



DCC-OCC

联合国海洋十年海洋与气候协作中心



United Nations Decade
of Ocean Science
for Sustainable Development



Ocean to climate Seamless
Forecasting system



Hosted by the First Institute of Oceanography
Ministry of Natural Resources, Qingdao, China

The Roles of DCC-OCC and OSF in Accelerating the Implementation of Ocean Decade in Indian Ocean

Dr. GUAN Song
Associate Professor
Senior Program Manager
18 May 2025



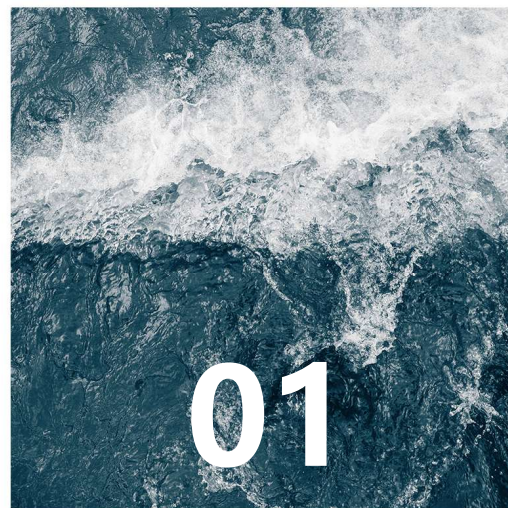
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Twitter: UN DCC-OCC



<http://www.dcc-occ.com>



Brief Introduction

Hosted by FIO, China

DCC-OCC

Endorsed on
8 June, 2022



 **2021-2030** United Nations Decade of Ocean Science for Sustainable Development

 **INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION**
COMMISSION Océanographique Intergouvernementale
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ
اللجنة الدولية الحكومية لعلوم المحيطات
政府间海洋学委员会

UNESCO - 7 Place de Fontenay - 75352 Paris Cedex 07 SP, France
<http://ioc.unesco.org> - contact phone: +33 (0)1 45 68 03 18
E-mail: v.rabinin@unesco.org

Ref. : IOC/VR/22.278/JB/AC/ml

3 June 2022

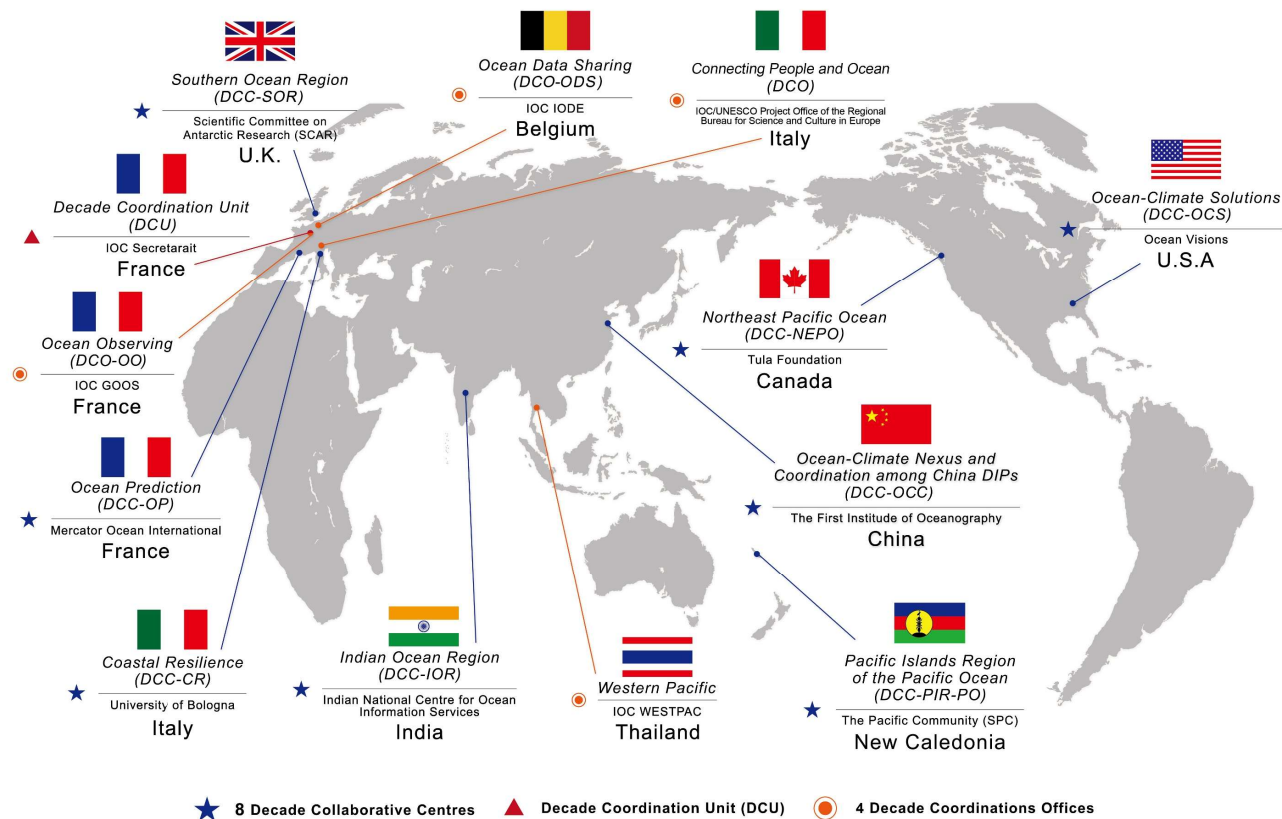
Subject: Endorsement letter of Decade Action No.18.2

Dear Mr. Qiao

It gives me a great pleasure to inform you of the endorsement of the Decade Action entitled "No 18.2. Ocean to climate Seamless Forecasting system", as a programme forming part of the UN Decade of Ocean Science for Sustainable Development 2021-2030. Please accept my sincere congratulations for this achievement. Let me also thank you for your engagement and commitment to the Ocean Decade vision of the science we need for the ocean we want.

OSF Programme

4 DCOs and 8 DCCs across the globe



Decade Coordination Office	
Theme / Region	Hosting UN Entity
Ocean Data Sharing	IODE, IOC-UNESCO
Ocean Observations	GOOS Secretariat
West Pacific	IOC Sub-commission for the West Pacific (supported by Thailand)
Connecting People and Ocean	IOC/UNESCO Project Office of the Regional Bureau for Science and Culture in Europe
Decade Collaborative Centre	
Theme / Region	Hosting State
Ocean-Climate Nexus and Coordination amongst Decade Implementing Partners in P.R. China (DCC-OCC)	China
Ocean-Climate Solutions (DCC-OCS)	U.S.A
Ocean Prediction (DCC-OP)	France
Coastal Resilience (DCC-CR)	Italy
Northeast Pacific Ocean (DCC-NEPO)	Canada
Indian Ocean Region (DCC-IOR)	India
Southern Ocean Region (DCC-SOR)	UK
Pacific Islands Region of the Pacific Ocean (DCC-PIR-RO)	New Caledonia

Challenge 5

Unlock ocean-based solutions to climate change.

