

IOC/UNESCO Bulletin No. 3
As of 18 March 2011

- *As all JR train lines in Miyagi, Fukushima and Yamagata Prefectures have been stopped, the access to the regions are extremely difficult.*

Casualties by the Earthquake and Tsunami

As of 02:30Z 18 March 2011

by the Japanese Fire and Disaster Management Agency (FDMA)

1. Dead: 3,617 persons
2. Missing: 7,762 persons
3. Injured: 2,517 persons
4. Fires: 280 events (276 fires were already extinguished)
5. Number of evacuees: 443,077

C: City, T: Town, V: Village

Prefecture	City, Town, Village & Population	dead	missing	Note: Tsunami related disaster
Hokkaido	Hakodate C 294,264	1		
Aomori	Hachinohe C 241,308	1	1	(FDMA) • Wide-area are inundated
	Misawa C 42,226	2		(FDMA) • Oil tanks in the harbor were collapsed
Iwate				• JR Train stop: Tohoku-Akita shinkansen, Ofunato, Kitagami, Kamaishi, Yamada lines etc (Recovering; no prospect) • Other lines are partially operational
	Miyako C 59,118	183	1,700	(FDMA) • Severe tsunami damages • More than 10 villages are completely destroyed
	Ofunato C 40,801	206	191	(FDMA) • More than 300 houses flow out • Many houses are flooded • 3,498 houses are completely destroyed • Especially Suesaki and Hosoura regions are severely damaged.

				No communication system
	Kuji C 36,651	3	2	
	Rikuzen-Takata C 23,243	194	1,778	- Population: 23,000 (FDMA) - Extremely severe damages - Widely inundation - No communication system 3,600 houses are damaged
	Kamaishi C 39,294	416	400	(FDMA) - Coast-Guard building inundated up to 2nd floor - Fire Office building is flooded - No communication system
	Otsuchi T 15,293	196	7	Ogasawara; Iwate U. (14 Mar) - Whole town is severely damaged - No communication system
	Yamada T 18,745	94	100	No communication system
	Iwaizumi T 10,693	4	4	- No communication system 40 houses are flooded
	Tanohata V 3,836	14	26	(FDMA) 249 houses flow out 148 houses are destroyed - No communication system
	Fudai V 3,094		5	(FDMA) Ootanabe and Horiuchi fishing ports are severely damaged.
	Noda V 4,639	26	20	- Tsunami flow over the village government building - Severe damage in the central village 400 houses in the Motomura District are severely damaged - No communication system
	Youno T 17,961			(FDMA) 20 houses flow out - Many fishing boats flow out - JR train bridge collapsed - No communication system
Miyagi	Sendai C 1,046,902	13	9	Koshimura; Tohoku U (12 Mar) Near Sendai air-port: inundated area is up-to 3- 4km

				from coast (depth: about 1 m) • Difficult to go to coastal area due to inundated water • Wakabayashi-ku: severely damaged. Under survey of missing people (FDMA) • 295 bodies are recovered (Not included in this table yet) • 296,323 houses: power cut as of 17 March
	Ishinomaki C 160,336	205	448	(FDMA) • Wide areas are inundated. Difficult for rescue work
	Shiogama C 56,325	12	4	
	Kesennuma C 73,239	323	Under survey	(FDMA) • Many people are isolated due to inundation of wide area
	Natori C 73,576	141	Under survey	(FDMA) • Many areas are inundated
	Tagajo C 62,881	82	Under survey	
	Iwanuma C 43,921	88	Under survey	
	Higashi-Matsushima C 42,859	392	429	
	Watari T 34,773	118	200	
	Matsushima T 16,193	1	28	
	Shichigahama T 20,377	41	146	• Tsunami height was more than 10 m • All facilities along coast were completely destroyed • No communication system
	Rifu T 9,768	1	0	• Tsunami sediment in Hamada and Suga district is about 3 cm thicknesses.
	Onagawa T 9,965	43	100	(FDMA) • About 630 people need to be rescued • Many areas are inundated
	Minami-	25	239	(FDMA)

