



# HOKKAIDO UNIVERSITY

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| Title            | 10 THE "OSHORO MARU" CRUISE 009 TO THE OGASAWARA ISLANDS IN DECEMBER 2014         |
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**THE "OSHORO MARU" CRUISE 009  
TO THE OGASAWARA ISLANDS**

**IN DECEMBER 2014**

1. Cruise Itinerary

Cruise 009

|                                                                       |            |      |
|-----------------------------------------------------------------------|------------|------|
| Departure from Hakodate                                               | December 3 | 2014 |
| Arrival at Yokohama                                                   | 6          |      |
| Departure from Yokohama                                               | 9          |      |
| Start hydrographic research (OS14168)                                 | 10         |      |
| Start vertical long-line research (OSVL1401)                          | 11         |      |
| Finish hydrographic research (OS14174)                                | 12         |      |
| Finish vertical long-line research (OSVL141406) and arrival at Futami | 13         |      |
| Departure from Futami                                                 | 14         |      |
| Arriveal at Tokyo                                                     | 17         |      |

Total coverage 1771.9 miles

2. Vessel Personnel

|       |          |                     |                |
|-------|----------|---------------------|----------------|
| Crew: | Captain: | Associate Professor | Shogo Takagi   |
|       |          |                     | And 29 persons |

(Hakodate – Yokohama)

|                  |           |
|------------------|-----------|
| Technical staff: | 4 persons |
|------------------|-----------|

(Yokohama –Tokyo)

|                  |                                                                                    |                    |
|------------------|------------------------------------------------------------------------------------|--------------------|
| Guest Scientist: | Assistant Professor (Hokkaido University Museum)                                   | Yoshiharu Fujita   |
|                  | Program-Specific Assistant Professor (Kyoto University)                            | Shunsuke Yamashita |
|                  | Postdoctoral Fellow (Department of Marine Science and Resources, Nihon University) | Shun Watanabe      |
|                  | Postdoctoral Fellow (Department of Marine Science and Resources, Nihon University) | Ryotaro Manabe     |

|                           |                                                                                                 |                  |
|---------------------------|-------------------------------------------------------------------------------------------------|------------------|
| Undergraduate instructor: | Professor (Department of Marine Science and Resources, Nihon University)                        | Takahito Kojima  |
|                           | Assistant Professor (Department of Marine Science and Resources, Nihon University)              | Yuya Makiguchi   |
|                           | Associate Professor (Department of Animal Science, Teikyo University of Science and Technology) | Kyoichi Mori     |
| Teaching Assistant:       |                                                                                                 | 3 persons        |
| Undergraduate Students:   |                                                                                                 |                  |
|                           | (Nihon University)                                                                              | 31 persons       |
|                           | (Teikyo University of Science Technology)                                                       | 14 persons       |
|                           |                                                                                                 | Total 58 persons |

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)  
Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

