Biometrics, identifications, and isotopic values of larval fish and isotopic values of zooplankton from samples collected on R/V Roger Revelle cruise RR2201 (BLOOFINZ-IO) in Argo Basin region off Northwest Australia from January to March 2022

Website: https://www.bco-dmo.org/dataset/994461
Data Type: Cruise Results
Version: 1
Version Date: 2026-03-11

Project
» Collaborative Research: Mesoscale variability in nitrogen sources and food-web dynamics supporting larval southern bluefin tuna in the eastern Indian Ocean (BLOOFINZ-IO)

Program
» Second International Indian Ocean Expedition (IIOE-2)

Contributors	Affiliation	Role
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Abstract
This dataset contains larval fish biometrics, larval identifications, and isotopic values. Zooplankton data and corresponding isotopic values are also included. Data are from samples collected on cruise RR2201 of R/V Roger Revelle (BLOOFINZ-IO, January-March 2022) in the Argo Basin region off Northwest Australia.

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Coverage

Location: Northwest Australia, Argo Basin
Spatial Extent: **N**:-13.010074 **E**:118.14204 **S**:-17.086491 **W**:113.955534
Temporal Extent: 2022-02-01 - 2022-02-28

Methods & Sampling

Larval tuna were collected in 2022 during BLOOFINZ-IO cruise RR2201 aboard R/V Roger Revelle (Landry et al., 2024). Plankton nets (Bongo-90 with 500-micrometer (µm) mesh) were utilized for ichthyoplankton sampling and the procedure was described in Malca et al., 2025. Larvae were identified at sea utilizing morphological, meristic, and pigmentation characteristics (Nishikawa, 1985; Nishikawa and Rimmer 1987). A subset of tuna larvae were identified and preserved at -80 degrees Celsius (°C) at sea and were processed for morphometrics, genetics, SIA, and aging in the IEO-CSIC laboratories in Malaga, Spain. Shipboard identifications were confirmed using: i) a multiplex PCR to distinguish SBT (*Thunnus maccoyii*) from yellowfin (*T. albacares*), albacore (*T. alalunga*), bigeye (*T. obesus*), and skipjack (*K. pelamis*) tunas (see Malca et al., 2025); ii) mitochondrial cytochrome c oxidase subunit I (COI), and iii) high-resolution melting (HRM) techniques (Malca et al., 2025).

Coupled to the Bongo-90 net system, a Bongo-25 (25-centimeter (cm) diameter) plankton net was fitted with 200 and 55 µm mesh nets to simultaneously target meso- and micro-zooplankton, respectively. A mechanical flowmeter (2030, General Oceanics) was placed in the center of all plankton nets to calculate the volume of water filtered (cubic meters) by each net. Plankton samples from the 200-µm net (hereafter meso-zooplankton) were divided into two aliquots using a Folsom plankton splitter, with half preserved in 95% ethanol and the other half frozen at −80°C. Microzooplankton (samples from 55-µm mesh net) were first poured through a 200-µm mesh sieve to remove larger zooplankton and debris, then filtered onto 55-µm mesh and frozen at −80°C (Laiz-Carrión et al., 2015). Each meso- and micro-zooplankton sample was freeze-dried for 48 hours at −20°C, and weighed to the nearest 1 microgram (µg). Dry weight (DW) biomass values were standardized to milligrams per cubic meter (mg m−3) using the volume filtered by the plankton nets.

Laboratory analysis at the Málaga Oceanographic Center (IEO-CSIC) was conducted by first measuring standard length (SL, mm) with Image J 1.44a software (USA National Institute of Health) and DW (mg, nearest 1 µg) after freeze-drying for 24 hours. Larvae were classified as preflexion and postflexion based on the degree of notochord flexion observed on a digitized and calibrated image of each larva (Kendall et al., 1984). Next, otoliths were removed and age estimations were conducted following the protocols described by Malca et al., 2023. Natural abundances of N (δ15N) and C (δ13C) were measured using an isotope-ratio spectrometer (Thermo-Finnigan Delta-plus) coupled to an elemental analyzer (FlashEA1112, Thermo-Finnigan) at the Instrumental Unit of Analysis of the University of A Coruña. Ratios of 15N/14N and 12C/13C were expressed in conventional delta notation (δ), relative to the international standard, Atmospheric Air (N2), and Pee-Dee Belemnite (PDB), respectively, using acetanilide as standard. The analysis precisions for δ15N and δ13C were 0.11‰ and 0.14‰, respectively, based on the standard deviation of internal references (repeatability of duplicates).

