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R/V Kairei Cruise Report
KR08-16

# Seismic survey and observation in Hyuga-nada

Dec. 06, 2008 – Dec. 26, 2008

Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

Table of Contents

1. Cruise Information

(1) Cruise Number, Ship name : KR08-16, R/V Kairei

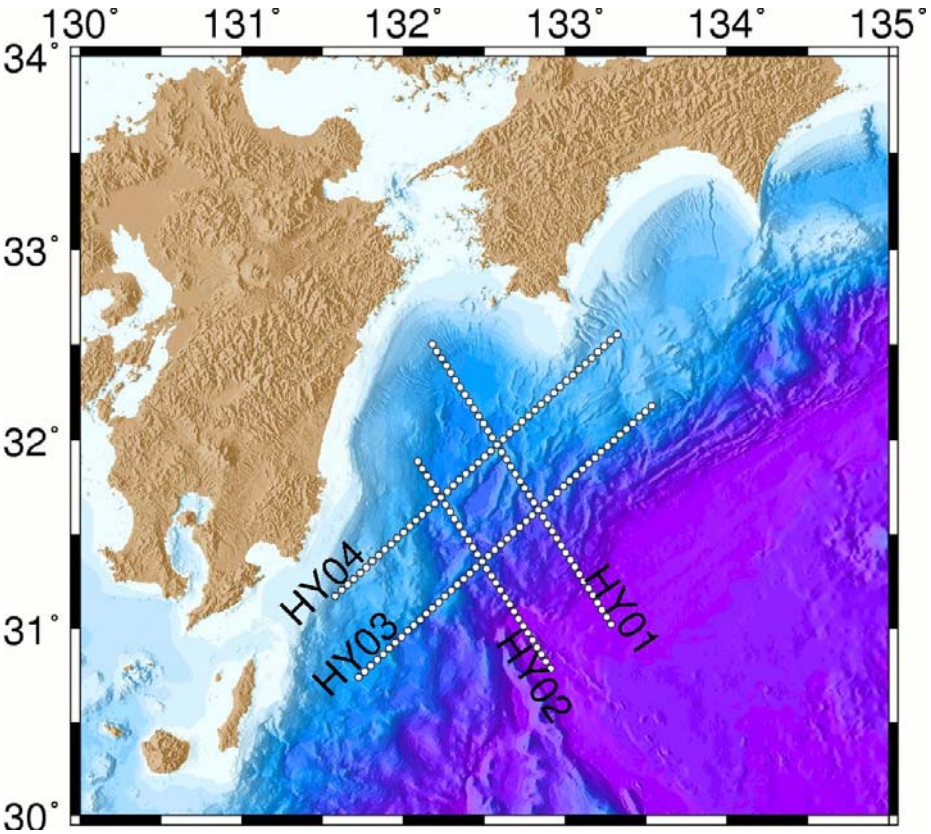
(2) Title of the Cruise
Seismic survey and observation in Hyuga-nada

(3) Title of proposal
Assessment Study of Co-movement of Tokai, Tonankai and Nankai Earthquake (commissioned by the MEXT)

(4) Cruise period, Port call
2008/12/06 – 2008/12/26, Yokosuka-Yokosuka

(5) Reseach Area
Hyuga-nada

(6) Reseach Map




White circles represent OBSs.

2. Researchers

(1) Chief Scientist [Affiliation] : FUJIE Gou [JAMSTEC]

(2) Representative of Science Party [Affiliation] : Yoshiyuki KANEDA [JAMSTEC]

(3) Science party list

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5) FUJIE Gou [JAMSTEC]
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7) Jin-Oh PARK [JAMSTEC]
8) Tsutomu TAKAHASHI [JAMSTEC]
9) Tetsuo NO [JAMSTEC]
10) Yoshio FUKAO [JAMSTEC]

3. Overview of Observation

(1) Objectives

In the Nankai Trough seismic subduction zone, a number of great earthquakes (M>8), such as 1944 Tonankai and 1946 Nankai earthqukaes, have been repeatedly occurred.

Notable features in this region are the segmentation of the rupture zones and synchronization of these segments. To understand the structure factors controlling the segmentation and the synchronization of rupture zones, it is necessary to reveal the detailed structure variations and seismic activities in this subduction zone. The objectives of this cruise are, 1) to construct detailed crustal structure in the Hyuga-nada region, and 2) to observe seismicity, particularly the activity of the low frequency tremors, in this region.