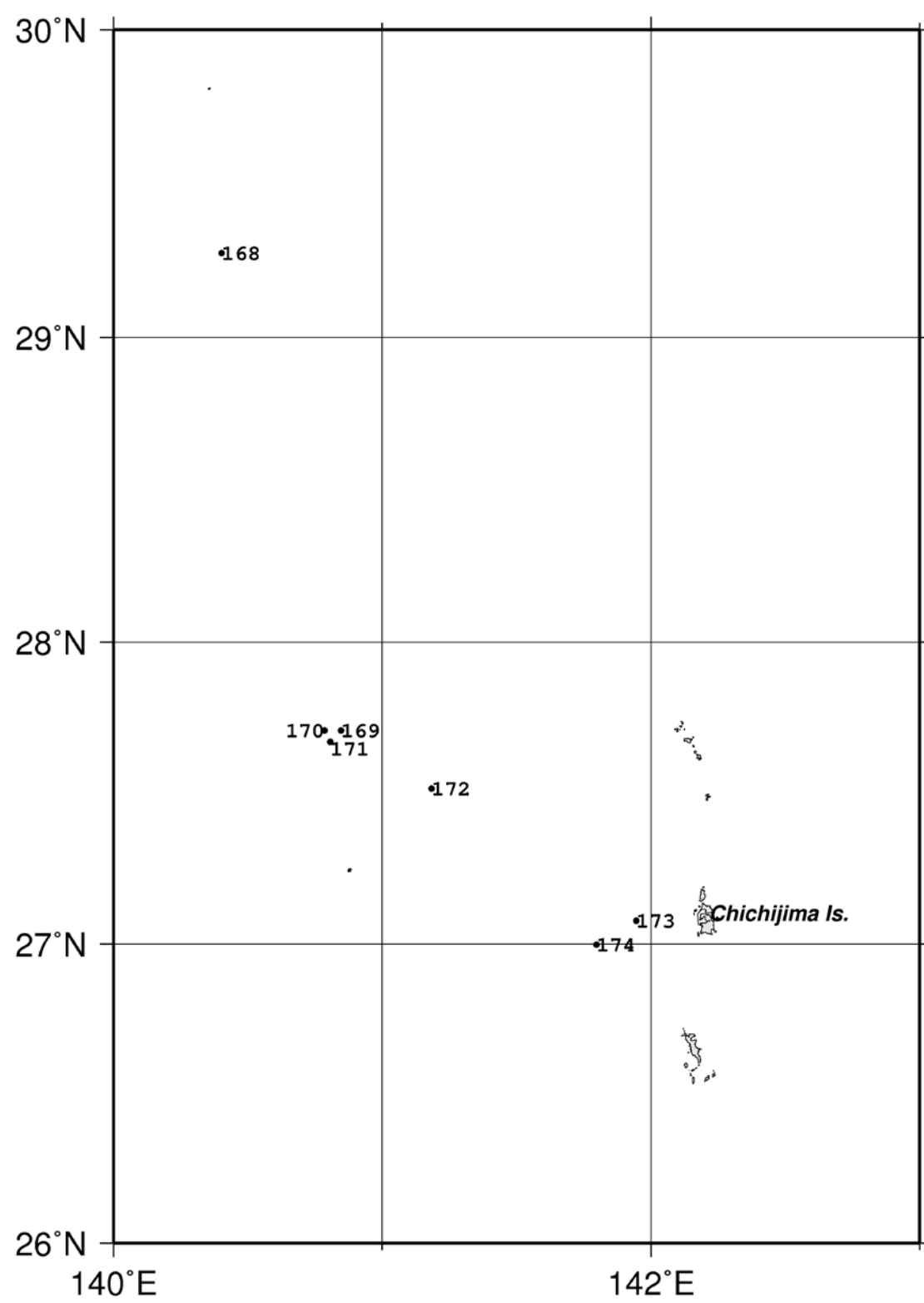


Fig.-1 Oceanographic stations

Table 1. List of Oceanographic station

| Station | Lat.       | Long.       | Date<br>(GMT) | Hour<br>(GMT) | T.Z | Depth | Col. | Tr. | SST  | Wr. | Gear    |
|---------|------------|-------------|---------------|---------------|-----|-------|------|-----|------|-----|---------|
| OS14168 | 29 16.49 N | 140 24.13 E | 12/10         | 10:01         | 9   | 2504  | -    | -   | 23.2 | bc  | XCTD-1  |
| OS14169 | 27 42.56 N | 140 50.81 E | 12/10         | 20:54         | p   | 1863  | -    | -   | 23.4 | c   | XCTD-2  |
| OS14170 | 27 42.51 N | 140 47.18 E | 12/10         | 21:55         | 9   | 1405  | 28.2 | -   | 23.3 | c   | 9p-1171 |
| OS14171 | 27 40.24 N | 140 48.40 E | 12/11         | 1:39          | 9   | 635   | -    | -   | 23.3 | c   | 9p-1171 |
| OS14172 | 27 31.02 N | 141 10.97 E | 12/11         | 10:51         | 9   | 4110  | -    | -   | 23.5 | bc  | XCTD-1  |
| OS14173 | 27 04.70 N | 141 56.67 E | 12/12         | 1:52          | 9   | 1458  | -    | -   | 22.6 | bc  | XCTD-2  |
| OS14174 | 26 59.87 N | 141 47.78 E | 12/12         | 12:00         | 9   | 3810  | -    | -   | 22.5 | bc  | XCTD-2  |

