:35.6	-16.18	168.03	33N	5	4.3	NEW HEBRIDES ISLANDS
	Y	28 4: 3:44.9	-0.18	125.07	33N	32	5.5	MOLUCCA SEA
	Y	28 4: 5:39.3	18.66	109.48	33N	15	5.2	HAINAN ISLAND
		28 5: 6: 8.0	-16.53	-174.36	33N	4	4.9	TONGA ISLANDS
U	Y	28 5:34:19.6	54.46	159.30	33N	8	4.2	NEAR EAST COAST OF KAMCHATKA
		28 7:18: 0.9	-0.20	125.67	33N	4	3.7	MOLUCCA SEA
U	Y	28 8:40: 6.1	39.57	71.65	33N	5	4.4	TADZHIK SSR
A	Y	28 15:31:15.1	53.61	-164.87	33N	24	5.0	UNIMAK ISLAND REGION
U	Y	28 17:30:50.5	48.41	154.53	33N	8	4.3	KURILE ISLANDS
		28 22:17:10.1	20.18	94.90	33N	10	4.7	BURMA
		29 0:31: 0.4	-0.95	100.05	33N	3	4.5	SOUTHERN SUMATRA
		29 2:22:18.6	43.23	13.84	133	9		CENTRAL ITALY
		29 3:45:45.4	-11.01	121.09	33N	6	4.1	SOUTH OF TIMOR
Y	29	12: 4:28.6	6.07	-73.15	124	10	4.5	NORTHERN COLOMBIA
		29 14:48: 6.3	-0.24	125.96	94	7	4.8	MOLUCCA SEA
Y	29	14:51:50.4	-10.18	161.21	33N	5	4.7	SOLOMON ISLANDS
Y	29	17:27:54.2	-20.76	-64.21	33N	5		SOUTHERN BOLIVIA
Y	29	19:49:26.7	-28.60	81.23	33N	10	5.1	SOUTH INDIAN OCEAN
Y	30	0:26:52.7	-7.40	162.74	33N	4	4.8	SOLOMON ISLANDS

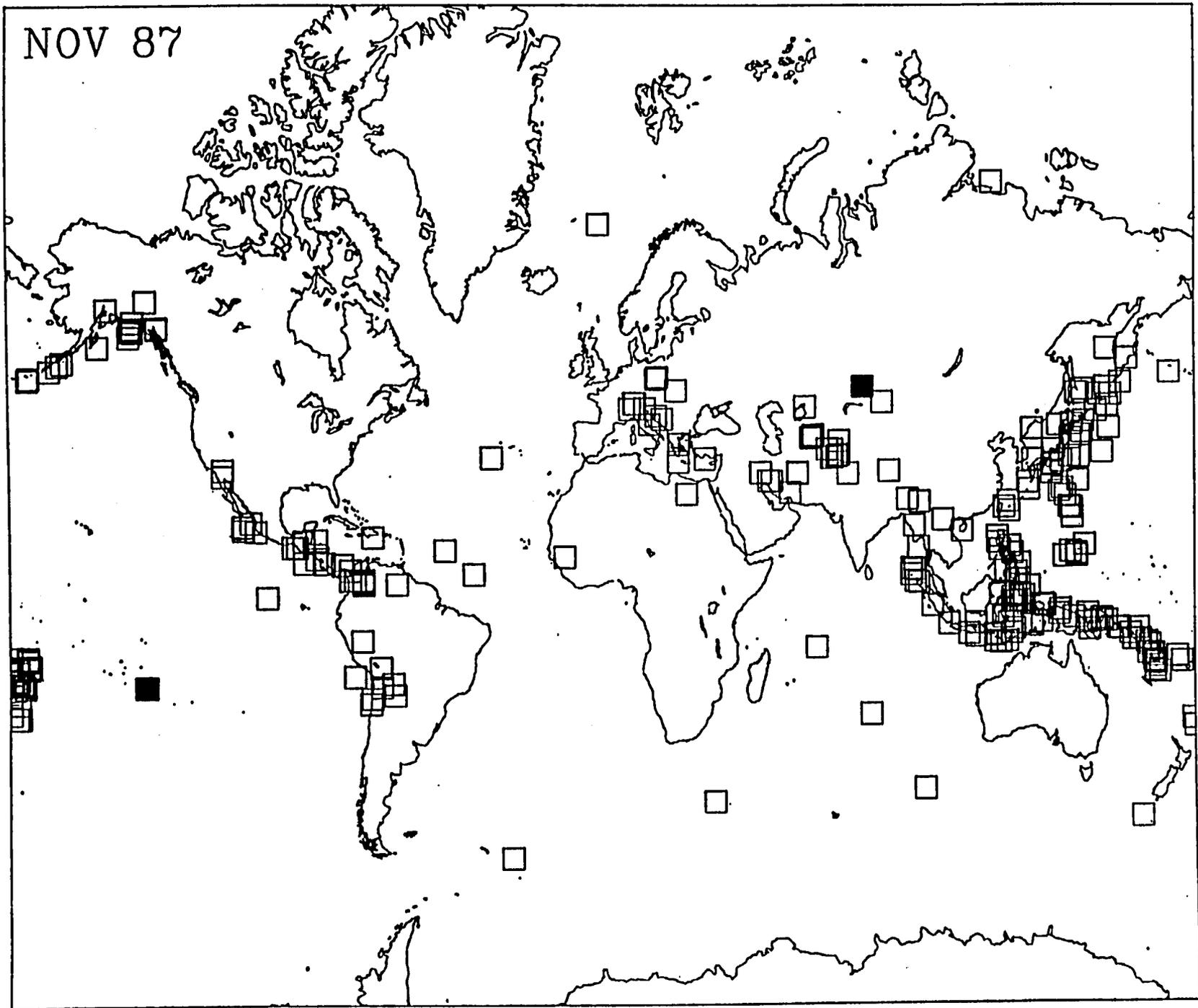
GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

NOVEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	30 0:38:27.6	-30.19	179.32	33N	4	4.8	KERMADEC ISLANDS REGION
Y	30 1:27:27.0	-14.22	-174.67	33N	12	4.3	SAMOA ISLANDS REGION
Y	30 1:28:25.6	-14.46	-174.51	33N	10	4.9	SAMOA ISLANDS REGION
U Y	30 1:34:46.5	37.80	69.60	33N	8	4.6	AFGHANISTAN-USSR BORDER REGION
Y	30 3:12:36.0	30.99	51.27	33N	19	4.7	IRAN
Y	30 3:21:46.9	14.11	-48.30	33N	10	4.6	NORTH ATLANTIC OCEAN
Y	30 4:19:24.0	39.16	22.86	33N	8	4.1	GREECE
	30 4:41:42.8	-0.20	124.40	67	16	5.0	MOLUCCA SEA
U	30 7:42:12.7	55.94	153.16	33N	4	4.3	SEA OF OKHOTSK
	30 13:22:16.9	0.15	127.08	33N	4	4.2	HALMAHERA
	30 18:41: 9.7	1.76	127.00	33N	4	4.5	MOLUCCA PASSAGE
	30 19: 8:25.8	-11.07	165.39	33N	15	4.8	SANTA CRUZ ISLANDS
A Y	30 19:23:11.6	57.93	-143.23	30	51	6.0	GULF OF ALASKA
A Y	30 19:48:36.3	59.99	-141.79	33N	20	5.7	SOUTHEASTERN ALASKA
A Y	30 23:48:23.2	58.63	-142.02	33N	16	4.8	GULF OF ALASKA

NOV 87



GLOBAL SEISMIC EVENT BULLETIN - DECEMBER 1987

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.D. Woodgold and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

1 Observatory Crescent, Ottawa K1A 0Y3

INTRODUCTION

This bulletin was compiled at the request of the Arms Control and Disarmament Division of the Department of External Affairs. It represents what can be achieved with limited resources and input data and caution should be exercised in the interpretation of its contents, as no guarantees can be provided concerning its accuracy or completeness. A bulletin is prepared monthly, and is issued about three weeks after the end of each month.

