

FY2023 Annual Report

Satoshi Mitarai

Marine Biophysics Unit (MBU)

Okinawa Institute of Science and Technology Graduate University (OIST)

Onna, Okinawa 904-0495, Japan

Website: <https://groups.oist.jp/mbu>



Staff

Members of the Marine Biophysics Unit

- Lead Investigator: Satoshi Mitarai
- Research Unit Administrator: Tomoko Yoshino

Table 1. Members of the Marine Biophysics Unit

	Name	Period (yyyy-mm-dd)	Funding source
Postdocs	Heng Wu	2019-07-01 – 2024-06-30	OIST & External ¹
	Tunggul Bhirawa	2024-04-01 – 2024-10-31	OIST
Students	Maki Thomas	2015-09-01 – 2023-05-31	OIST
	Otis Brunner	2018-09-01 – 2023-05-22	OIST
	Kota Ishikawa	2020-09-01 – 2024-03-31	OIST & External ²
Technicians	Akinori Murata	2021-02-01 – 2024-03-31	OIST

	Tunggul Bhirawa	2023-11-01 – 2024-03-31	OIST
Assistants	Kazumi Inoha	2015-04-03 – 2024-09-30	OIST
	Kimberlie Ward	2023-01-01 – 2023-06-30	OIST
	Kanako Gibo	2024-01-15 – 2024-09-30	External ³
Interns	Nicole Yap ⁴	2023-02-06 – 2023-05-01	OIST
	Sawyer Suzuki ⁵	2023-07-31 – 2023-09-29	OIST
	Melissa Tanaka ⁶	2023-10-05 – 2023-11-30	OIST
	Sophie Schoenherr ⁷	2023-10-10 – 2024-03-28	OIST
	Jakob Rahner ⁸	2023-12-07 – 2024-05-17	OIST

1. Grant-in-Aid for Early-Career Scientist, Japan Society for the Promotion of Science Scholarship (23K17033)
2. Grant-in-Aid for JSPS Fellows, Research Fellowship for Young Scientists (DC2), Japan Society for the Promotion of Science Scholarship (JP23KJ2133)
3. JST COI-NEXT
4. MarFishEco Sustainable Fisheries Consultants
5. University of Oxford (Undergraduate student)
6. Graduated from Stanford University (Master, June 2023)
7. University of Aveiro (Graduate student)
8. Graduated from Carl von Ossietzky University Oldenburg (Master, March 2023)

New Members

Lily Walker

- Rotation student, Academic Year 2022/2023, Term 3

Lily is a current rotation student in the MBU with a background in general physics and an interest in oceanography. Through ocean numerical modeling and fieldwork, she will study the dynamics of rip currents for local Okinawan shores. This research can hopefully offer some insight into both material transport, for example for coral larvae, but also for safety around more dangerous areas of the Okinawan coast.

Diala Edde

- Rotation student, Academic Year 2022/2023, Term 3

Diala has a background in marine biology, specifically ichthyology. Since her main interest is in fish larvae dispersal patterns, she has joined the Mitarai unit as a rotation student to learn ocean modeling and particle tracking simulations. Her rotation project will focus on ocean reconstruction simulations from the Quaternary period (400,000-800,000 Mya) to determine the dynamics of the Kuroshio Current during that time.

Sophie Schoenherr

Sophie is a current student at the University of Aveiro, Portugal where she's completing a MSc. in Applied Marine Biology. She has a background in shallow coral reef research and restoration and is now curious to learn about their deeper counterparts, namely cold-water corals. During her time

in the Mitarai Unit, she aims to combine the current - unfortunately scarce - knowledge on cold-water coral biology with biophysical modeling to gain a better understanding on the potential dispersal pathways and connectivity of these unique ecosystems.

Melissa Tanaka

My background is in environmental engineering with a focus on environmental fluid mechanics. I have recently completed my masters and am here to pursue my interest in research while working with typhoon data. I am originally from Long Beach, CA and I love to run and I love the ocean!

Jakob Rahner

Jakob did his Master's degree in Marine Environmental Sciences, focusing largely on numerical modeling approaches. Having previously worked on seed transport in ocean currents, he wants to extend his knowledge by looking at long-distance hydrochorous dispersal of mangrove seeds. Additionally, he will be working on modeling the dispersal of cold-water coral larvae at a regional scale.

Tunggul Bhirawa

Tunggul is an Ocean Engineer and Experimentalist in Fluid Mechanics, focusing on research areas including Air-Sea Interaction (ASI), Ocean Wave Physics, and Wave Turbulence. He has extensive experience utilizing experimental techniques and camera-based imaging technologies, including Particle Image Velocimetry (PIV) and Laser Surface Detection methods, Stereoscopic Imaging, and 3D Surface Reconstruction. Tunggul is particularly interested in Ocean-Atmosphere Interaction, which is essential in the global climate and to improve the climate prediction model, especially during extreme conditions such as Typhoons/Tropical cyclones.

Kanako Gibo

I am Administrative Staff Assistant. Also, taking care of the logistics with collaborators. I was born and raised in Okinawa. I would be happy to be a bridge between Okinawa and MBU to contribute for my beloved Okinawa through this unit.

Collaborations

Collaborative Agreements

Nippon Telegraph and Telephone Corporation (NTT)

- Type: Joint research agreement
- Topic: Ocean-atmosphere interactions in typhoons
- NTT: Masaki Hisada, Hiroshi Matsubara, Naoko Kosaka, Tatsuya Iizuka, Yuka Shinozaki, Yusuke Umemiya
- OIST: Satoshi Mitarai, Atsushi Fujimura, Akinori Murata, Kazumi Inoha, Tomoko Yoshino
- Period: September 10, 2021 – March 31, 2024
- Note: Entered on October 9, 2021, Amended on March 22, 2022, Amended on May 30, 2022, Amended on October 20, 2022, Amended on March 31, 2023

University of Guam (UOG)

- Type: Joint research agreement
- Topic: Larval dispersal and marine population connectivity
- UOG: Terry Donaldson, Atsushi Fujimura, David Combosch
- OIST: Satoshi Mitarai, Yuichi Nakajima

- Period: April 1, 2021 – March 31, 2025
- Note: Entered on August 25, 2021

11th Regional Coast Guard Headquarters (11th HQ)