	Sanriku T 17,382			Many areas are inundated
Fukushima	Iwaki C 345,310	145	22	(FDMA) Severe tsunami damages
	Souma C 37,919	105		(FDMA) Severe tsunami damages
	Minami-Souma C 70,971	176	110	
	Hirono T 5,383	2	1	
	Naraha T 7,847	2	10	
	Tomiooka T 15,755	2	8	
	Okuma T 11,264		8	
	Futaba T 6,917	1	14	
	Namie T 20,686		918	
	Shinchi T 8,306	34	130	
Ibaragi	Oarai T 18,188	1		(FDMA) Inundation up to central city
Shizuoka	Shimoda C 25,549			(FDMA) 13 houses are inundated

As of 09:00z 18 Mar 2011

By **the National Police Agency**

- Dead: 6,548
- Missing: 10,354
- Road destruction: 1,285
- Bridge destruction: 48
- Railway destruction: 5

Note;

- All JR train lines in Miyagi, Fukushima and Yamagata Prefectures have been stopped.

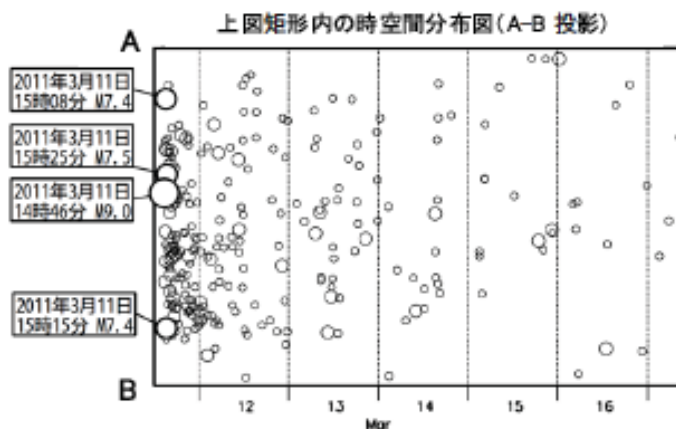
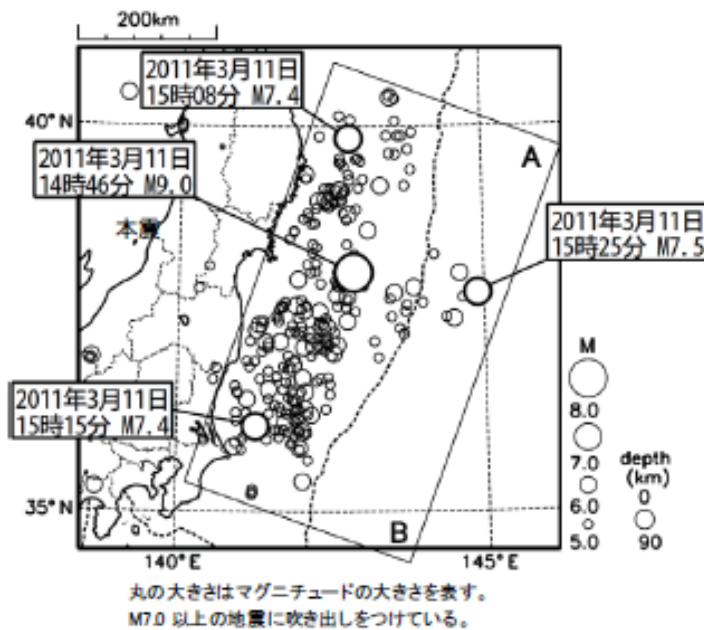
<http://www.coastal.jp/tsunami2011/>

2 Important information taken from this site;

<http://www.coastal.jp/tsunami2011/index.php?plugin=attach&refer=FrontPage&openfile=AdvisoryTsunamiSurveys.pdf>

<http://www.coastal.jp/tsunami2011/index.php?plugin=attach&refer=FrontPage&openfile=110316note1.pdf>

震央分布図
(2011年3月11日12時00分～17日09時00分、深さ90km以浅、 $M \geq 5.0$)