Individual station reports from both Canadian and international sources have been used in the preparation of this bulletin. For Canada, station operator readings from the 15-station Canadian Standard Network have been included, together with automatic readings from the Yellowknife seismological array. Seismic data routinely distributed over the Global Telecommunications System of the World Meteorological Organisation has also been acquired. At present data reports are being received from the following countries:

Austria	Australia	Czechoslovakia
Denmark	German D.R.	F.R. of Germany
Hungary	Indonesia	India
Japan	New Zealand	Norway
Sweden	U.K. (includes reports from arrays in Australia and India)	

Step are being taken to extend this list so that the resulting bulletin is more complete; in particular, arrangements are being made to obtain data from Argentina, Hong Kong, Mexico, Thailand, the U.S., and Zambia.

The data from all these sources are reformatted, merged and sorted and then passed to a computer program which searches for seismic events consistent with the time pattern of the readings. The bulletin which is automatically produced by this process is then reviewed by a seismologist. An experienced seismologist recognizes certain patterns as typical of fictitious events formed by the computer program from coincidental seismic phases of two or more actual seismic events. A certain number of events (2-3 daily) are rejected on this basis. The resulting bulletin is not considered as complete as that produced by the United States Geological Survey (USGS), which receives data from many other stations worldwide directly by telex or other means, and devotes several tens of personnel to its analysis.

The USGS publishes bulletins at three stages - after one week (QED, or quick epicentre determination), after 6-8 weeks (PDE, or Preliminary Determination of Epicentres) and a final summary on a monthly basis after a delay of 4-7 months. Comparison of this bulletin with those produced by the USGS indicates that it is somewhat more complete than the QED but less complete than the PDE and USGS monthly summary (which are not available until later). The events missed by the Canadian bulletin are usually the smaller ones, often located in the Southern Hemisphere; this situation can

be improved by rapid access to more data and by refinement of the computer analysis procedures.

The bulletin, as well as giving the date, time, location and magnitude of the seismic events, indicates when the event lies within the territory of one of the nuclear weapons states. In some circumstances it may be possible to tentatively identify an event as a nuclear explosion; in others the detonation may have been announced by the culprit. For each event the designation Y indicates that it was detected by the Yellowknife Array.

SPECIAL COMMENTS - DECEMBER 1987.

There were five nuclear explosions this month. Two explosions at the Nevada test site (USA), which are not listed in this bulletin, occurred on the 1st and the 2nd, both at 16:30. Three explosions occurred at the East Kazakh test site (USSR) and are listed in this bulletin: on the 13th at 03:21, on the 20th at 02:55 and on the 27th at 03:05. Two of the East Kazakh explosions were detected by the Yellowknife Array. The third occurred during a period of three days for which the Yellowknife data were lost due to computer disk problems.

The largest earthquake (magnitude 6.4) on the 12th, occurred south of Honshu, Japan. A total of 248 events are listed in this bulletin for December. Of these, 144, or 58%, were detected by the Yellowknife Array. The map on the following page shows the seismic events listed in the bulletin. The solid squares are nuclear explosions; the open squares are earthquakes.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

DECEMBER 1987 GLOBAL SEISMIC EVENT BULLETIN

Column 1: N - Underground Nuclear Explosion (confirmed)
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	1 1: 7:44.7	58.80	-141.60	33N	8	4.3	OFF COAST OF SOUTHEASTERN ALASKA
A	1 2:22:29.5	52.29	-170.81	33N	4	4.5	FOX ISLANDS, ALEUTIAN ISLANDS
A Y	1 3:59:10.0	52.06	-170.56	33N	34	5.0	FOX ISLANDS, ALEUTIAN ISLANDS
	1 4: 4:15.4	-17.26	-173.17	33N	25	5.4	TONGA ISLANDS
A Y	1 4:25:15.9	59.17	-142.24	20	25	4.6	GULF OF ALASKA
	1 8:50:37.7	26.26	93.30	33N	8	4.7	EASTERN INDIA
Y	1 10: 2: 3.4	6.49	-78.38	33N	12	4.6	SOUTH OF PANAMA
A Y	1 12: 4: 0.0	58.27	-142.59	22	22	5.3	GULF OF ALASKA
A Y	1 13:48: 4.6	52.09	-170.88	33N	10	4.6	FOX ISLANDS, ALEUTIAN ISLANDS
A Y	1 14:38:56.1	59.12	-140.12	33N	6	4.0	SOUTHEASTERN ALASKA
	1 18:22:57.4	-21.82	-178.05	33N	23	5.5	WEST OF TONGA ISLANDS
A	1 20:41:29.9	59.82	-138.81	33N	6	4.1	SOUTHEASTERN ALASKA
A Y	2 1:50: 9.1	58.92	-141.04	33N	8	4.2	OFF COAST OF SOUTHEASTERN ALASKA
A Y	2 1:53:33.2	59.44	-141.29	19	20	5.0	SOUTHEASTERN ALASKA
A	2 5:13: 7.7	58.78	-142.61	32	31	5.0	GULF OF ALASKA
A Y	2 9: 2:27.6	46.78	-120.28	33N	5		WASHINGTON
Y	2 20:30: 4.5	18.22	-108.91	33N	5	4.7	REVILLA GIGEDO ISLANDS REGION
A	2 21:50: 5.5	59.37	-142.73	33N	8	4.3	GULF OF ALASKA
A Y	3 3:59:39.9	50.78	-177.59	33N	15	4.6	ANDREANOF ISLANDS, ALEUTIAN IS
A Y	3 8:46: 6.4	52.11	-170.90	33N	8	4.3	FOX ISLANDS, ALEUTIAN ISLANDS
A	3 9:20:20.7	59.05	-141.62	33N	28	5.1	SOUTHEASTERN ALASKA
Y	3 11: 4:31.5	-20.75	-68.01	33N	15	5.4	CHILE-BOLIVIA BORDER REGION
	3 16:13: 8.5	3.48	126.59	70	9	4.8	TALAUD ISLANDS
A	3 23:31:54.7	59.35	-141.50	33N	8	4.4	SOUTHEASTERN ALASKA
	4 1: 8:49.0	0.09	121.56	33N	3	4.1	NORTHERN CELEBES
Y	4 1:34:49.0	18.77	145.11	33N	4	4.4	MARIANA ISLANDS
A	4 2:15:35.3	58.50	-143.58	33N	7	4.8	GULF OF ALASKA
A Y	4 9:14:55.2	59.22	-139.50	33N	5	4.4	SOUTHEASTERN ALASKA
	4 14:45:14.8	45.87	10.69	33N	18		NORTHERN ITALY
	4 17:17:59.1	45.87	8.20	33N	9		NORTHERN ITALY
Y	4 19:51:23.6	-5.61	154.65	33N	35	5.8	SOLOMON ISLANDS
	5 2:59:36.5	-9.70	152.59	626	4	3.5	DENTRECASTEAUX ISLANDS REGION
	5 3:22:30.7	8.66	-39.56	33N	10	4.4	CENTRAL MID-ATLANTIC RIDGE
U Y	5 6:28:43.5	46.53	152.81	33N	16	4.6	KURILE ISLANDS

Notes: Time of the event is considered accurate to better than 2 seconds. LAT and LONG are Latitude (degrees North) and Longitude (degrees East) and are generally accurate to better than 100 km. DEP is the source depth in km. - this can rarely be determined accurately without the use of either data from close stations or depth phases. When given as 33N this indicates that the event is probably shallow (less than 50 km. depth) and has been constrained to a normal (N) depth of 33 km. NS is the number of stations used in the event location. MAG is the average body-wave magnitude mb.