(2) Observation, activities

1) OBS deployment
All the 160 OBSs were successfully deployed at planned points.

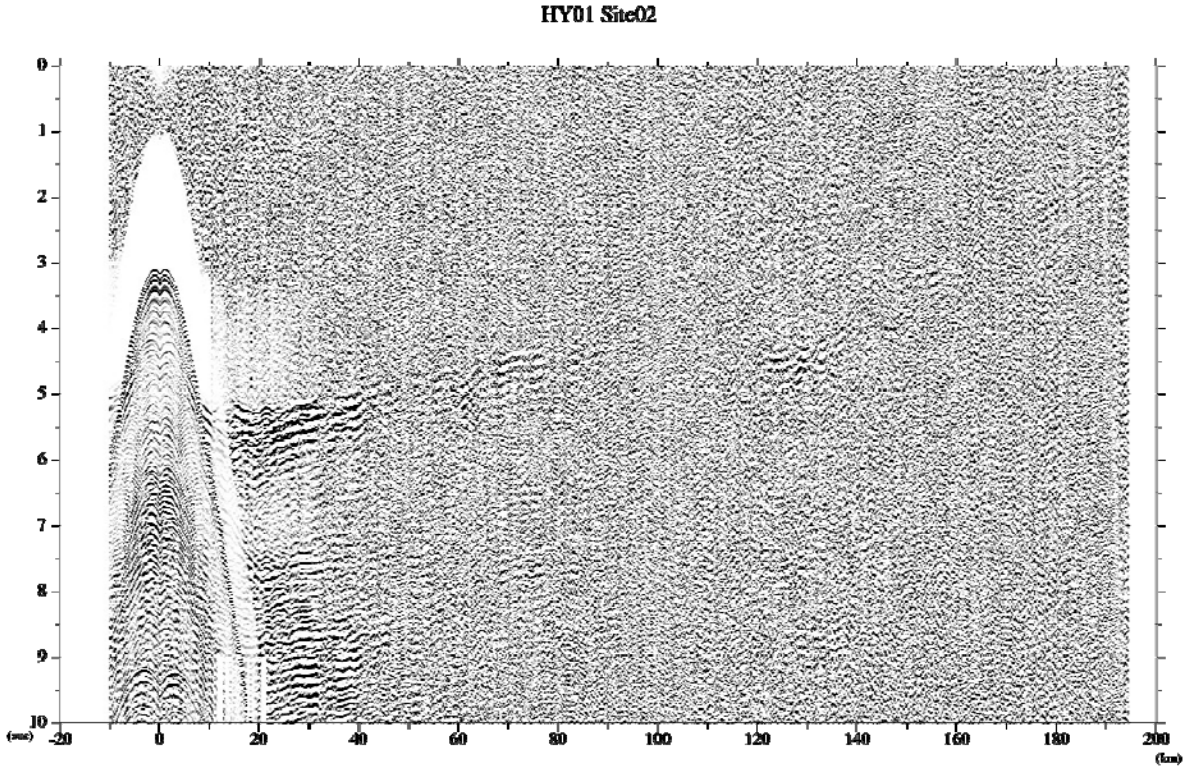
2) Airgun shooting for OBSs
We shot the airgun array for OBSs on all the 4 lines at a 200m interval.

3) MCS survey using airgun and multichannel hydrophone streamer cable
We planed to conduct MCS survey on HY02 and HY03. However, we could not because of heavy weather and mechanical troubles of airguns.

4) Bathymetry, magnetics and gravity observation
During the cruise, bathymetry, magnetics and gravity data have been recorded continuously by SEABEAM2112.004, three component magnetometer and gravity meter, respectively.

5) OBS recovery
We recovered 28 OBSs on the southern part of HY01 and HY02.

(3) Research results
An example of record section observed at Site02 on HY01. We could observe




refractions upto about 200km offset. During this cruise, we recovered 28 of 160 OBSs. We left the rest OBSs for the observation of seismic activity.

4. List of observation instruments

(1) Ocean bottom seismometer（OBS）

Tokyo-Sokushin type with a 24bit delta-sigma A/D converter.

(2) SEABEAM2112.004

(3) three component magnetometer

(4) gravity meter.