Additional details regarding the survey (RR2201 cruise) can be found in the cruise report found in the link: http://hdl.handle.net/1834/43464.

Data Processing Description

Larval biometrics, stable isotopes values and identifications, along with their associated zooplankton size fractionated biomasses and stable isotopes values were logged in datasheets and uploaded to a central database in excel. Quality control was performed multiple times at each step of the lab data collection process.

BCO-DMO Processing Description

- Imported original file "Inditun_v1.xlsx" (sheet 1) into the BCO-DMO system.
- Renamed fields to comply with BCO-DMO naming conventions.
- Converted Date_Cast from "%Y-%m-%d %H:%M:%S UTC" format to ISO 8601 datetime format "%Y-%m-%dT%H:%M:%SZ".
- Saved the final file as "994461_v1_bloofinz-io_tuna_isotopes_and_biometrics.csv".

Problem Description

At sea, cNODE transpoder (MINI34) was not a reliable depth recorder, therefore live-depth measurements were not possible. The Bongo-90 with black nets was lost due to the kevlar wire breaking; it was replaced by the Neuston net that had a similar mesh size.

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Related Publications

Kendall, A.W.Jr., Ahlstrom, E.H., Moser, H.G., (1984). "Early life history of fishes and their characters: In Ontogeny and Systematics of Fishes: Based on an International Symposium Dedicated to the Memory of Elbert Halvor Ahlstrom : the Symposium was Held August 15-18, 1983, La Jolla, California. (1984). United States: University of Kansas. https://isbnsearch.org/isbn/9789996335662
Methods

Laiz-Carrión, R., Gerard, T., Uriarte, A., Malca, E., Quintanilla, J. M., Muhling, B. A., Alemany, F., Privoznik, S. L., Shiroza, A., Lamkin, J. T., & García, A. (2015). Correction: Trophic Ecology of Atlantic Bluefin Tuna (Thunnusthynnus) Larvae from the Gulf of Mexico and NW Mediterranean Spawning Grounds: A Comparative Stable Isotope Study. PLOS ONE, 10(9), e0138638. https://doi.org/10.1371/journal.pone.0138638
Methods

Malca, E., Quintanilla, J. M., Gerard, T., Alemany, F., Sutton, T., García, A., Lamkin, J. T., & Laiz-Carrión, R. (2023). Differential larval growth strategies and trophodynamics of larval Atlantic bluefin tuna (Thunnus thynnus) from two discrete spawning grounds. Frontiers in Marine Science, 10. https://doi.org/10.3389/fmars.2023.1233249
Methods

Nishikawa, Y., Rimmer, D. W., & CSIRO Marine Laboratories. (1987). Identification of larval tunas, billfishes and other scombroid fishes (Suborder Scombroidei): an illustrated guide. Commonwealth Scientific and Industrial Research Organisation, Marine Research Laboratories. https://isbnsearch.org/isbn/0643042938
Methods

Richards, W. J. (Ed.). (2005). Early Stages of Atlantic Fishes. https://doi.org/10.1201/9780203500217
Methods

Shiroza, A., Malca, E., Lamkin, J. T., Gerard, T., Landry, M. R., Stukel, M. R., Laiz-Carrión, R., & Swalethorp, R. (2021). Active prey selection in developing larvae of Atlantic bluefin tuna (Thunnus thynnus) in spawning grounds of the Gulf of Mexico. Journal of Plankton Research, 44(5), 728–746. https://doi.org/10.1093/plankt/fbab020
Methods

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Related Datasets

IsRelatedTo

Landry, M. R., Kranz, S. A., & Stukel, M. R. (2024). Scientific sampling event log from R/V Roger Revelle cruise RR2201 in the Eastern Indian Ocean (Argo Basin) from January to March 2022 (Version 1) [Data set]. Biological and Chemical Oceanography Data Management Office (BCO-DMO). https://doi.org/10.26008/1912/bco-dmo.943418.1