GEOPHYSICS DIVISION, GEOLOGICAL SURVEY OF CANADA

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 Column 3: Y - Detected at Yellowknife Array

DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
A Y	5 8:39:33.4	52.10	178.86	530	7	3.8	RAT ISLANDS, ALEUTIAN ISLANDS
Y	5 15:27: 1.9	12.81	-99.09	33N	4		OFF COAST OF MEXICO
A	5 18:19:12.2	54.04	-163.69	33N	19	4.8	UNIMAK ISLAND REGION
A	5 20:10:22.0	59.27	-142.79	33N	5	4.3	GULF OF ALASKA
	5 21:48:24.6	-11.48	151.84	33N	3	4.2	DENTRECASTEAUX ISLANDS REGION
Y	5 22:53:45.9	15.23	-96.23	33N	3		NEAR COAST OF OAXACA, MEXICO
	6 0:48:23.3	3.98	125.62	33N	10	5.1	TALAUD ISLANDS
A Y	6 2:32: 3.1	58.52	-142.64	33N	7	4.4	GULF OF ALASKA
Y	6 2:36:15.1	24.20	121.80	33N	4	3.9	TAIWAN
	6 3:23:26.4	-22.59	-177.27	33N	7	5.4	SOUTH OF FIJI ISLANDS
Y	6 4: 7:42.5	0.52	148.99	33N	13	5.2	CAROLINE ISLANDS REGION
Y	6 17:15:13.9	4.13	-81.78	33N	4	4.5	SOUTH OF PANAMA
U Y	6 18:16:32.8	54.42	161.96	33N	37	5.1	NEAR EAST COAST OF KAMCHATKA
Y	7 0: 0:11.7	-19.30	-169.36	33N	13	5.1	TONGA ISLANDS REGION
Y	7 0: 7:32.2	37.79	42.94	38	28	4.7	TURKEY
	7 1:57: 7.6	34.86	20.16	33N	13	4.1	MEDITERRANEAN SEA
Y	7 5:54: 3.0	49.36	-127.40	33N	11	4.4	VANCOUVER ISLAND REGION
A Y	7 9:25:11.4	63.25	-149.97	33N	5	4.8	CENTRAL ALASKA
	7 9:52:34.3	37.61	142.09	33N	11	4.5	OFF EAST COAST OF HONSHU, JAPAN
Y	7 11:39:14.9	26.51	123.51	33N	5	4.3	NORTHEAST OF TAIWAN
Y	7 12:26:32.0	-12.89	167.01	185	37	5.2	SANTA CRUZ ISLANDS
Y	7 12:49:57.1	-13.28	166.95	33N	8	4.7	NEW HEBRIDES ISLANDS
Y	7 13:14:47.5	-13.08	167.22	93	13	5.4	NEW HEBRIDES ISLANDS
U	7 13:58:39.8	48.31	154.20	33N	5	4.1	KURILE ISLANDS
A Y	7 17:48:25.6	44.52	-128.31	33N	18	4.8	OFF COAST OF OREGON
Y	7 19:20:28.9	-12.73	167.36	33N	15	5.2	SANTA CRUZ ISLANDS
Y	8 1:46:31.9	42.57	145.14	33N	17	4.5	HOKKAIDO, JAPAN REGION
A Y	8 5:12:33.6	58.87	-142.70	33N	9	4.9	GULF OF ALASKA
Y	8 5:48:42.0	36.66	133.87	33N	14	4.7	SEA OF JAPAN
	8 10:39:12.9	35.14	72.58	33N	5	4.1	PAKISTAN
Y	8 14:48: 4.8	-32.26	-112.45	33N	13	5.7	EASTER ISLAND CORDILLERA
Y	8 16:33:42.1	7.53	-75.26	33N	5	4.1	NORTHERN COLOMBIA
	8 17:21:21.1	12.30	125.50	33N	3	4.2	SAMAR, PHILIPPINE ISLANDS
Y	8 18: 9:34.6	35.02	-61.35	33N	11	4.9	NORTH ATLANTIC OCEAN
Y	8 18:17:13.8	21.88	142.74	33N	7	4.5	MARIANA ISLANDS REGION
Y	8 19:11:59.9	-10.92	166.85	564	10	4.4	SANTA CRUZ ISLANDS
	8 19:56:55.3	-42.16	47.08	33N	12	5.0	CROZET ISLANDS REGION
Y	8 20: 9:29.2	-11.74	166.24	33N	6	4.7	SANTA CRUZ ISLANDS
Y	8 22:26:45.6	44.41	139.90	33N	3	4.0	EASTERN SEA OF JAPAN
A Y	8 23:25:53.4	58.64	-142.12	33N	4		GULF OF ALASKA
	9 0:37: 7.1	44.71	10.76	33N	14		NORTHERN ITALY
	9 2:33:39.8	-14.87	166.83	33N	5	4.8	NEW HEBRIDES ISLANDS
U Y	9 4:21:49.1	36.62	71.67	33N	4	4.0	AFGHANISTAN-USSR BORDER REGION

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	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	9	6:33:14.7	2.63	149.46	33N	5	4.8	CAROLINE ISLANDS REGION
Y	9	7:31:12.4	33.92	-60.99	30	33	5.1	NORTH ATLANTIC OCEAN
	9	8:28:38.9	-24.88	-174.97	33N	4	3.7	SOUTH OF TONGA ISLANDS
Y	9	15:40:32.4	35.17	-4.14	33N	16	4.7	STRAITS OF GIBRALTAR
U Y	9	20:27:47.6	36.78	71.08	33N	8	4.1	AFGHANISTAN-USSR BORDER REGION
Y	10	0:20:44.0	37.86	-5.44	33N	3		SPAIN
	10	1:35:41.8	31.19	138.31	33N	6	4.8	SOUTH OF HONSHU, JAPAN
A	10	2:13:16.4	61.33	-151.44	33N	6	4.3	SOUTHERN ALASKA
U	10	5:0:48.5	36.13	68.85	33N	8	4.3	HINDU KUSH REGION
Y	10	5:44:28.8	34.59	27.14	33N	21	4.4	EASTERN MEDITERRANEAN SEA
	10	7:22:41.9	3.53	96.59	33N	23	5.0	NORTHERN SUMATRA
Y	10	8:10:59.3	3.96	127.96	33N	10	4.7	TALAUD ISLANDS
Y	10	9:24:47.4	-15.28	-173.38	33N	18	4.9	TONGA ISLANDS
	10	14:27:34.5	-4.17	142.50	89	5	4.5	PAPUA NEW GUINEA
	10	18:57:41.5	-2.14	138.84	33N	6	4.9	WEST IRIAN
	10	19:17:35.1	65.44	-132.21	33N	12	4.5	NORTHERN YUKON TERRITORY, CANAD
	10	22:24:27.5	-30.96	-178.61	33N	5	5.4	KERMADEC ISLANDS
Y	10	22:51:12.3	36.55	22.00	33N	26	4.6	SOUTHERN GREECE
	11	0:39:31.8	3.26	63.60	63	18	4.4	CARLSBERG RIDGE
Y	11	2:3:11.3	-22.03	-175.43	33N	39	5.4	TONGA ISLANDS REGION
Y	11	4:21:26.5	13.37	-87.95	33N	8		HONDURAS
	11	8:54:39.9	0.63	125.00	48	8	4.7	NORTHERN CELEBES
	11	13:39:2.0	35.52	29.11	33N	4	3.8	EASTERN MEDITERRANEAN SEA
	11	16:41:23.5	-6.63	130.39	121	13	4.7	BANDA SEA
Y	11	17:8:26.2	8.97	-82.98	33N	12	4.5	PANAMA-COSTA RICA BORDER REGION
Y	11	19:26:52.9	80.19	-0.23	33N	10	4.1	NORTH OF SVALBARD
	11	20:57:50.7	11.07	125.14	33N	3	4.1	SAMAR, PHILIPPINE ISLANDS
Y	11	23:27:27.6	11.20	125.37	33N	18	4.8	SAMAR, PHILIPPINE ISLANDS
Y	12	4:51:35.8	29.93	140.10	33N	64	6.4	SOUTH OF HONSHU, JAPAN
C	Y	5:48:57.2	29.72	90.39	33N	7	4.4	TIBET
Y	12	6:50:17.6	15.42	-106.39	33N	6	4.7	OFF COAST OF MEXICO
Y	12	7:47:33.9	33.98	135.17	31	6	4.5	NEAR S COAST OF SOUTHERN HONSHU
	12	8:10:47.7	-21.19	-177.71	33N	13	4.7	WEST OF TONGA ISLANDS
A	Y	12:16:37.7	52.60	-171.34	33N	18	4.6	FOX ISLANDS, ALEUTIAN ISLANDS
Y	12	15:12:19.0	15.62	-87.77	538	10		HONDURAS
	12	16:45:55.8	45.76	11.36	33N	21		NORTHERN ITALY
	12	18:14:31.6	-7.24	104.03	33N	3	4.6	SOUTHWEST OF SUMATRA
	12	18:24:32.5	34.79	29.48	33N	16	4.2	EASTERN MEDITERRANEAN SEA
Y	12	19:22:41.5	-18.90	-177.13	33N	9	4.9	WEST OF TONGA ISLANDS
U	12	22:54:30.3	37.77	74.76	33N	3	3.5	TADZHIK-SINKIANG BORDER REGION
C	Y	12:23:39:27.7	39.32	74.31	33N	5	4.5	SOUTHERN SINKIANG PROV, CHINA
Y	13	0:24:7.9	25.35	122.20	33N	4	4.8	TAIWAN REGION
Y	13	2:48:26.3	30.71	138.32	33N	24	5.6	SOUTH OF HONSHU, JAPAN

