

Collecting and sharing framework of marine biodiversity data in the North-Western Pacific region



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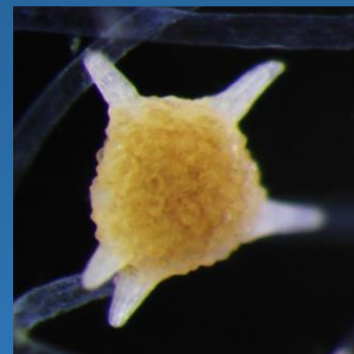
Self introduction

1998-2005: Population dynamics of epifaunal caprellids in algal bed

2006-2010: Ecology of by-catch species in longline fisheries

2010-2014: Detecting suitable habitat for foraminiferal species in coral reef

2014- : Data manager of OBIS Japan



OBIS JAPAN

<http://www.godac.jamstec.go.jp/bisma/e/index.html>

<http://www.godac.jamstec.go.jp/j-obis/j/index.html>



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<https://obis.org/contact/>

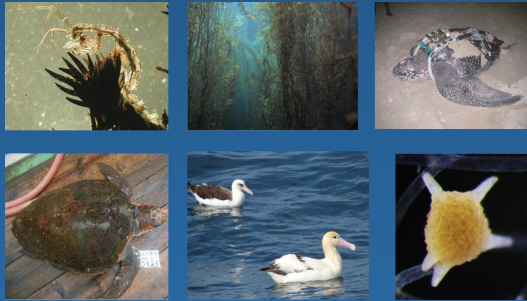
Today's outline

- Global activities on integrating biodiversity information (GBIF & OBIS)
- Key factors in OBIS framework: data format and database for scientific name
- OBIS node activities in Japan
- Data use-case

Today's outline

- Global activities on integrating biodiversity information (GBIF & OBIS)

Biodiversity information are composed from biological occurrence data



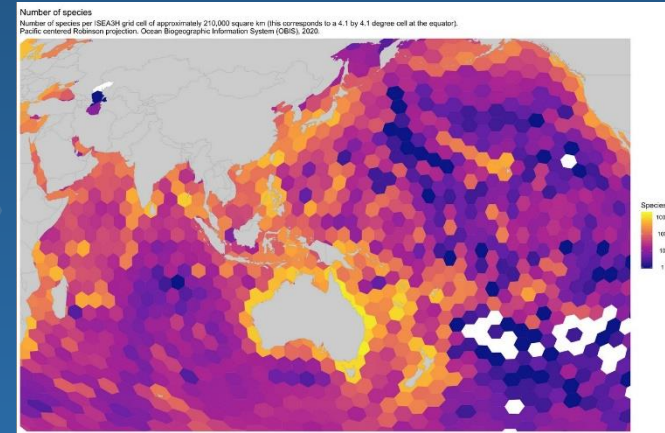
Observations=
Biological occurrence records



Points of the records



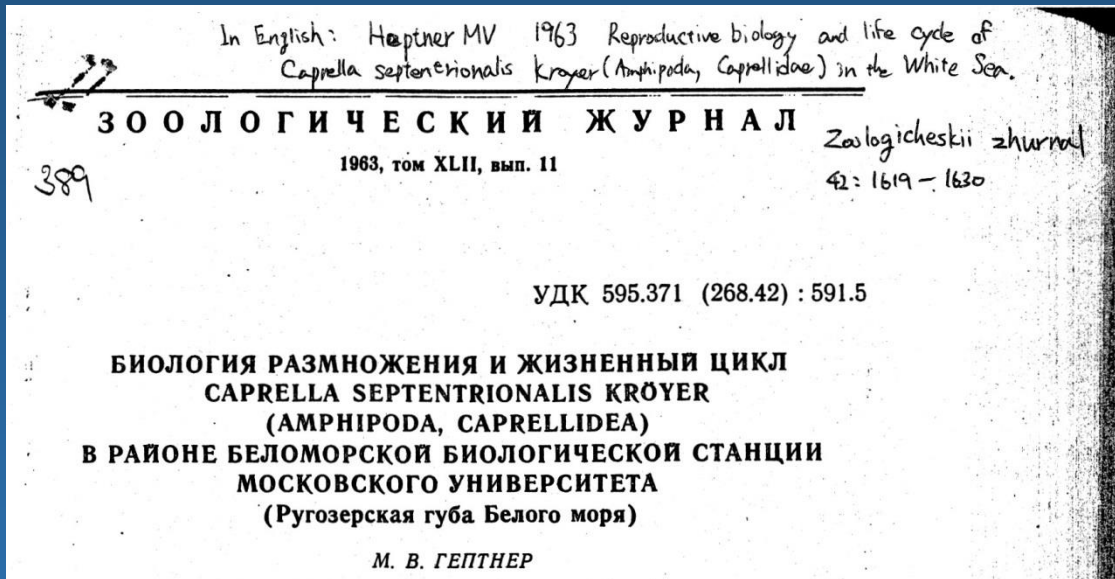
https://obis.org/products/maps/202002/species_pacific_5.png



Species distribution/
Community structure

Past (XXXX-2000)

Textual information in scientific papers (paper media) → limited data source



Heptner, M. V. 1963. Reproductive biology and life cycle of *Caprella septentrionalis* Kroyer (Amphipoda, Caprellidae) in the White Sea (In Russian with English summary). *Zoologicheskii Zhurnal* 42:1619-1630.

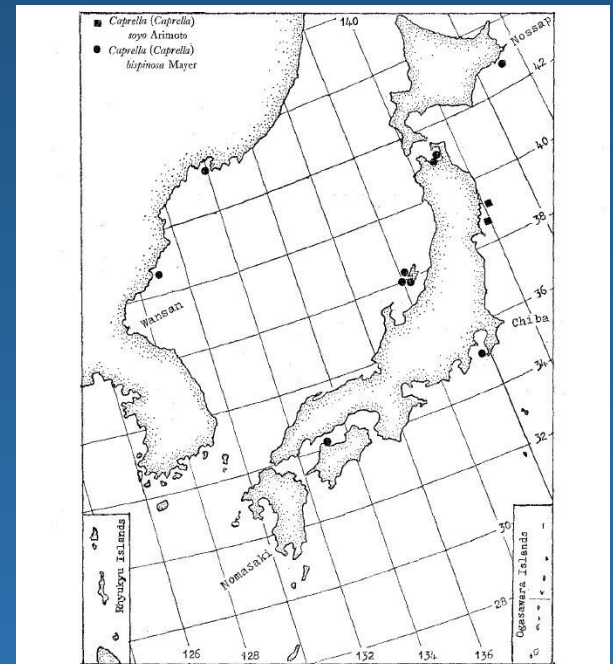
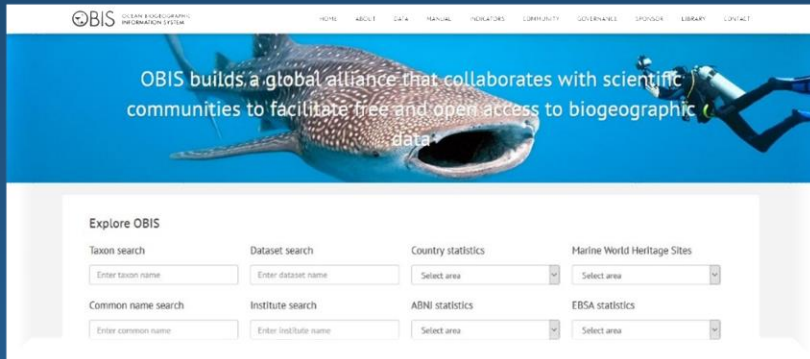


Fig. 56. Distribution records of *Caprella (Caprella) seyo* Arimoto and *Caprella (Caprella) hispinosa* Mayer around Japan.