Mission

- Understanding of the ocean-climate nexus
- Knowledge and solutions to climate change
- Stakeholders/partnerships
- Best practices/data and products



01 **Coordinating** Decade Programmes

02 Stakeholder **engagement**

03 **Catalyzing** new Decade Actions

04 **Monitoring** and **Reporting**

05 Developing **Capacity**

06 **Communications**, Awareness Raising and Outreach

07 Mobilization of **Resources**

08 **Best Practice** for Modelling Community

09 Coordinating **Decade Implementing Partners** in China

10 Supporting the **China's National Decade Committee**

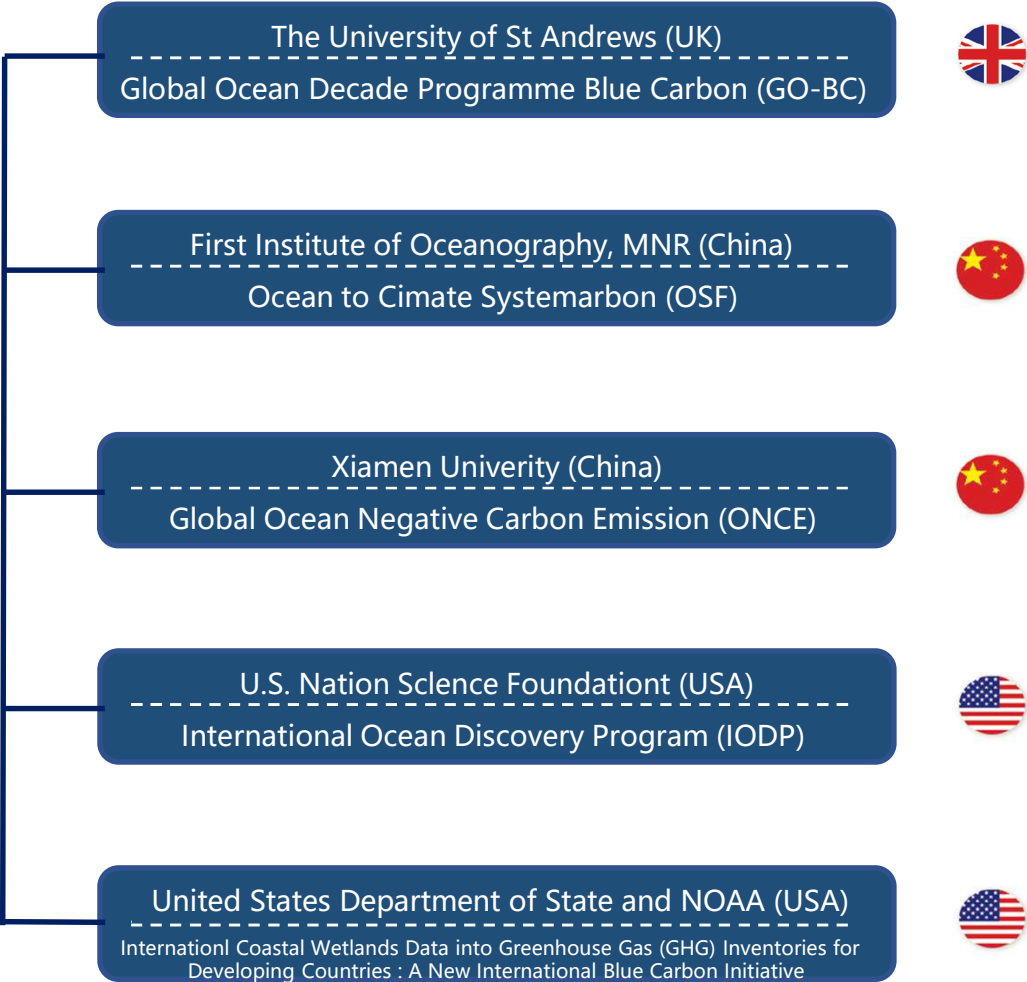
Key Responsibilities

International + Domestic

A platform of supporting, catalyzing, co-designing, advocating

Coordinate Decade Programmes

Responsible for Coordination



Assist in Coordination



Coordinate Decade Implementing Partners



中国21世纪议程管理中心

The Administrative Center for China's Agenda 21

The Administrative Center for China's Agenda 21 (ACCA21)

中国21世纪议程管理中心



北京大学

PEKING UNIVERSITY

Peking University (PKU)

北京大学



国家海洋信息中心

National Marine Data and Information Service

National Marine Data and Information Service (NMDIS)

国家海洋信息中心



南方科技大学

SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

Southern University of Science and Technology (SUSTech) and the Preparing Shenzhen Ocean University (SOU)

南方科技大学/深圳海洋大学（筹建）



National Institute of Oceanography & Fisheries

المعهد القومى لعلوم البحار والمصايد

National Institute of Oceanography and Fisheries (NIOF)

埃及国家海洋学与渔业研究所



“海洋十年”国际合作中心

OCEAN DECADE COOPERATION CENTER

Ocean Decade Cooperation Center of China (ODCC)

“海洋十年” 国际合作中心

The Ocean We Want



Challenge 5

Unlock ocean-based solutions to climate change



Challenge 6

Increase community resilience to ocean hazards



Challenge 7

Expand the Global Ocean Observing System



A predicted ocean

where society understands and can respond to changing ocean conditions.





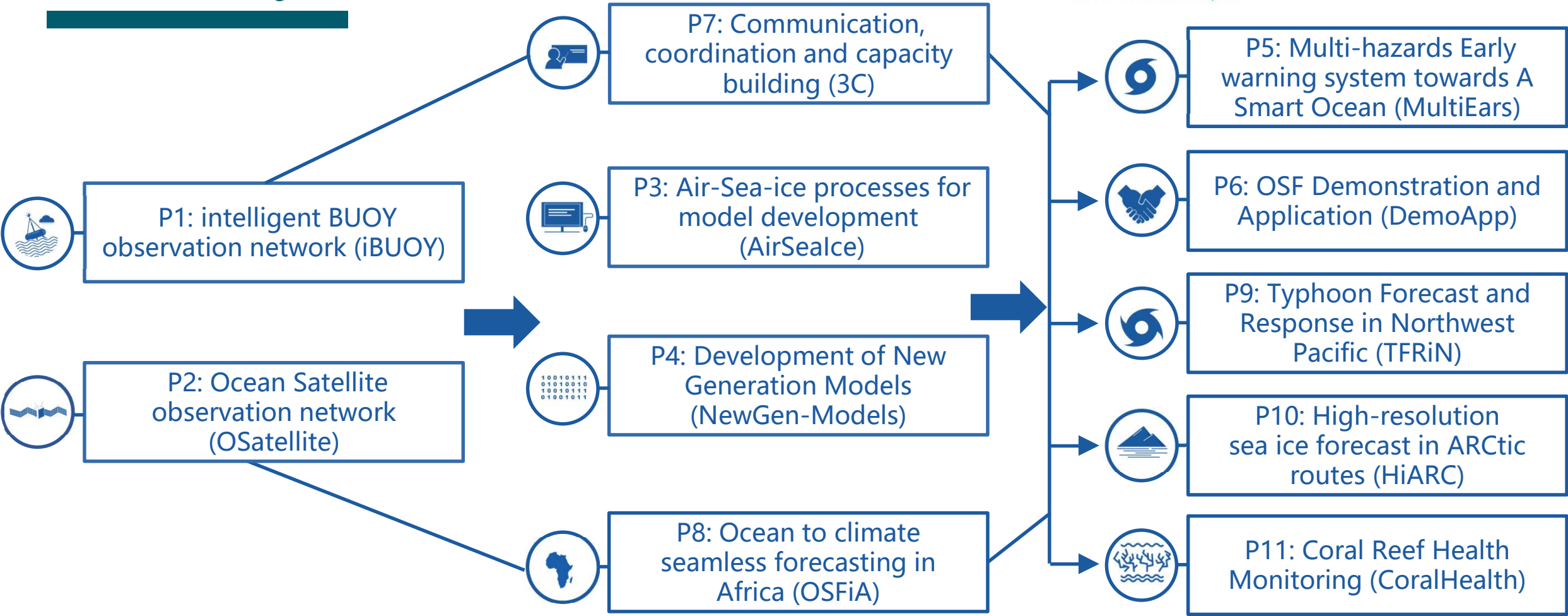
Vision

To advance ocean-climate nexus understanding
To provide high-quality seamless prediction

Objective

A system that will provide ocean-climate seamless forecasting in a timescale from hours to years and in a spatial scale from kilometers to global.