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DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
N U Y	13 3:21:11.0	50.25	78.80	0G	55	5.9	EASTERN KAZAKH SSR
Y	13 4:51:49.2	14.58	-92.78	33N	14	5.3	NEAR COAST OF CHIAPAS, MEXICO
Y	13 5:44:46.4	15.50	145.78	33N	6	4.7	MARIANA ISLANDS
U Y	13 6:23:11.5	36.75	71.30	33N	5	3.8	AFGHANISTAN-USSR BORDER REGION
	13 8:43:45.1	8.59	-143.98	33N	4	4.8	NORTH PACIFIC OCEAN
U Y	13 12:15:26.2	51.88	158.92	33N	36	5.1	NEAR EAST COAST OF KAMCHATKA
	13 12:42:50.4	-13.51	-179.68	33N	12	5.4	FIJI ISLANDS REGION
	13 20:46:42.8	-49.99	120.16	33N	3	5.0	SOUTH OF AUSTRALIA
	13 21: 5: 5.9	73.95	-92.16	22	29	5.1	NORTHWEST TERRITORIES, CANADA
	13 22:56:49.0	-16.67	-178.00	33N	8	4.8	WEST OF TONGA ISLANDS
U Y	14 0:36: 6.6	44.45	147.87	38	34	4.9	KURILE ISLANDS
Y	14 8:28:32.1	-8.94	109.46	33N	7	4.7	JAVA
Y	14 15:29:52.6	23.97	119.66	33N	6	4.1	TAIWAN REGION
	14 18:52:55.6	-32.82	-176.93	33N	4	4.6	SOUTH OF KERMADEC ISLANDS
Y	14 19:13:51.3	-9.71	68.38	33N	3	4.6	CHAGOS ARCHIPELAGO REGION
Y	14 21: 9:37.2	57.76	-56.04	33N	6	3.6	EAST OF LABRADOR
	14 23:21:12.5	-31.36	-179.78	33N	4	5.1	KERMADEC ISLANDS REGION
Y	15 2: 1:50.4	8.87	126.75	33N	6	4.2	MINDANAO, PHILIPPINE ISLANDS
	15 3: 8:34.3	-33.77	179.90	33N	6	4.9	SOUTH OF KERMADEC ISLANDS
Y	15 7:35: 1.6	36.80	17.52	33N	26	4.8	MEDITERRANEAN SEA
A Y	15 9:11:28.2	50.94	-177.30	33N	7	4.3	ANDREANOF ISLANDS, ALEUTIAN IS
U Y	15 12:58:31.5	42.96	102.62	33N	3		MONGOLIA
Y	15 14:21: 8.3	-0.07	-80.45	175	9	4.5	NEAR COAST OF ECUADOR
Y	15 14:57:41.1	23.97	142.73	33N	35	5.6	VOLCANO ISLANDS REGION
A	15 15:11: 7.1	59.40	-141.97	33N	25	5.0	SOUTHEASTERN ALASKA
Y	15 19:17:19.9	23.67	142.21	33N	5	4.2	VOLCANO ISLANDS REGION
A	15 20:58:50.3	51.49	176.80	33N	4	4.4	RAT ISLANDS, ALEUTIAN ISLANDS
Y	16 6:53:21.1	25.06	121.26	33N	7	4.4	TAIWAN
Y	16 11:13:41.8	-18.40	-173.56	33N	6	4.7	TONGA ISLANDS
	16 14:48:26.3	-12.48	116.88	33N	4		SOUTH OF SUMBAWA ISLAND
	16 20: 3:49.9	-9.07	124.91	33N	4		TIMOR
Y	17 1:48: 8.6	5.17	94.51	33N	15	5.0	NORTHERN SUMATRA
Y	17 2: 8:16.4	35.34	140.48	40	93	5.9	NEAR EAST COAST OF HONSHU, JAPA
Y	17 5: 7: 4.4	35.36	140.51	33N	8	4.2	NEAR EAST COAST OF HONSHU, JAPA
U Y	17 6:39:51.8	38.28	71.67	33N	3	4.0	AFGHANISTAN-USSR BORDER REGION
	17 11:45:15.6	25.56	142.50	33N	8	4.4	VOLCANO ISLANDS REGION
C Y	17 12:17:26.3	42.55	83.45	33N	17	4.7	NORTHERN SINKIANG PROV, CHINA
Y	18 4:30:54.2	36.27	14.73	33N	5	3.9	SICILY
	18 4:51: 8.4	41.15	19.46	33N	13		ALBANIA
Y	18 5: 1: 3.1	-2.13	-77.90	33N	27	5.6	PERU-ECUADOR BORDER REGION
Y	18 5:53:44.6	23.14	121.08	33N	17	4.7	TAIWAN
Y	18 7:45:45.4	2.12	-78.34	33N	4	4.3	NEAR WEST COAST OF COLOMBIA
Y	18 9:50:38.6	16.03	-106.10	33N	4	4.6	OFF COAST OF MEXICO

