



UN 46: Collaborations for Northwest Pacific Marine Ecosystem Prediction (COSMEC, 2025-2030)

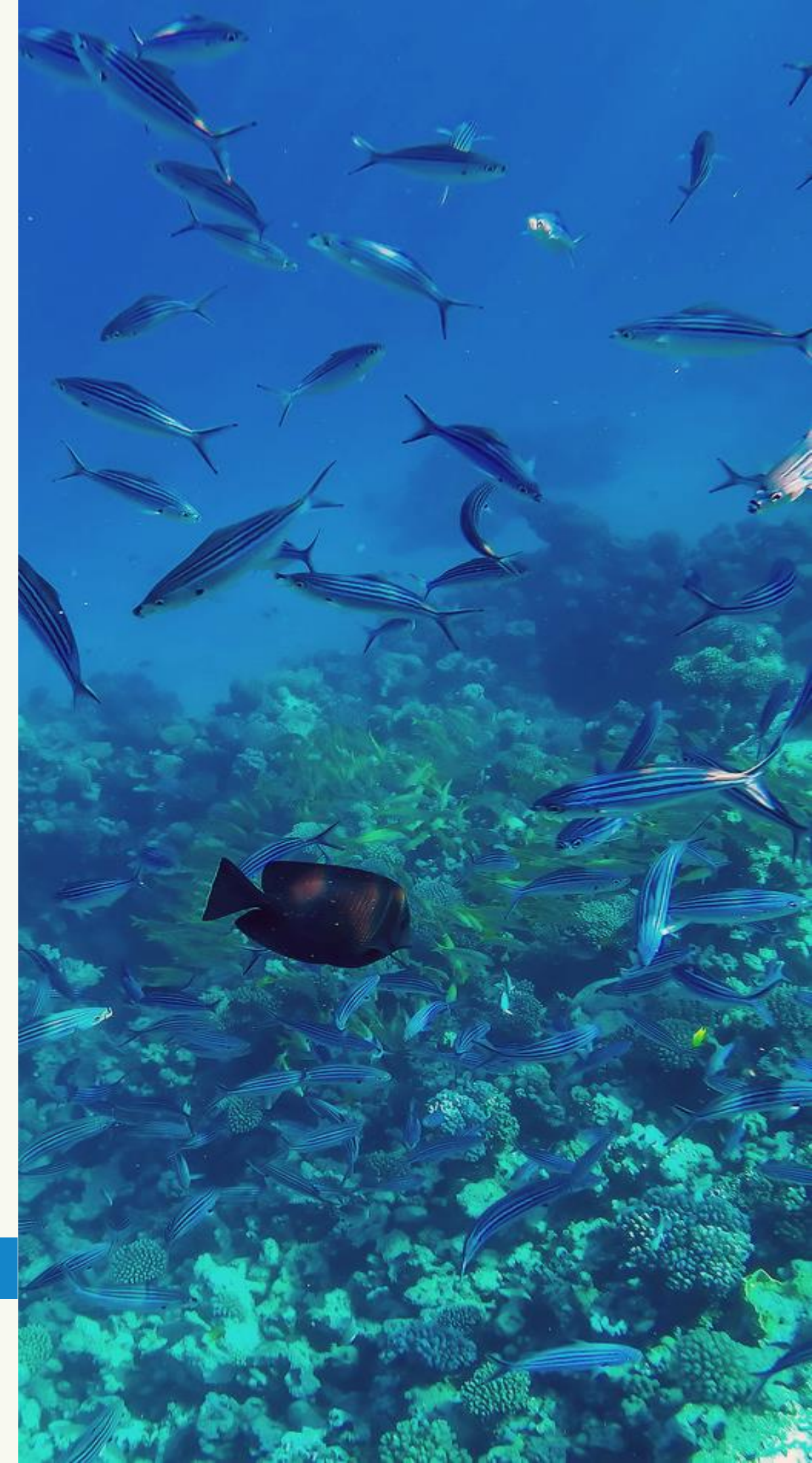
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WPI-AIMEC, Tohoku University and JAMSTEC

Sixteenth Intergovernmental Session of the
IOC Sub-Commission for the Western Pacific (WESTPAC-XVI)
Hangzhou, China, 10-12 November 2026