OSF 11 Projects



Leading with ocean and climate seamless forecasting science

Needs-oriented, filling important geographical and thematic gaps

Extensive partnership network, with increasing influence

Expansion of Global Partnership Network



25 countries

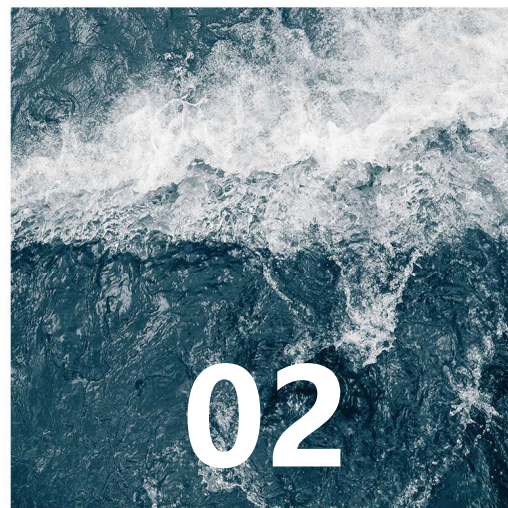
34 institutions

3 international organizations

52 countries

78 partners

5 international organizations

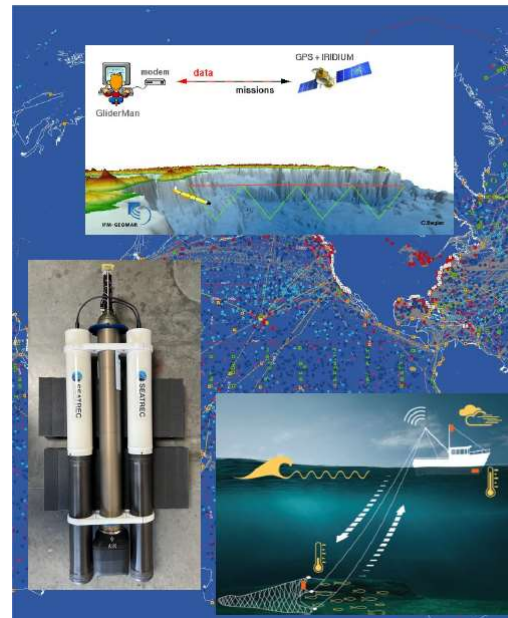


Regional Collaboration

Regional Collaboration---Africa

Agulhas Current Observing System Design Workshop

- DCC-OCC/GOOS/OOPC/SAEON/WCRP/NOAA
- Cape Town, South African; Sep. 9-13, 2024
- Travelling Support for 6 young scholars (Tanzania, Indonesia, Madagascar, China)
- GOOS Co-design exemplar-boundary current





Agulhas Current Observing System Design Workshop

September 9 - 12, 2024
President Hotel, Cape Town, South Africa

WHAT?
The purpose of this workshop is to understand **priority gap areas**, develop observational **requirements** and a **draft design** of an ocean observing system to better understand key features in the Agulhas Current region that influence critical areas e.g., **Tropical Cyclones, Marine Life and Marine Heatwaves**.

WHO?
We highly encourage experts from the **intermediary*** stakeholder community to participate in this workshop including ocean and atmospheric observationalists, modelers and operational forecasters.

***INTERMEDIARY USERS** are intermediaries to the End Users, entities that integrate the ocean observing data into forecasts, assessments, or other products and services for delivery of information products and services to the end users.

Pre-register - [here](#)
*Please note that due to limited space, only participants receiving confirmation of attendance will be able to attend in person. Confirmations will be sent out by July 5th.

Student & ECOP Travel Support Request - [here](#)

Deadline: July 5th

MORE INFORMATION
For questions, please contact: t.morris@sacon.nrl.ac.za and ann-christine.zinkann@noaa.gov

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www.atlantos-ocean.org | www.gooscean.org

 **Ocean Observing Co-Design**
by The Global Ocean Observing System



Agulhas Current Observing System Design Workshop

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www.atlantos-ocean.org | www.gooscean.org

 **Ocean Observing Co-Design**
by The Global Ocean Observing System

Regional Collaboration---*Indian Ocean*

International Workshop on Blue Disaster Prevention and Mitigation

- DCC-OCC/ELSEVIER/FIO; Qingdao, China/24 Oct. 2024
- Madagascar, Maldives, Kenya, Indonesia, Sri Lanka, and Malaysia
- "Ocean and Climate Early wArNing Universal System (OCEANUS)" Early Warning Universal System
- The consensus on a new mechanism of blue disaster prevention and mitigation



Regional Collaboration---*Southeast Asia*

8th China-Southeast Asian Countries Marine Cooperation Forum

---*Promoting UN Ocean Decade through Regional Cooperation*

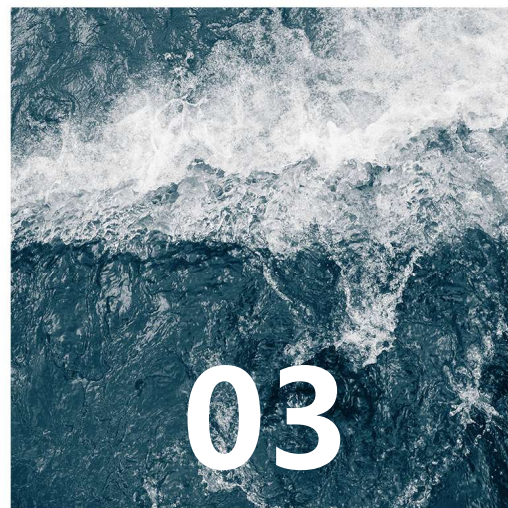
- DCC-OCC/SEE/FIO
- Jakarta, Indonesia/28 Nov. 2024
- Indigenous and local knowledge

Indigenous and local knowledge:

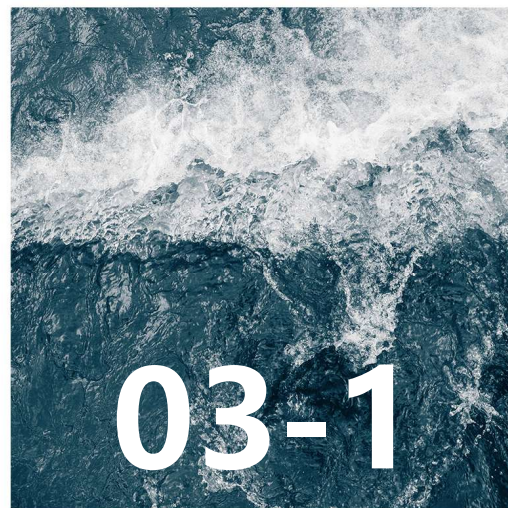
--- SEE (Blue Partnership Action Fund) + IPB University + Pesisir Lestari