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	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	Y	18 10:17:21.7	13.17	145.17	33N	5	4.6	MARIANA ISLANDS
	Y	18 16:24: 6.6	28.47	56.85	42	44	5.5	SOUTHERN IRAN
		18 19:12:24.0	5.10	94.43	33N	7	4.8	NORTHERN SUMATRA
	Y	18 20:54:30.1	27.72	55.20	33N	5	4.3	SOUTHERN IRAN
		18 23:38:38.2	-4.41	147.57	33N	3	5.2	BISMARCK SEA
	Y	19 3:26:32.3	16.99	-106.33	33N	6	4.4	OFF COAST OF MEXICO
U	Y	19 8:27:29.1	40.41	52.26	33N	17	4.8	TURKMEN SSR
	Y	19 10:14:32.3	0.59	122.90	33N	10	4.7	NORTHERN CELEBES
	Y	19 21: 5:16.9	13.22	143.39	33N	6	4.7	SOUTH OF MARIANA ISLANDS
N U	Y	20 2:55:16.4	50.70	77.81	OG	12	4.6	EASTERN KAZAKH SSR
	Y	20 3: 0:16.8	7.65	-79.99	33N	5	4.7	SOUTH OF PANAMA
	Y	20 8:11:59.0	19.97	121.17	33N	3	4.4	PHILIPPINE ISLANDS REGION
		20 9:58:52.9	37.34	139.86	33N	5	4.7	HONSHU, JAPAN
		20 12:43:20.0	-25.60	-178.84	33N	4	4.8	SOUTH OF FIJI ISLANDS
	Y	20 15: 6:55.7	82.88	-11.26	15	13	4.8	NEAR NORTH COAST OF GREENLAND
		20 18:58:48.3	-9.20	127.58	33N	4		TIMOR SEA
	Y	21 2:27:29.5	24.09	142.76	33N	11	4.5	VOLCANO ISLANDS REGION
U	Y	21 4:28:26.0	38.87	71.04	33N	19	4.8	AFGHANISTAN-USSR BORDER REGION
	Y	21 7:56:34.7	-2.11	-75.77	33N	11	4.7	PERU-ECUADOR BORDER REGION
	Y	21 13:54:48.5	-22.13	-177.97	33N	8	4.4	SOUTH OF FIJI ISLANDS
		21 14:34:13.5	-16.23	-176.10	33N	15	5.5	WEST OF TONGA ISLANDS
		21 17:27:47.7	-20.85	-177.06	33N	9	5.1	WEST OF TONGA ISLANDS
		21 19:46:31.3	-56.78	-150.83	33N	6	4.7	SOUTH PACIFIC CORDILLERA
		21 20:55:46.0	39.66	20.30	33N	8	4.2	GREECE-ALBANIA BORDER REGION
C		22 0:16:39.5	41.38	89.72	29	62	5.6	SOUTHERN SINKIANG PROV, CHINA
		22 7:48:21.8	30.09	124.24	33N	5	5.3	OFF COAST OF EASTERN CHINA
		22 13:48:53.7	14.40	-89.40	33N	5	4.1	GUATEMALA
	Y	22 16:19:31.8	31.46	142.56	33N	8	4.4	SOUTH OF HONSHU, JAPAN
C		22 18:22:10.6	30.05	95.15	33N	3	3.9	TIBET
		22 18:47:33.3	39.76	143.29	33N	7	4.3	OFF EAST COAST OF HONSHU, JAPAN
	Y	22 19:22:25.3	12.03	144.42	33N	6	4.5	SOUTH OF MARIANA ISLANDS
U	Y	22 20: 2:59.1	45.31	150.46	33N	9	4.2	KURILE ISLANDS
	Y	22 20:38:44.5	60.24	-29.57	33N	7	4.7	NORTH ATLANTIC OCEAN
	Y	22 21:54:56.1	59.46	-29.82	33N	7	4.5	NORTH ATLANTIC OCEAN
	Y	23 6:25:32.6	3.89	-82.60	33N	5	4.6	SOUTH OF PANAMA
	Y	23 9: 1:29.3	-14.64	-177.18	33N	7	4.2	FIJI ISLANDS REGION
		23 10: 0: 9.0	-23.16	-175.39	33N	4	4.3	TONGA ISLANDS REGION
	Y	23 10:10:17.2	-0.26	125.01	33N	27	5.6	MOLUCCA SEA
	Y	23 17:13: 4.7	14.55	-91.00	33N	3		GUATEMALA
	Y	23 20:33:41.8	17.74	146.56	33N	17	5.0	MARIANA ISLANDS
A		23 22: 7:37.7	51.89	176.58	33N	4	4.4	RAT ISLANDS, ALEUTIAN ISLANDS
	Y	24 7:34:14.3	35.41	135.82	253	5	4.0	SOUTHERN HONSHU, JAPAN
	Y	24 10:15:46.2	44.59	141.21	33N	10	4.8	HOKKAIDO, JAPAN REGION

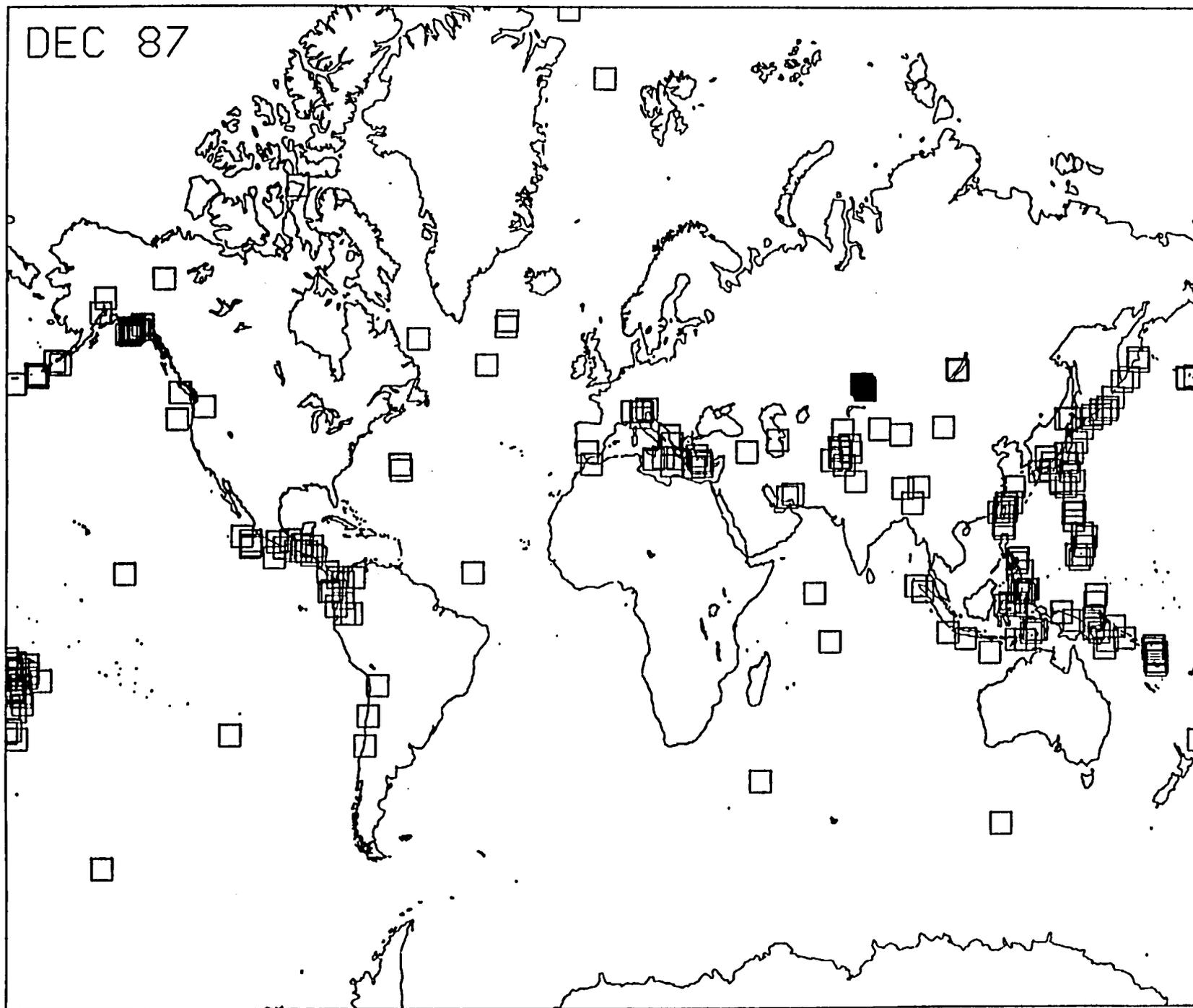
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	DAY	TIME	LAT.	LONG.	DEP.	NS	MAG	
	24	17:43:29.5	-7.48	150.37	33N	4	3.9	NEW BRITAIN REGION
U Y	24	18:28:28.7	53.01	107.09	33N	6	4.3	LAKE BAIKAL REGION
U Y	24	19:29:33.8	53.29	106.61	33N	6	4.1	LAKE BAIKAL REGION
U Y	25	5:11: 4.0	54.96	161.80	33N	19	4.5	NEAR EAST COAST OF KAMCHATKA
Y	25	6:39:35.9	17.19	-94.32	33N	7	4.9	CHIAPAS, MEXICO
Y	25	17:13:58.8	-3.69	148.68	33N	3	4.1	BISMARCK SEA
Y	25	22:56:30.5	-19.92	-175.49	33N	26	5.6	TONGA ISLANDS
U Y	25	23:32:18.0	45.16	148.08	315	4		KURILE ISLANDS
A Y	26	0: 1:34.7	58.51	-142.51	33N	11	4.7	GULF OF ALASKA
A Y	26	0: 8: 5.5	54.54	-165.33	32	10	4.8	FOX ISLANDS, ALEUTIAN ISLANDS
Y	26	1: 2:59.4	31.44	76.12	33N	4	4.2	NORTHERN INDIA
U Y	26	6:45: 4.8	42.31	72.14	33N	7	4.9	KIRGIZ SSR
Y	26	7:45:15.1	37.10	27.71	33N	7	4.3	TURKEY
U Y	26	8:58:34.6	46.02	150.77	33N	5		KURILE ISLANDS
Y	26	10:54:23.2	-12.93	166.92	33N	4		SANTA CRUZ ISLANDS
Y	26	17:27:28.1	-15.88	167.13	33N	8	5.0	NEW HEBRIDES ISLANDS
Y	26	19:17:58.5	-15.84	-178.59	33N	4	4.7	FIJI ISLANDS REGION
Y	26	19:50:45.9	-15.73	-178.79	33N	5	4.9	FIJI ISLANDS REGION
Y	26	20:17:59.4	16.71	-98.36	33N	15	5.1	NEAR COAST OF GUERRERO, MEXICO
Y	26	23: 3:27.9	-8.89	157.66	33N	5	4.4	SOLOMON ISLANDS
N U	27	3: 5: 8.4	49.78	78.87	0G	38	6.0	EASTERN KAZAKH SSR
U	27	7:16:16.1	26.01	121.91	33N	4	4.5	TAIWAN REGION
U	27	16:23:10.7	51.22	156.98	33N	9	4.5	KAMCHATKA
	28	4:57:57.9	46.26	12.61	33N	9		NORTHERN ITALY
	28	8:16:19.2	-27.88	-70.66	34	30	6.1	NEAR COAST OF NORTHERN CHILE
	28	13:24:14.6	-15.05	167.56	33N	4	5.3	NEW HEBRIDES ISLANDS
	28	14:40:14.5	20.91	120.81	33N	14	4.9	PHILIPPINE ISLANDS REGION
	28	18:51:21.1	-18.30	-176.18	33N	6	4.2	WEST OF TONGA ISLANDS
	30	6:39:16.6	-7.43	129.43	296	8	4.3	BANDA SEA
	30	11: 2:37.8	33.53	141.09	33N	7	4.6	OFF EAST COAST OF HONSHU, JAPAN
	30	11:56:15.3	-34.56	-71.82	33N	16	5.6	NEAR COAST OF CENTRAL CHILE
	30	16:16:55.9	36.05	28.84	33N	16		DODECANESE ISLANDS
	30	17:26: 9.9	16.10	-90.70	33N	6	4.2	MEXICO-GUATEMALA BORDER REGION
	30	20:19:15.5	-26.56	-177.05	33N	15	5.0	SOUTH OF FIJI ISLANDS
	30	20:48:58.1	4.17	128.66	33N	4	4.1	NORTH OF HALMAHERA
	30	21:16:33.8	-6.53	148.66	33N	28	4.9	NEW BRITAIN REGION
	31	0:31:37.8	-6.32	148.62	33N	18	4.9	NEW BRITAIN REGION
	31	10:43: 9.0	53.83	-35.62	33N	6	4.3	NORTH ATLANTIC OCEAN
	31	19: 3:51.9	33.54	131.75	33N	10	4.7	KYUSHU, JAPAN
	31	19:57:46.8	3.13	127.45	403	5	3.7	TALAUD ISLANDS
U	31	21:15:22.2	45.99	152.49	33N	6	4.2	KURILE ISLANDS REGION
	31	23:50:16.8	-6.51	131.24	33N	5		TANIMBAR ISLANDS REGION