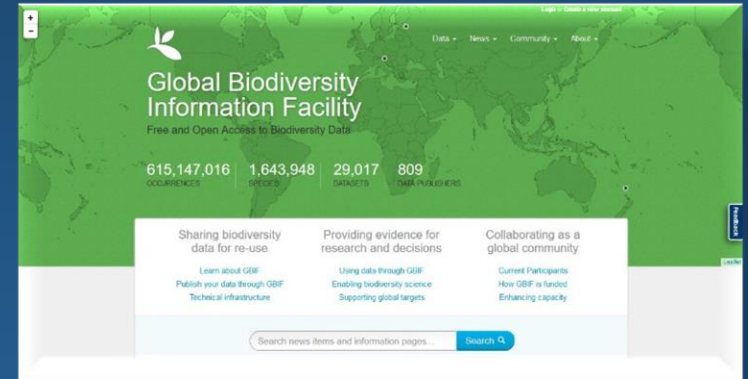
Arimoto, I. 1976. Taxonomic studies of caprellids (Crustacea, Amphipoda, Caprellidae) found in the Japanese and adjacent waters. Special Publications from the Seto Marine Biological Laboratory Ser. III:1-229.

Present (2000-2020)

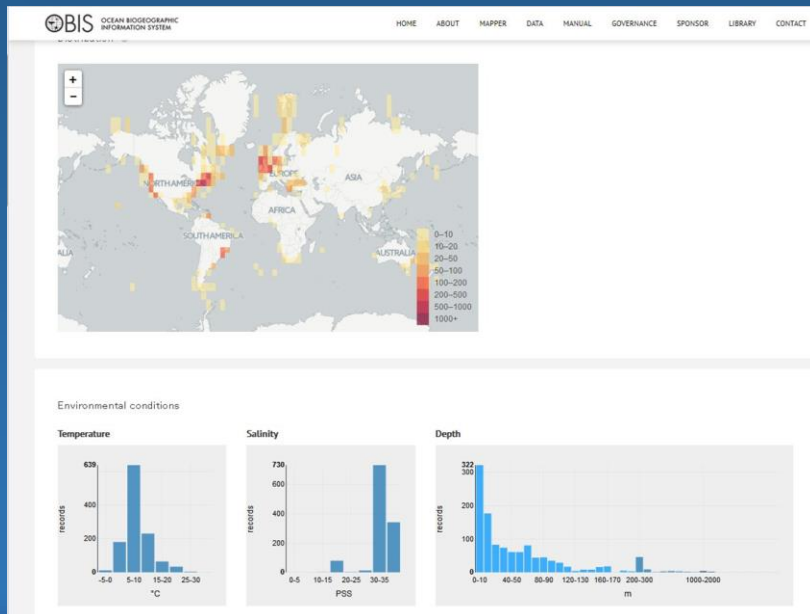
- Many global-scale database such as **GBIF** or **OBIS** etc. have been launched.



<http://beta.iobis.org/>



<http://www.gbif.org/>

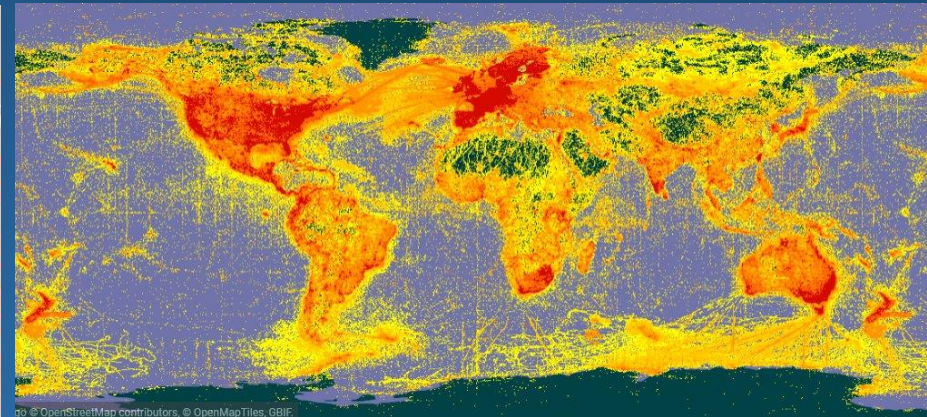
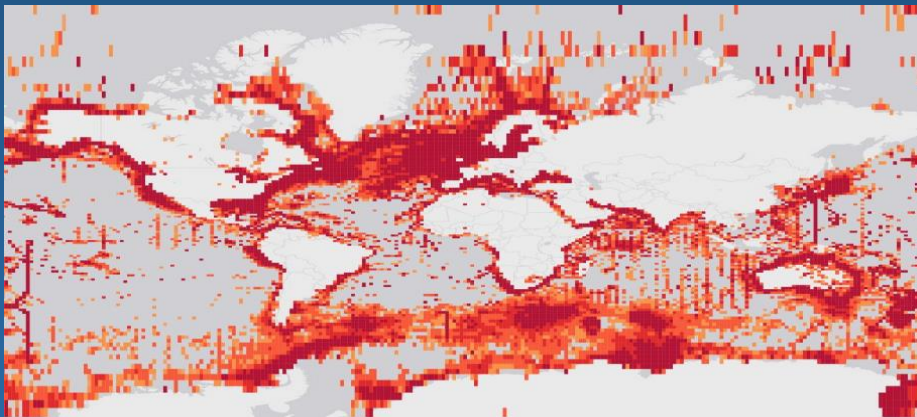


Currently, we can easily access many distribution data on target species through global scale databases