- Type: Cooperative agreement
- Purpose: OIST will use its best efforts to improve the sophistication of ocean tide model and current simulation, utilizing detailed sea bottom topographic data and abundant ocean-current survey data possessed by 11th HQ, and 11th HQ will use its best efforts to improve drift prediction accuracy, utilizing the sophisticated ocean tide model data and results of ocean current simulation improved by OIST.
- 11th HQ: Takuma Kimura, Katsumi Nagakura, Shinobu Uchimura, Masayuki Nakagawa, Tsukasa Samizo, Ayaka Tanba
- OIST: Satoshi Mitarai, Kazumi Inoha, Akinori Murata
- Period: April 1, 2021 – March 31, 2024
- Note: Entered on March 27, 2012, Amended on March 31, 2015, Amended on March 31, 2018, Amended on March 30, 2021, Amended on June 18, 2021, Amended on May 30, 2022

Naha Coast Guard Office (NCGO)

- Type: Comprehensive collaboration agreement
- Purpose: The purpose of this Agreement is for the Parties to contribute to the enhancement of the safe and secure oceanic activities, the advancement of science and technology, and the development of local community and human resources, by the comprehensive collaboration and cooperation between the Parties, utilizing each Party's functions within their respective areas of operation.
- Period: January 27, 2023 – March 31, 2026
- Note: Entered on January 27, 2023

Naha Coast Guard Office (NCGO)

- Type: Memorandum of Understanding
- Topic: Marine environmental survey of the sea area surrounding Apogama in Onna-son
- Period: January 27, 2023 – March 31, 2026
- Note: Entered on January 27, 2023

Tohoku University

- Type: Collaborative Research Agreement
- Topic: Glacial-interglacial variations in the Kuroshio Current and their impact on coral reef assemblages
- Researchers (TU): Hideko Takayanagi, Yasufumi Iryu
- Researcher (OIST): Satoshi Mitarai
- Period: June 1, 2023 – March 31, 2024
- Note: Entered on June 1, 2023

Kyoto University

- Type: Collaborative Research Agreement
- Topic: Swimming performance assessment and kinematic analysis of swimming in sea snakes
- Researchers (KU): Akira Mori
- Researcher (OIST): Satoshi Mitarai
- Period: March 1, 2024 – July 10, 2024

- Note: Entered on March 1, 2024, Amended on March 1, 2024

Visiting Researchers

Amatzia Genin

- Affiliation: Hebrew University of Jerusalem
- Position: Professor (Emeritus)
- Webpage: <https://www.bio.huji.ac.il/en/content/genin-amatzia>
- Funding source: OIST
- Research topic: Effects of prey density and flow speed on plankton feeding by garden eels
- OIST visit: September 4–12, 2023

Atsushi Fujimura

- Affiliation: University of Guam
- Position: Associate Professor
- Webpage: <https://www.uog.edu/directory/fujimura-atsushi>
- Funding source: Other than OIST
- Research topic: Biophysical mechanisms of coral bleaching in the Western Pacific Ocean
- Period: September 1, 2022 – August 31, 2023
- OIST visit: June 29–July 7, 2023

Yosuke Yamada

- Affiliation: Japan Agency for Marine-Earth Science and Technology
- Position: Researcher (tenure track)
- Webpage: <https://www.jamstec.go.jp/kochi/j/groups/geomicrobiology.html>
- Funding source: Other than OIST
- Research topic: Observation and measurement of marine microbes and particles
- Period: August 1, 2022 – March 31, 2025
- OIST visit: November 21, 2023 – December 19, 2023

Alex Wyatt

- Affiliation: Hong Kong University of Science and Technology
- Position: Assistant Professor, Associate Director
- Webpage: <http://www.alexsjwyatt.com/>
- Funding source: Other than OIST
- Research topic: Environmental drivers of coral reef ecosystems in the Ryukyu Archipelago
- Period: July 1, 2021 – June 30, 2024
- OIST visit:

Hidekatsu Yamazaki

- Funding source: Other than OIST
- Research topic: Is the Kuroshio really oligotrophic?
- Period: June 1, 2023 – May 31, 2025
- OIST visit:

Yusuke Uchiyama

- Affiliation: Kobe University
- Position: Professor

- Webpage: <http://www2.kobe-u.ac.jp/~uchiyama/>
- Funding source: Other than OIST
- Research topic: Development of coral larval transport model for coastal and reef areas in Okinawa
- Period: October 16, 2023 – October 15, 2024
- OIST visit: September 18–24, 2024

Research Interns

Jakob Rahner

- Affiliation: Carl von Ossietzky University of Oldenburg
- Status: Master's student
- Webpage: <https://uol.de/en/course-of-study/marine-environmental-sciences-master-210>
- Funding source: OIST
- Period: December 7, 2023 – May 17, 2024

Sophie Schoenherr

- Affiliation: University of Aveiro
- Status: Master's student
- Webpage: <https://www.ua.pt/en/course/451>
- Funding source: OIST
- Period: October 10, 2023 – March 28, 2024

Melissa Tanaka

- Affiliation: Stanford University
- Status: Master's student
- Webpage: <https://cee.stanford.edu/>
- Funding source: OIST
- Period: October 6 – November 20, 2023

Sawyer Suzuki

- Affiliation: University of Oxford
- Status: Undergraduate student
- Webpage: <https://www.ox.ac.uk/admissions/undergraduate/courses/course-listing/earth-sciences-geology>
- Funding source: OIST
- Period: July 31–August 18, 2023, September 11–29, 2023

Nicole Yap

- Affiliation: MarFishEco Sustainable Fisheries Consultants
- Status: Marine Consultant
- Webpage: <https://www.marfisheco.com/team/>
- Funding source: OIST
- Period: February 4, 2023 – May 1, 2023

Visitors

Takuma Kimura, Takenaka, Isao Tedokon, Tsukasa Samizo

- Affiliation: 11th Regional Coast Guard Headquarters

- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: March 22, 2024
- Venue: 11th Regional Coast Guard Headquarters
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kanako Gibo, Kazumi Inoha
- Note: Annual meeting

Makoto Tanaka, Shosuke Izumi, Madoka Touyama, Syonosuke Kyoda

- Affiliation: Naha Coast Guard
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: February 29, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Yasunobu Tanaka, Kentaro Takaoka
- Note: Meeting for COI-NEXT's FY2024 plan

