

## For Using Data

|                        |  |
|------------------------|--|
| Data Policy            | JAMSTEC  |
| Principal Investigator | Data Management Office                           |
| Use Constraints        | See Terms and Conditions about constrain of use. |
| Data Citation          | See Terms and Conditions about data citation.    |

## Quality

DMO-Processed

## Instrument

Radio navigation system



## Overview

The following information is continuously collected and recorded as the Navigation QCed data during the cruise of R/V MIRAI.

Time  
Location  
Surface temperature  
Wind direction and velocity  
Current direction and velocity  
Water depth

Data are recorded every one minute, and data file named after cruise code.

## System

Manufacturer: SENA Co., Ltd.  
Model: Sena Advanced Integrated Navigation System Data format version 02.6

## Sensor specifications

- 1) GPS receiver
  - Manufacturer: Fugro Survey Limited
  - Model: StarPack-D
  - Receiver location: Compass deck [starboard side]  
Compass deck [port side]
  - Output data: NMEA
- 2) Doppler sonar
  - Manufacturer: FURUNO ELECTRIC CO., LTD.
  - Model: DS-30
  - Range:
    - Ship speed: -10.00 - +40.00knot [Cross direction]  
-9.99 - +9.99knot [Horizontal direction]
    - Current direction and speed: 0.0 - 9.9knot [All direction]
  - Accuracy: Current speed: +/- (2.0% + 0.2 knot)
- 3) Multi narrow beam echo sounder
  - Manufacturer: Elac
  - Model: SeaBeam3012
  - Frequency: 12kHz
  - Range: 50m - 11,000m
- 4) Anemometer
  - Manufacturer: Koshin Denki Kogyo Co., Ltd.
  - Model: KE-500
  - Altitude: 24m (above sea level)
  - Starting wind speed: 2m/s or less

Durability: 90m/s  
Accuracy: 10m/s or less +/-0.5m/s  
10m/s or more +/-5%

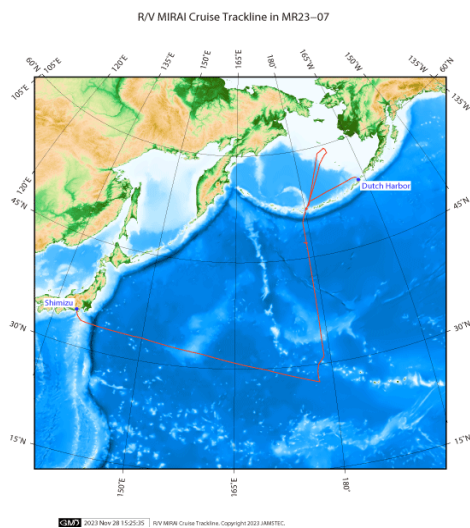
**Note**

Please see the 'data set' and 'readme' for the detail of the following observation.

|                          |  |
|--------------------------|--|
| Air temperature:         | Marine Meteorology                                 |
| Sea surface temperature: | Underway Thermosalino Graph                        |
| Atmospheric pressure:    | Marine Meteorology                                 |
| Relative humidity:       | Marine Meteorology                                 |
| Water depth:             | Bathymetry (MBES)                                  |
| Current direction/speed: | Shipboard Acoustic Doppler Current Profiler (ADCP) |

## Related Information

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### MR23-07

Ship Name: MIRAI  
Period: 2023/10/06 - 2023/11/08  
Chief Scientist: Katsuro Katsumata (JAMSTEC)  
Proposal: Quantitative observation experiment in the North Pacific subarctic gyre — GO-SHIP Observation P14

Organic alkalinity

Float Deployments with GO-BGC

Biology Observation with GO-SHIP

Distribution of Iodine and Iodites in the North Pacific Ocean

Biogeography of Plankton in the North Pacific Ocean

Vertical mixing and transport of heat and material in the North Pacific Ocean and Bering Sea

Float Deployments to Capture Environmental Changes in the North Pacific Ocean

Polycyclic Aromatic Hydrocarbons, Radium, Cesium

Multifaceted Observation of Cloud and Rain System in the North Pacific

Speciation of Iodine, Ammonia, Nitrite in the North Pacific Ocean

Deployment of EM-APEX floats as part of US Partnership Project

Experiment on DFMC SBASS from QZSS

## Format Description for QCed Data of Navigation

The one record of this data has 117 bytes of data part and 12 bytes of flag part.