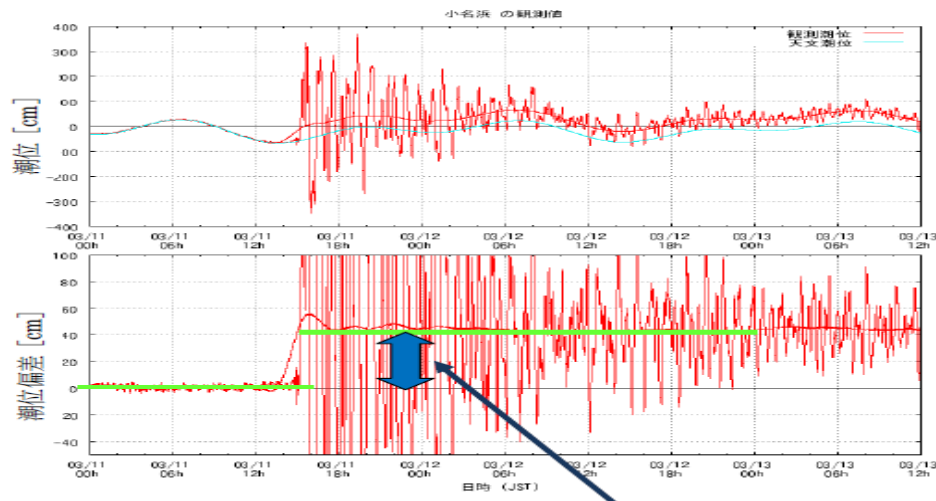
Distribution of aftershocks; 500 km x 200 km ($M \geq 5.0$)

Mar 06 :00	upper JMA scale; correspond 8 – 9 of MMI scale) within 3 days from 06Z, 17 Mar. is 40 % 2. Probability of a earthquake (expected seismic intensity is more than 5-upper JMA scale) within 3 days from 06Z, 20 Mar. is 20 %
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(Taken from JMA press release)

Co-seismic subsidence along the Pacific coast

小名浜（福島県）の観測値



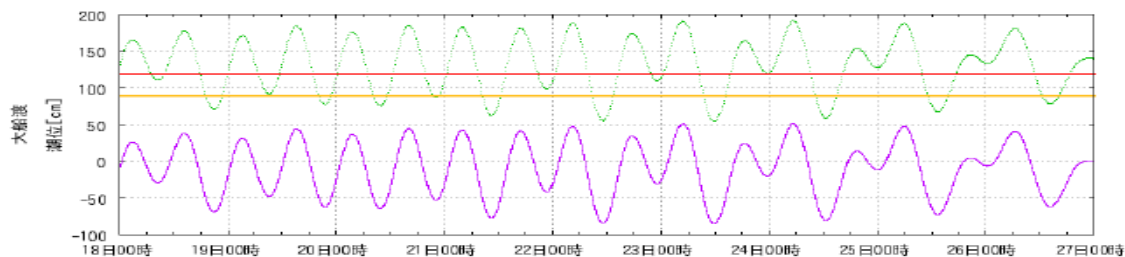
Upper Figure shows the original sea level data at Onahama, Fukushima. The scale of the each grid is 100 cm, the record starts from 00:00 11 Mar to 12:00 13 March, 2011 (local time).

Lower Figure shows the de-tided record. The scale of each grid is 20 cm. the co-seismic subsidence is about 40 cm.

The expected sea level from 18 to 26 March 2011 at Ofunato, Iwate will exceed warning level at many areas.

大潮期間中の天文潮位（主な地点、平成 23 年 3 月 18 日～26 日）

大船渡（岩手県）



Purple line; expected normal sea level change

Green line; expected sea level change taking into account subsidence

Orange line; threshold of storm surge Advisory

Red line; threshold of storm surge Warning

As it is “equinoctial tide; i.e. the largest tides during a year” now, it needs the careful caution for inundation.

Taken from; <http://www.jma.go.jp/jma/press/1103/17b/ooshio.pdf>

Observed Tsunami in Japanese coast. (Revised)

Data are taken from Tsunami Information released by JMA.

(Note: Only the stations; of max amplitude is **more than 1 meter**, are shown.)