--- East of Indonesia





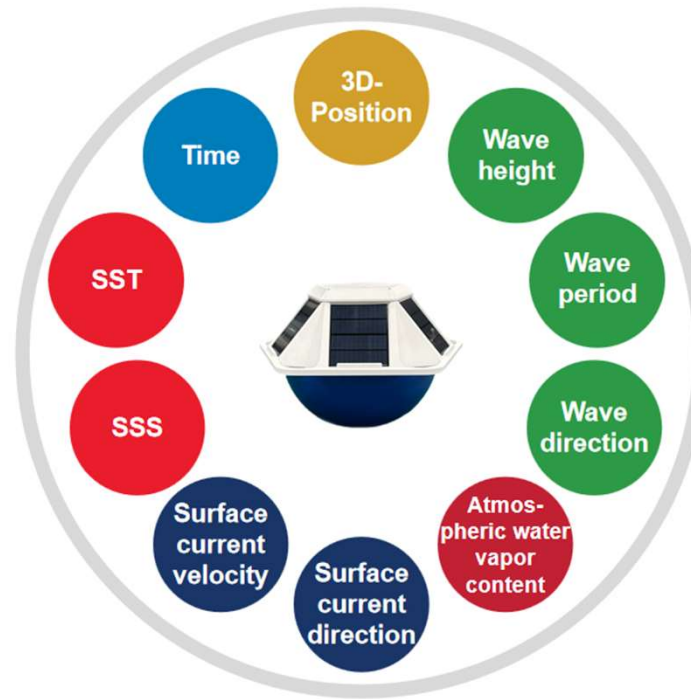
Public Goods and Services



Observation

Best Practice Recommendations

~4%
of the cost of
prevailing wave
buoys



New Generation Low-cost GNSS drifting Buoy

Launching Ceremony at the DCC-OCC International Launching Conference

2. Launch of New Generation Ocean Observation Satellites



New generation ocean color satellite
on 16 November, 2023 in China

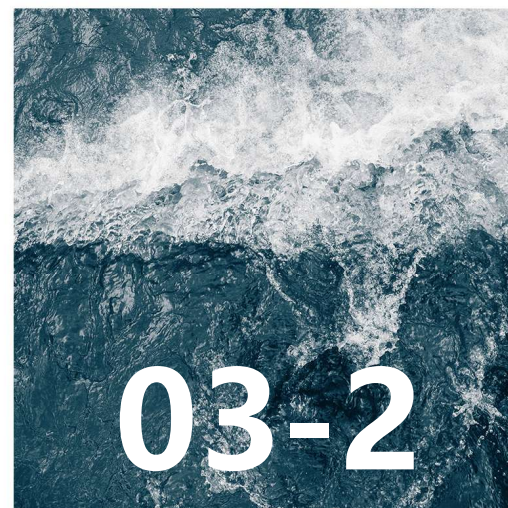


New satellite for ocean salinity detection
on 14 November, 2024 in China



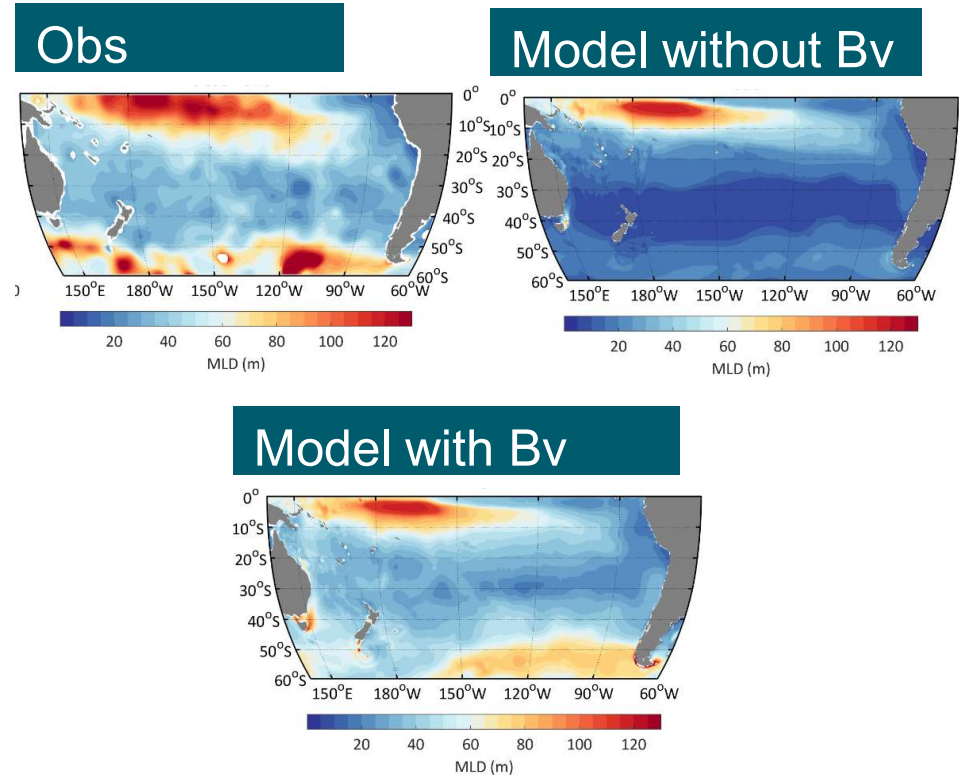
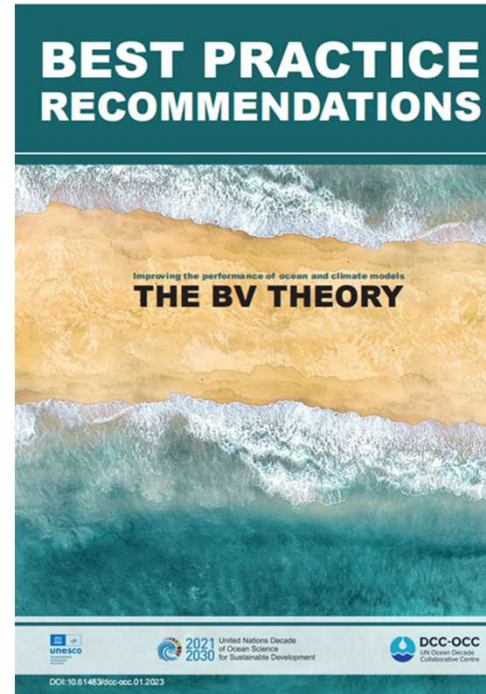
High-precision and resolution.





Model

Best Practice Recommendations



$$B_V = \alpha \iint_{\vec{k}} E(\vec{k}) \exp(2kz) d\vec{k} \frac{\partial}{\partial z} \left[\iint_{\vec{k}} \omega^2 E(\vec{k}) \exp(2kz) d\vec{k} \right]^{\frac{1}{2}}$$