OBIS and GBIF

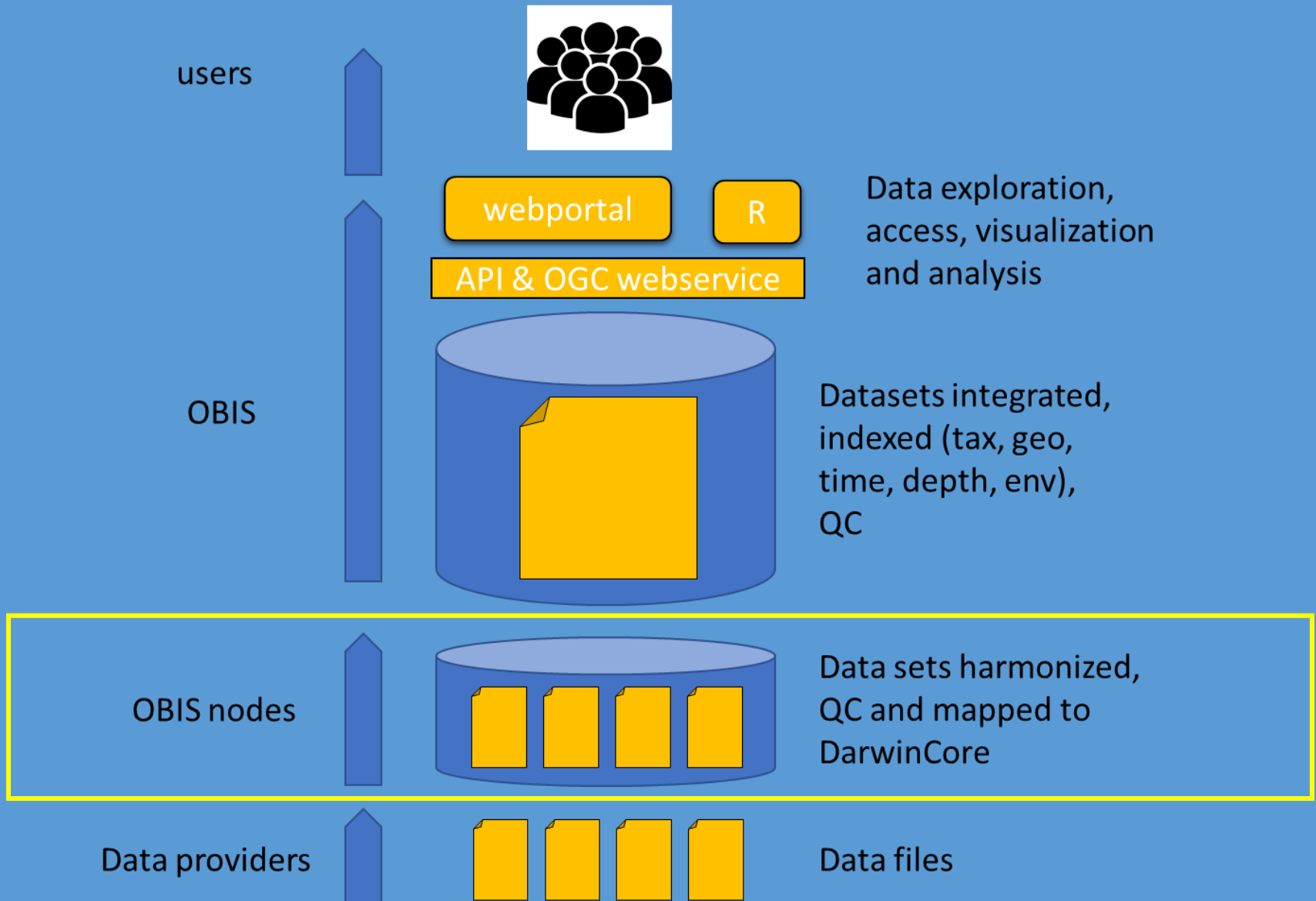
<http://beta.iobis.org/>

<http://www.gbif.org/>



Target	Marine only	<	Land and Marine
Records	63,695,682	<<	1,634,289,915
Data format	DarwinCore	=	DarwinCore
Data platform	IPT	=	IPT
Data sharing	Shared with GBIF		Shared with OBIS

Data flow in OBIS



cited from OBIS node training materials

OBIS nodes in Asia-Pacific region



Today's outline

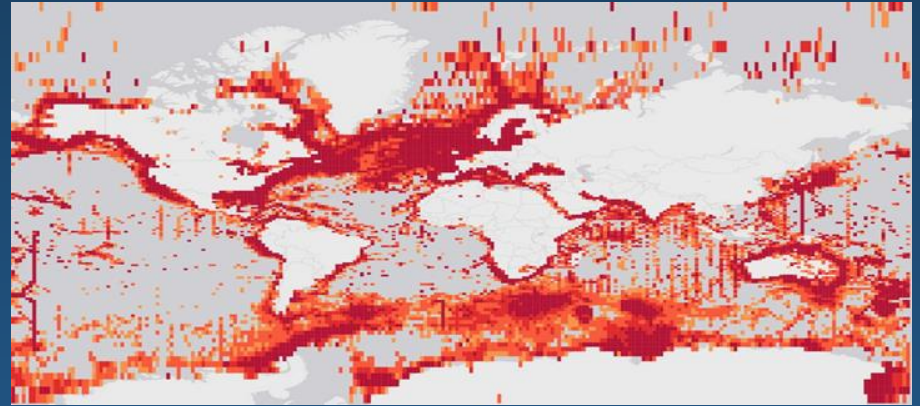
- Global activities on integrating biodiversity information (GBIF & OBIS)
- **Key factors in OBIS framework: data format and database for scientific name**
- OBIS node activities in Japan
- Data use-case