Satoshi Fujii

- Affiliation: University of the Ryukyus
- Webpage: <https://iicc.skr.u-ryukyu.ac.jp/matching/seeds/communication/910.php>
- Date: January 31, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Bring items for the marine radar

Yasuo Niida

- Affiliation: Central Research Institute of Electric Power Industry
- Webpage: <https://egsweb.denken.or.jp/researcher/1003450/>
- Date: January 31, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Bring items for the marine radar

Yoshinori Ishigaki

- Affiliation: ORNIS
- Webpage: <https://www.ornis.jp>
- Date: January 31, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Bring items for the marine radar

Andreas Andersson, Max Rintoul,

- Affiliation: Scripps Institute of Oceanography
- Webpage: <https://scripps.ucsd.edu/>
- Date: January 5- January 25, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Note: Onna son fieldwork

Yuna Zayasu

- Affiliation: OIST (visiting researcher)

- Webpage: <https://www.oist.jp/>
- Date: January 5- January 25, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Note: Onna son fieldwork

Reggie Spaulding

- Affiliation: Sunburst Sensors
- Webpage: <http://www.sunburstsensors.com/>
- Date: January 5- January 16, 2024
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Note: Onna son fieldwork

Masanori Kyo

- Affiliation: JAMSTEC
- Webpage: https://www.jamstec.go.jp/souran/html/Masanori_Kyo_3a982-e.html
- Date: December 27, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai

Shuichi Mori

- Affiliation: JAMSTEC
- Webpage: <http://hujan.jp/>
- Date: October 23, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: Meeting

Ryu Toyama, Kosuke Yamashita, Madoka Toyama

- Affiliation: Naha Coast Guard
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: October 4, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Kazumi Inoha, Tomoko Yoshino
- Note: Meeting and campus tour

Naoyuki Kitamura

- Affiliation: 11th Regional Coast Guard Headquarters
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/>
- Date: October 4, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Kazumi Inoha, Tomoko Yoshino
- Note: Meeting and campus tour

Isao Tedokon, Tsukasa Samizo

- Affiliation: 11th Regional Coast Guard Headquarters

- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/>
- Date: September 15, 2023
- Venue: OIST
- Participant from OIST: Akinori Murata, Kazumi Inoha
- Note: Pass Microstar buoys

Katsuro Okawachi, Makoto Tanaka, Shousuke Izumi, Madoka Toyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: September 8, 2023
- Venue: OIST
- Participant from OIST: President Karin Markides, Satoshi Mitarai, Shoko Bito, Akiko Ringdahl
- Note: Courtesy call to the President

Isao Tedokon, Tsukasa Samizo

- Affiliation: 11th Regional Coast Guard Headquarters
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/>
- Date: September 6, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Meeting about Anemometer and next year planning for drifter experiment.

Makoto Tanaka, Shousuke Izumi, Madoka Toyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: September 4, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: COI-NEXT JST site visit

Makoto Tanaka, Madoka Toyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: August 31, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Note: Meeting with pilots of patrol vessel Okinawa

Makoto Tanaka, Shonosuke Kyoda

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: August 25, 2023
- Venue: Onna Port
- Participant from Onna Fisheries Coop: Yonamine-san
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Meeting Yonamine-san to ask about Phayao and local water safety for COI-NEXT project

Yutaka Yonamine

- Affiliation: Onna Fisheries Coop
- Date: August 4, 2023
- Venue: Onna Port
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Discussion on Phayao

Makoto Tanaka, Shosuke Izumi, Madoka Touyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: August 4, 2023
- Venue: Onna Port
- Participant from OIST: Satoshi Mitarai, Akinori Murata, Kazumi Inoha
- Note: Discussion on Phayao

Makoto Tanaka, Shonosuke Kyoda

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Venue: Naha Coast Guard Office
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Date: July 26, 2023
- Note: Meeting about infrared cameras

Makoto Tanaka, Shosuke Izumi, Madoka Touyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: July 11, 2023
- Venue: Onna Fisheries Coop
- Participant from OIST: Satoshi Mitarai
- Note: Meeting to Onna Fisheries Coop for COI-NEXT project

Satoshi Fujii

Affiliation: University of the Ryukyus

Webpage: <https://iicc.skr.u-ryukyu.ac.jp/matching/seeds/communication/910.php>

Date: July 5, 2023

Venue: OIST (Lab2, Lab4)

Participant from OIST: Satoshi Mitarai, Tadashi Tsukamoto (BFM)

Note: Checking the locations for the marine radar

Naoto Endo

Affiliation: NTT Space Environment and Energy Laboratories

Webpage: <https://www.rd.ntt/e/se/>

Date: July 2–3, 2023

Venue: OIST

Participant from OIST: Akinori Murata

Note: Typhoon observations

Ikko Taninaka, Shu Ogawa

Affiliation: NTT Data Hokuriku

Webpage: <https://www.rd.ntt/e/se/>

Date: July 2–3, 2023

Venue: OIST

Participant from OIST: Akinori Murata

Note: Typhoon observation

Masanori Kyo

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

Webpage: https://www.jamstec.go.jp/souran/html/Masanori_Kyo_3a982-e.html

Date: June 28, 2023

Venue: OIST

Participant from OIST: Satoshi Mitarai

Note: Meeting

Kunihiro Shimaya, Takuma Kimura, Hiroaki Takenaka, Tsukasa Samizo

- Affiliation: 11th Regional Coast Guard Headquarters
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/>
- Date: June 21, 2023
- Venue: OIST
- Participant from OIST: Karine Markides, Shigeharu Kato, Satoshi Mitarai
- Note: Courtesy call to President Karine Markides, and campus tour

Takeyoshi Nagai, Yuki Ikeda, Silvana Duran, Diego Otero

- Affiliation: Tokyo University of Marine Science and Technology
- Webpage: <https://olcr.kaiyodai.ac.jp/db/profile.php?yomi=nagai,takeyoshi>
- Date: June 19, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: Meeting

Avery Snyder

- Affiliation: Ocean Tech Connection
- Webpage: <https://oceantechconnection.com/>
- Date: June 19, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: Meeting

Satoshi Fujii

- Affiliation: University of the Ryukyus
- Webpage: <https://iicc.skr.u-ryukyu.ac.jp/matching/seeds/communication/910.php>
- Date: June 18, 2023
- Venue: OIST (Seaside House, Main Campus)
- Participant from OIST: Satoshi Mitarai
- Note: Planning on high frequency ocean radars