5. Cruise log:

| Date (Dec. 2008) | Remarks |
|---|---|
| 6 | Departure from Yokosuka |
| 7 | Transit to survey area |
| 8 | OBS deployment |
| 9 | OBS deployment |
| 10 | OBS deployment |
| 11 | OBS deployment |
| 12 | OBS deployment |
| 13 | OBS deployment, Airgun shot on HY03 |
| 14 | Airgun shot on HY03, OBS deployment |
| 15 | Airgun shot on HY01 |
| 16 | Airgun shot on HY01 |
| 17 | Airgun shot on HY02 |
| 18 | Airgun shot on HY02, HY04 |
| 19 | Airgun shot on HY04, HY03 |
| 20 | Airgun shot on HY03 |
| 21 | OBS recovery |
| 22 | OBS recovery |
| 23 | OBS recovery |
| 24 | OBS recovery |
| 25 | Transit Yokosuka |
| 26 | Arrival at Yokosuka |

6. OBS position (deploy position)

| Site | Position | | |
|---|---|---|---|
| | Lat(N) | Lon(E) | Depth |
| 1 | 31_01.3840 | 133_17.0399 | 4664 |
| 2 | 31_03.6662 | 133_15.3728 | 4692 |
| 3 | 31_05.9532 | 133_13.6887 | 4736 |
| 4 | 31_08.2287 | 133_12.0262 | 4772 |
| 5 | 31_10.5202 | 133_10.3380 | 4746 |
| 6 | 31_12.7953 | 133_08.6674 | 4431 |
| 7 | 31_15.0823 | 133_06.9905 | 4378 |
| 8 | 31_17.3749 | 133_05.2953 | 4204 |
| 9 | 31_19.6533 | 133_03.6162 | 3937 |
| 10 | 31_21.9385 | 133_01.9327 | 3689 |
| 11 | 31_24.2159 | 133_00.2437 | 3503 |
| 12 | 31_26.4954 | 132_58.5444 | 3387 |
| 13 | 31_28.7793 | 132_56.8686 | 3186 |
| 14 | 31_31.0708 | 132_55.1773 | 3056 |
| 15 | 31_33.3418 | 132_53.4557 | 2867 |
| 16 | 31_35.6107 | 132_51.7767 | 2650 |
| 17 | 31_37.8953 | 132_50.0819 | 2607 |
| 18 | 31_40.1721 | 132_48.4006 | 2532 |
| 19 | 31_42.4415 | 132_46.7000 | 2465 |
| 20 | 31_44.7265 | 132_45.0041 | 2265 |
| 21 | 31_47.0034 | 132_43.2882 | 1829 |
| 22 | 31_49.2796 | 132_41.5975 | 1913 |
| 23 | 31_51.5597 | 132_39.8896 | 1824 |
| 24 | 31_53.8326 | 132_38.1815 | 1830 |
| 25 | 31_56.1219 | 132_36.4804 | 1978 |
| 26 | 31_58.3943 | 132_34.7938 | 1476 |
| 27 | 32_00.6720 | 132_33.0556 | 1876 |
| 28 | 32_02.9481 | 132_31.3575 | 1751 |
| 29 | 32_05.2146 | 132_29.6719 | 1816 |
| 30 | 32_07.4874 | 132_27.9508 | 1722 |
| 31 | 32_09.7617 | 132_26.2171 | 1866 |
| 32 | 32_12.0640 | 132_24.4655 | 1789 |
| 33 | 32_14.3071 | 132_22.7716 | 1769 |
| 34 | 32_16.5788 | 132_21.0509 | 1700 |
| 35 | 32_18.8520 | 132_19.3426 | 1656 |
| 36 | 32_21.1249 | 132_17.6242 | 1619 |
| 37 | 32_23.3955 | 132_15.9018 | 1537 |
| 38 | 32_25.6693 | 132_14.1675 | 1338 |
| 39 | 32_27.9430 | 132_12.4561 | 1124 |
| 40 | 32_30.2042 | 132_10.7090 | 920 |