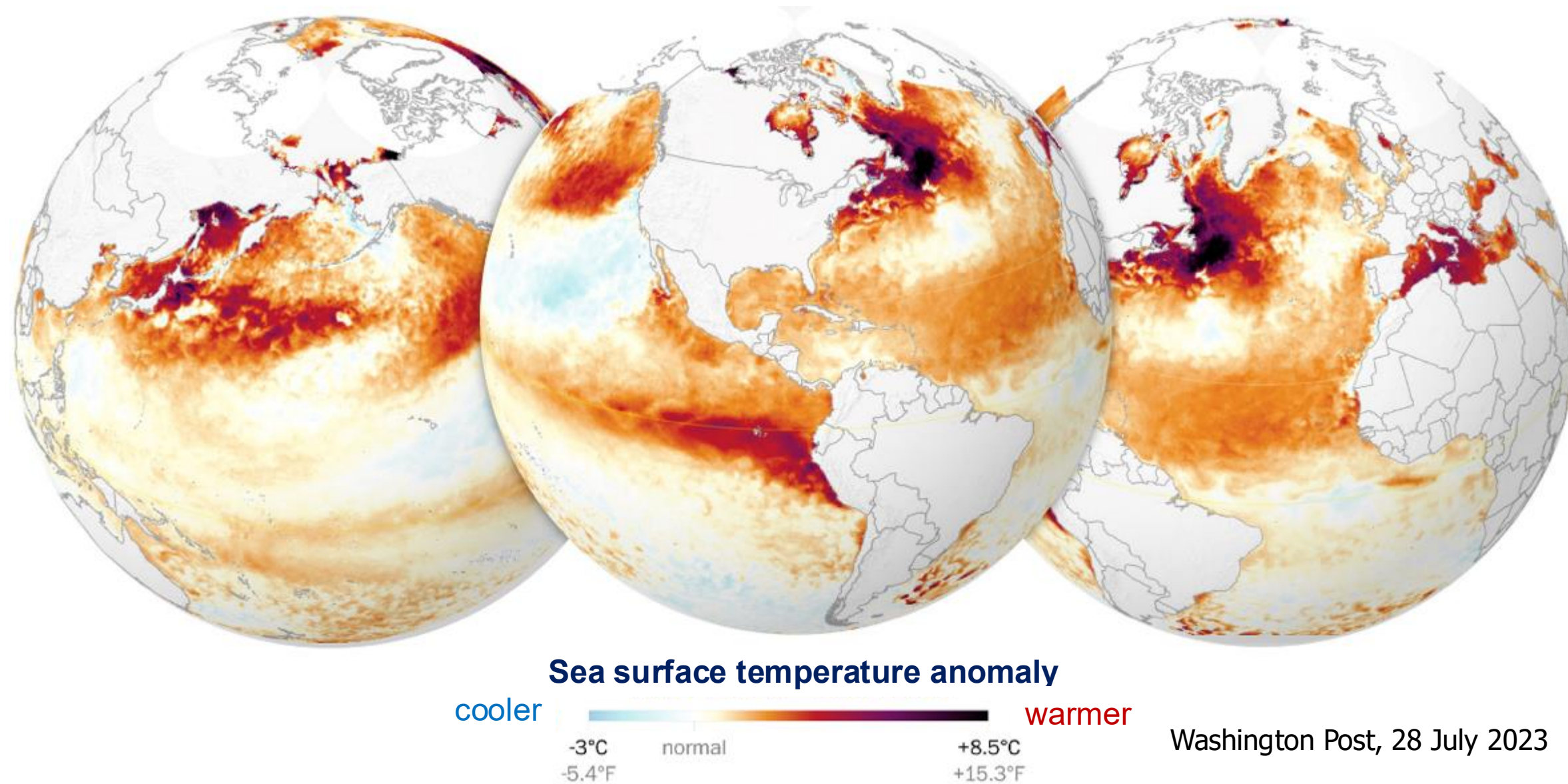
Summary Outline



1. **Justification** and project/WG duration
2. Project/WG **objectives**
3. **Major activities and outputs** (particular those accomplished during 2025-2026)
4. **Anticipated activities and outputs** in 2027
5. **Biennial workplan and budget** for 2028-2029, structured around the IOC HLOs
6. **Strategic recommendations** for future development



1. Justification and duration



"The era of global warming has ended, the era of global boiling has arrived."

The current rate of rise in sea temperatures is the fastest in Earth's history over the past 250 million years, and it could lead to a catastrophic collapse of marine ecosystems.