Takaki Tsubono, Yasuo Niida

- Affiliation: Central Research Institute of Electric Power Industry

- Webpage: <https://criepi.denken.or.jp/en/>
- Date: June 18, 2023
- Venue: OIST (Seaside House, Main Campus)
- Participant from OIST: Satoshi Mitarai
- Note: Planning on high frequency ocean radars

Makoto Tanaka, Shosuke Izumi, Madoka Touyama, Manabu Tamashiro, Kitagawa-san, Kawakami-san

Affiliation: Naha Coast Guard Office

Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>

Date: June 16, 2023

Venue: OIST

Participant from OIST: Shigeharu Kato, Shoko Bito, Junichi Ozawa, Hisashi Gakiya, Natsuki Matsumoto, Satoshi Mitarai, Akinori Murata, Kazumi Inoha

Note: COI-NEXT project meeting

Shuichi Mori

- Affiliation: Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Center for Coupled Ocean-Atmosphere Research (CCOAR)
- Webpage: http://hujan.jp/index_e.html
- Date: June 6, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: Meeting with Satoshi

Po-Shun Chuang

- Affiliation: Biodiversity Research Center, Academia Sinica
- Webpage: http://sltang.biodiv.tw/pages/members_detail.php?bob
- Date: May 22, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai
- Note: Discussion on future collaborations

Naoshi Koiwai, Isao Tedokon, Tsukasa Samizo, Taichi Sasada, Yuiko Shimoji

- Affiliation: 11th Regional Coast Guard Headquarters
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/>
- Date: May 18, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Tomoko Yoshino
- Note: OIST visit of a new deputy director

Katsuro Okawachi, Makoto Tanaka, Shosuke Izumi, Manabu Tamashiro, Takeshi Nakazato, Kosuke Yamashita, Madoka Touyama

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: May 16, 2023
- Venue: NCGO
- Participant from OIST: Satoshi Mitarai, Akinori Murata

- Note: COI-NEXT Planning

Tomoko Takeda

- Webpage: <https://kayannelab.com/en/members/tomoko-takeda/>
- Date: May 9–14, 2023
- Venue: OIST
- Participant from OIST: Satoshi Mitarai, Akinori Murata
- Note: Onna son fieldwork

Max Rintoul, Samuel Kekuwa

- Webpage: <https://grad.ucsd.edu/student-life/student-spotlights/sio/max-rintoul.html>
- Webpage: <https://scripps.ucsd.edu/profiles/skekuwa>
- Date: April 27 – May 14, 2023
- Venue: OIST
- Participant: Satoshi Mitarai, Akinori Murata,
- Note: Onna son fieldwork

Makoto Tanaka, Ryu Toyama, Madoka Toyama, Yuria Itoman

- Affiliation: Naha Coast Guard Office
- Webpage: <https://www.kaiho.mlit.go.jp/11kanku/naha/>
- Date: April 13, 2023
- Venue: OIST
- Participant: Shigeharu Kato, Satoshi Mitarai, Shoko Bito, Kentaro Takaoka, Junichi Ozawa
- Note: COI-NEXT project

Kazuhiko Sakai

- Affiliation: University of the Ryukyus
- Webpage: https://kenkyushadb.lab.u-ryukyu.ac.jp/html/100000364_ja.html
- Date: April 10, 2023
- Venue: University of the Ryukyus (Sesoko)
- Participant: Satoshi Mitarai
- Note: Collaboration papers

Jana Pilátová

- Affiliation: Charles University
- Webpage: <https://www.mff.cuni.cz/en/faculty/organizational-structure/people?hdl=14028>
- Date: April 7, 2023
- Venue: OIST
- Participant: MBU and Satoh Unit
- Note: Presentation at the joint meeting with Satoh Unit

Activities and Findings

Fieldwork Activities

Shore Sampling and Observation (Boat/Kayak)

- Participant: Akinori Murata
- Date: March 29, 2024

- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-4
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Drifter experiment and water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Akinori Murata
- Date: March 14, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Drifter experiment and water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: February 28, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: February 15, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: February 1, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Water sampling and pH measurement

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: January 19, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Drifter experiment and water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: January 18, 2024
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Mooring of Spotter and water sampling

Oceanographic Research Under Agreements with the Japan Coast Guard

- Participant: Akinori Murata
- Date: December 4, 2023
- Boat: Orge
- Application ID: FWA-2021-027-4
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Recovery sensors off Apogama

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Sawyer Suzuki
- Date: September 20, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022-2
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Deploy 4 Microstar drifters (all with drogues)

Oceanographic Research Under Agreements with the Japan Coast Guard

- Participant: Akinori Murata
- Date: September 20, 2023
- Boat: JCG Helicopter
- Application ID: FWA-2021-027-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino

- Note: OIST-FLIR Interference test to aeronautical instruments, JCG-FLIR shooting

Reef Observation (Diving)

- Participant: Kota Ishikawa, Keishu Asada
- Date: September 6, 2023
- Boat: Yutaka Yonamine
- Application ID: FWA-2021-016-6
- Lead investigator: Satoshi Mitarai
- Onsite leader: Keishu Asada
- On-campus contact: Tomoko Yoshino
- Note: Observing Garden eel and Chromis

Oceanographic Research Under Agreements with the Japan Coast Guard

- Participant: Akinori Murata
- Date: September 6, 2023
- Boat: Kazuya Hayashi, OOW Boat
- Application ID: FWA-2021-027-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Deployment of sensors off Apogama

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu
- Date: August 31, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Kazumi Inoha
- Note: Deploy four Microstar drifters with and without a drogue right before Typhoon #11

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu
- Date: August 15–17, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Water sampling

Wave Glider observations of surface winds and currents

- Participant: Akinori Murata
- Date: August 15, 2023
- Boat: Orge
- Application ID: FWA-2021-017-5

- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Recovery of two Wave Gliders

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu
- Date: July 29, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Deploy five Microstar drifters with and without a drogue right before Typhoon #6

Oceanographic Research Under Agreements with the Japan Coast Guard

- Participant: Satoshi Mitarai, Akinori Murata
- Date: July 26, 2023
- Boat: JCG fleet
- Application ID: FWA-2021-027-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Satoshi Mitarai
- On-campus contact: Kazumi Inoha
- Note: FLIR shooting off Ka-Mi-Ji-