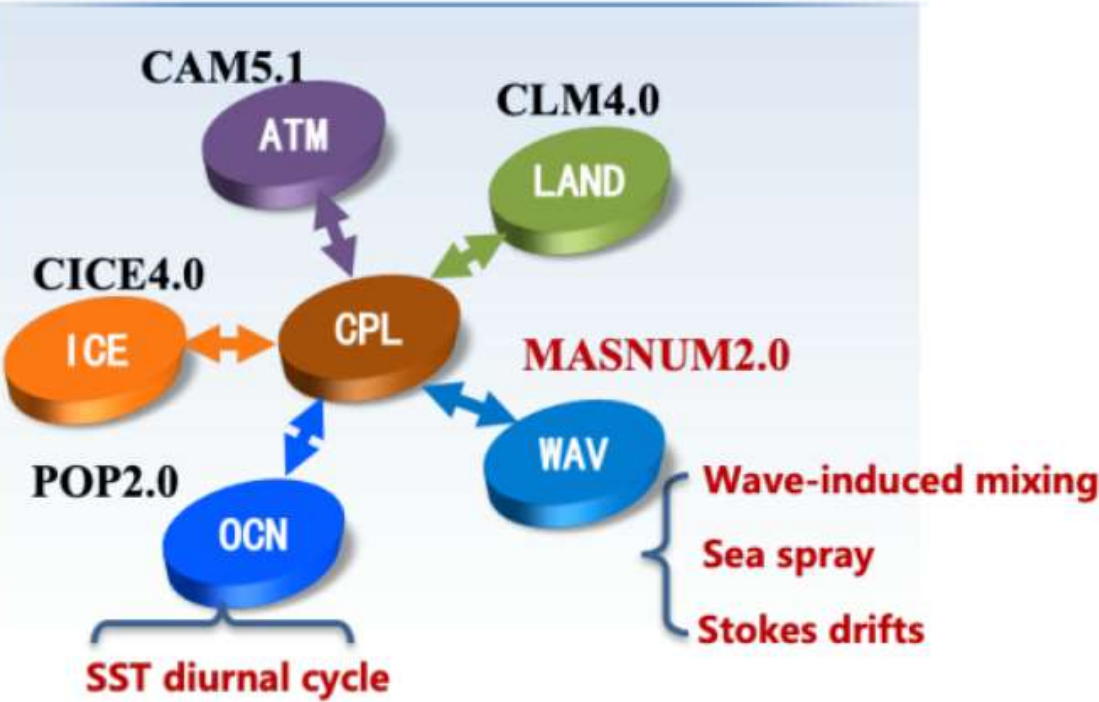
Issue I Bv Theory

Launching Ceremony at the DCC-OCC International Launching Conference

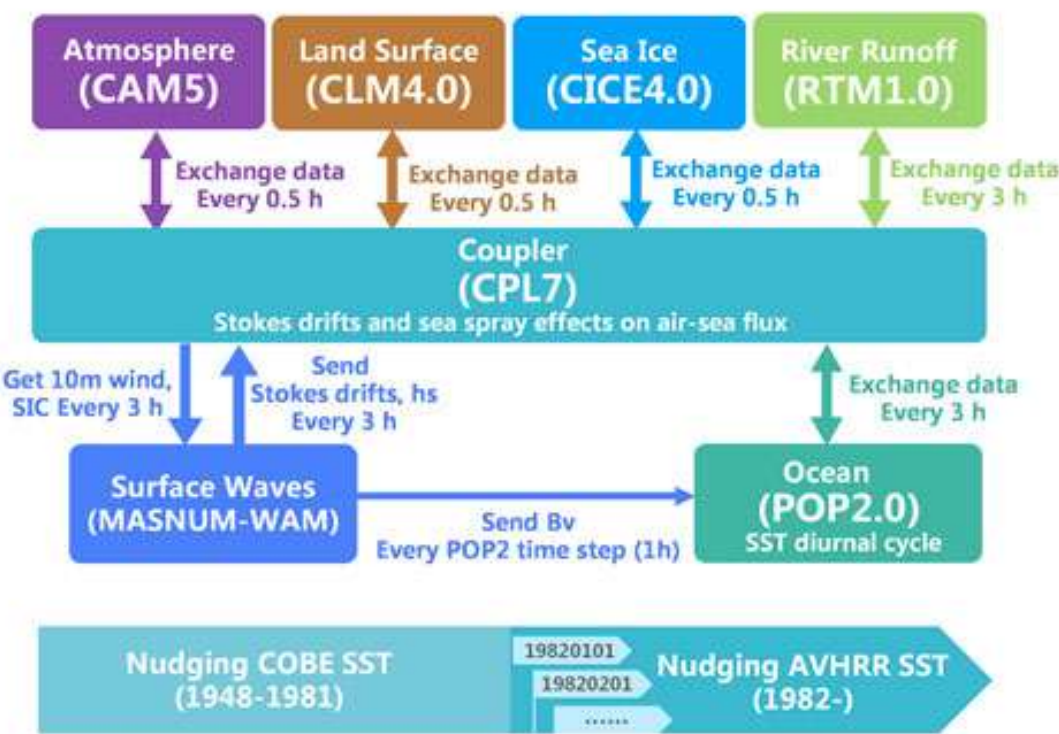
4. FIO-ESM v2.0: FIO-CPS



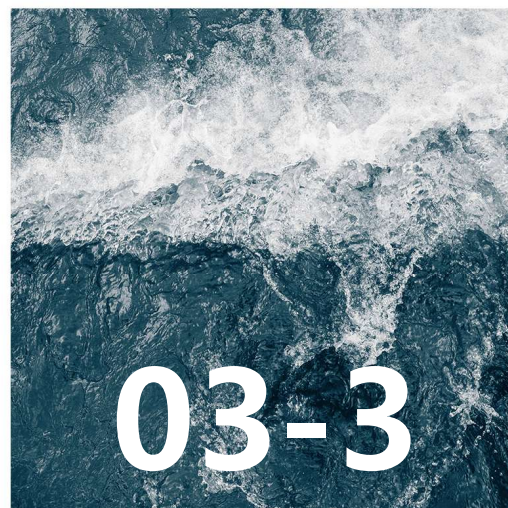
FIO-ESM v2.0



FIO-CPS v2.0



Short-term climate prediction in the coming 13 months.




Forecasting

5. FIO-COM32: FIO-OFS

Accurate forecasts for the S&R on 5 July 2018 in Thailand

Accurate forecasts for the S&R on 22 September 2022 in Cambodia



No. 0403/ C 16Δ0

Marine and Coastal Resources Research and Development Institute
120 Moo 3, Rathaprasasunabhaikul Bldg.
6th Floor, Chang Wattana Road
Thung Song Hong, Lak Si, Bangkok
10210 Thailand
Tel : 66(2) 1411383
FAX : 66(2) 1439260

July B.E. 2562 (2019)

Dear Dr. Fangli Qiao,

Subject: Achievement of Ocean Forecasting System on DMCR missions.

Since 2015, the Ocean Forecast System (OFS) has been developed under collaboration between the First Institute of Oceanography (FIO), Ministry of Natural Resources, China, and Marine and Coastal Resources Research and Development Institute (MCRRI), Department of Marine and Coastal Resources (DMCR), Ministry of Natural Resources and Environment, Thailand. The OFS has constantly provided forecasting on state of the ocean, in particular encompassing the Thai waters and adjacent areas. As Director of MCRRI, I hereby stress that the OFS is a great supportive tool to DMCR missions not only in the view of research but also in the missions of other relevant governmental agencies in Thailand. The recent cases are exemplified as shown below.

In terms of search and rescue, the case of ship accident on 5th July 2018, where 47 Chinese tourists were lost at sea off southern Phuket Island, the OFS was found indeed crucial for the search and rescue mission, namely by accelerating the areas identification, finding survivors, and recovering the bodies. With support from the FIO and DMCR, the forecasted drifting path basing on the OFS products were daily sent to the rescue team. A total of 6 forecasting reports were provided during the mission, and it was clearly demonstrated its essential for the success in real search and rescue practice. Such system is strongly encouraged to be continued to promote cooperation among governmental agencies and also with international organization in emergency case.

The other evidence on the benefit of using OFS is for management response to environmental changes. In April 2019, piling corals as being triggered by persistence of warm water were reported both in the Gulf of Thailand and the Andaman Sea. Monitoring of sea surface temperature (SST) data is necessary in the assessment of bleaching extent and situation. While in situ observations of SST which is still very restricted basing on the limited number of monitoring stations, the OFS products provided sufficient prediction and assessment of the SST outlook which can help support the coral bleaching response plan under the DMCR mission.

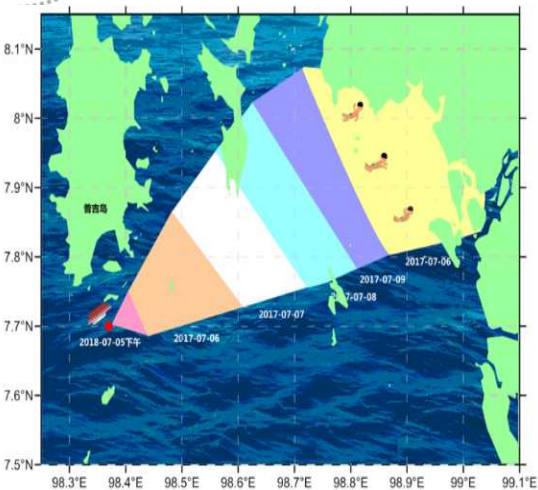
Recent concern...


FIO-OFS

FIO-COM

Nuclear Pollution Simulation/Prediction System

Coral Reef Bleaching Early Warning System





KINGDOM OF CAMBODIA
Nation Religion King

General Directorate of Natural Protected Area
Department of Coastal Zone and Marine Conservation
N°.....DCZMC.GDNPA.MoE

Phnom Penh, 11 October, 2022

Prof. Fangli Qiao
Deputy Director General
First Institute of Oceanography (FIO)
Ministry of Natural Resources, China

Acknowledgement Letter Case of Providing Accurate Forecasting in Search and Rescue

Dear Professor Fangli Qiao,

The Department of Coastal Zone and Marine Conservation (DCZMC), Ministry of Environment (MoE), Cambodia would like to sincerely thank the First Institute of Oceanography (FIO) for accurately, timely and professionally providing the forecasting support during the search and rescue in the shipwreck accident in Cambodia happened on 22 September, 2022.

A fishing boat sank near Koh Tang, Koh Rong City, Preahsihanouk province of Cambodia on September 22, 2022. Eighteen of the total 41 person on board were rescued immediately, while 23 others fell into the sea and disappeared. Cambodia government actively carried out search and rescue at the first time. In order to greatly improve the efficiency and pertinence of the search and rescue, it is urgent to forecast the drift path of the lost in the ocean and the marine environment.

With the close cooperation and joint efforts of FIO and DCZMC, your forecasted drifting path and environmental parameters of wind, surface wave and surface current based on the Southeast Asia Ocean Environment Forecast and Disaster Early Warning System (OFS) were daily sent to the rescue team during 23 and 29 September. The 7 reports clearly demonstrated their essential for the success of this search and rescue practice through identifying the search areas, finding survivors, and recovering the bodies. All the find are in the narrow forecasting sector which indicates the accuracy of the OFS forecast system.


Under the support of Ministry of Natural Resources of China and Ministry of Environment of Cambodia, DCZMC has been actively involving in the OFS through close cooperation with FIO since 2016. The great value of our cooperation on OFS is clearly demonstrated through, but not limited to, this search and rescue event.