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

| Station OS14168      |        |        |       | Station OS14169      |        |        |       | Station OS14170      |        |        |        |
|----------------------|--------|--------|-------|----------------------|--------|--------|-------|----------------------|--------|--------|--------|
| Latitude 29-16.49N   |        |        |       | Latitude 27-42.56N   |        |        |       | Latitude 27-42.51N   |        |        |        |
| Longitude 140-24.13E |        |        |       | Longitude 140-50.81E |        |        |       | Longitude 140-47.18E |        |        |        |
| Depth(m) 2504        |        |        |       | Depth(m) 1863        |        |        |       | Depth(m) 1405        |        |        |        |
| Depth                | Temp.  | Sal.   | SIG-T | Depth                | Temp.  | Sal.   | SIG-T | Press.               | Temp.  | Sal.   | SIG-T  |
| 12                   | 23.061 | 31.552 | -     | 5                    | 23.320 | 34.664 | -     | 5                    | 23.222 | 34.698 | 23.641 |
| 20                   | 23.069 | 34.635 | -     | 10                   | 23.320 | 34.677 | -     | 10                   | 23.218 | 34.698 | 23.642 |
| 30                   | 23.069 | 34.642 | -     | 20                   | 23.320 | 34.686 | -     | 20                   | 23.225 | 34.698 | 23.639 |
| 40                   | 23.069 | 34.643 | -     | 30                   | 23.320 | 34.692 | -     | 30                   | 23.223 | 34.698 | 23.640 |
| 50                   | 23.069 | 34.650 | -     | 40                   | 23.300 | 34.686 | -     | 40                   | 23.225 | 34.698 | 23.639 |
| 75                   | 22.783 | 34.666 | -     | 50                   | 23.301 | 34.690 | -     | 50                   | 23.228 | 34.698 | 23.639 |
| 100                  | 20.377 | 34.772 | -     | 75                   | 23.194 | 34.679 | -     | 75                   | 22.087 | 34.732 | 23.990 |
| 125                  | 19.015 | 34.764 | -     | 100                  | 22.273 | 34.654 | -     | 100                  | 20.269 | 34.779 | 24.522 |
| 150                  | 18.505 | 34.747 | -     | 125                  | 18.746 | 34.760 | -     | 125                  | 18.268 | 34.754 | 25.017 |
| 175                  | 18.176 | 34.733 | -     | 150                  | 17.840 | 34.725 | -     | 150                  | 17.508 | 34.732 | 25.187 |
| 200                  | 17.386 | 34.710 | -     | 175                  | 17.386 | 34.714 | -     | 175                  | 17.202 | 34.722 | 25.253 |
| 250                  | 16.776 | 34.683 | -     | 200                  | 17.115 | 34.705 | -     | 200                  | 17.005 | 34.715 | 25.295 |
| 300                  | 15.988 | 34.616 | -     | 250                  | 16.862 | 34.693 | -     | 250                  | 16.868 | 34.707 | 25.321 |
| 400                  | 13.713 | 34.453 | -     | 300                  | 16.646 | 34.679 | -     | 300                  | 16.773 | 34.701 | 25.339 |
| 500                  | 11.278 | 34.284 | -     | 400                  | 15.671 | 34.603 | -     | 400                  | 15.997 | 34.633 | 25.466 |
| 600                  | 9.049  | 34.153 | -     | 500                  | 13.612 | 34.451 | -     | 500                  | 14.162 | 34.497 | 25.764 |
| 700                  | 6.268  | 34.033 | -     | 600                  | 10.513 | 34.237 | -     |                      |        |        |        |
| 800                  | 5.330  | 34.066 | -     | 700                  | 8.018  | 34.114 | -     |                      |        |        |        |
| 900                  | 4.671  | 34.131 | -     | 800                  | 6.163  | 34.100 | -     |                      |        |        |        |
| 1000                 | 4.144  | 34.213 | -     | 900                  | 4.819  | 34.178 | -     |                      |        |        |        |
| 1100                 | 3.586  | 34.312 | -     | 1000                 | 4.105  | 34.279 | -     |                      |        |        |        |
|                      |        |        |       | 1200                 | 3.435  | 34.395 | -     |                      |        |        |        |
|                      |        |        |       | 1500                 | 2.464  | 34.533 | -     |                      |        |        |        |

## Vertical long-line Research

Four operations using a vertical long-line were performed.