Summary of OBIS data

presence records: 63,695,682

Datasets: 3,689

Accepted species: 146,970



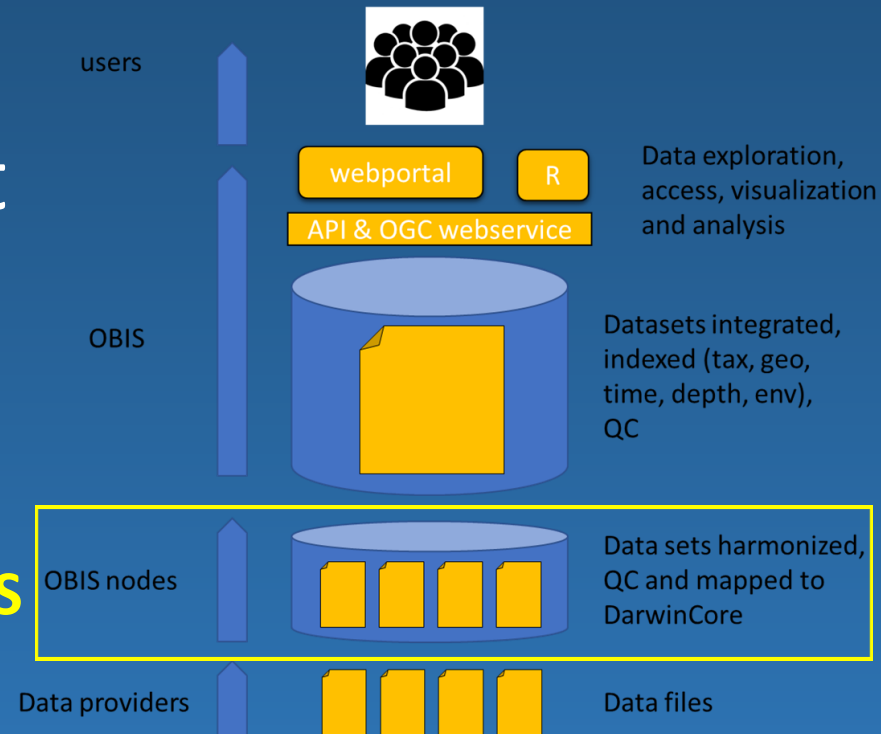
<https://mapper.obis.org/>

To integrate large dataset smoothly,

OBIS use

-data standard: **Darwin Core**

-common scientific name DB: **WoRMS**

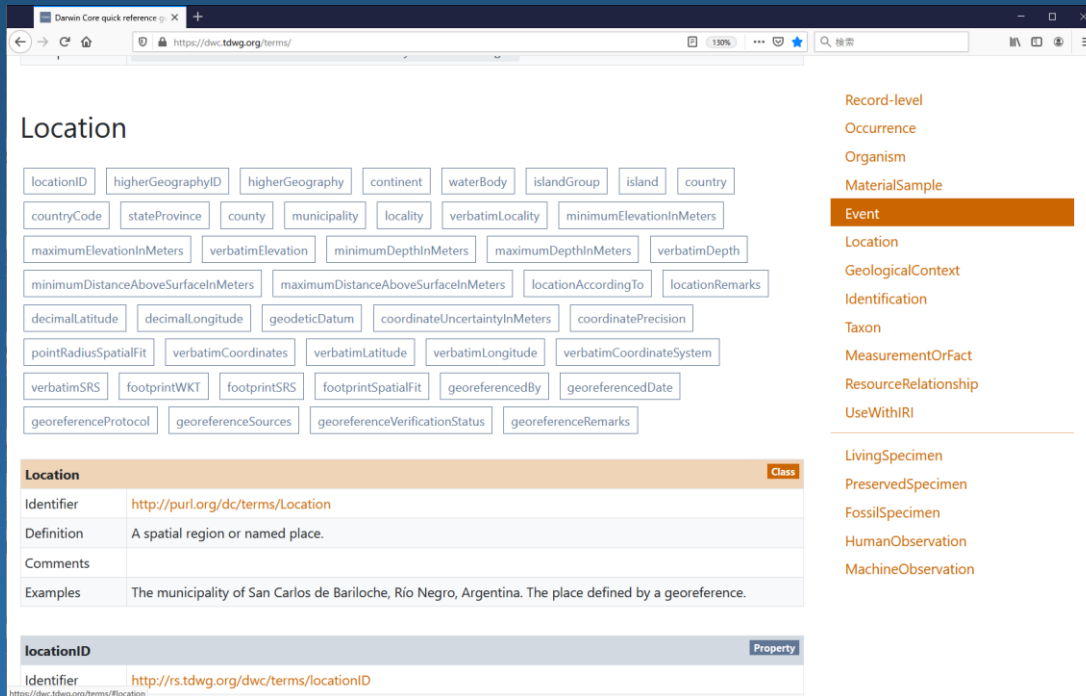


cited from OBIS node training materials

Darwin Core (by TDWG)

Darwin Core is a body of standards for biodiversity informatics. It provides **stable terms and vocabularies** for sharing biodiversity data.

OBIS Node **data manager always check** data from data providers and **modify** the data to correct DwC format (Taxon; Location; Date, etc.).



<https://dwc.tdwg.org/terms/#location>

44 terms related to **location** information


PUBLIC SERVICE ANNOUNCEMENT:

OUR DIFFERENT WAYS OF WRITING DATES AS NUMBERS CAN LEAD TO ONLINE CONFUSION. THAT'S WHY IN 1988 ISO SET A GLOBAL STANDARD NUMERIC DATE FORMAT.

THIS IS **THE** CORRECT WAY TO WRITE NUMERIC DATES:

2013-02-27

THE FOLLOWING FORMATS ARE THEREFORE DISCOURAGED:

02/27/2013 02/27/13 27/02/2013 27/02/13
20130227 2013.02.27 27.02.13 27-02-13
27.2.13 2013.II.27. 27²/₂-13 2013.158904109
MMXIII-II-XXVII MMXIII ^{LVII}/_{CCLXV} 1330300800
 $((3+3) \times (111+1) - 1) \times 3 / 3 - 1 / 3^3$ 2013
10/1101/1101 02/27/20/13 $\begin{matrix} 2 & 3 & 1 & 4 \\ 0 & 1 & 2 & 3 & 7 \\ & 5 & 6 & 7 & 8 \end{matrix}$ 

<https://obis.org/manual/darwincore/>

WoRMS for scientific name

WoRMS taxon details

★ *Halichondria (Halichondria) panicea* (Pallas, 1766)

AphiaID 165853 (urn:lsid:marinespecies.org:tax-name:165853)

Classification Biota > ★ Animalia (Kingdom)
> ★ Porifera (Phylum)
> ★ Demospongiae (Class)
> ★ Heteroscleromorpha (Subclass)
> ★ Suberitida (Order)
> ★ Halichondriidae (Family)
> ★ *Halichondria* (Genus)
> ★ *Halichondria (Halichondria)* (Subgenus)
> ★ *Halichondria (Halichondria) panicea* (Species)

Status accepted



★ *Halichondria panicea*

- ★ *Alcyonium paniceum* (Pallas, 1766) (genus transfer)
- ★ *Amorphina appendiculata* Schmidt, 1875 (genus transfer and junior synonym)
- ★ *Amorphina coccinea* (Bowerbank, 1861) (genus transfer & junior synonym)
- ★ *Amorphina grisea* Fristedt, 1887 (genus transfer and junior synonym)
- ★ *Amorphina paciscens* Schmidt, 1875 (genus transfer and junior synonym)
- ★ *Amorphina panicea* (Pallas, 1766) (genus transfer)
- ★ *Clathria (Microcionia) seriata* (Grant, 1826) (genus transfer and junior synonym)
- ★ *Clathria (Microcionia) tumulosa* (Bowerbank, 1882) (genus transfer and junior synonym)
- ★ *Clathria seriata* (Grant, 1826) (genus transfer and junior synonym)
- ★ *Eumastia appendiculata* (Schmidt, 1875) (genus transfer and junior synonym)
- ★ *Halichondria albescens* (Rafinesque, 1818) (junior synonym)
- ★ *Halichondria ambigua* Bowerbank, 1874- accepted, alternate representation (junior synonym)
- ★ *Halichondria bibula* (Schmidt, 1870) (junior synonym)
- ★ *Halichondria brettii* (Bowerbank, 1866)- accepted, alternate representation (subgenus assignment)
- ★ *Halichondria caduca* Bowerbank, 1866- accepted, alternate representation (junior synonym)
- ★ *Halichondria coccinea* Bowerbank, 1861- accepted, alternate representation (junior synonym)
- ★ *Halichondria coralloides* Bowerbank, 1882- accepted, alternate representation (junior synonym)
- ★ *Halichondria edusa* Bowerbank, 1874- accepted, alternate representation (junior synonym)
- ★ *Halichondria firmus* (Bowerbank, 1874)- accepted, alternate representation (junior synonym)
- ★ *Halichondria glabra* Bowerbank, 1866- accepted, alternate representation (junior synonym)
- ★ *Halichondria grisea* (Fristedt, 1887)- accepted, alternate representation (junior synonym)
- ★ *Halichondria incerta* Bowerbank, 1866- accepted, alternate representation (junior synonym)
- ★ *Halichondria lactea* (Bowerbank, 1866)- accepted, alternate representation (junior synonym)
- ★ *Halichondria membrana* (Bowerbank, 1866)- accepted, alternate representation (junior synonym)
- ★ *Halichondria paciscens* (Schmidt, 1875)- accepted, alternate representation (junior synonym)
- ★ *Halichondria panacea* (misspelling of species name)
- ★ *Halichondria panicea* (Pallas, 1766)- accepted, alternate representation (subgenus assignment)
- ★ *Halichondria pannosus* Verrill, 1874- accepted, alternate representation (junior synonym)
- ★ *Halichondria papillaris* (Linnaeus, 1791)- accepted, alternate representation (junior synonym)
- ★ *Halichondria reticulata* Lieberkühn, 1859- accepted, alternate representation (junior synonym)
- ★ *Halichondria reticulata* (Bowerbank, 1866) (junior synonym)
- ★ *Halichondria sevosia* Johnston, 1842- accepted, alternate representation (junior synonym)
- ★ *Halichondria topsenti* Laubenfels, 1936- accepted, alternate representation (junior synonym)
- ★ *Halichondriella corticata* Burton, 1931 (genus transfer and junior synonym)
- ★ *Halina panicea* (Pallas, 1766) (genus transfer)
- ★ *Halina papillaris* (Pallas, 1766) (genus transfer and junior synonym)
- ★ *Halispongia papillaris* (Pallas, 1766) (genus transfer and junior synonym)
- ★ *Hymeniacion brettii* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion coccinea* (Bowerbank, 1861) (genus transfer and junior synonym)
- ★ *Hymeniacion fallaciosus* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion firmus* Bowerbank, 1874 (genus transfer)
- ★ *Hymeniacion fragilis* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion lactea* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion membrana* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion parfitti* Parfitt, 1868 (genus transfer and junior synonym)
- ★ *Hymeniacion reticulatus* Bowerbank, 1866 (genus transfer and junior synonym)
- ★ *Hymeniacion solidus* Bowerbank, 1882 (genus transfer and junior synonym)
- ★ *Hymeniacion tegetricula* Bowerbank, 1874 (genus transfer and junior synonym)