Malca, E., Die, D. J., Laiz Carrion, R., Jivanjee, A. A., Feltz, A., Carr, M., Lashley, C. L., & Quintanilla, J. M. (2025). Larval fish counts and larval tuna counts with corresponding plankton net type and geographic coordinates from R/V Roger Revelle cruise RR2201 (BLOOFINZ-IO, January-March 2022) in the Argo Basin region off NW Australia (Version 1) [Data set]. Biological and Chemical Oceanography Data Management Office (BCO-DMO). https://doi.org/10.26008/1912/bco-dmo.958726.1

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Parameters

Parameter	Description	Units
Cycle	Cycle (C1, C2, C3, C4) or Transect (T2, T3, T4, T5)	unitless
Latitude	Decimal latitude; negative = South	decimal degrees
Longitude	Decimal longitude; positive = East	decimal degrees
Cast	Cast number sequential for CTD	unitless
Station	Tuna team tow number 001-189 in sequential order	unitless
Date_Cast	Date and time of CTD cast (UTC)	unitless
Preservative	Preservation method (frozen or ethanol)	unitless
Identifier	Individual larval identifier	unitless
Species	Species identification using visual and genetic methods. Southern bluefin tuna (SBT) Thunnus maccoyii, Yellowfin tuna (YFT) Thunnus albacares, Bigeye tuna (BET) Thunnus obesus, Skipjack tuna (SKJ) Katsuwonus pelamis	unitless
Stage	Developmental stage (preflexion, postflexion, egg)	unitless
Length	Standard length	millimeters (mm)
Width	Myotome width	millimeters (mm)
Dry_Weight	Dry weight	milligrams (mg)
Age	days post hatch	number of days
N_pcnt	% N isotope larval value	percent (%)
C_pcnt	% C isotope larval value	percent (%)
d15N	δ15N larval value	per mil (‰)
d13C	δ13C larval value	per mil (‰)

MICRO_BIOMASS	Microzooplankton dry weight	milligrams per cubic meter (mg m3)
MICRO_N	Microzooplakton (55-200 µm) % N value	percent N
MICRO_C	Microzooplakton (55-200 µm) % C value	percent C
MICRO_d15N	Microzooplakton (55-200 µm) δ15N value	per mil (‰)
MICRO_d13C	Microzooplakton (55-200 µm) δ13C value	per mil (‰)
MESO_BIOMASS	Mesozooplankton dry weight mg m3	milligrams per cubic meter (mg m3)
MESO_N	Mesozooplakton (200-2000 µm) % N value	percent N
MESO_C	Mesozooplakton (200-2000 µm) % C value	percent C
MESO_d15N	Mesozooplakton (200-2000 µm) δ15N value	per mil (‰)
MESO_d13C	Mesozooplakton (200-2000 µm) δ13C value	per mil (‰)

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Instruments

Dataset-specific Instrument Name	Bongo-90 and Black Widow (modified Bongo-90 frame)
Generic Instrument Name	Bongo Net
Dataset-specific Description	Three plankton nets were used: Bongo-90 (dual 90-cm diameter bongo frame with 505-µm mesh nets), Black Widow (modified Bongo-90 frame with black nets with 1000 µm mesh), and the neuston was a square single-frame net (1 m2, with 1000-µm mesh). Bongo-90 tows were generally done with a smaller net (Bongo-25, 25 cm diameter mouth; 200 and 50-µm mesh nets with flowmeters) attached above the larger nets to sample zooplankton prey (Shiroza et al. 2021). The Bongo-90 and Bongo-25 had mechanical flowmeters (2030R, General Oceanics Inc.) centered in the middle to measure the amount of water filtered by each net.
Generic Instrument Description	A Bongo Net consists of paired plankton nets, typically with a 60 cm diameter mouth opening and varying mesh sizes, 10 to 1000 micron. The Bongo Frame was designed by the National Marine Fisheries Service for use in the MARMAP program. It consists of two cylindrical collars connected with a yoke so that replicate samples are collected at the same time. Variations in models are designed for either vertical hauls (OI-2500 = NMFS Pairovet-Style, MARMAP Bongo, CalVET) or both oblique and vertical hauls (Aquatic Research). The OI-1200 has an opening and closing mechanism that allows discrete "known-depth" sampling. This model is large enough to filter water at the rate of 47.5 m3/minute when towing at a speed of two knots. More information: Ocean Instruments, Aquatic Research, Sea-Gear