DEC 87



1987 SUMMARY

GLOBAL SEISMIC EVENT BULLETINS

prepared for

ARMS CONTROL AND DISARMAMENT DIVISION

DEPARTMENT OF EXTERNAL AFFAIRS

125 SUSSEX DRIVE, OTTAWA

by C.R.D. Woodgold and R.G. North

GEOPHYSICS DIVISION

GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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MONTHLY SEISMIC EVENT BULLETINS

Each month, a bulletin of worldwide seismic events has been prepared at the request of the Arms Control and Disarmament Division of the Department of External Affairs. The bulletin is issued about three weeks after the end of each month. This report summarises the monthly bulletins issued during 1987.

GLOBAL SEISMIC ACTIVITY

There were 3199 seismic events listed in the bulletin during the year. Fig. 1 shows all these events, most of which are earthquakes. The highly seismically active regions of the world can be clearly seen on this map.

Fifty-one percent of the events in the bulletin were detected by the Yellowknife Array; the locations of these are shown in Fig. 2. In comparing Figures 1 and 2, it should be realised that events within 11,000 km. of the array, corresponding to the distance to which the direct P wave can be observed, are those most likely to be detected. Figure 3, which shows the world to a distance of 11,000 km. from the array, illustrates the region for which the Yellowknife system is most effective. At greater distances the seismic waves are influenced by the core of the earth, and only larger events produce signals big enough to be detected by the array.

The effectiveness of the array in monitoring global seismic activity varies seasonally, due to noise caused by wave action on Great Slave Lake. This is demonstrated in table 1 below, which show the total number of events listed in each monthly bulletin, together with the number and percentage of these detected by the array. It can be seen quite clearly that the proportion of events detected is highest during the winter months, when the lake is frozen over.

TABLE 1.
NUMBER OF EVENTS IN GLOBAL BULLETIN BY MONTH IN 1987

Month	Number of events	Number detected at YKA	Percent detected at YKA
Jan.	208	157	75%
Feb.	251	171	68%
Mar.	300	248	83%
Apr.	262	194	74%
May	299	181	61%
June	290	101	35%
July	296	93	31%
Aug.	258	77	30%
Sept.	248	88	35%
Oct.	275	69	25%
Nov.	264	96	36%
Dec.	248	144	58%

UNDERGROUND NUCLEAR EXPLOSIONS.

Thirty, or just less than one percent, of the events listed in the 1987 bulletins were underground nuclear explosions. Of these, 28 were detected by the Yellowknife array (YKA). An additional 13 explosions, not included in the bulletins but listed by other authorities, took place. Six of these additional events were detected by the array. Table 3 lists the 43 nuclear explosions detonated during 1987; their locations are shown in Figure 4. Table 2, below, gives the total number of explosions for each country (UK tests are conducted at the US test site in Nevada, and are included with those of the USA).

TABLE 2
UNDERGROUND NUCLEAR EXPLOSIONS (1987)

	Total	Detected by YKA
China	1	1
France	8	8
USA (+UK)	14	8
USSR	20	18
All	43	35

As can be seen from the above, the Yellowknife Array has a particularly excellent record of detecting nuclear explosions. The frequency band to which the data are filtered and the spacing of the substations of the Array are well-suited to the detection of explosion P-waves, which tend to be of slightly higher frequency than earthquake P-waves.

The two events in the Soviet Union which were not detected by YKA took place when the array data was not being captured correctly due to hardware problems. The 6 U.S. events missed were small and could in general be detected only by stations within the USA itself; if data from stations inside the USSR had been available (note that the NRDC stations are turned off before Soviet explosions!) it is quite possible that the number of reported Soviet explosions would have been greater. As usual, YKA demonstrates an outstanding capability to detect French explosions in the South Pacific.

In February 1987 the USSR ended the unilateral nuclear test moratorium which it started in August 1985. The number of Soviet tests was slightly higher than the annual average in the years before the moratorium. The USA carried out somewhat fewer tests than the average over the last few years, while the French testing program continued at the usual level. The largest explosion of the year was the single test conducted by China - its yield may well have exceeded the 150 kiloton limit of the threshold treaty signed in 1976 by the UK, USA and USSR (but not by France and China). On the basis of the seismic evidence, there is no reason to suspect that any of the three signatories to the 1976 treaty exceeded the 150 kiloton limit.