Morodok Tectro Building 2nd (Lot 503) Tonle Bassac, Chamkerng, Phnom Penh, Cambodia, Phone: (855)23 235 032 E-mail: panromarine@gmail.com

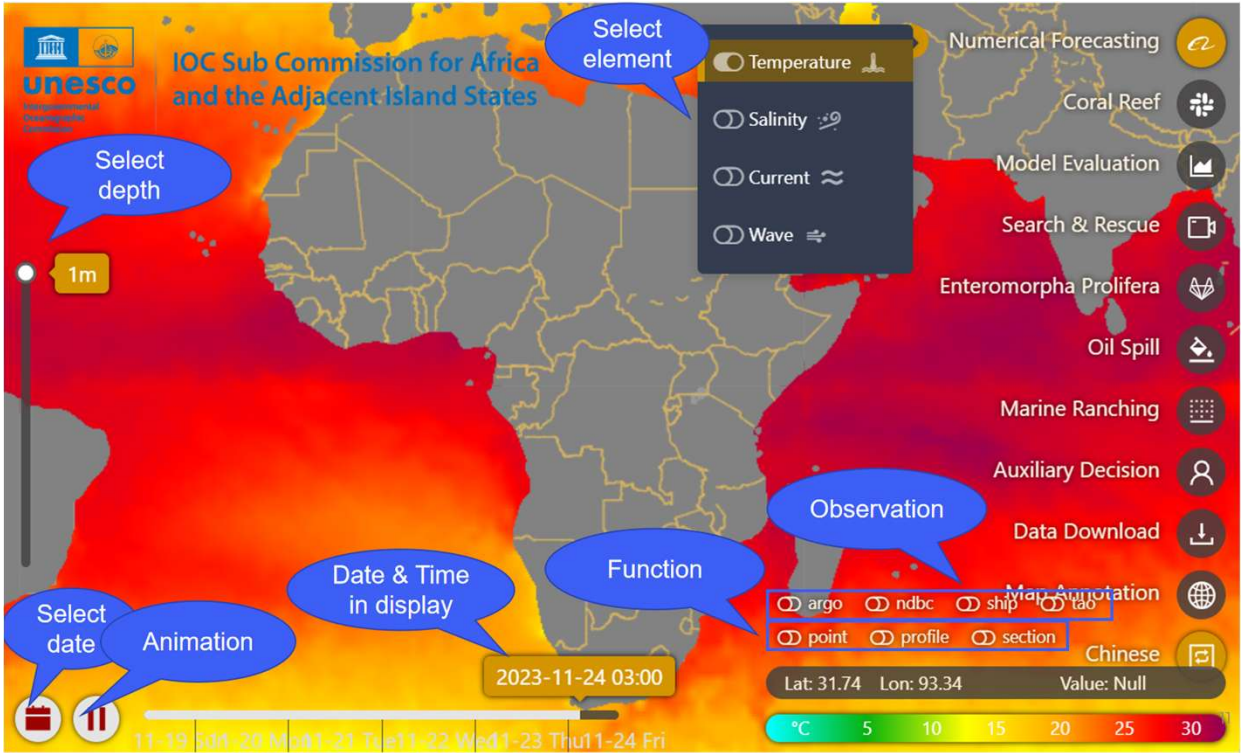
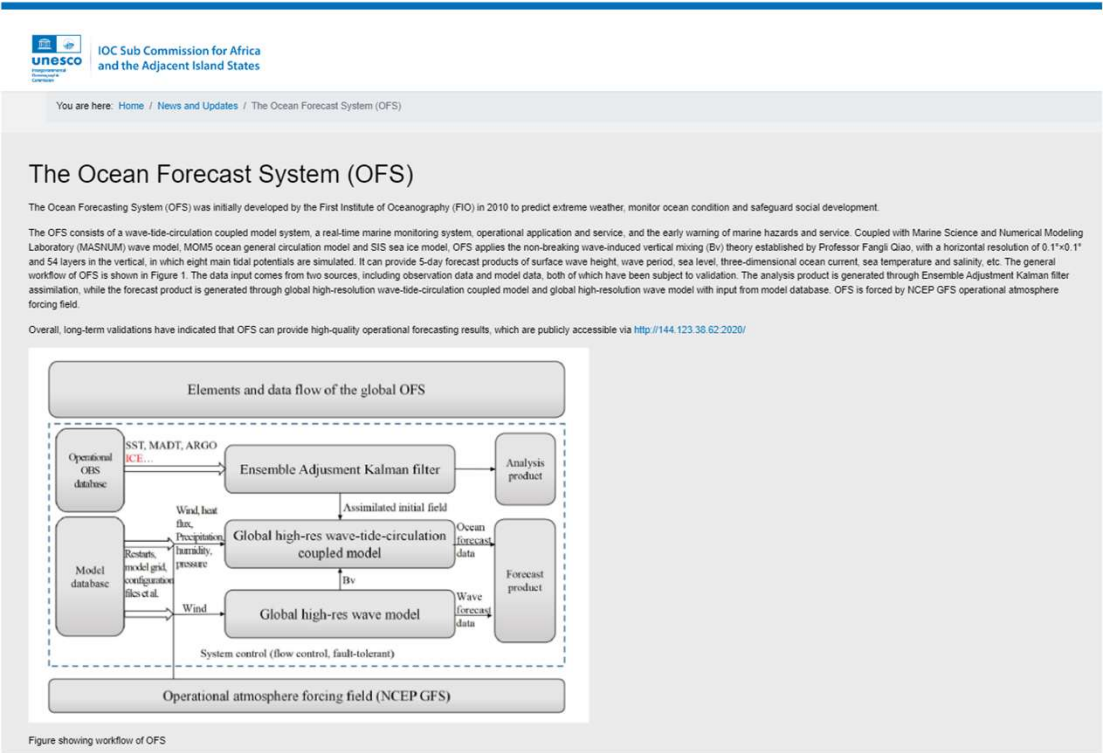
We look forward to operationally run this OFS in Cambodia to further benefit our people and our ocean management, and take part in your programme of the Ocean to climate Seamless Forecasting system (OSF) approved by the UN Decade of Ocean Science for Sustainable Development (2021-2030).

We highly appreciate the continuous support from you.

Best Regards


Meas Rithy
Deputy Director

5. FIO-OFS: Transplantation to IOCAFRICA



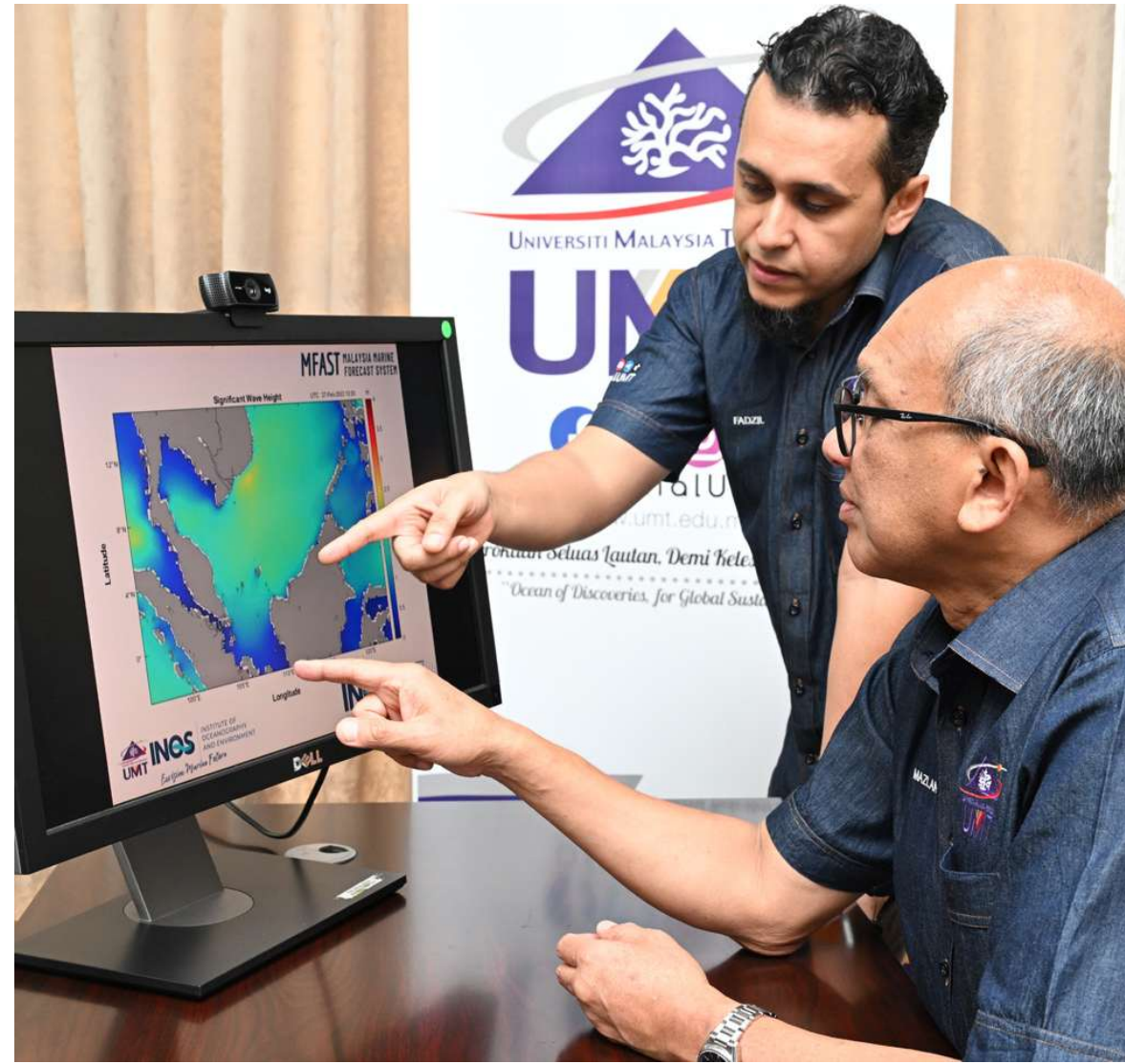
FIO-OFS was ported successfully onto the website of IOC Sub Commission for Africa and the Adjacent Island States (IOCAFRICA)