| Site | Position | | |
|---|---|---|---|
| | Lat(N) | Lon(E) | Depth |
| 41 | 30_47.1880 | 132_54.5914 | 4867 |
| 42 | 30_49.4718 | 132_52.9070 | 4865 |
| 43 | 30_51.7425 | 132_51.2199 | 4637 |
| 44 | 30_54.0257 | 132_49.5351 | 4594 |
| 45 | 30_56.3023 | 132_47.8556 | 4666 |
| 46 | 30_58.6007 | 132_46.1710 | 4810 |
| 47 | 31_00.8621 | 132_44.4953 | 4893 |
| 48 | 31_03.1380 | 132_42.8063 | 4902 |
| 49 | 31_05.4140 | 132_41.1114 | 4879 |
| 50 | 31_07.6850 | 132_39.4180 | 3531 |
| 51 | 31_09.9736 | 132_37.7391 | 3367 |
| 52 | 31_12.2496 | 132_36.0409 | 3100 |
| 53 | 31_14.5271 | 132_34.3426 | 2828 |
| 54 | 31_16.1029 | 132_32.6487 | 2757 |
| 55 | 31_19.0768 | 132_30.9537 | 2456 |
| 56 | 31_21.3516 | 132_29.2627 | 2311 |
| 57 | 31_23.6215 | 132_27.5432 | 2403 |
| 58 | 31_25.8919 | 132_25.8428 | 2276 |
| 59 | 31_28.1699 | 132_24.1406 | 2707 |
| 60 | 31_30.4344 | 132_22.4249 | 2143 |
| 61 | 31_32.7140 | 132_20.7402 | 2077 |
| 62 | 31_34.9862 | 132_19.0259 | 1895 |
| 63 | 31_37.2658 | 132_17.3230 | 1955 |
| 64 | 31_39.5294 | 132_15.6171 | 1967 |
| 65 | 31_41.7967 | 132_13.8929 | 1843 |
| 66 | 31_44.0716 | 132_12.1834 | 1929 |
| 67 | 31_46.3445 | 132_10.4709 | 1910 |
| 68 | 31_48.6085 | 132_08.7533 | 1814 |
| 69 | 31_50.8883 | 132_07.0384 | 1703 |
| 70 | 31_53.1496 | 132_05.3212 | 1492 |
| 71 | 30_44.3951 | 131_43.3414 | 1607 |
| 72 | 30_46.2488 | 131_45.6346 | 1722 |
| 73 | 30_48.1043 | 131_47.9075 | 1316 |
| 74 | 30_49.9589 | 131_50.1894 | 1747 |
| 75 | 30_51.8088 | 131_52.4786 | 1686 |
| 76 | 30_53.6651 | 131_54.7507 | 1618 |
| 77 | 30_55.5096 | 131_57.0611 | 2066 |
| 78 | 30_57.3624 | 131_59.3473 | 2206 |
| 79 | 30_59.1988 | 132_01.6339 | 1835 |
| 80 | 31_01.0694 | 132_03.9226 | 1968 |

| Site | Position | | |
|---|---|---|---|
| | Lat(N) | Lon(E) | Depth |
| 81 | 31_02.9053 | 132_06.2315 | 2143 |
| 82 | 31_04.7552 | 132_08.5189 | 2290 |
| 83 | 31_06.6047 | 132_10.8181 | 2106 |
| 84 | 31_08.4590 | 132_13.1173 | 1855 |
| 85 | 31_10.2995 | 132_15.4210 | 1721 |
| 86 | 31_12.1329 | 132_17.7211 | 1933 |
| 87 | 31_13.9875 | 132_20.0264 | 2240 |
| 88 | 31_15.8283 | 132_22.3368 | 2534 |
| 89 | 31_17.6727 | 132_24.6426 | 2304 |
| 90 | 31_19.5241 | 132_26.9467 | 2286 |
| 91 | 31_23.1970 | 132_31.5623 | 2467 |
| 92 | 31_25.0383 | 132_33.8769 | 2763 |
| 93 | 31_26.8778 | 132_36.1967 | 2813 |
| 94 | 31_28.7399 | 132_38.5362 | 2578 |
| 95 | 31_30.5560 | 132_40.8276 | 2479 |
| 96 | 31_32.3863 | 132_43.1396 | 2695 |
| 97 | 31_34.2338 | 132_45.4665 | 2810 |
| 98 | 31_36.0581 | 132_47.7828 | 2717 |
| 99 | 31_39.7172 | 132_52.4184 | 2449 |
| 100 | 31_41.5643 | 132_54.7553 | 2386 |
| 101 | 31_43.3924 | 132_57.0837 | 2486 |
| 102 | 31_45.2305 | 132_59.4139 | 2409 |
| 103 | 31_47.0609 | 133_01.7376 | 2490 |
| 104 | 31_48.8846 | 133_04.0682 | 2522 |
| 105 | 31_50.7071 | 133_06.4013 | 2508 |
| 106 | 31_52.5484 | 133_08.7499 | 2501 |
| 107 | 31_54.3788 | 133_11.0833 | 2452 |
| 108 | 31_56.2070 | 133_13.4171 | 1998 |
| 109 | 31_58.0401 | 133_15.7588 | 1863 |
| 110 | 31_59.8597 | 133_18.1035 | 1767 |
| 111 | 32_01.6902 | 133_20.4805 | 1726 |
| 112 | 32_03.5090 | 133_22.7863 | 1860 |
| 113 | 32_05.3293 | 133_25.1350 | 2101 |
| 114 | 32_07.1527 | 133_27.4765 | 1619 |
| 115 | 32_08.9758 | 133_29.8274 | 1325 |
| 116 | 32_10.8074 | 133_32.1894 | 1029 |
| 117 | 31_10.3321 | 131_34.7895 | 749 |
| 118 | 31_12.1911 | 131_37.0843 | 854 |
| 119 | 31_14.0464 | 131_39.3857 | 931 |
| 120 | 31_15.9098 | 131_41.6654 | 894 |

