

# CRUISE SUMMARY REPORT

FOR COLLATING CENTRE USE

Centre: BODC Ref. No.:

 Is data exchange  Yes  In part  No  
 restricted

**SHIP** enter the full name and international radio call sign of the ship from which the data were collected, and indicate the type of ship, for example, research ship; ship of opportunity, naval survey vessel; etc.

Name: **Hakuho Maru**Call Sign: **JDSS**Type of ship: **Research Ship**CRUISE NO. / NAME **KH-22-7 Cruise**

enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).

CRUISE PERIOD start 30 / June / 2022 to 1/ September /2022 end  
 (set sail) day/ month/ year day/ month/ year (return to port)

PORT OF DEPARTURE (enter name and country) **Tokyo (Japan)**PORT OF RETURN (enter name and country) **Tokyo (Japan)**

**RESPONSIBLE LABORATORY** enter name and address of the laboratory responsible for coordinating the scientific planning of the cruise

Name: **Marine Inorganic Chemistry Lab., Atmosphere and Ocean Research Institute, Univ. Tokyo**Address: **5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8564**Country: **Japan**

**CHIEF SCIENTIST(S)** enter name and laboratory of the person(s) in charge of the scientific work (chief of mission) during the cruise.

**Hajime Obata, Marine Inorganic Chemistry Lab., Atmosphere and Ocean Research Institute, Univ. Tokyo**

**OBJECTIVES AND BRIEF NARRATIVE OF CRUISE** enter sufficient information about the purpose and nature of the cruise so as to provide the context in which the report data were collected.

The Hakuho Maru KH-22-7 cruise, nicknamed as "Ophiuchus (OP) Expedition", was conducted from 30 June to 1 September 2022 (64 days in total) in the western equatorial Pacific and western North Pacific. The cruise consisted of the following two legs

Leg-1: Tokyo, Japan (30 June 2022) to Tokyo, Japan (26 July 2022)

Leg-2: Tokyo, Japan (10 August 2022) to Tokyo, Japan (1 September 2022)

This cruise has been internationally authorized as the GEOTRACES section study in the western Pacific Ocean (GP22).

The information on TEIs in the ocean is useful to deepen our understandings on physical, chemical and biological processes in marine environments. To predict future environmental changes caused by human activities, we need to investigate the global distributions of biologically available chemical species of TEIs in the ocean and their exchange fluxes at the air-sea and sediment-water interfaces. This is particularly important in the case of micronutrients such as Fe, Zn and Cu whose oceanic distributions seem to be a crucial link to climatic processes. Together with other biologically required TEIs, perturbations of their cycles may have fundamental consequences for the global carbon cycle, which is firmly associated with global climate. However, accumulated high-quality data are not large enough to draw a global picture of marine biogeochemical cycles of TEIs.

This cruise aimed to establish the 2-dimensional profiles of GEOTRACES TEIs in the western Pacific. It is well known that both Oyashio and Kuroshio are strong surface currents and transport trace elements from marginal seas like the Sea of Okhotsk and the East China Sea to the western North Pacific. Moreover, atmospheric dust deposition from the Asian deserts supplies huge amounts of trace elements to the western North Pacific. Therefore, we decided to set 2-dimensional section observations along 155°E to investigate TEIs in seawaters and sediments of the western Pacific. This section includes subarctic Pacific known as a typical High Nutrient, Low Chlorophyll (HNLC) zone. The cruise also clarifies the present status of TEIs in seawaters of the subtropical Pacific, which is a typical oligotrophic area.