Some species have many synonymized name.

WoRMS provides

- correct spelling
- validity of the names
- scientific name ID as URN style
- web service to check scientific name

Example of DwC data

8 required terms in OBIS framework:

- **scientificName**
- **scientificNameID**
- **occurrenceID**
- **eventDate**
- **decimalLatitude**
- **decimalLongitude**
- **occurrenceStatus**
- **basisOfRecord**

scientificName	scientificNameID	occurrenceID	eventDate	decimalLatitude	decimalLongitude	occurrenceStatus	basisOfRecord
Arca zebra	urn:lsid:marinespecies.org:taxname:420713	MCNUSB_001	1999-01-01	-10.7413	-63.8791	Present	PreservedSpecimen
Perna viridis	urn:lsid:marinespecies.org:taxname:367822	MCNUSB_002	1999-01-01	10.7413	-63.8791	Present	PreservedSpecimen
Phyllonotus pomum	urn:lsid:marinespecies.org:taxname:419944	MCNUSB_003	1999-01-01	10.7413	-63.8791	Present	PreservedSpecimen
Strombus pugilis	urn:lsid:marinespecies.org:taxname:419695	MCNUSB_047	1999-01-01	10.8737	-63.8805	Present	PreservedSpecimen
Trachycardium	urn:lsid:marinespecies.org:taxname:203976	MCNUSB_075	1999-01-01	10.8477	-68.2424	Present	PreservedSpecimen
Chione cancellata	urn:lsid:marinespecies.org:taxname:397040	MCNUSB_006	1999-01-01	10.6886	-63.8514	Present	PreservedSpecimen
Atrina seminuda	urn:lsid:marinespecies.org:taxname:420740	MCNUSB_007	1999-01-01	10.6886	-63.8514	Present	PreservedSpecimen
Lyropecten	urn:lsid:marinespecies.org:taxname:203879	MCNUSB_004	1999-01-01	10.7413	-63.8791	Present	PreservedSpecimen

iOBIS (2017) "Slides on OBIS data formats File" at OBIS Nodes Training Course (2017) access through <https://classroom.oceanteacher.org/mod/resource/view.php?id=7459>

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- Key factors in OBIS framework: data format and database for scientific name
- **OBIS node activities in Japan**
- Data use-case

OBIS Japan has developed original DB: BISMAL

BISMAL
Biological Information System for Marine Life

Please search name. Search

NEWS Show all

2020/11/09 A new dataset has been published on BISMAL. [The 24th field study tour in Sesoko, Okinawa - a citizen science, observations of invertebrates.](#) The dataset contains a list of the species observed at the 24th citizen science field study tour in Sesoko Island in 2018. Please refer to the link for details.

2020/11/09 A new dataset has been published on BISMAL. [Crabs from the Philippines and Thailand.](#) This dataset contains data of brachyuran crabs collected by Keiji Wada in 1982 in Thailand and in 2000 in the Philippines. Please refer to the link for details.

2020/08/14 A new dataset has been published on BISMAL.

BISMAL Biological Information System for Marine Life

Home | Database | Occurrence records | Dataset | About BISMAL | Please search name. Search

Calyptogenia Dall, 1891 [Show literature](#) [Taxonomy](#) [Occurrence records](#) [Report this issue](#)

tree

- Kingdom: Eukarya
- Group: Opisthokonta
- Phylum: Arthropoda
- Phylum: Mollusca
- Class: Bivalvia (Linnaeus, 1758)
- Subclass: Lamellobranca (Naiman, 2004)
- Order: Venerida (Gray, 1854)
- Superfamily: Calyptogeniidae (Gray, 1847 (1849))
- Family: Veneroidae Dall & Strenson, 1901
- Genus: *Calyptogenia* Dall, 1891 [Show data directly below](#)
- Genus: *Colaspis* Woodring, 1930
- Genus: *Solenopoda* Strenson, 1940
- Genus: *Allospira* Woodring, 1938
- Genus: *Allospira* Woodring, 1938
- Genus: *Venerella* Dall, 1906
- Genus: *Venerella* Sowerby, 1847
- Genus: *Venerella* Sowerby & Hille, 2009

Occurrence records Occurrence records

Summary

Record acquisition range: [with latitude and longitude information: 99%](#)

Latitude: 25.318750 ~ 42.318750
Longitude: -113.208300 ~ -173.501700
Depth: 502.000 ~ 5434.000 m

Record acquisition period: [With period: 100%](#)
1961/05/05 ~ 2017/04/17
* Date last modified: 2020/12/01

Number of record: 2,224

Filter: [?](#)

[Library of Deep sea Images, IAMS \(JL\)](#)

[Show all](#)

[Environment data]

Depth

Depth (m)	#Records
0 - 100	1155
100 - 200	1000
200 - 300	500
300 - 400	200
400 - 500	100
500 - 600	50
600 - 700	20
700 - 800	10
800 - 900	5
900 - 1000	2
1000 - 1100	1
1100 - 1200	1
1200 - 1300	1
1300 - 1400	1
1400 - 1500	1
1500 - 1600	1
1600 - 1700	1
1700 - 1800	1
1800 - 1900	1
1900 - 2000	1
2000 - 2100	1
2100 - 2200	1
2200 - 2300	1
2300 - 2400	1
2400 - 2500	1
2500 - 2600	1
2600 - 2700	1
2700 - 2800	1
2800 - 2900	1
2900 - 3000	1
3000 - 3100	1
3100 - 3200	1
3200 - 3300	1
3300 - 3400	1
3400 - 3500	1
3500 - 3600	1
3600 - 3700	1
3700 - 3800	1
3800 - 3900	1
3900 - 4000	1
4000 - 4100	1
4100 - 4200	1
4200 - 4300	1
4300 - 4400	1
4400 - 4500	1
4500 - 4600	1
4600 - 4700	1
4700 - 4800	1
4800 - 4900	1
4900 - 5000	1
5000 - 5100	1
5100 - 5200	1
5200 - 5300	1
5300 - 5400	1
5400 - 5500	1
5500 - 5600	1
5600 - 5700	1
5700 - 5800	1
5800 - 5900	1
5900 - 6000	1
6000 - 6100	1
6100 - 6200	1
6200 - 6300	1
6300 - 6400	1
6400 - 6500	1
6500 - 6600	1
6600 - 6700	1
6700 - 6800	1
6800 - 6900	1
6900 - 7000	1
7000 - 7100	1
7100 - 7200	1
7200 - 7300	1
7300 - 7400	1
7400 - 7500	1
7500 - 7600	1
7600 - 7700	1
7700 - 7800	1
7800 - 7900	1
7900 - 8000	1
8000 - 8100	1
8100 - 8200	1
8200 - 8300	1
8300 - 8400	1
8400 - 8500	1
8500 - 8600	1
8600 - 8700	1
8700 - 8800	1
8800 - 8900	1
8900 - 9000	1
9000 - 9100	1
9100 - 9200	1
9200 - 9300	1
9300 - 9400	1
9400 - 9500	1
9500 - 9600	1
9600 - 9700	1
9700 - 9800	1
9800 - 9900	1
9900 - 10000	1