Wave Glider observations of surface winds and currents

- Participant: Akinori Murata
- Date: July 20, 2023
- Boat: Orge
- Application ID: FWA-2021-017-5
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Deployment of Wave Glider (Seiuchi-san)

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: July 19, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Satoshi Mitarai
- Note: Water sampling

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata

- Date: July 18, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Water sampling

Oceanographic Research Under Agreements with the Japan Coast Guard

- Participant: Akinori Murata
- Date: July 12, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2021-027-3
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Preliminary survey off Apogama

Wave Glider observations of surface winds and currents

- Participant: Akinori Murata
- Date: July 10, 2023
- Boat: Orge
- Application ID: FWA-2021-017-5
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Recovery of Wave Glider (Seiuchi-san)

Wave Glider observations of surface winds and currents

- Participant: Akinori Murata
- Date: July 4, 2023
- Boat: Orge
- Application ID: FWA-2021-017-5
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Deployment of two Wave Gliders

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu
- Date: June 29, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Deploy two Microstar drifters with extra weight

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu
- Date: June 26, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Heng Wu
- On-campus contact: Tomoko Yoshino
- Note: Microstar drifter test (with extra weight)

Wave Glider observations of surface winds and currents

- Participant: Akinori Murata
- Date: June 9, 2023
- Boat: Orge
- Application ID: FWA-2021-017-5
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On Campus: Satoshi Mitarai, Tomoko Yoshino
- Note: OISTER pre-launch test off Itoman

Shore Sampling and Observation (Boat/Kayak)

- Participant: Heng Wu, Akinori Murata
- Date: April 19–21, 2023
- Boat: Kazuya Hayashi
- Application ID: FWA-2022-022
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- On-campus contact: Tomoko Yoshino
- Note: Drifter experiment and water sampling

Research Findings

Functions of extracellular polymeric substances in partitioning suspended and sinking particles in the upper oceans of two open ocean systems

Marine particle dynamics and carbon export, involving extracellular polymeric substances (EPS) like transparent exopolymer particles (TEP) and Coomassie Brilliant Blue-stained particles (CSP), are poorly understood. Although TEP adhesive properties may enhance carbon export by facilitating aggregate formation, their low density can also enhance particle suspension. Factors influencing TEP regulation of particle dynamics remain unclear. To investigate EPS contributions to particle dynamics, we investigated ratios of TEP to particulate organic carbon (POC) and of CSP to POC in suspended and sinking particles collected with marine snow catchers. Samples were collected in a subarctic region near Hokkaido during a spring phytoplankton bloom and in the oligotrophic, subtropical Kuroshio region. At Hokkaido, the mean TEP : POC ratio of sinking particles was $> 30\times$ lower than in suspended particles (2.3), consistent with a model prediction of selective retention of buoyant TEP-rich particles in the upper water column. In the Kuroshio region, sinking particles also contained fewer TEP than suspended particles; however, the TEP : POC ratio of sinking particles (1.0) was $> 10\times$ higher than at Hokkaido, suggesting that TEP

constitute a significant carbon component of sinking particles. These findings indicate that TEP facilitate aggregation of high-density particles and particle sinking in the Kuroshio region. Distributions of CSP : POC ratios between suspended and sinking particles resembled TEP : POC ratios in both regions, implying a significant contribution of CSP to particle dynamics. We propose that EPS have divergent effects on suspension and sinking of marine particles, which vary with particle composition and biogeochemical conditions.

High-frequency variability dominates potential connectivity between remote coral reefs

Coral larval dispersal establishes connectivity between reefs, but larval fluxes vary over timescales from daily to multidecadal due to oceanographic variability. Using a 2-km-resolution ocean model, we simulate daily spawning events from 1993 to 2019 and assess the potential connectivity between all reefs in the tropical southwest Indian Ocean. Although there is a significant seasonal cycle in potential connectivity, day-to-day variability generally dominates. Larval dispersal pathways on any particular day provide limited information about the dispersal pathways a few days later. The magnitude of this high-frequency variability depends on the local geography and oceanography, with small and isolated reefs generally subject to the most variability. Stochastic oceanographic variability introduces considerable uncertainty to dispersal predictions, imposing fundamental limitations on what simulations can tell us about inter-reef connectivity. Protracted spawning over only a few days can significantly reduce variability associated with the likelihood of a larva settling. The duration of spawning is therefore a more important parameter in modeling coral connectivity than the exact timing of spawning onset. Finally, we find that a small proportion of spawning events account for the majority of settling larvae, particularly at remote islands, and demonstrate that a time-mean picture of dispersal may be inappropriate for predicting demographic and genetic connectivity. Given the diversity of coral reef environments in the southwest Indian Ocean, we expect that these results will apply to inter-reef coral connectivity across the tropics more broadly, as well as other weakly swimming reef taxa with the potential for long-distance dispersal.

Simultaneous Observations of Atmosphere and Ocean Directly under Typhoons Using Autonomous Surface Vehicles

This paper presents experimental observations to improve typhoon prediction accuracy and to understand interactions between atmosphere and ocean directly under typhoons. Two unmanned surface vehicles (Wave Gliders (WGs)) equipped with interchangeable sensors were sailed toward the path of an approaching Category 5 typhoon (Hinnamnor), which began on 29 August 2022 and subsided on 6 September, reaching a minimum pressure of 920 hPa and a maximum wind speed of 55 m/s (105 knots). Sensors on WGs measured atmospheric pressure, wind speed, atmospheric and seawater temperature, wave height, currents, salinity, and chlorophyll-a concentrations in different parts of the typhoon. These observations made it possible to clarify changes in various phenomena as the typhoon approached and to compare differences in storm characteristics measured by the two WGs. Sea surface pressure in the core of a typhoon is useful as an initial predictor of its intensity. Data assimilation into numerical models and other observations are expected to improve prediction accuracy of typhoon phenomena. Furthermore, simultaneous observations of atmosphere and ocean will also be useful for modeling interactions.