TABLE 3

NUCLEAR EXPLOSIONS IN 1987

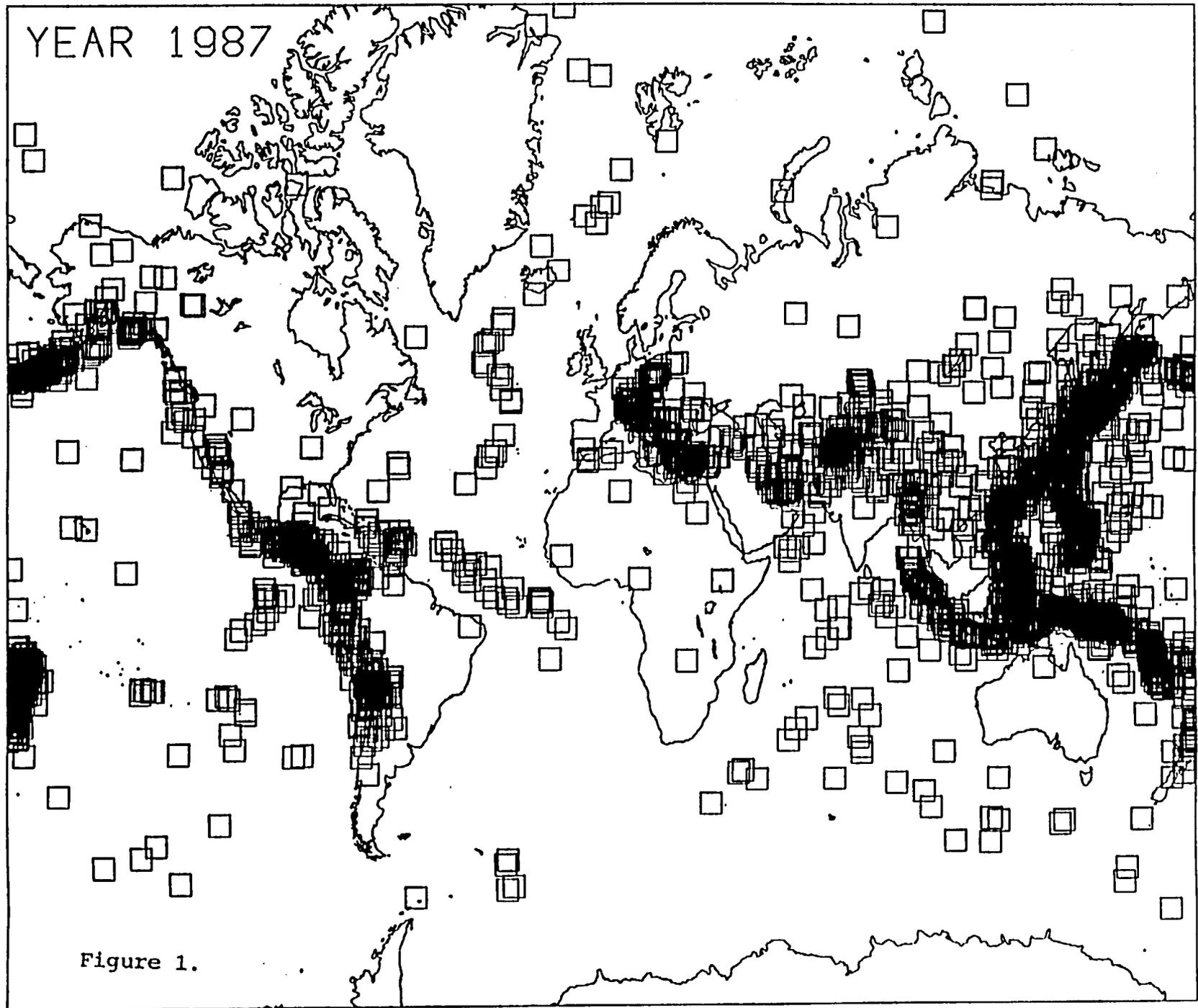
Column 1: B - Listed in Global Seismic Event Bulletin
 Column 2: A - in U.S. Territory C - in Chinese Territory
 U - in Soviet Territory F - in French Territory
 Column 3: Y - Detected at Yellowknife Array

MO: Month
 DA: Day
 TIME: Universal Time
 LAT: Latitude; positive is North, negative is South
 LONG: Longitude; positive is East, negative is West
 Mb/ML: Seismic magnitude: on the mb scale; or, if no mb estimate
 is available, then the mL scale is used.

	MO	DA	TIME	LAT	LONG	Mb/ML	
A	2	3	15:20:00.0	37.18	-116.05	2.2	SOUTHERN NEVADA
B A Y	2	11	16:44:59.5	36.39	-116.23	4.5	SOUTHERN NEVADA
B U Y	2	26	4:58:31.6	50.78	77.84	5.1	EASTERN KAZAKH SSR
B U Y	3	12	1:57:25.7	50.69	78.73	5.4	EASTERN KAZAKH SSR
A	3	18	18:28:00.0	37.21	-116.21	4.3	SOUTHERN NEVADA
B U Y	4	3	1:17:14.2	49.95	78.76	6.0	EASTERN KAZAKH SSR
B U Y	4	17	1: 3: 8.4	50.05	78.86	6.0	EASTERN KAZAKH SSR
B A Y	4	18	13:40: 6.2	37.57	-116.24	5.2	SOUTHERN NEVADA
U Y	4	19	4:00:01.1	60.78	56.22	4.5	URAL MOUNTAINS REGION
U Y	4	19	4:05:01.0	60.67	56.30	4.4	URAL MOUNTAINS REGION
A Y	4	22	22:00:00.0	36.98	-116 00	4.2	SOUTHERN NEVADA
B A Y	4	30	13:30:10.7	38.98	-116.91	5.2	SOUTHERN NEVADA
B F Y	5	5	16:48:00.5	-21.58	-138.62	4.9	TUAMOTU ARCHIPELAGO
B U Y	5	6	4: 2: 1.4	49.03	79.50	5.4	EASTERN KAZAKH SSR
B F Y	5	20	17: 4:57.6	-22.85	-139.85	5.5	TUAMOTU ARCHIPELAGO
B C Y	6	5	5: 0: 3.3	41.70	88.78	6.0	S. SINKIANG PROV, CHINA
B U Y	6	6	2:37:15.9	50.67	77.59	5.1	EASTERN KAZAKH SSR
B F Y	6	6	18: 0: 6.6	-22.14	-135.67		TUAMOTU ARCHIPELAGO
A	6	18	15:20:00.0	37.19	-116.04	4.1	SOUTHERN NEVADA
B U Y	6	20	0:53: 9.4	50.02	78.92	6.0	EASTERN KAZAKH SSR
A	6	20	16:00:00.1	37.22	-116.18	3.5	SOUTHERN NEVADA
B F Y	6	21	17:55: 4.7	-21.57	-139.50	4.6	TUAMOTU ARCHIPELAGO
B U Y	7	7	0: 0: 3.5	61.60	113.02	4.9	CENTRAL SIBERIA
B A Y	7	16	19: 0: 5.4	37.28	-115.74	4.8	SOUTHERN NEVADA
B U Y	7	17	1:17:12.9	50.06	78.13	5.6	EASTERN KAZAKH SSR
B U Y	8	2	0:58:11.6	50.02	79.16	5.7	EASTERN KAZAKH SSR
B U Y	8	2	2: 0: 5.3	73.35	54.86	5.6	NOVAYA ZEMLYA
B U	8	12	1:30: 1.1	61.42	113.13	4.8	CENTRAL SIBERIA
B A Y	8	13	14: 0: 5.8	37.28	-115.60	5.6	SOUTHERN NEVADA
U	9	18	2:32	50.	78.		EASTERN KAZAKH SSR
B A Y	9	24	15: 0: 7.7	38.16	-116.56	5.3	SOUTHERN NEVADA
B U Y	10	3	15:15: 6.3	48.15	57.49	4.8	WESTERN KAZAKH SSR
B A Y	10	23	16: 0: 5.6	37.29	-115.88	5.0	SOUTHERN NEVADA
B F Y	10	23	16:50: 6.8	-22.05	-136.35	5.5	TUAMOTU ARCHIPELAGO
B F Y	11	5	17:30: 4.0	-21.79	-138.28	5.1	TUAMOTU ARCHIPELAGO
B U Y	11	15	3:31:10.8	49.88	78.94	5.9	EASTERN KAZAKH SSR
B F Y	11	19	16:31: 4.8	-21.70	-138.76	5.4	TUAMOTU ARCHIPELAGO
F Y	11	29	17:59:00.	-22.	-139.		TUAMOTU ARCHIPELAGO
A	12	1	16:30:00.0	37.00	-116.00		SOUTHERN NEVADA
A	12	2	16:30:00.0	37.24	-116.16	4.1	SOUTHERN NEVADA
B U Y	12	13	3:21:11.0	50.25	78.80	5.9	EASTERN KAZAKH SSR
B U Y	12	20	2:55:16.4	50.70	77.81	4.6	EASTERN KAZAKH SSR
B U Y	12	27	3: 5: 8.4	49.78	78.87	6.0	EASTERN KAZAKH SSR

FIGURES

1. Locations of the 3199 events listed in the 1987 monthly bulletins.
2. Locations of the events listed in the bulletins which were also detected by the Yellowknife array.
3. World map plotted to a distance of 11,000 km. from the array. This area is that for which the array detection performance is greatest.
4. Locations of the 34 underground nuclear explosions which took place during 1987.