| Site | Position | | |
|---|---|---|---|
| | Lat(N) | Lon(E) | Depth |
| 121 | 31_17.7637 | 131_43.9599 | 876 |
| 122 | 31_19.6131 | 131_46.2661 | 934 |
| 123 | 31_21.4661 | 131_48.5674 | 657 |
| 124 | 31_23.3262 | 131_50.8585 | 1051 |
| 125 | 31_25.1741 | 131_53.1515 | 1082 |
| 126 | 31_27.0288 | 131_55.4642 | 1206 |
| 127 | 31_28.8695 | 131_57.7545 | 1202 |
| 128 | 31_30.7258 | 132_00.0604 | 1275 |
| 129 | 31_32.5757 | 132_02.3605 | 1644 |
| 130 | 31_34.4224 | 132_04.6618 | 1608 |
| 131 | 31_36.2689 | 132_06.9684 | 1781 |
| 132 | 31_38.1165 | 132_09.2813 | 1944 |
| 133 | 31_39.9625 | 132_11.5906 | 1774 |
| 134 | 31_43.6517 | 132_16.2222 | 2015 |
| 135 | 31_45.5009 | 132_18.5313 | 1951 |
| 136 | 31_47.3385 | 132_20.8471 | 1980 |
| 137 | 31_49.1860 | 132_23.1676 | 1922 |
| 138 | 31_51.0331 | 132_25.4848 | 2086 |
| 139 | 31_52.8670 | 132_27.8043 | 2013 |
| 140 | 31_54.7060 | 132_30.1374 | 1946 |
| 141 | 31_56.5437 | 132_32.4557 | 1888 |
| 142 | 32_00.2135 | 132_37.1176 | 1699 |
| 143 | 32_02.0683 | 132_39.4387 | 1914 |
| 144 | 32_03.9013 | 132_41.7750 | 1860 |
| 145 | 32_05.7405 | 132_44.1084 | 1446 |
| 146 | 32_07.5731 | 132_46.4557 | 1484 |
| 147 | 32_09.4390 | 132_48.7849 | 1437 |
| 148 | 32_11.2491 | 132_51.1251 | 1329 |
| 149 | 32_13.1405 | 132_53.4547 | 1242 |
| 150 | 32_14.9386 | 132_55.7976 | 1208 |
| 151 | 32_16.7532 | 132_58.1505 | 1151 |
| 152 | 32_18.5758 | 133_00.4874 | 1065 |
| 153 | 32_20.4063 | 133_02.8152 | 930 |
| 154 | 32_22.2304 | 133_05.1621 | 922 |
| 155 | 32_24.0778 | 133_07.5170 | 1004 |
| 156 | 32_25.8949 | 133_09.8777 | 917 |
| 157 | 32_27.7358 | 133_12.2172 | 858 |
| 158 | 32_29.4339 | 133_14.5834 | 837 |
| 159 | 32_31.3735 | 133_16.8961 | 743 |
| 160 | 32_33.2267 | 133_19.2780 | 895 |

7. Airgun lines (end points)

| Line name | Lat | Lon | Lat | Lon |
|---|---|---|---|---|
| HY01 | 31.24056 | 133.3753 | 32.68694 | 132.3900 |
| HY02 | 30.66056 | 133.0778 | 32.07472 | 132.1911 |
| HY03-1 | 30.75028 | 131.8989 | 31.71500 | 132.9139 |
| HY03-2 | 32.78917 | 133.6569 | 31.36472 | 132.5700 |
| HY04 | 31.23861 | 131.4956 | 32.59917 | 133.5436 |

8. Notice on using

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