	Initial Tsunami arrival time (Z) 11 Mar 2011	Amplitude of initial motion (m)	direction of the first motion	Maximum Tsunami arrival time(Z) 11 Mar 2011	Max amplitude (zero to peak)	Elapse time of max wave
Kushiro	6:34	2.0m	(+)	14:39	2.1m	8:53
Nemuro-shi Hanasaki	6:34	Slight	(-)	6:57	2.8m	1:11
Hamanaka-cho Kiritappu-ko	6:27	Slight	(-)	13:19	2.6m	7:33
Urakawa	6:19	0.2m	(-)	7:42	2.7m	1:56
Tokachi-ko	6:26	0.2m	(-)	6:57	2.8m or more	1:11
Erimo-cho Shoya	6:18	0.1m	(-)	6:44	3.5m	0:58
Hakodate	7:11	1.9m	(+)	14:35	2.4m	8:49
Tomakomai-nishiko	6:37	0.2m	(-)	8:30	2.1m	2:44
Tomakomai-higashiko	6:40	0.2m	(-)	7:17	2.5m or more	1:31
Shiraoi-ko	6:40	0.1m	(-)	7:01	1.8m	1:15
Oshima Mori-ko	6:56	Slight	(-)	10:37	1.8m	4:51
Muroran-ko	6:56	Slight	(-)	11:06	1.0m	5:20
Hachinohe	6:22	0.8m	(-)	7:51	2.7m or more	2:05
Mutsu-shi Sekinehama	6:20	0.1m	(-)	9:16	2.9m	3:30
Miyako	5:48	0.2m	(+)	6:21	4.0m or more	0:35
Ofunato	5:46	0.2m	(-)	6:15	3.2m or more	0:29
Kamaishi	5:45	0.1m	(-)	6:21	4.1m or more	0:35
Ishinomaki-shi Ayukawa	5:46	0.1m	(+)	6:20	3.3m or more	0:34
Soma	5:55	0.3m	(+)	6:50	7.3m or more	1:04
Oarai	6:15	1.8m	(+)	7:52	4.2m	2:06
Choshi	6:13	0.5m	(+)	8:22	2.4m	2:36
Tateyama-shi Mera	6:29	1.3m	(+)	8:05	1.6m	2:19
Tokyo Harumi	7:37	0.8m	(+)	10:15	1.3m	4:29
Yokosuka	6:52	0.9m	(+)	8:16	1.6m	2:30
Yokohama	7:09	0.8m	(+)	8:37	1.6m	2:51
Hachijojima Yaene	6:40	1.4m	(+)	6:48	1.4m	1:02
Hachijojima Kaminato	6:35	1.2m	(+)	6:45	1.2m	0:59
Chichijima Futami	7:14	1.0m	(+)	7:46	1.8m	2:00
Numazu-shi Uchiura	7:01	1.4m	(+)	7:16	1.4m	1:30
Omaezaki	7:03	1.0m	(+)	8:18	1.4m	2:32
Tahara-shi Akabane	7:21	1.1m	(+)	8:32	1.6m	2:46
Nagoya	8:43	0.7m	(+)	10:36	1.0m	4:50
Toba	7:34	0.5m	(+)	10:13	1.8m	4:27
Owase	7:17	1.0m	(+)	8:12	1.7m	2:26

Kumano-shi Yuki	7:12	0.7m	(+)	7:28	0.7m	1:42
Nachi-katsuura-cho Uragami	7:14	0.9m	(+)	9:06	1.3m	3:20
Kushimoto-cho Fukuro-ko	7:16	0.7m	(+)	16:32	1.4m	10:46
Gobo-shi Haraido	7:35	0.7m	(+)	8:57	1.1m	3:11
Shirahama-cho Katata	7:34	0.9m	(+)	15:35	1.0m	9:49
Tokushima Yuki	7:37	1.0m	(+)	11:27	1.1m	5:41
Tosa-shimizu	7:56	0.9m	(+)	16:58	1.3m	11:12
Susaki-ko	8:00	1.4m	(+)	11:59	2.6m	6:13
Nichinan-shi Aburatsu	8:05	1.0m	(+)	15:12	1.1m	9:26
Miyazaki-ko	8:06	1.4m	(+)	18:33	1.6m	12:47
Shibushi-ko	8:12	1.1m	(+)	8:39	1.1m	2:53
Tanegashima Kumano	7:52	0.8m	(+)	18:23	1.5m	12:37
Amami-shi Kominato	8:01	0.1m	(-)	16:48	1.2m	11:02

Observed tsunami height; (After National Geophysical Data Center, NOAA) (Revised)
Note: Japanese stations are excluded