Bacterial Community Shifts during Polyp Bail-Out Induction in Pocillopora Corals

Polyp bail-out constitutes both a stress response and an asexual reproductive strategy that potentially facilitates dispersal of some scleractinian corals, including several dominant reef-building taxa in the family Pocilloporidae. Recent studies have proposed that microorganisms may

be involved in onset and progression of polyp bail-out. However, changes in the coral microbiome during polyp bail-out have not been investigated. In this study, we induced polyp bail-out in Pocillopora corals using hypersaline and hyperthermal methods. Bacterial community dynamics during bail-out induction were examined using the V5-V6 region of the 16S-rRNA gene. From 70 16S-rRNA gene libraries constructed from coral tissues, 1,980 OTUs were identified.

Gammaproteobacteria and Alphaproteobacteria consistently constituted the dominant bacterial taxa in all coral tissue samples. Onset of polyp bail-out was characterized by increased relative abundance of Alphaproteobacteria and decreased abundance of Gammaproteobacteria in both induction experiments, with the shift being more prominent in response to elevated temperature than to elevated salinity. Four OTUs, affiliated with *Thalassospira*, *Marisediminitalia*, Rhodobacteraceae, and Myxococcales, showed concurrent abundance increases at the onset of polyp bail-out in both experiments, suggesting potential microbial causes of this coral stress response.

Quantifying connectivity between mesophotic and shallow coral larvae in Okinawa Island, Japan: a quadruple nested high-resolution modeling study

Coral bleaching has recently been occurring extensively across the world's oceans, primarily because of high water temperatures. Mesophotic corals that inhabit depths of approximately 30–150 m are expected to survive bleaching events and reseed shallow water corals afterward. In Okinawa, Japan, mesophotic coral ecosystems have been reported to serve as a refuge for preserving the genotypic diversity of bleaching-sensitive corals. The connectivity of larval populations among different habitats is a key element that determines the area to be conserved in desirable coral ecosystems. Because coral larvae are largely transported passively by ambient oceanic currents, particularly in the horizontal direction, numerical ocean circulation models greatly help to quantify connectivity with detailed spatiotemporal network structures. The present study aimed to quantify the short-distance connectivity of shallow and mesophotic coral larvae in reef areas on the northwest coast of Okinawa Island. To this end, a quadruple nested high-resolution synoptic ocean model at a lateral spatial grid resolution of 50 m was developed, which was capable of realizing detailed coastal currents influenced by complex nearshore topography, and coupled with an offline 3-D Lagrangian particle-tracking model. After validating the developed model, short-distance horizontal coral connectivity across reef areas on the northwest coast was successfully evaluated. The alongshore lateral connectivity had apparent asymmetry caused by depth-dependent horizontal currents, whereas the larvae spawned at shallow and mesophotic depths were reachable to each other. Such across-depth larval dispersal was attributable to the mixed-layer depth in the spawning period, viz., the boreal spring, which approximately coincides with the boundary between shallow and mesophotic coral, leading to the intensive vertical exchange of virtual larvae.

Publications

Journals

Published

1. **Yamada, Y.**, Ebihara, A., Fukuda, H., Otsuka, S., **Mitarai, S.**, & Nagata, T. (2024). Functions of extracellular polymeric substances in partitioning suspended and sinking particles in the upper oceans of two open ocean systems. *Limnology and Oceanography*. <https://doi.org/10.1002/lno.12554>

2. **Nakajima, Y., Wepfer, P. H., & Mitarai, S.** (2023). Clonal distribution and spatial genetic structure of the reef-building coral *Galaxea fascicularis*. *Conservation Genetics*.
<https://doi.org/10.1007/s10592-023-01591-6>
3. **Vogt-Vincent, N. S., Mitarai, S., & Johnson, H. L.** (2023). High-frequency variability dominates potential connectivity between remote coral reefs. *Limnology and Oceanography*.
<https://doi.org/10.1002/lno.12455>
4. Kosaka, N., Umemiya, Y., Endou, N., Kura, T., Matsubara, H., Hisada, M., **Murata, A., & Mitarai, S.** (2023). Simultaneous observations of atmosphere and ocean directly under typhoons using autonomous surface vehicles. *SOLA*.
<https://doi.org/10.2151/sola.2023-016>
5. **Chuang, P-S., Yamada, Y., Liu, P-Y., Tang, S-L., & Mitarai, S.** (2023). Bacterial community shifts during polyp bail-out induction in *Pocillopora* corals. *Microbiology Spectrum*.
<https://doi.org/10.1128/spectrum.00257-23>
6. **Takeyasu, K., Uchiyama, Y., & Mitarai, S.** (2023). Quantifying connectivity between mesophotic and shallow coral larvae in Okinawa Island, Japan: a quadruple nested high-resolution modeling study. *Frontiers in Marine Science*.
<https://doi.org/10.3389/fmars.2023.1174940>

Books and other one-time publications

- Nothing to report

Oral and poster presentations

Presented

7. **Mitarai, S., Murata, A., Kosaka, N., Endou, N., Kura, T., Hisada, M., Iida, K., Shimura, T., & Mori, N.** (2024). Wave glider and spotter observations of oceanic responses to Typhoon Khanun. *2024 Ocean Sciences Meeting*, New Orleans, 18–23 February 2024.
8. **Vogt-Vincent, N., Burt, A., Kaplan, D., van der Ven, R., Turnbull, L., Mitarai, S., & Johnson Helen** (2023). No island is truly isolated: how ocean currents connect coral reefs and transport pollution across the western Indian Ocean. Invited talk at the University of Exeter, January 16, 2024.
9. **Wu, H., Ishikawa, K., Yamada, Y., Murata, A., & Mitarai, S.** (2023). Effects of flows on the transparent exopolymer particle concentration in a fringing coral reef: field observations. *AGU23, San Francisco, CA & Online everywhere*, 11–25 December 2023.
10. Endou, N., Kosaka, N., Matsubara, H., Shinozaki, Y., Hisada, M., **Murata, A., & Mitarai, S.** (2023). Behavior analysis of surface vehicle in the typhoon storm zone. *The Japan Society of Naval Architects and Ocean Engineers 2023 Fall Meeting, Nagasaki & Online, Japan*, 27–28 November 2023.
11. Talma, S., **Vogt-Vincent, N., Burt, A., Mitarai, S., Turnbull, L., & Johnson, H.** (2023). Transboundary marine pollution threatens remote islands in Seychelles. *United Nations Climate Change Conference (COP28), Dubai, United Arab Emirates*, November 30 – December 12, 2023. (Oral presentation on December 3, 2023)
12. Kosaka, N., Endou, N., Kura, T., Shinozaki, Y., Umemiya, Y., Matsubara, H., Hisada, M., **Murata, A., & Mitarai, S.** (2023). Simultaneous Observations of Atmosphere and Ocean Directly under Typhoons Using Autonomous Surface Vehicles. *International Workshop on Typhoon Science and Technology Research Center, Yokohama National University, Yokohama, Japan*, 8–9 November 2023.