In order to pursue these purposes, we have taken air, seawater, and sediment samples for chemical analyses. Water samples were collected from surface to near the bottom by using a clean CTD Carousel Multi Sampling system (24 Niskin-X (12L) bottles) attached at the end of an Aramid yarn cable. The system was also equipped with various chemical sensors for in situ measurements. For the precise measurements of trace radioactive nuclides in seawater,



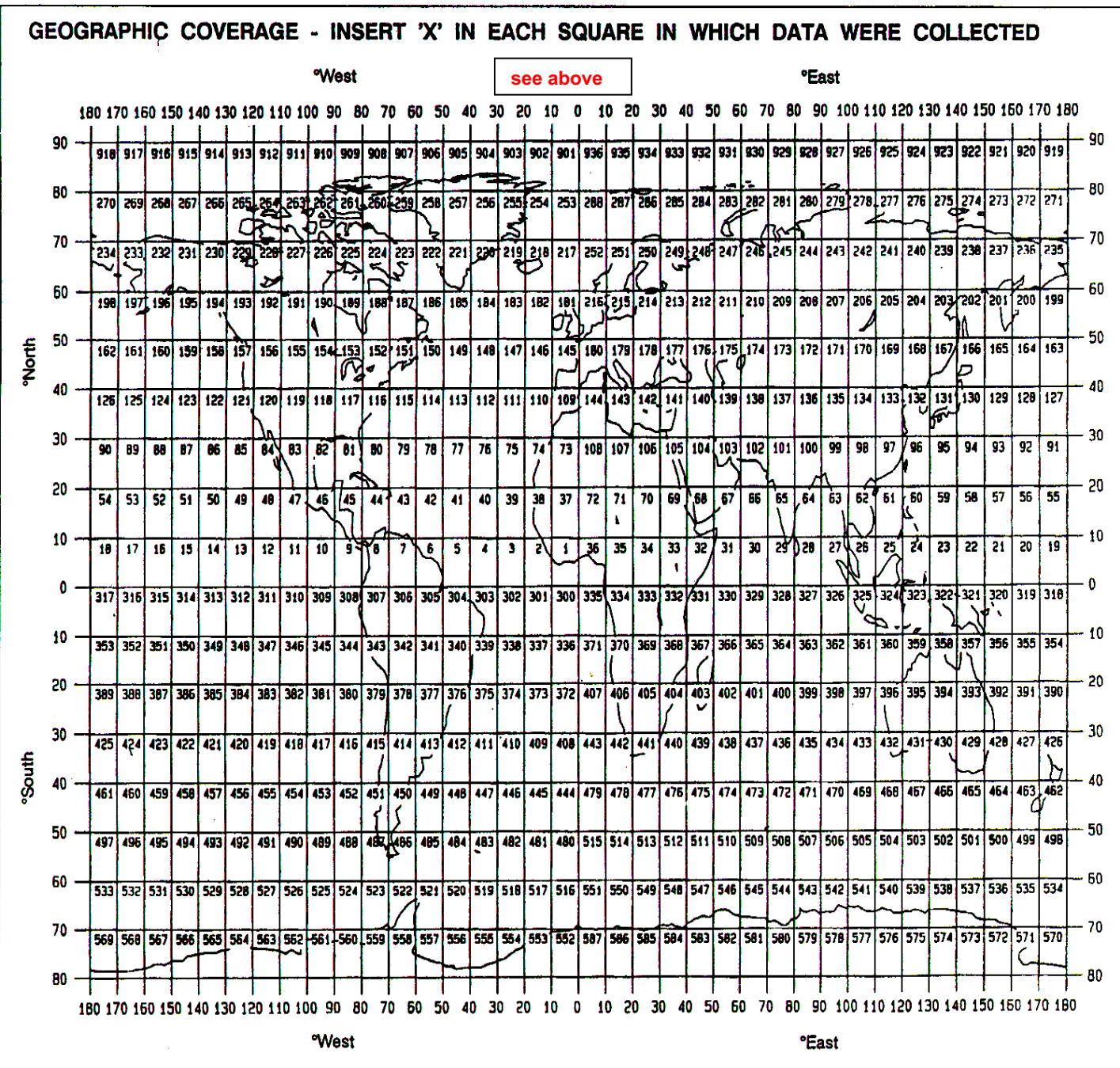


<p><b>TRACK CHART:</b> You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken.</p>	<p>Insert a tick (✓) in this box if a track chart is supplied</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <span style="font-size: 20px;">✓</span> </div>
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**GENERAL OCEAN AREA(S):** Enter the names of the oceans and/or seas in which data were collected during the cruise – please use commonly recognised names (see, for example, International Hydrographic Bureau Special Publication No. 23, 'Limits of Oceans and Seas'). western Pacific