Station Name	Height (m)	Distance (km)	Country
YUZHNO-KURIL'SK, KUNASHIR ISLAND	1.99	699	RUSSIA
MALOKURIL'SKAYA BAY, SHIKOTAN	3.00	720	RUSSIA
BUREVESTNIK, ITURUP I., KURILSKIYE	2.00	847	RUSSIA
CAPE KRILON	0.19	850	RUSSIA
RUDNAYA	0.32	859	RUSSIA
KORSAKOV, SAKHALIN	0.23	924	RUSSIA
NEVELSK, SAKHALIN	0.06	931	RUSSIA
KHOLMSK	0.07	969	RUSSIA
D21401 BPR, 250NM SE of ITIRUP IS	0.67	987	RUSSIA
STARODUBSKOE	0.16	1,012	RUSSIA
ITURUP, KURILSKIYE	0.53	1,102	RUSSIA
PORONAYSK	0.20	1,213	RUSSIA
D21419 BPR, 209 NM S of KURIL IS	0.40	1,305	RUSSIA
PETROPAVLOVSK, KAMCHATKA	0.18	2,064	RUSSIA
SEMJACHIK, KAMCHATKA	0.68	2,064	RUSSIA
NIKOLSKOE, BERING IS.	0.24	2,575	RUSSIA
SAIPAN, NORTHERN MARIANA ISLANDS	0.80	2,589	USA TERRITORY
D21415 BPR, 175 NM S of ATTU, AK	0.27	2,667	USA
SHEMYA ISLAND, AK	1.57	2,910	USA
D52405 BPR, GUAM	0.07	2,999	USA TERRITORY
D21414 BPR, NORTHWEST PACIFIC OCEAN	0.27	3,087	USA
WAKE ISLAND	0.50	3,155	USA TERRITORY
D52402 BPR - 790 NM NW OF KWAJALEIN	0.29	3,213	USA TERRITORY
YAP ISLAND, CAROLINE ISLANDS	0.20	3,232	MICRONESIA, FED. STATES OF
LEGASPI	0.25	3,349	PHILIPPINES
SUBIC BAY	0.07	3,396	PHILIPPINES
LUBANG	0.18	3,492	PHILIPPINES
ADAK, SWEEPER COVE, AK	1.10	3,495	USA
MALAKAL ISLAND, CAROLINE ISLANDS	0.16	3,537	PALAU
D52403 BPR - 430 NM SW OF TRUK	0.13	3,838	MICRONESIA, FED. STATES OF
MIDWAY ISLANDS	1.27	3,878	USA TERRITORY
D46408 BPR, NORTHWEST PACIFIC OCEAN	0.22	3,949	USA
ST. PAUL ISLAND, AK	0.61	4,001	USA
NIKOLSKI, AK	0.84	4,031	USA
KWAJALEIN, MARSHALL ISLANDS	0.66	4,155	USA TERRITORY
UNALASKA, DUTCH HARBOR, AK	0.51	4,192	USA
D46402 BPR, S of DUTCH HARBOR	0.01	4,362	USA
NOME, AK	0.04	4,444	USA
KING COVE, AK	0.54	4,470	USA
LOMBRUM, ADMIRALTY ISLANDS	1.04	4,515	PAPUA NEW GUINEA
MANUS ISLAND, ADMIRALTY ISLANDS	1.03	4,515	PAPUA NEW GUINEA
MAJURO, MARSHALL ISLANDS	0.51	4,532	MARSHALL ISLANDS, REP. OF
BITUNG	0.26	4,568	INDONESIA
PORT MOLLER, AK	0.15	4,580	USA
SAND POINT, AK	0.61	4,585	USA