5. FIO-OFS: National Operational Forecasting System in Malaysia



MFAST based on FIO-OFS

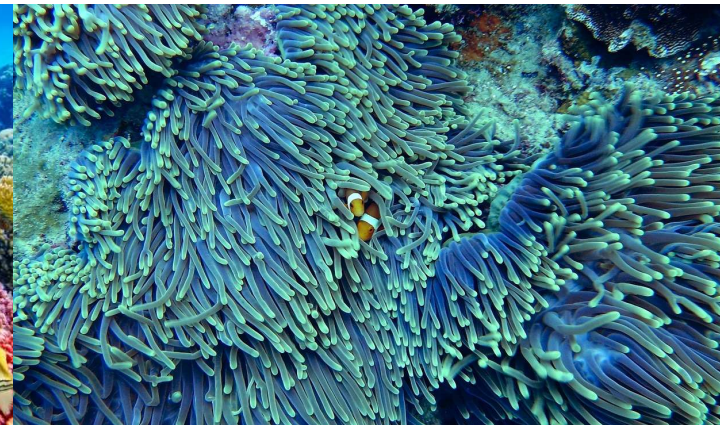
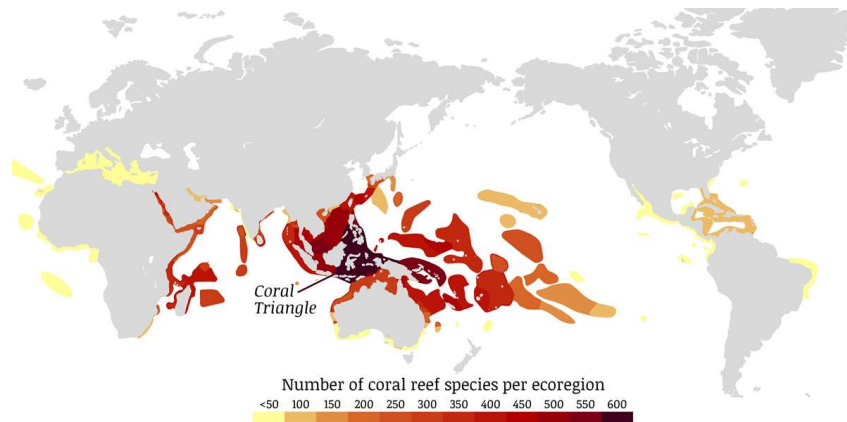
- Led by Professor Mohd Fadzil Mohd Akhir, Co-PI of Project 5: Multi-hazards Early warning system towards A Smart Ocean (MultiEars), the Malaysia Marine Forecast System (MFAST) based on FIO-OFS was successfully developed;
- As the national operational forecasting system, MFAST provides 5-day prediction results of ocean currents, wave heights, and surface temperatures in the region

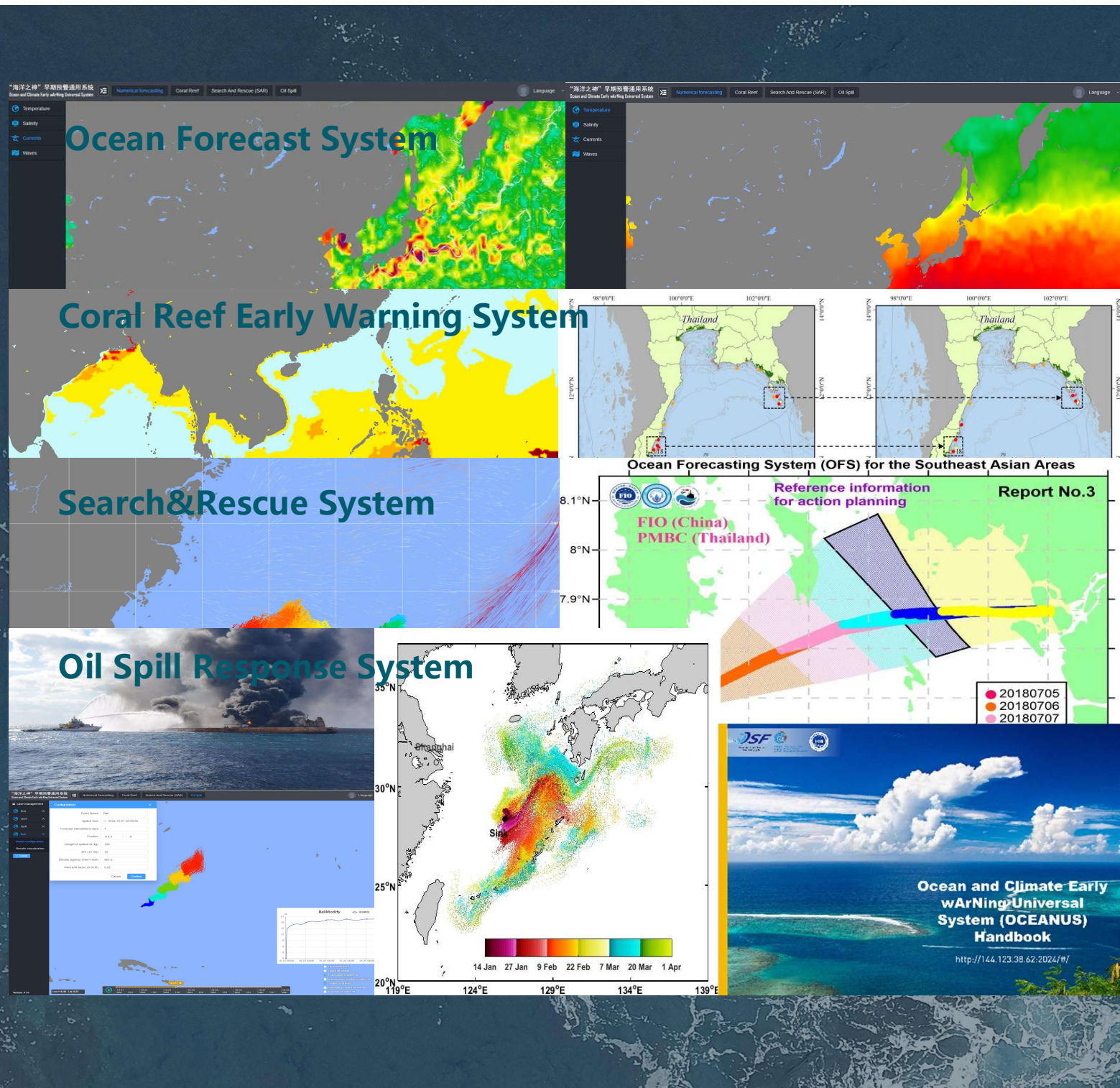


5. FIO-COM32: Coral Reef Bleaching Early Warning System



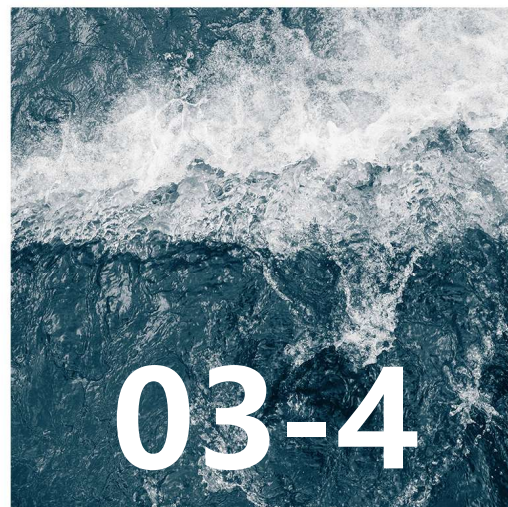
Coral reefs are among the most diverse ecosystems on Earth, and they provide important ecological, economic and social benefits. Studies have shown that abnormally high ocean temperatures are the main cause of coral reef bleaching. Years of dead coral reefs have been found to correspond to historically hot years, based on precise measurements of dead large coral reefs.