Dataset-specific Instrument Name	Mechanical flowmeters
Generic Instrument Name	Flow Meter
Dataset-specific Description	Three plankton nets were used: Bongo-90 (dual 90-cm diameter bongo frame with 505-µm mesh nets), Black Widow (modified Bongo-90 frame with black nets with 1000 µm mesh), and the neuston was a square single-frame net (1 m2, with 1000-µm mesh). Bongo-90 tows were generally done with a smaller net (Bongo-25, 25 cm diameter mouth; 200 and 50-µm mesh nets with flowmeters) attached above the larger nets to sample zooplankton prey (Shiroza et al. 2021). The Bongo-90 and Bongo-25 had mechanical flowmeters (2030R, General Oceanics Inc.) centered in the middle to measure the amount of water filtered by each net.
Generic Instrument Description	General term for a sensor that quantifies the rate at which fluids (e.g. water or air) pass through sensor packages, instruments, or sampling devices. A flow meter may be mechanical, optical, electromagnetic, etc.

Dataset-specific Instrument Name	Isotope-ratio spectrometer (Thermo-Finnigan Delta-plus)
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Isotopes were recorded using isotope-ratio spectrometer (Thermo-Finnigan Delta-plus) coupled to an elemental analyzer (FlashEA1112, Thermo-Finnigan).
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	Freeze dryer (Telstar LyoAlfa)
Generic Instrument Name	Lyophilizer
Dataset-specific Description	Larval biometric measurements and subsequent sample preparation stable isotopes analyses were conducted using calibrated stereomicroscopes equipped with image-analysis systems (Image J 1.44a software, USA National Institute of Health) and a freeze dryer (Telstar LyoAlfa)and weighed on a microbalance with a precision of 0.01 mg. Genetic identification were performed at Molecular Biology and Genetics Laboratory of the Málaga Oceanographic Center, IEO-CSIC.
Generic Instrument Description	A lyophilizer, also known as freeze dryer or liofilizador, is a device that is used to freeze-dry material.

Dataset-specific Instrument Name	stereomicroscopes
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Larval biometric measurements and subsequent sample preparation stable isotopes analyses were conducted using calibrated stereomicroscopes equipped with image-analysis systems (Image J 1.44a software, USA National Institute of Health) and a freeze dryer (Telstar LyoAlfa)and weighed on a microbalance with a precision of 0.01 mg. Genetic identification were performed at Molecular Biology and Genetics Laboratory of the Málaga Oceanographic Center, IEO-CSIC.
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	Neuston net
Generic Instrument Name	Neuston Net
Dataset-specific Description	Three plankton nets were used: Bongo-90 (dual 90-cm diameter bongo frame with 505-µm mesh nets), Black Widow (modified Bongo-90 frame with black nets with 1000 µm mesh), and the neuston was a square single-frame net (1 m2, with 1000-µm mesh). Bongo-90 tows were generally done with a smaller net (Bongo-25, 25 cm diameter mouth; 200 and 50-µm mesh nets with flowmeters) attached above the larger nets to sample zooplankton prey (Shiroza et al. 2021). The Bongo-90 and Bongo-25 had mechanical flowmeters (2030R, General Oceanics Inc.) centered in the middle to measure the amount of water filtered by each net.
Generic Instrument Description	Neuston Nets are nets that collect zooplankton that live in the top few centimeters of the sea surface (the neuston layer). This specialized net has a rectangular mouth opening usually 2 or 3 times as wide as deep, i.e. 1 meter by 1/2 meter or 60 cm by 20 cm, with sometimes hollow piping construction to aid in flotation. They are generally towed half submerged at 1-2 kts from the side of the vessel on a boom to avoid the ship's wake.