D46403 BPR, SE OF SHUMAGIN IS, AK	0.10	4,833	USA
ALITAK, AK	0.18	4,964	USA
NAURU	0.27	4,998	NAURU
OLD HARBOR, AK	0.38	5,017	USA
KODIAK, AK	0.35	5,064	USA
FRENCH FRIGATE SHOALS, HI	0.38	5,078	USA
SELDOVIA, AK	0.10	5,100	USA
BETIO, TARAWA	0.27	5,156	KIRIBATI
SEWARD, AK	0.29	5,221	USA
JOHNSTON ISLAND	0.20	5,243	USA TERRITORY
VALDEZ, AK	0.08	5,377	USA
D52406 BPR, HONIARA	0.20	5,391	USA
CORDOVA, AK	0.09	5,412	USA
HONIARA, GUADALCANAL	0.21	5,616	SOLOMON ISLANDS
YAKUTAT, AK	0.35	5,766	USA
NAWILIWILI, KAUAI, HI	0.88	5,792	USA
GROOTE EYLANDT ISLAND	0.04	5,837	AUSTRALIA
BARBERS POINT, OAHU, HI	0.70	5,942	USA
HONOLULU, OAHU, HI	0.71	5,962	USA
ELFIN COVE, AK	0.21	5,991	USA
SKAGWAY, AK	0.21	6,009	USA
D55023 BPR, ETD CORAL SEA	0.04	6,024	PAPUA NEW GUINEA
KAUMALAPAU, LANAI, HI	0.91	6,071	USA
SITKA, AK	0.40	6,086	USA
JUNEAU, AK	0.21	6,096	USA
KAHULUI, MAUI, HI	2.00	6,108	USA
PORT ALEXANDER, AK	0.42	6,155	USA
D51407 BPR, SE OF HONOLULU, HI	0.31	6,182	USA
KAWAIHAE, HAWAII, HI	1.04	6,217	USA
D55012 BPR, CORAL SEA	0.04	6,251	PAPUA NEW GUINEA
CRAIG, AK	0.31	6,273	USA
HILO, HAWAII, HI	1.33	6,302	USA
LANGARA ISLAND, BRITISH COLUMBIA	0.54	6,326	CANADA
KETCHIKAN, AK	0.11	6,366	USA
LUGANVILLE	0.54	6,523	VANUATU
KANTON ISLAND, PHOENIX ISLANDS	0.16	6,565	KIRIBATI
PORT VILA, EFATE ISLAND	0.80	6,800	VANUATU
WINTER HARBOR, BRITISH COLUMBIA	0.86	6,805	CANADA
D51425 BPR, 370 NM NW Of APIA	0.14	6,832	SAMOA
ROSSLYN BAY	0.41	6,895	AUSTRALIA
ASTORIA, OR	0.18	6,993	USA
PORT ALBERNI, BRITISH COLUMBIA	0.76	7,075	CANADA
NEAH BAY, WA	0.43	7,135	USA
LA PUSH, WA	0.71	7,159	USA
PATRICIA BAY, BRITISH COLUMBIA	0.79	7,211	CANADA
LAUTOKA	0.29	7,216	FIJI
PORT ANGELES, WA	0.59	7,224	USA
CHERRY POINT, WA	0.07	7,226	USA

FRIDAY HARBOR, WA	0.10	7,228	USA
WESTPORT, WA	0.46	7,249	USA
PORT TOWNSEND, WA	0.16	7,269	USA
TOKE POINT, WA	0.33	7,270	USA
CHRISTMAS ISLAND, LINE ISLANDS	0.53	7,307	KIRIBATI
SUVA, KING'S WHARF	0.21	7,320	FIJI
SEATTLE, WA	0.04	7,325	USA
SKAMOKAWA, WA	0.06	7,328	USA
TACOMA, WA	0.06	7,337	USA
WAUNA, OR	0.05	7,338	USA
GARIBALDI, OR	0.35	7,339	USA
SOUTH BEACH, OR	0.43	7,383	USA
CHARLESTON, OR	0.71	7,447	USA
PORT ORFORD, OR	2.02	7,462	USA
D46411 BPR, NW OF SAN FRANCISCO, CA	0.19	7,482	USA
CRESCENT CITY, CA	2.47	7,542	USA
NORTH SPIT, HUMBOLDT BAY, CA	0.97	7,598	USA
PAGO BAY, GUAM	0.34	7,622	USA TERRITORY
PAGO PAGO, AMERICAN SAMOA	0.53	7,623	USA TERRITORY
POINT ARENA, CA	1.74	7,743	USA
ARENA COVE, CA	0.82	7,747	USA
POINT REYES, CA	1.35	7,857	USA
RICHMOND, CA	0.35	7,903	USA
MARE ISLAND, CA	0.07	7,905	USA
SAN FRANCISCO, CA	0.62	7,906	USA
ALAMEDA, CA	0.51	7,921	USA
PORT CHICAGO, CA	0.04	7,921	USA
REDWOOD CITY, CA	0.12	7,943	USA
MONTEREY, CA	0.70	8,024	USA
PORT KEMBLA	0.36	8,146	AUSTRALIA
PORT SAN LUIS, CA	2.02	8,194	USA
PLATFORM HARVEST, CA	0.15	8,251	USA
SANTA BARBARA, CA	1.02	8,328	USA
D46412 BPR, W-SW OF SAN DIEGO, CA	0.10	8,395	USA
SANTA MONICA, CA	0.84	8,442	USA
LOS ANGELES, CA	0.49	8,479	USA
PORTLAND	0.12	8,528	AUSTRALIA
FISHING ROCK, RAOUL ISLAND	0.47	8,574	NEW ZEALAND
RAOUL ISLAND, BOAT COVE	0.31	8,577	NEW ZEALAND
LA JOLLA, CA	0.39	8,611	USA
SAN DIEGO, CA	0.63	8,627	USA
NORTH CAPE	0.38	8,684	NEW ZEALAND
BURNIE, TASMANIA	0.16	8,836	AUSTRALIA
RAROTONGA	0.29	8,953	COOK ISLANDS
SPRING BAY, TASMANIA	0.47	9,013	AUSTRALIA
TAURANGA	0.28	9,139	NEW ZEALAND
LOTTIN PT	0.33	9,208	NEW ZEALAND
HUAHINE	0.34	9,244	FRENCH POLYNESIA