Ocean and Climate Early wArNing Universal System (OCEANUS) V1.0





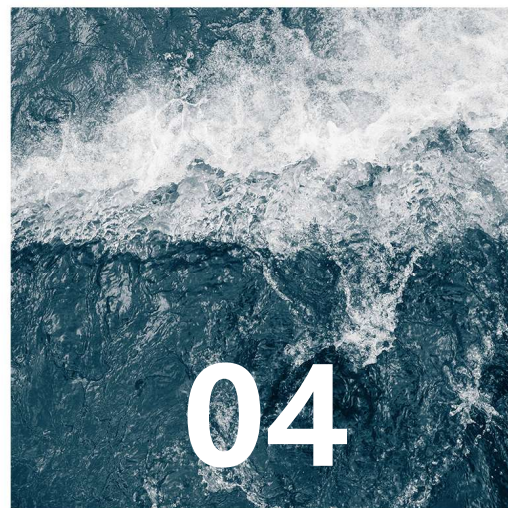
Ocean Management Toolkit



Coastal City Toolkit on Ocean-based Solutions for Climate Change (CCTS)

Marine Disasters Prevention and Mitigation	Maritime Navigation Safety	Coastal Ecosystem Health	Integrated Coastal Zone Management	Blue Economy Support	Ocean Literacy
OCEANUS early warning system	Maritime Silk Road forecasting	Coral reef bleaching monitoring and forecasting	ICM Code	Ocean renewable energy development	Ocean Literacy Alliance for Primary and Middle Schools
Typhoon forecasting	Arctic shipping risk assessment	Pollution tracing and trajectory prediction	MPA planning	Blue carbon storage estimation	Marine Museums Alliance
Climate heat wave and drought/flood	Optimal marine path planning	Marine aquaculture environment assessment	Estuaries pollution	Assessment of climate effects of emission reduction	Marine knowledge outreach
Marine search and rescue; oil spill tracking	Customized forecasting support	Marine endangered species protection	Island Management	Ocean tourism index	Best practice on human-ocean harmony

Data Support **State-of-the-art Model** Capacity Building



Ocean Literacy

Ocean Literacy---Exhibitions



DCC-OCC National Maritime Museum of China Barcelona Maritime Museum



IOC-UNESCO
PRADA
DCC-OCC

Qingdao, China
Oct. 2023



Opening Ceremony



Exhibition

To celebrate this exhibition, a global drawing competition was held for primary and secondary students, receiving enthusiastic responses worldwide. The DCC-OCC selected ten outstanding pieces to be featured on limited-edition canvas bags as commemorative gifts.



commemorative gifts



Barcelona, Spain/9 – 26 April, 2024

Ocean Literacy--- *Ocean Decade on Campus*

1st Session (11/1/2024)

- East China Normal University
- Lectures + Roundtable



2024.1 Shanghai

2nd Session (8/6/2024)

- Sun Yat-Sen University
- Ocean Decade on Campus Alliance (71 members)



2024.6 Zhuhai

3rd Session (12 and 15/7/2024)

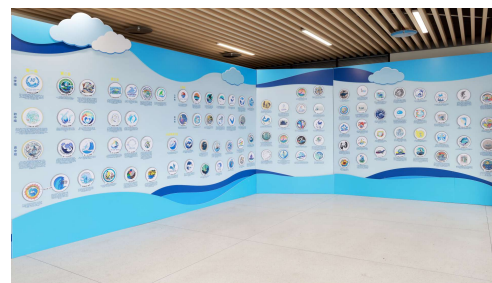
- Elsevier/ODC
- Webinars (over 13000)



2024.7 Online

4th Session (2-6/1/2025)

- SUSTech
- Exhibition of LOGO Designing Competition



2025.1 Shenzhen

“海洋十年”进校园

2024年1月11日 14:00-17:00
华东师范大学闵行校区 河口海岸大楼B101

主办单位：联合国“海洋十年”海洋与气候协作中心
华东师范大学河口海岸学国家重点实验室
自然资源部第一海洋研究所



张占海 研究员

自然资源部原总工程师，现任中国大洋矿产资源研究开发协会理事长，首批“新世纪百千万人才工程”国家级人选，2022年联合国海洋大会中国政府特使。

报告题目：海洋科学变革与全球海洋治理

联合国海洋科学促进可持续发展十年（2021-2030）是本世纪联合国发起的最重要的海洋倡议，旨在未来十年掀起全球范围内的“真正海洋科学革命”。“变革”这一理念是“海洋十年”的核心，其突出特点是将海洋科学与全球治理深度结合，推动形成变革性的科学解决方案和全球海洋治理的政策工具，以促进海洋及其资源的可持续利用，加强人类与海洋的联结。讲座将介绍“海洋十年”的愿景、目标、挑战、行动和最新进展，全球海洋治理关注的重大问题，海洋科学与全球海洋治理的关系，并探讨我们如何参与和应对。



于卫东 教授/博导

中山大学大气科学学院副院长、海洋科学考察中心主任、海洋物理与气候观测工作组（OOPC）联合主席。主要开展热带海洋-大气相互作用观测研究，推动了印度洋海洋观测系统（IndOOS）、第二次国际印度洋科学考察（IIOE-2）规划与发展。

报告题目：遥远印度洋如何影响我国季风性气候——以长江流域梅雨为例

我国是典型季风性气候，降水主要集中在夏季，夏季降水的主要水汽来自遥远的印度洋。欧亚早期贸易海上航线开辟、郑和下西洋等无不借助这支从热带印度洋吹向东亚地区的亚洲季风西南气流。因此，印度洋并不遥远，认识和观测印度洋影响到我们日常生活与可持续发展。

圆桌论坛：联合国海洋十年 赋能青年研究员

Interactive Roundtable: Empowering Early-Career Researchers (ECRs) in the UN Ocean Decade



主持人
方潇雨



Wulantari



Milki Debi



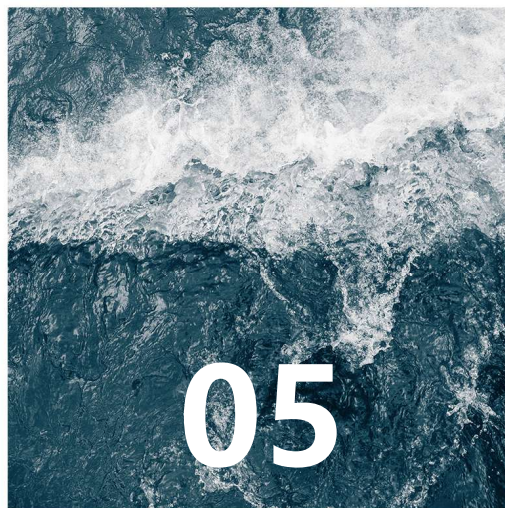
Md. Jaker Hossain



赵宁



冯志轩



Collaboration of China's Ocean Decade Actions

Annual Ocean Decade Conferences of China

- 1st: Dec 12, 2022, FIO, Qingdao
- 2nd: Jan 12-13, 2024, East China Normal University, Shanghai
- 3rd: Jan 2-3, 2025, Southern University of Science and Technology, Shenzhen



2022.12 Qingdao



2024.1 Shanghai



2024.1 Shanghai



2025.1 Shenzhen

Thanks



DCC-OCC
Decade Collaborative Center on Ocean-Climate
Nexus and Coordination Amongst Decade
Implementing Partners in P.R. China



**2021
2030** United Nations Decade
of Ocean Science
for Sustainable Development