Dataset-specific Instrument Name	microbalance
Generic Instrument Name	scale or balance
Dataset-specific Description	Larval biometric measurements and subsequent sample preparation stable isotopes analyses were conducted using calibrated stereomicroscopes equipped with image-analysis systems (Image J 1.44a software, USA National Institute of Health) and a freeze dryer (Telstar LyoAlfa)and weighed on a microbalance with a precision of 0.01 mg. Genetic identification were performed at Molecular Biology and Genetics Laboratory of the Málaga Oceanographic Center, IEO-CSIC.
Generic Instrument Description	Devices that determine the mass or weight of a sample.

Dataset-specific Instrument Name	FlashEA1112, Thermo-Finnigan
Generic Instrument Name	Thermo Fisher Scientific Flash EA 1112 elemental analyzer
Dataset-specific Description	Isotopes were recorded using isotope-ratio spectrometer (Thermo-Finnigan Delta-plus) coupled to an elemental analyzer (FlashEA1112, Thermo-Finnigan).
Generic Instrument Description	The Thermo Finnigan {Thermo Fisher Scientific} Flash EA 1112 elemental analyzer is a laboratory instrument used to determine total carbon, hydrogen, nitrogen, sulphur, and oxygen in a sample. The sample is completely and instantaneously oxidised by flash combustion, which converts all organic and inorganic substances into combustion products. The resulting combustion gases pass through a reduction furnace and are swept into the chromatographic column by the helium carrier gas. The gases are separated in the column and detected by the thermal conductivity detector, which gives an output signal proportional to the concentration of the individual components of the mixture. The instrument was originally manufactured by Thermo Finnigan, which was acquired by Thermo Electron and later Thermo Scientific (part of Thermo Fisher Scientific).

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Deployments

RR2201

Website	https://www.bco-dmo.org/deployment/916293
Platform	R/V Roger Revelle
Report	http://hdl.handle.net/1834/43464
Start Date	2022-01-20
End Date	2022-03-14
Description	See more information at R2R: https://www.rvdata.us/search/cruise/RR2201

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Project Information

Collaborative Research: Mesoscale variability in nitrogen sources and food-web dynamics supporting larval southern bluefin tuna in the eastern Indian Ocean (BLOOFINZ-IO)

Coverage: Eastern Indian Ocean, Indonesian Throughflow area, and the Gulf of Mexico

NSF Award Abstract:
The small area between NW Australia and Indonesia in the eastern Indian Ocean (IO) is the only known spawning ground of Southern Bluefin Tuna (SBT), a critically endangered top marine predator. Adult SBT migrate thousands of miles each year from high latitude feeding areas to lay their eggs in these tropical waters, where food concentrations on average are below levels that can support optimal feeding and growth of their larvae. Many critical aspects of this habitat are poorly known, such as the main source of nitrogen nutrient that sustains system productivity, how the planktonic food web operates to produce the unusual types of zooplankton prey that tuna larvae prefer, and how environmental differences in habitat quality associated with ocean fronts and eddies might be utilized by adult spawning tuna to give their larvae a greater chance for rapid growth and survival success. This project investigates these questions on a 38-day expedition in early 2021, during the peak time of SBT spawning. This project is a US contribution to the 2nd International Indian Ocean Expedition (IIOE-2) that advances understanding of biogeochemical and ecological dynamics in the poorly studied eastern IO. This is the first detailed study of nitrogen and carbon cycling in the region linking Pacific and IO waters. The shared dietary preferences of SBT larvae with those of other large tuna and billfish species may also make the insights gained broadly applicable to understanding larval recruitment issues for top consumers in other marine ecosystems. New information from the study will enhance international management efforts for SBT. The shared larval dietary preferences of large tuna and billfish species may also extend the insights gained broadly to many other marine top consumers, including Atlantic bluefin tuna that spawn in US waters of the Gulf of Mexico. The end-to-end study approach, highlights connections among physical environmental variability, biogeochemistry, and plankton food webs leading to charismatic and economically valuable fish production, is the theme for developing educational tools and modules through the "scientists-in-the-schools" program of the Center for Ocean-Atmospheric Prediction Studies at Florida State University, through a program for enhancing STEM learning pathways for underrepresented students in Hawaii, and through public outreach products for display at the Birch Aquarium in San Diego. The study also aims to support an immersive field experience to introduce talented high school students to marine research, with the goal of developing a sustainable marine-related educational program for underrepresented students in rural northwestern Florida.