NAPIER	0.46	9,343	NEW ZEALAND
RANGIROA	0.42	9,370	FRENCH POLYNESIA
PAPEETE, TAHITI	0.37	9,414	FRENCH POLYNESIA
WELLINGTON	0.17	9,445	NEW ZEALAND
JACKSON BAY	0.35	9,527	NEW ZEALAND
NUKU HIVA ISLAND, MARQUESAS IS	1.48	9,555	FRENCH POLYNESIA
NUKUALOFA (NUKU'ALOFA)	1.24	9,555	TONGA
CHRISTCHURCH	0.48	9,604	NEW ZEALAND
D51406 BPR, SOUTHEAST OF HAWAII	0.18	9,653	USA
PUYSEGER	0.09	9,694	NEW ZEALAND
DUNEDIN	0.11	9,775	NEW ZEALAND
TUKBUAI	0.20	9,868	FRENCH POLYNESIA
CABO SAN LUCAS	0.17	9,875	MEXICO
WAITANGI, CHATHAM ISLAND	0.60	10,040	NEW ZEALAND
OWENGA, CHATHAM ISLAND	0.91	10,046	NEW ZEALAND
MANZANILLO	1.70	10,589	MEXICO
D43412 BPR, 240 NM SW MANZANILLO	0.15	10,613	MEXICO
RIKITEA, MANGAREVA ISLAND	0.36	10,975	FRENCH POLYNESIA
ACAPULCO	1.05	11,101	MEXICO
D43413 BPR, 360 NM SW ACAPULCO	0.20	11,553	MEXICO
ACAJUTLA	0.48	12,099	EL SALVADOR
LA UNION	0.05	12,261	EL SALVADOR
D32411 BPR, 710 NM WSW of PANAMA	0.11	12,749	PANAMA
QUEPOS	0.18	12,851	COSTA RICA
BALTRA ISLAND, GALAPAGOS ISLANDS	0.86	13,205	ECUADOR
SANTA CRUZ I., GALAPAGOS ISLANDS	2.26	13,227	ECUADOR
EASTER ISLAND	0.73	13,353	CHILE
D32413 BPR, 1000 NM W-NW OF LIMA	0.13	13,468	PERU
LA LIBERTAD	1.61	14,071	ECUADOR
D32412 BPR, SW OF LIMA, PERU	0.09	14,804	PERU
CALLAO-LA PUNTA	1.44	15,145	PERU
ATICO	0.63	15,739	PERU
SAN FELIX	0.51	15,849	CHILE
D32401 BPR, W-SW OF ARICA, CHILE	0.10	15,883	CHILE
ARICA	2.45	16,166	CHILE
IQUIQUE	1.04	16,308	CHILE
ANTOFAGASTA	0.96	16,522	CHILE
CALDERA	2.14	16,693	CHILE
COQUIMBO	2.42	16,799	CHILE
TALCAHUANO	2.09	16,905	CHILE
VALPARAISO	1.54	16,911	CHILE
CONSTITUCION	1.93	16,921	CHILE
SAN ANTONIO	0.89	16,932	CHILE
CORRAL	1.59	16,946	CHILE
PUERTO MONTT	0.15	17,006	CHILE
PUERTO WILLIAMS	0.18	17,115	CHILE