### Data part

| No. | Column    | Content                      | Format        | Unit            | Remarks  |
|-----|-----------|------------------------------|---------------|-----------------|--|
| 1   | 1 - 8     | Date                         | i4,i2,i2      |                 | YYYYMMDD (UTC)   |
| 2   | 10 - 15   | Time                         | i2,i2,i2      |                 | hhmmss (UTC)   |
| 3   | 17 - 19   | Datum                        | a3            |                 | W84:WGS84<br>TD_:TOKYO DATUM   |
| 4   | 21 - 31   | Latitude                     | i2,x1,f7.4,a1 | degree - minute | dd-mm.mmmmmN(S)  |
| 5   | 33 - 44   | Longitude                    | i3,x1,f7.4,a1 | degree - minute | ddd-mm.mmmmmE(W)   |
| 6   | 46 - 49   | Ship speed(Ground)           | f4.1          | knot            |  |
| 7   | 51 - 55   | Course(Ground)               | f5.1          | degree          |  |
| 8   | 57 - 60   | Ship speed(Water)            | f4.1          | knot            | *1   |
| 9   | 62 - 66   | Gyro                         | f5.1          | degree          |  |
| 10  | 68 - 72   | Air temperature              | f5.1          | deg-C           |  |
| 11  | 74 - 78   | Sea surface temperature(SST) | f5.2          | deg-C           |  |
| 12  | 80 - 85   | Atmospheric pressure         | f6.1          | hPa             | Adjusted to the sea surface level  |
| 13  | 87 - 89   | Relative humidity            | i3            | %               |  |
| 14  | 91 - 93   | True wind direction          | i3            | degree          | Averaged over the previous 6 seconds *2                                    |
| 15  | 95 - 98   | True wind speed              | f4.1          | m/sec           | Averaged over the previous 6 seconds *2<br>No anemometer height adjustment |
| 16  | 100 - 106 | Depth                        | f7.1          | m               |  |
| 17  | 108 - 112 | Current direction            | f5.1          | degree          | Calculated value   |
| 18  | 114 - 117 | Current speed                | f4.1          | knot            | Calculated value   |

### Flag part

| No. | Column | Content | Format | Remarks   |
|-----|--------|---------|--------|---|
| 19  | 119    | Flag 1  | i1     | QC flag for 'Latitude' and 'Longitude'              |
| 20  | 120    | Flag 2  | i1     | QC flag for 'Ship speed (Ground)'                   |
| 21  | 121    | Flag 3  | i1     | QC flag for 'Course (Ground)'                       |
| 22  | 122    | Flag 4  | i1     | QC flag for 'Ship speed (Water)'                    |
| 23  | 123    | Flag 5  | i1     | QC flag for 'Gyro'                                  |
| 24  | 124    | Flag 6  | i1     | QC flag for 'Air temperature'                       |
| 25  | 125    | Flag 7  | i1     | QC flag for 'Sea Surface Temperature (SST)'         |
| 26  | 126    | Flag 8  | i1     | QC flag for 'Atmospheric pressure'                  |
| 27  | 127    | Flag 9  | i1     | QC flag for 'Relative humidity'                     |
| 28  | 128    | Flag 10 | i1     | QC flag for 'Wind direction' and 'Wind speed'       |
| 29  | 129    | Flag 11 | i1     | QC flag for 'Depth'                                 |
| 30  | 130    | Flag 12 | i1     | QC flag for 'Current direction' and 'Current speed' |

\*1 The plus and minus sign of No.8 [Ship speed (Water)] about R/V KAIREI indicates the velocity of direction of a bow and stem.

\*2 No.14 [True wind direction] and No.15 [True wind speed] about R/V SHINSEI MARU are instantaneous value.

\* The terminator of each record is 'CR+LF' code.

\* Missing value and format error value are filled with '9'.

### Definition of Quality Control Flags

Flag 1 : Longitude and Latitude

- 1 - accepted
- 2 - questionable value
- 4 - failed in location check
- 9 - system error or input error

Flag 2 : Ship speed (ground)

- 1 - accepted
  - 2 - questionable value
  - 4 - failed range check (under 20 knots)
  - 9 - system error or input error
- Flag 3 : Course (ground)
- 1 - accepted
  - 2 - questionable value
  - 4 - failed range check (0 ~ 360 degree)
  - 9 - system error or input error
- Flag 4 : Ship speed (water)
- 1 - accepted
  - 4 - failed range check (under 20 knots)
  - 9 - system error or input error
- Flag 5 : Gyro
- 1 - accepted
  - 4 - failed range check (0 ~ 360 degree)
  - 9 - system error or input error
- Flag 6 : Air temperature
- 3 - assumed good\*
  - 4 - failed range check (-20 ~ 40 degC)
  - 9 - system error or input error
- Flag 7 : Sea surface temperature
- 3 - assumed good\*
  - 4 - failed range check (-3 ~ 37 degC)
  - 9 - system error or input error
- Flag 8 : Atmospheric pressure
- 3 - assumed good\*
  - 4 - failed range check (890 ~ 1040 hPa)
  - 9 - system error or input error
- Flag 9 : Relative humidity
- 3 - assumed good\*
  - 4 - failed range check (0 ~ 100 %)
  - 9 - system error or input error
- Flag 10 : Wind direction and wind speed
- 3 - assumed good\*
  - 4 - failed range check (0 ~ 360 degree : wind direction, 0 ~ 60 m/s : wind speed)
  - 9 - system error or input error
- Flag 11 : Depth
- 3 - assumed good\*
  - 4 - failed range check (4 ~ 11000 m)
  - 9 - system error or input error
- Flag 12 : Current direction and current speed
- 3 - assumed good\*
  - 4 - failed range check (0 ~ 360 degree : current direction, 0 ~ 5 knots : current speed)
  - 9 - system error or input error

\* 'assumed good' means that this data passed range check but may contains leap or inappropriate zero.