Southern Bluefin Tuna (SBT) migrate long distances from high-latitude feeding grounds to spawn exclusively in a small oligotrophic area of the tropical eastern Indian Ocean (IO) that is rich in mesoscale structures, driven by complex currents and seasonally reversing monsoonal winds. To survive, SBT larvae must feed and grow rapidly under environmental conditions that challenge conventional understanding of food-web structure and functional relationships in poor open-ocean systems. The preferred prey of SBT larvae, cladocerans and Corycaeidae copepods, are poorly studied and have widely different implications for trophic transfer efficiencies to larvae. Differences in nitrogen sources - N fixation vs deep nitrate of Pacific origin - to sustain new production in the region also has implications for conditions that may select for prey types (notably cladocerans) that enhance transfer efficiency and growth rates of SBT larvae. The relative importance of these N sources for the IO ecosystem may affect SBT resiliency to projected increased ocean stratification. This research expedition investigates how mesoscale variability in new production, food-web structure and trophic fluxes affects feeding and growth conditions for SBT larvae. Sampling across mesoscale features tests hypothesized relationships linking variability in SBT larval feeding and prey preferences (gut contents), growth rates (otolith analyses) and trophic positions (TP) to the environmental conditions of waters selected by adult spawners. Trophic Positions of larvae and their prey are determined using Compound-Specific Isotope Analyses of Amino Acids (CSIA-AA). Lagrangian experiments investigate underlying process rates and relationships through measurements of water-column 14C productivity, N2 fixation, 15NO3- uptake and nitrification; community biomass and composition (flow cytometry, pigments, microscopy, in situ imaging, genetic analyses); and trophic fluxes through micro- and mesozooplankton grazing, remineralization and export. Biogeochemical and food web elements of the study are linked by CSIA-AA (N source, TP), 15N-constrained budgets and modeling. The project elements comprise an end-to-end coupled biogeochemistry-trophic study as has not been done previously for any pelagic ecosystem.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Program Information

Second International Indian Ocean Expedition (IIOE-2)

Website: https://web.whoi.edu/iioe2/

Coverage: Indian Ocean

Description from the program website:
The Second International Indian Ocean Expedition (IIOE-2) is a major global scientific program which will engage the international scientific community in collaborative oceanographic and atmospheric research from coastal environments to the deep sea over the period 2015-2020, revealing new information on the Indian Ocean (i.e. its currents, its influence upon the climate, its marine ecosystems) which is fundamental for future sustainable development and expansion of the Indian Ocean's blue economy. A large number of scientists from research institutions from around the Indian Ocean and beyond are planning their involvement in IIOE-2 in accordance with the overarching six scientific themes of the program. Already some large collaborative research projects are under development, and it is anticipated that by the time these projects are underway, many more will be in planning or about to commence as the scope and global engagement in IIOE-2 grows.

Focused research on the Indian Ocean has a number of benefits for all nations. The Indian Ocean is complex and drives the region's climate including extreme events (e.g. cyclones, droughts, severe rains, waves and storm surges). It is the source of important socio-economic resources (e.g. fisheries, oil and gas exploration/extraction, eco-tourism, and food and energy security) and is the background and focus of many of the region's human populations around its margins. Research and observations supported through IIOE-2 will result in an improved understanding of the ocean's physical and biological oceanography, and related air-ocean climate interactions (both in the short-term and long-term). The IIOE-2's program will complement and harmonise with other regional programs underway and collectively the outcomes of IIOE-2 will be of huge benefit to individual and regional sustainable development as the information is a critical component of improved decision making in areas such as maritime services and safety, environmental management, climate monitoring and prediction, food and energy security.

IIOE-2 activities will also include a significant focus on building the capacity of all nations around the Indian Ocean to understand and apply observational data or research outputs for their own socio-economic requirements and decisions. IIOE-2 capacity building programs will therefore be focused on the translation of the science and information outputs for societal benefit and training of relevant individuals from surrounding nations in these areas.

A Steering Committee was established to support U.S. participation in IIOE-2. More information is available on their website at https://web.whoi.edu/iioe2/.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1851395
Ministry of Science, Innovation and Universities (MICINN)	PID2021/122862NB/100 UE-FEDER

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