13. Kosaka, N., Endo, N., Kura, T., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Simultaneous atmosphere-ocean observation experiment for Typhoon Khanun in 2023. 2nd Symposium on Urban Extreme Weather (19th Symposium on Typhoon Research), Disaster Prevention Research Institute, Kyoto University, 13–14 September 2023.
14. **Vogt-Vincent, N.**, Burt, A., McManus, L., Turnbull, L., **Mitarai, S.**, & Johnson, H. (2023). How well connected are coral reefs in the southwest Indian Ocean? 2023 [Ocean Modelling SIG \(Special Interest Group\) meeting](#), Challenger Society for Marine Science, National Oceanography Centre, Southampton, U.K., September 5–6, 2023. (Oral presentation on September 5, 2023)
15. **Ishikawa, K., Wu, H., Mitarai, S.**, & Genin, A. (2023). Empirical energy cost-benefit model for planktivorous reef fish, *Chromis viridis*. 58th Annual Meeting of the Ichthyological Society of Japan, On-site meeting at Bunkyo Campus, Nagasaki University, Nagasaki, Japan, 1–4 September 2023.
16. **Vogt-Vincent, N., Mitarai, S.**, & Johnson, H. (2023). Coral reef potential connectivity in the southwest Indian Ocean. [2023 Ecological Society of America \(ESA\) Annual Meeting](#), Portland, Oregon, USA, August 6–11, 2023. (Poster)
17. Uchiyama, Y., Kataoka, K., Takeyasu, K., & **Mitarai, S.** (2023). Wave Effects on Lagrangian Transport and Dispersal in the Nearshore Zone. [AOGS 2023 \(Asia Oceania Geosciences Society\)](#), Singapore, July 30 – August 4, 2023. (Oral on August 3, 8:15–10:00 AM)
18. Rintoul, M., Courtney, T., Dohner, J., Giddings, S., Kekuewa, S., Lindhart, M., **Mitarai, S.**, Monismith, S., Pezner, A., & Andersson, A. (2023). Physical controls of coral reef biogeochemical variability. [Coastal Ocean Dynamics \(Gordon Research Seminar\)](#), Smithfield, Rhode Island, USA, June 17–18, 2023.
19. **Yamada, Y.**, Patel, N., Fukuda, H., Nagata, T., **Mitarai, S.**, & Azam, F. (2023). Bacterial surface roughness regulates nanoparticle scavenging in seawater. [ASLO Aquatic Sciences Meeting 2023](#), Palma de Mallorca, Spain, June 4–9, 2023. (Oral on June 7, 2023 at 10:30 AM Central European Summer Time)
20. **Wu, H., Yamada, Y., Chuang P.-S., Ishikawa, K., & Mitarai, S.** (2023). Effects of flows on transparent exopolymer particle release by branching corals. [Japan Geoscience Union Meeting 2023](#), Chiba, Japan & Online, May 21–26, 2023. (Oral on May 25 at 4pm)
21. **Ishikawa, K., Wu, H., Mitarai, S.**, & Genin, A. (2023). Turbulence effects on zooplanktivory by free-swimming damselfish and anchored garden eels in coral reefs. [Japan Geoscience Union Meeting 2023](#), Chiba, Japan & Online, May 21–26, 2023. (Oral on May 25 at 2:55pm)
22. Kosaka, N., Endo, N., Kura, T., Shinozaki, Y., Umemiya, Y., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Simultaneous atmospheric and oceanic observation experiment under typhoon. [2023 Spring Meeting of the Meteorological Society of Japan](#), Tokyo, Japan & Online, May 16–20, 2023. (Oral, May 16, 9am–12pm)
23. Kura, T., Kosaka, N., Endo, N., Shinozaki, Y., Umemiya, Y., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Observation of sea water temperature by autonomous instruments directly under typhoon. [2023 Spring Meeting of the Meteorological Society of Japan](#), Tokyo, Japan & Online, May 16–20, 2023. (Poster, May 17, 4:15–5:45pm)
24. Endo, N., Kosaka, N., Kura, T., Shinozaki, Y., Umemiya, Y., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Behavior analysis of autonomous atmospheric and oceanographic instruments under typhoon. [2023 Spring Meeting of the Meteorological Society of Japan](#), Tokyo, Japan & Online, May 16–20, 2023. (Oral, May 16, 9am–12pm)
25. Shinozaki, Y., Kosaka, N., Endo, N., Kura, T., Umemiya, Y., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Observation of significant wave height and salinity by autonomous

instruments under typhoon. [2023 Spring Meeting of the Meteorological Society of Japan](#), Tokyo, Japan & Online, May 16–20, 2023. (Poster, May 17, 4:15–5:45pm)

26. Umemiya, Y., Kosaka, N., Endo, N., Kura, T., Shinozaki, Y., Hisada, M., **Murata, A., & Mitarai, S.**, (2023). Atmospheric observation by autonomous instruments directly under typhoon. [2023 Spring Meeting of the Meteorological Society of Japan](#), Tokyo, Japan & Online, May 16–20, 2023. (Poster, May 17, 4:15–5:45pm)
27. **Vogt-Vincent, N. S.**, Burt, A. J., Kaplan, D., **Mitarai, S.**, Turnbull, L. A., Johnson, H. L. (2023). Sources of marine debris for Seychelles and other remote islands in the western Indian Ocean. [EGU General Assembly 2023](#), Vienna, Austria & Online, April 23–28, 2023. ('Posters on site' in session OS4.8)

Intellectual Property Rights and Other Specific Achievements

- Nothing to report

Meetings and Events

Invited lectures

- **Vogt-Vincent, N.**, Burt, A., Kaplan, D., van der Ven, R., Turnbull, L., **Mitarai, S.**, & Johnson Helen (2023). No island is truly isolated: how ocean currents connect coral reefs and transport pollution across the western Indian Ocean. Invited talk at the University of Exeter, January 16, 2024.