2,155 / 2,224 records

Temperature

Temperature (deg. cent)	#Records
0 - 10	10
10 - 20	20
20 - 30	30
30 - 40	40
40 - 50	2010
50 - 60	100
60 - 70	50
70 - 80	20
80 - 90	10
90 - 100	5

2,010 / 2,224 records

A database **specific to the region**

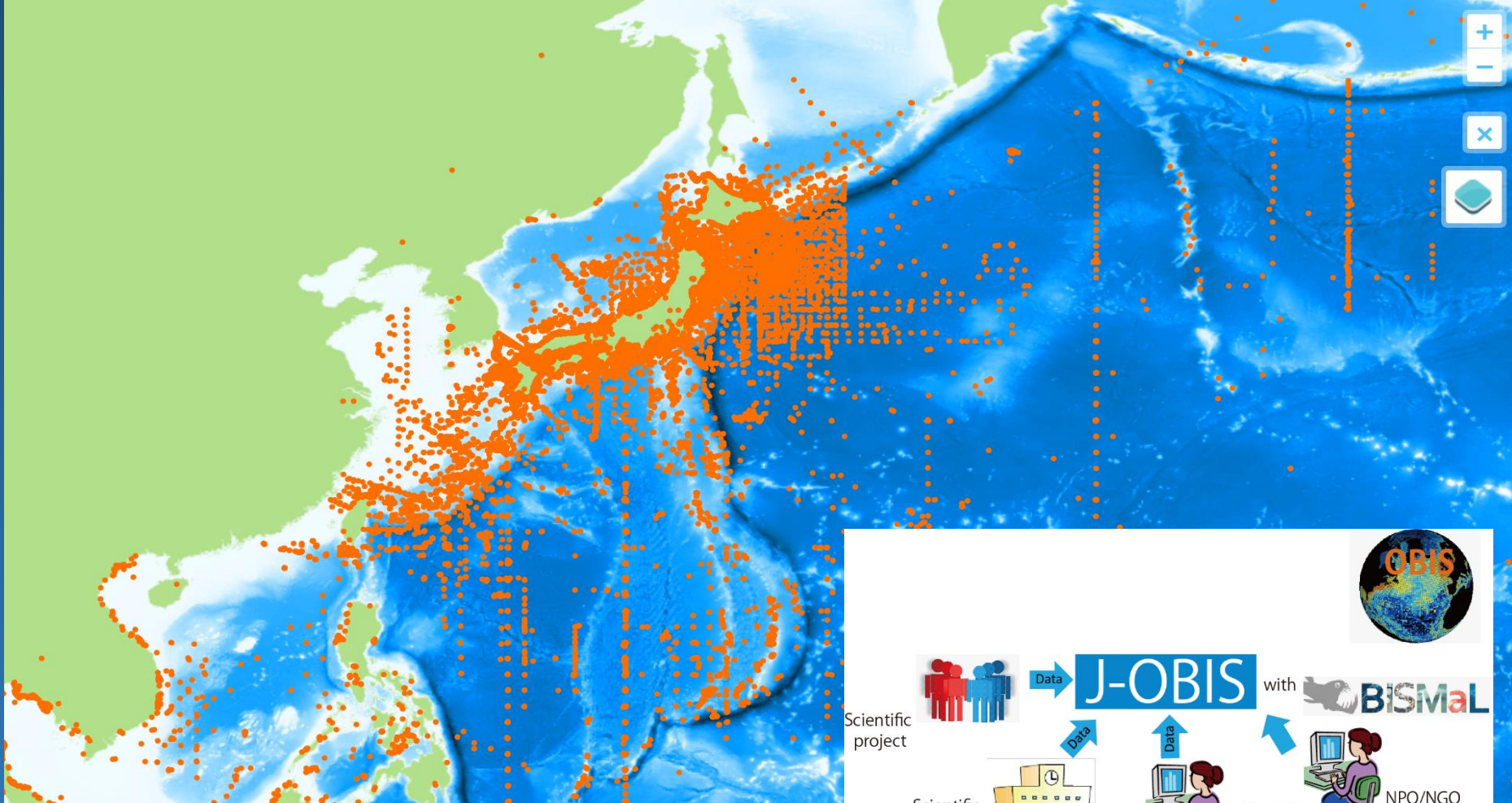
- Local language UI for local data providers
- Taxonomic information around Japan (39,445 taxa)

Marine biodiversity data around Japan

2,300,399 records (present/absent)

14,144 species

form various type of data providers (Scientists/ NPO/NGO/ Government)
Coastal monitoring/ Vessel investigation/ Literature-based data/ etc.



In BISMAL, data providers can

- use DwC check tools
- have their own dataset page

The screenshot shows the BISMAL interface for uploading a file. The header includes the BISMAL logo and navigation buttons for 'データ管理メイン', 'データセット一覧', and 'ログアウト'. A search bar contains the text 'test'. Below the header is an 'UPLOAD FILE SUMMARY' table with the following data:

状態	▲ 完了
ファイル名	Sheet1_0_動作確認用登録データ_20190809.xlsx
ユーザ	fushoa
指定オプション	
レコード数	18件 [新規: 18件、更新: 0件]
処理時間	2019/08/09 13:49:33 ~ 2019/08/09 13:49:34

Below the summary is a table with 30 items. The table has columns for Row, Occurrence ID, Column, and エラー詳細. The first four rows show errors:

Row	Occurrence ID	Column	エラー詳細
▲ 2	urn:catalog:jamstec:test:jamstec_31	geodeticDatum	測地系が省略されているため測地系変換できません。
▲ 2	urn:catalog:jamstec:test:jamstec_31	scientificName	複数の分類群候補から特定できませんでした。
▲ 3	urn:catalog:jamstec:test:jamstec_32	geodeticDatum	測地系が省略されているため測地系変換できません。
▲ 3	urn:catalog:jamstec:test:jamstec_22	scientificName	複数の分類群候補から特定できませんでした。

The screenshot shows the BISMAL dataset page for the Research Institute of Marine Invertebrates (RIMI). The header includes the BISMAL logo and navigation buttons for 'Show data', 'More', and a search bar with the text 'Please search name.'. Below the header is the RIMI logo and name. The page is divided into several sections:

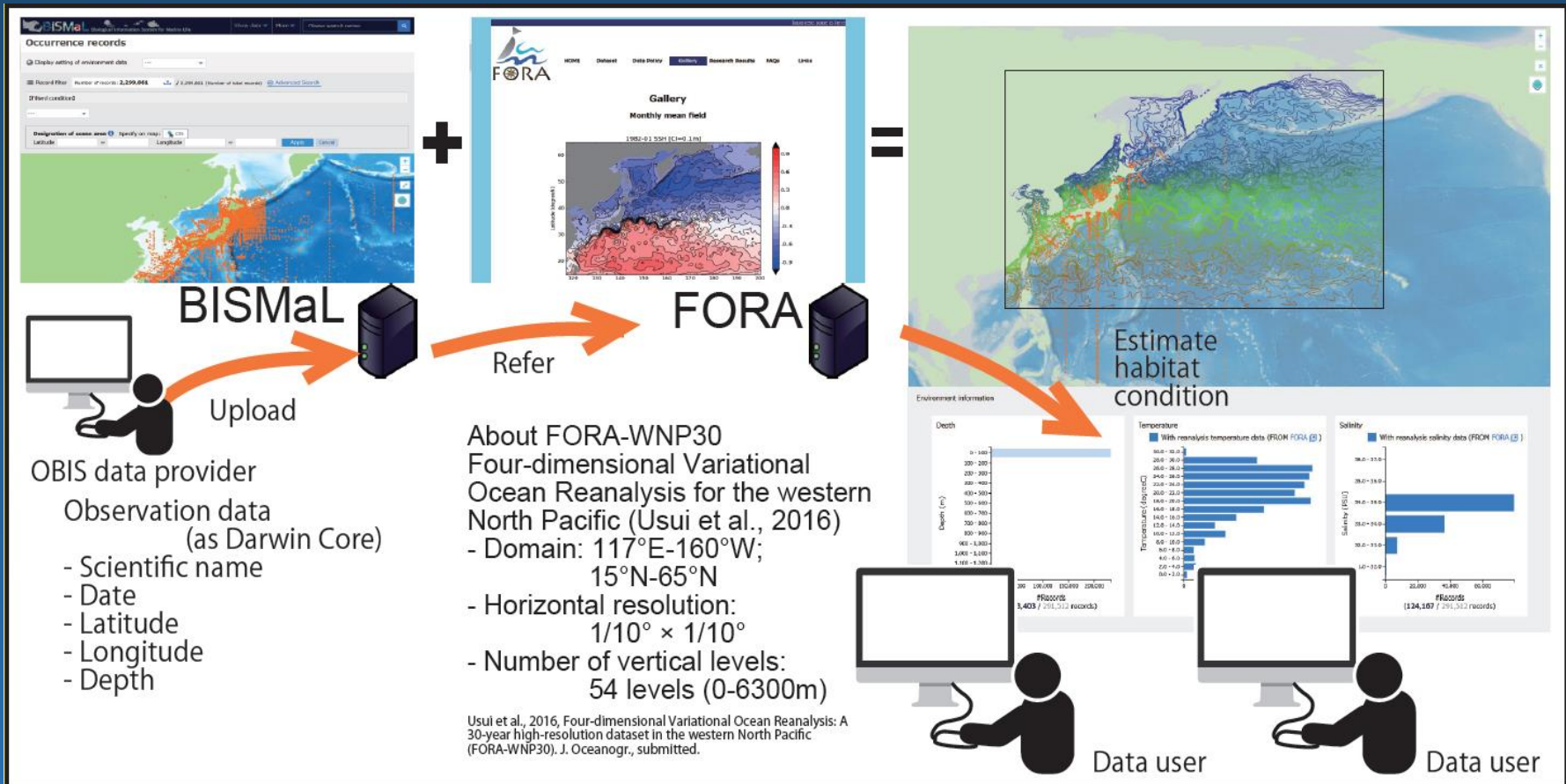
- Abstract:** A list of the species observed at the 24th citizen science field study tour in Sesoko Island, Okinawa Island in May 2018. Total 80 invertebrates species were observed in intertidal rocky shore, and Mollusca was found most.
- URL:**
- License:** This work is licensed under a Creative Commons Attribution (CC-BY) 4.0 License.
- Citation:** Research Institute of Marine Invertebrates (2018) The 24th field study tour in Sesoko, Okinawa - a citizen science, observations of invertebrates. Available at <https://rimi.or.jp/event/iso2018/> Accessed on yyyy-mm-dd.
- Literature:**
- Contacts:** Eri Katayama, Resource Contact, Resource Creator, Metadata Provider. Organization: Research Institute of Marine Invertebrates (RIMI). Phone: +81-3-3537-1791. Address: 801, 1-3-14, Minato Chuo-ku Tokyo 104-0043 Japan. Home Page: <https://rimi.or.jp/>. Email: katayama@rimi.or.jp.

At the bottom, it says 'Datasets and providers RIMI'.

QC tool for data providers

Dataset page

BISMaL can estimate past environments for records by referring ocean reanalysis dataset



Hosono et al. (2020) WCMB_2020

Today's outline











- Global activities on integrating biodiversity information (GBIF & OBIS)
- Key factors in OBIS framework: data format and database for scientific name
- OBIS node activities in Japan
- **Data use-case**

Collecting and sharing data enable us to

- calculate biological index
 - analyze data gap
 - provide useful information for policy maker
- &
- perform data driven science in global scale

2020

Scientific Papers using OBIS data in 2020

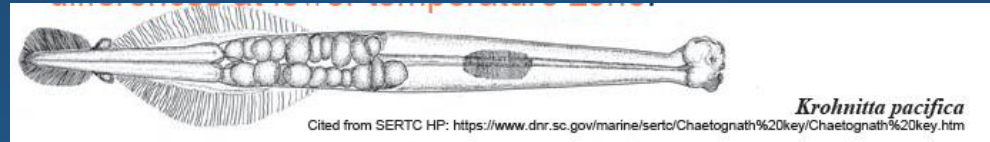
- 1523 **Zárate, M.; Buckle, C.; Mazzanti, R.; Lewis, M.; Fillottrani, P.R.; Delrieux, C.** (2020). Harmonizing big data with a knowledge graph: *OceanGraph KG* uses case, *in*: Rucci, E. *et al. Cloud computing, big data & emerging topics: 8th Conference, JCC-BD&ET 2020 La Plata, Argentina, September 8–10, 2020: Proceedings. Communications in Computer and Information Science*, 1291: pp. 81-92. https://hdl.handle.net/10.1007/978-3-030-61218-4_6  
- 1522 **Bonello, G.; Grillo, M.; Cecchetto, M.; Giallain, M.; Granata, A.; Guglielmo, L.; Pane, L.; Schiaparelli, S.** (2020). Distributional records of Ross Sea (Antarctica) planktic Copepoda from bibliographic data and samples curated at the Italian National Antarctic Museum (MNA): checklist of species collected in the Ross Sea sector from 1987 to 1995. *ZooKeys* 969: 1-22. <https://hdl.handle.net/10.3897/zookeys.969.52334>  
- 1521 **Aldea, C.; Novoa, L.; Alcaino, S.; Rosenfeld, S.** (2020). Diversity of benthic marine mollusks of the Strait of Magellan, Chile (Polyplacophora, Gastropoda, Bivalvia): a historical review of natural history. *ZooKeys* 963: 1-36. <https://hdl.handle.net/10.3897/zookeys.963.52234>  
- 1520 **Le Marchand, M.; Hattab, T.; Niquil, N.; Albouy, C.; Le Loc'h, F.; Lasram, F.B.R.** (2020). Climate change in the Bay of Biscay: Changes in spatial biodiversity patterns could be driven by the arrivals of southern species. *Mar. Ecol. Prog. Ser.* 647: 17-31. <https://hdl.handle.net/10.3354/meps13401>  
- 1519 **Deutsch, C.; Penn, J.L.; Seibel, B.** (2020). Metabolic trait diversity shapes marine biogeography. *Nature (Lond.)* 585(7826): 557-562. <https://hdl.handle.net/10.1038/s41586-020-2721-y>  