The gear comprised by three types of main line (400,500,600m) with a weight attached to one end, a buoy attached to the other end, and six branch lines (18m-for tuna and 4m-for squid) attached to the main line.

These operations were supervised by the captain, Deck officers, Science officer, crews, and under graduate instructor were engaged in the work

Table 3 Data on vertical long line research

| Table 3 Data on Vertical Long line Research |           |              |              |              |              |
|---------------------------------------------|-----------|--------------|--------------|--------------|--------------|
| No. of research                             |           | OSVL 1401-01 | OSVL 1401-02 | OSVL 1401-03 | OSVL 1401-04 |
| Date                                        |           | 11-Dec       |              |              |              |
| position of<br>line set                     | Lat. (N)  | 27-42.3      | 27-42.4      | 27-42.4      | 27-42.5      |
|                                             | Long. (E) | 140-49.3     | 140-48.8     | 140-48.3     | 140-47.9     |
| Time<br>(S.M.T.)                            | Line set  | 0619         | 0625         | 0630         | 0635         |
|                                             | Line haul | 0814-0951    |              |              |              |
| Length of main line(m)                      |           | 600          | 600          | 500          | 500          |
| Depth(m)                                    |           | 1051-1380    |              |              |              |
| Surface temp. (°C)                          |           | 23.2         |              |              |              |
| Wether                                      |           | c            |              |              |              |
| Wind                                        |           | East-4       |              |              |              |
|                                             |           |              |              |              |              |
| Flying squid                                |           |              | 1            |              |              |
| Diamondback squid                           |           |              | 1            |              |              |
| Swordfish                                   |           | 1            |              |              |              |
|                                             |           |              |              |              |              |
|                                             |           |              |              |              |              |
| No. of research                             |           | OSVL 1402-01 | OSVL 1402-02 | OSVL 1402-03 |              |
| Date                                        |           | 11-Dec       |              |              |              |
| position of<br>line set                     | Lat. (N)  | 27-40.4      | 27-40.4      | 27-40.4      |              |
|                                             | Long. (E) | 140-49.9     | 140-49.6     | 140-49.2     |              |
| Time<br>(S.M.T.)                            | Line set  | 1005         | 1011         | 1018         |              |
|                                             | Line haul | 1140-1235    |              |              |              |
| Length of main line(m)                      |           | 600          | 600          | 500          |              |
| Depth(m)                                    |           | 1160         |              |              |              |
| Surface temp. (°C)                          |           | 23.2         |              |              |              |
| Wether                                      |           | bc           |              |              |              |
| Wind                                        |           | East-5       |              |              |              |
|                                             |           |              |              |              |              |
|                                             |           |              |              |              |              |
| nothing                                     |           |              |              |              |              |
|                                             |           |              |              |              |              |
|                                             |           |              |              |              |              |
| No. of research                             |           | OSVL 1403-01 | OSVL 1403-02 | OSVL 1403-03 | OSVL 1403-04 |
| Date                                        |           | 11-Dec       |              |              |              |
| position of<br>line set                     | Lat. (N)  | 27-40.5      | 27-40.4      | 27-40.2      | 27-40.1      |
|                                             | Long. (E) | 140-52.0     | 140-52.4     | 140-52.9     | 140-53.2     |
| Time<br>(S.M.T.)                            | Line set  | 1253         | 1259         | 1304         | 1309         |
|                                             | Line haul | 1457-1621    |              |              |              |
| Length of main line(m)                      |           | 600          | 600          | 500          | 500          |
| Depth(m)                                    |           | 2711         |              |              |              |
| Surface temp. (°C)                          |           | 23.3         |              |              |              |
| Wether                                      |           | c            |              |              |              |
| Wind                                        |           | SSE-5        |              |              |              |
|                                             |           |              |              |              |              |
|                                             |           |              |              |              |              |
| Flying squid                                |           |              |              | 1            |              |
| Diamondback squid                           |           |              | 1            | 1            |              |
| Sickle pomfret                              |           |              | 1            |              |              |
| Blue shark                                  |           |              | 1            |              |              |