Mini-symposium & Workshop

- None

MBU Events

Introduction of new members, academic achievements (e.g., publications, external grants, final exams/presentations, degree awards, graduation ceremony), farewell to the members.

- July 4, 2023. The first collaboration paper with NTT has been published.
- June 28, 2023. Po-Shun's new paper has been published.
- May 31, 2023. Diala joined the MBU as a rotation student.
- May 26, 2023. Farewell to Otis and Kim
- May 19, 2023. Maki attended the Graduation Ceremony.
- May 19, 2023. Lily joined the MBU as a rotation student.
- April 28, 2023. Farewell Nicole
- April 24, 2023. Another collaboration paper with Yusuke Uchiyama has been published.
- April 13, 2023. Heng received Grant-in-Aid for Early-Career Scientist, Japan Society for the Promotion of Science Scholarship.
- April 13, 2023. Kota received Grant-in-Aid for JSPS Fellows, Research Fellowship for Young Scientists (DC2), Japan Society for the Promotion of Science Scholarship.

Non-OIST Funding

Granted

NOAA Ocean Acidification Program, National Oceanographic Partnership Program

- Title: Carbon capture and ocean acidification mitigation potential by seaweed farms in tropical and subtropical coastal environments
- PI: Andreas Andersson (Scripps Institution of Oceanography), **Satoshi Mitarai** (OIST), Loretta Roberson (Marine Biological Laboratory), Reggie Spaulding (Sunburst Sensors), Adrienne Sutton (Pacific Marine Environmental Laboratory)
- Amount: \$1,451,590 (~216M JPY)
- Period: September 1, 2023 – August 31, 2026
- Funding agency: Department of Commerce and National Oceanic and Atmospheric Administration (NOAA), USA
- Funding program: NOAA Ocean Acidification Program, National Oceanographic Partnership Program (NOPP), [NOAA-OAR-OAP-2023-2007714](#)

Grant-in-Aid for Early-Career Scientist

- Name: **Heng Wu** (OIST)
- Amount: 2,500,000 JPY
- Period: April 1, 2023 – March 31, 2025
- Funding agency: Japan Society for the Promotion of Science Scholarship
- Title: Hydrodynamic effect on the production and fate of coral mucus
- Grant number: 23K17033

Grant-in-Aid for JSPS Fellows, Research Fellowship for Young Scientists (DC2)

- Name: **Kota Ishikawa** (OIST)
- Amount: 200,000 JPY/month + 1,000,000 JPY/year
- Period: April 1, 2023 – March 31, 2025
- Funding agency: Japan Society for the Promotion of Science Scholarship
- Title: The effects of flow, turbulence, and prey density on planktivory by anchored garden eels and free, site-attached fish in coral reefs
- Grand number. JP23KJ2133

Outreach Activities

Public Lectures

Kota Ishikawa

- Title: [All about garden eels](#)
- Program: N/A
- Venue: [Science Cafe “RICCA RIKA”](#), Okinawa City, Okinawa
- Date: July 29, 2023

School Visits

Sophie Schoenherr

- Presentation title: The deep-sea: Exploring the unknown
- Venue: Hope International Academy (1-51 Miyagi, Chatan-Cho, Okinawa 904-0113)
- Date: November 2, 2023

Others

Media coverage

TV & Radio

None

Newspapers

None

OIST News

Research Update

- Title: NTT and OIST make first simultaneous atmospheric and marine observations directly beneath Cat 5 typhoon in NW Pacific
- Date: May 23, 2023
- Link to the article: <https://www.oist.jp/news-center/news/2023/5/23/ntt-and-oist-make-first-simultaneous-atmospheric-and-marine-observations-directly-beneath-cat-5>

Others

Canon Foundation news

- Title: From Okinawa! Exploring the "unknown" of the ocean: the mechanism of larval transport in deep-sea habitats
- Date: May 17, 2023
- Link to the article: https://jp.foundation.canon/ga/aid_destination/ad_news_2023_satoshi-mitarai_phd.html

NTT Press release

- Title: NTT and OIST make first simultaneous atmospheric and marine observations directly beneath Cat 5 typhoon in NW Pacific
- Date: May 23, 2023
- Link to the article: <https://group.ntt/en/newsrelease/2023/05/23/230523a.html>

Applications

Fieldwork Applications

Shore sampling and observation (boat/kayak)

- Application ID: FWA-2022-022
- Application: https://eas.oist.jp/field/app_form.php?id=FAP-100658
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- Participant: Satoshi Mitarai, Kazumi Inoha, Heng Wu, Maki Thomas, Otis Brunner, Akinori Murata, Kota Ishikawa
- Note: Submitted on March 9, 2023, Approved on April 11, 2023

Wave Glider observations of surface winds and currents

- Application ID: FWA-2021-017-5

- Application: https://eas.oist.jp/field/app_form.php?id=FAP-100614
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- Participant: Satoshi Mitarai, Akinori Murata
- Note: Submitted on March 9, 2023, Approved on April 11, 2023

Oceanographic research under operational cooperation with the Japan Coast Guard

- Application ID: FWA-2021-027-3
- Application: https://eas.oist.jp/field/app_form.php?id=FAP-100657
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- Participant: Satoshi Mitarai, Akinori Murata
- Note: Submitted on March 9, 2023, Approved on April 11, 2023

Tonan-maru Cruise

- Application ID:
- Application:
- Lead investigator: Satoshi Mitarai
- Onsite leader: Akinori Murata
- Participant: Satoshi Mitarai, Akinori Murata
- Note:

Animal Experiment applications

Physical reaction of garden eels and reef fish using a flume tank

- Application ID: 2019-249-3
- Animal use: garden eels (*Heteroconger hassi*), blue-green chromis (*Chromis viridis*)
- Location: OIST Marine Science Station at Seragaki
- Effective: September 30, 2021 – September 29, 2024
- Note:

Laser Experiment applications

Effect of flows on transparent exopolymer particle release from corals

- Application ID: LWP-2020-005
- Application: https://eas.oist.jp/laser/app_form.php?id=LWP-100171
- Laser class: 4
- Location: OIST Marine Science Station at Seragaki
- Note: Submitted on December 14, 2021, Approved on January 11, 2022