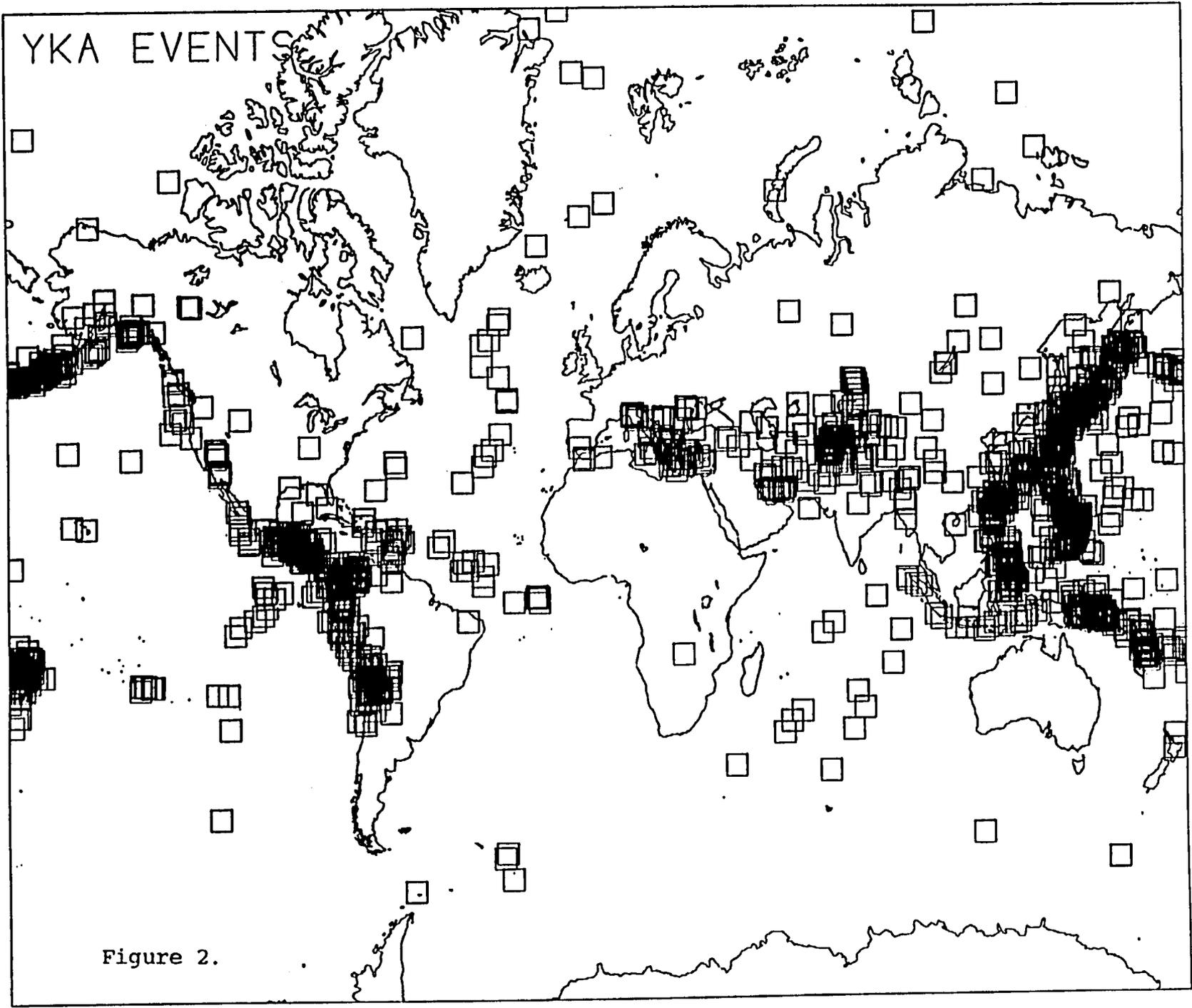


Figure 2.

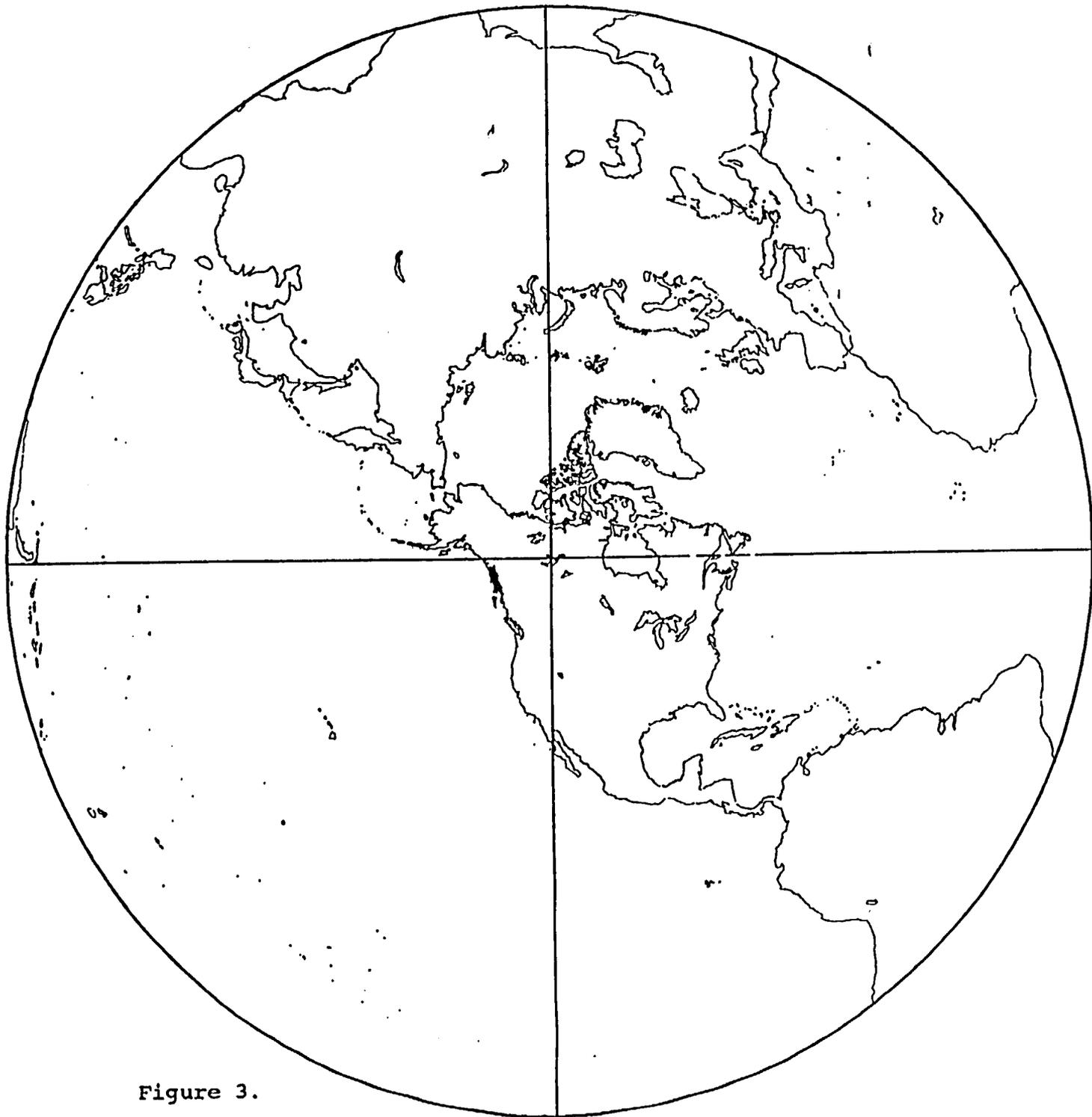


Figure 3.

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