Continued

| No. of research        |           | OSVL 1404-01 | OSVL 1404-02 | OSVL 1404-03 | OSVL 1404-04 | OSVL 1404-05 | OSVL 1404-06 |
|------------------------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| Date                   |           | 12-Dec       |              |              |              |              |              |
| position of            | Lat. (N)  | 27-06.7      | 27-06.5      | 27-06.5      | 27-06.4      | 27-06.3      | 27-06.2      |
| line set               | Long. (E) | 141-56.5     | 141-57.1     | 141-57.7     | 141-58.1     | 141-58.5     | 141-58.9     |
| Time                   | Line set  | 0619         | 0625         | 0631         | 0636         | 0642         | 0646         |
| (S.M.T.)               | Line haul | 0832-1048    |              |              |              |              |              |
| Length of main line(m) |           | 600          | 500          | 600          | 500          | 600          | 500          |
| Depth(m)               |           | 1352-1734    |              |              |              |              |              |
| Surface temp. (°C)     |           | 22.5         |              |              |              |              |              |
| Wether                 |           | bc           |              |              |              |              |              |
| Wind                   |           | NW-3         |              |              |              |              |              |
| Bigeye tuna            |           | 1            |              | 1            |              |              |              |
| Blue shark             |           |              |              | 1            |              |              |              |
| No. of research        |           | OSVL 1405-01 | OSVL 1405-02 | OSVL 1405-03 | OSVL 1405-04 | OSVL 1405-05 | OSVL 1405-06 |
| Date                   |           | 12-Dec       |              |              |              |              |              |
| position of            | Lat. (N)  | 27-05.5      | 27-05.6      | 27-05.8      | 27-05.9      | 27-06.0      | 27-06.1      |
| line set               | Long. (E) | 141-50.8     | 141-51.1     | 141-51.5     | 141-51.9     | 141-52.2     | 141-52.5     |
| Time                   | Line set  | 1204         | 1209         | 1215         | 1221         | 1226         | 1231         |
| (S.M.T.)               | Line haul | 1351-1558    |              |              |              |              |              |
| Length of main line(m) |           | 600          | 600          | 500          | 500          | 500          | 500          |
| Depth(m)               |           | -            |              |              |              |              |              |
| Surface temp. (°C)     |           | 22.4         |              |              |              |              |              |
| Wether                 |           | b            |              |              |              |              |              |
| Wind                   |           | WSW-3        |              |              |              |              |              |
| Diamondback squid      |           |              |              | 1            |              |              |              |
| Bigeye tuna            |           | 1            | 1            |              |              |              |              |
| Thresher shark         |           |              |              | 1            |              |              |              |
| No. of research        |           | OSVL 1406-01 | OSVL 1406-02 | OSVL 1406-03 | OSVL 1406-04 | OSVL 1406-05 | OSVL 1406-06 |
| Date                   |           | 13-Dec       |              |              |              |              |              |
| position of            | Lat. (N)  | 27-10.0      | 27-09.7      | 27-09.4      | 27-09.2      | 27-08.9      | 27-08.7      |
| line set               | Long. (E) | 141-54.4     | 141-54.9     | 141-54.9     | 141-55.2     | 141-55.4     | 141-55.7     |
| Time                   | Line set  | 0611         | 0617         | 0622         | 0627         | 0632         | 0637         |
| (S.M.T.)               | Line haul | 0828-1018    |              |              |              |              |              |
| Length of main line(m) |           | 600          | 600          | 600          | 500          | 500          | 500          |
| Depth(m)               |           | 2080         |              |              |              |              |              |
| Surface temp. (°C)     |           | 22.5         |              |              |              |              |              |
| Wether                 |           | c            |              |              |              |              |              |
| Wind                   |           | NW-4         |              |              |              |              |              |
| Flying squid           |           | 1            |              |              |              |              |              |

S.T. : Surface temperature

Wr.: Weather (r: rain, o: 100% clouded, c: 75-99% clouded, d: drizzling rain, bc: 25-75% clouded)