**SPECIFIC AREAS:** If the cruise activities were concentrated in a specific area(s) of an ocean or sea, then enter a description of the area(s). Such descriptions may include references to local geographic areas, to sea floor features, or to geographic coordinates.  
Please insert here the number of each square in which data were collected from the below given chart

21, 57, 58, 93, 129, 130, 165, 166, 320



**THANK YOU FOR YOUR COOPERATION**  
 Please send your completed report without delay to the collating centre indicated on the cover page

**PARAMETER CODES****METEOROLOGY**

M01	Upper air observations
M02	Incident radiation
M05	Occasional standard measurements
M06	Routine standard measurements
M71	Atmospheric chemistry
M90	Other meteorological measurements

**PHYSICAL OCEANOGRAPHY**

H71	Surface measurements underway (T,S)
H13	Bathythermograph
H09	Water bottle stations
H10	CTD stations
H11	Subsurface measurements underway (T,S)
H72	Thermistor chain
H16	Transparency (eg transmissometer)
H17	Optics (eg underwater light levels)
H73	Geochemical tracers (eg freons)
D01	Current meters
D71	Current profiler (eg ADCP)
D03	Currents measured from ship drift
D04	GEK
D05	Surface drifters/drifted buoys
D06	Neutrally buoyant floats
D09	Sea level (incl. Bottom pressure & inverted echosounder)
D72	Instrumented wave measurements
D90	Other physical oceanographic measurements

**CHEMICAL OCEANOGRAPHY**

H21	Oxygen
H74	Carbon dioxide
H33	Other dissolved gases
H22	Phosphate
H23	Total - P
H24	Nitrate
H25	Nitrite
H75	Total - N
H76	Ammonia
H26	Silicate
H27	Alkalinity
H28	PH
H30	Trace elements
H31	Radioactivity
H32	Isotopes
H90	Other chemical oceanographic measurements

**MARINE CONTAMINANTS/POLLUTION**

P01	Suspended matter
P02	Trace metals
P03	Petroleum residues
P04	Chlorinated hydrocarbons
P05	Other dissolved substances
P12	Bottom deposits
P13	Contaminants in organisms
P90	Other contaminant measurements

**MARINE BIOLOGY/FISHERIES**

B01	Primary productivity
B02	Phytoplankton pigments (eg chlorophyll, fluorescence)
B71	Particulate organic matter (inc POC, PON)
B06	Dissolved organic matter (inc DOC)
B72	Biochemical measurements (eg lipids, amino acids)
B73	Sediment traps
B08	Phytoplankton
B09	Zooplankton
B03	Seston
B10	Neuston
B11	Nekton
B13	Eggs & larvae
B07	Pelagic bacteria/micro-organisms
B16	Benthic bacteria/micro-organisms
B17	Phytobenthos
B18	Zoobenthos
B25	Birds
B26	Mammals & reptiles
B14	Pelagic fish
B19	Demersal fish
B20	Molluscs
B21	Crustaceans
B28	Acoustic reflection on marine organisms
B37	Taggings
B64	Gear research
B65	Exploratory fishing
B90	Other biological/fisheries measurements

**MARINE GEOLOGY/GEOPHYSICS**

G01	Dredge
G02	Grab
G03	Core - rock
G04	Core - soft bottom
G08	Bottom photography
G71	In-situ seafloor measurement/sampling
G72	Geophysical measurements made at depth
G73	Single-beam echosounding
G74	Multi-beam echosounding
G24	Long/short range side scan sonar
G75	Single channel seismic reflection
G76	Multichannel seismic reflection
G26	Seismic refraction
G27	Gravity measurements
G28	Magnetic measurements
G90	Other geological/geophysical measurements