Simple usage of occurrence data with estimated environmental data

Two common arrow worms **with no environmental information**

Krohnitta pacifica

K. subtilis

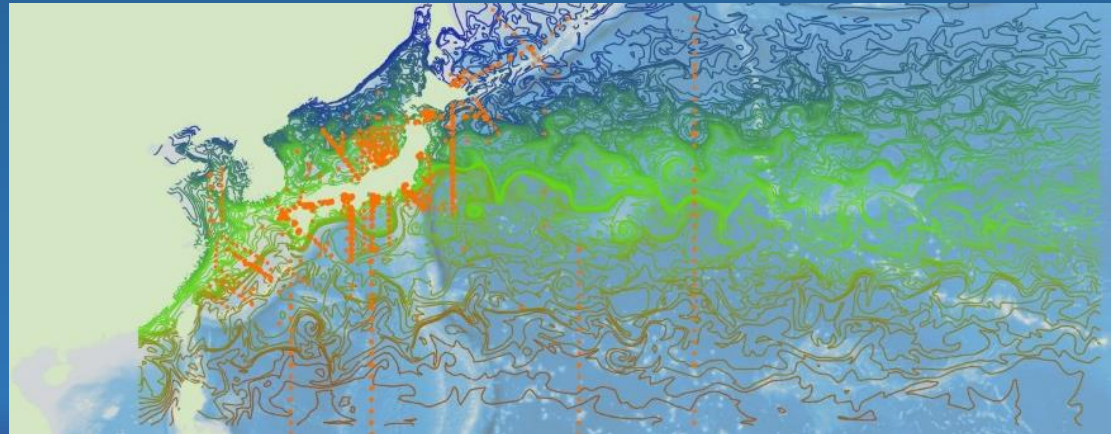


Extract old observation (in 1982-1992) from BISMAL

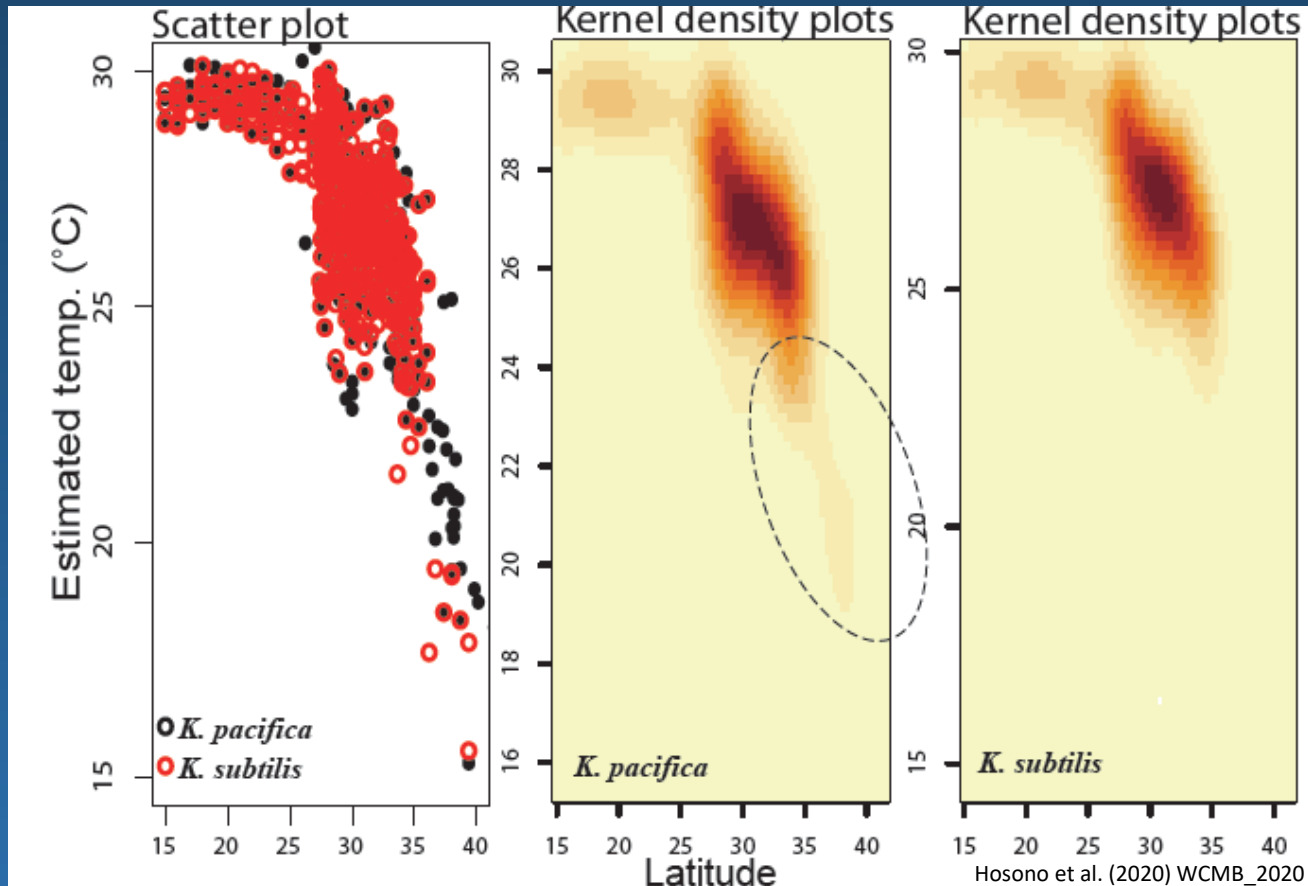
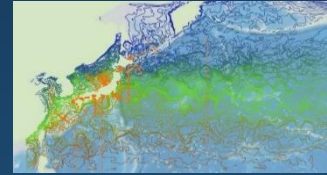
K. pacifica 904

K. subtilis 1136

Estimate temperature for these records using BISMAL function



Simple usage of occurrence data with estimated environmental data



Estimated thermal habitats for two *Krohnitta* species.

The thermal habitats of two species are mostly overlapped, but Kernel density plots detect habitat differences at lower temperature zone.

Today's outline

- Global activities on integrating biodiversity information (GBIF & OBIS)
- Key factors in OBIS framework: data format and database for scientific name
- OBIS node activities in Japan
- Data use-case

In addition to the node activities,
we made educational materials for kids.



http://www.godac.jamstec.go.jp/j-obis/e/img/jobis_video_en.mp4