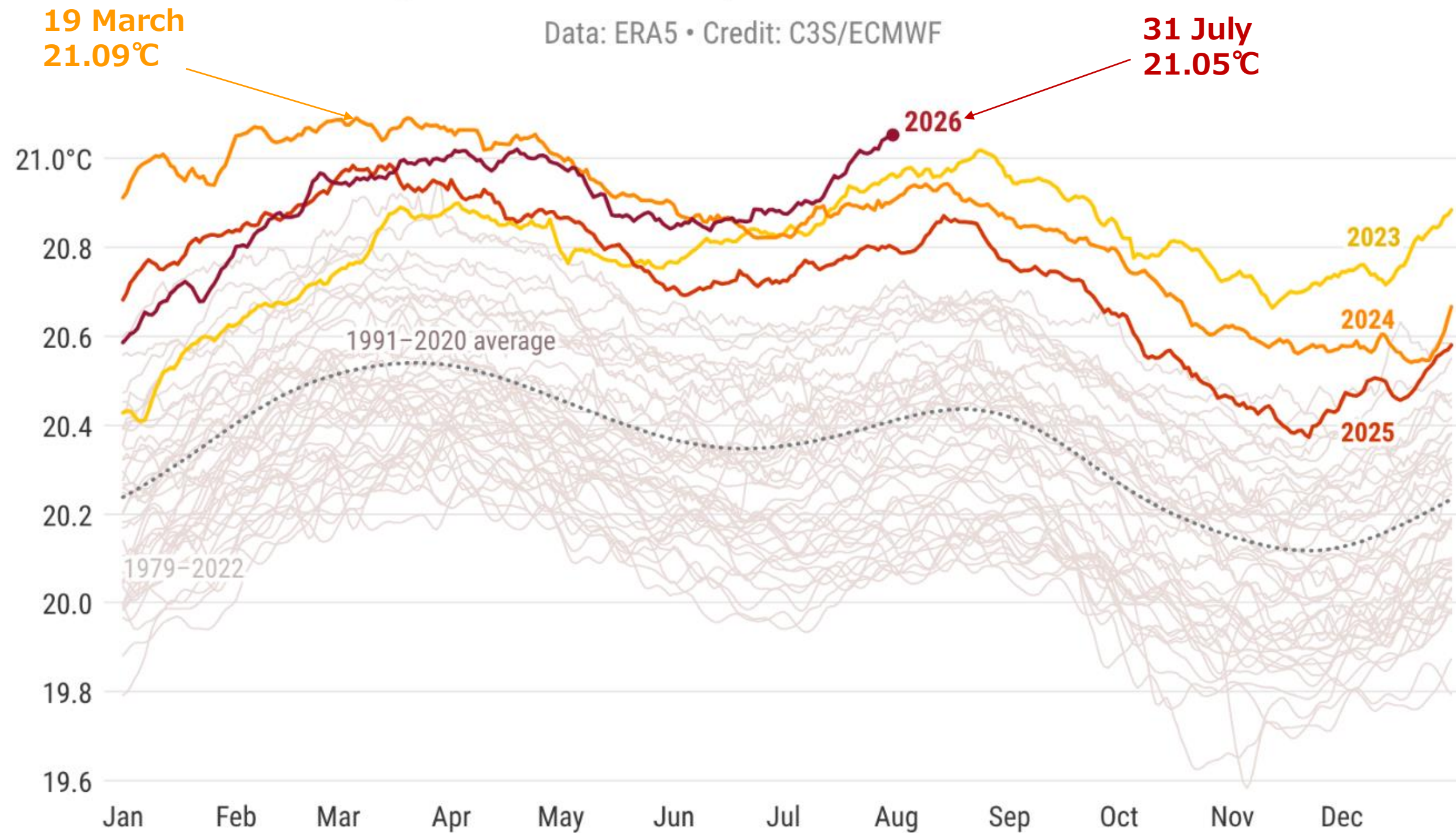


1. Justification and duration



Daily sea surface temperature for 60°S–60°N

Data: ERA5 • Credit: C3S/ECMWF



- Average global sea surface temperature (excluding polar regions).
- Sea surface temperatures are currently reaching the highest levels ever recorded.



PROGRAMME OF
THE EUROPEAN UNION



IMPLEMENTED BY ECMWF

1. Justification and duration

Northwest Pacific is the confluence of diverse climatic zones and rich marine ecosystems → **undergoing rapid changes.**

- **Unprecedented crisis:** Marine ecosystems face threats from climate change, ocean acidification, and human activities.
- **Regional vulnerability:** While the Northwest Pacific boasts rich ecosystems, it also experiences extreme variability.
- **Societal impact:** These changes affect the fishing industry, coastal economies, and global climate dynamics.
- **Knowledge gap:** Although the availability of physical data, such as water temperature and salinity, has improved, the development of biological/ecosystem data and predictive models still lags behind.

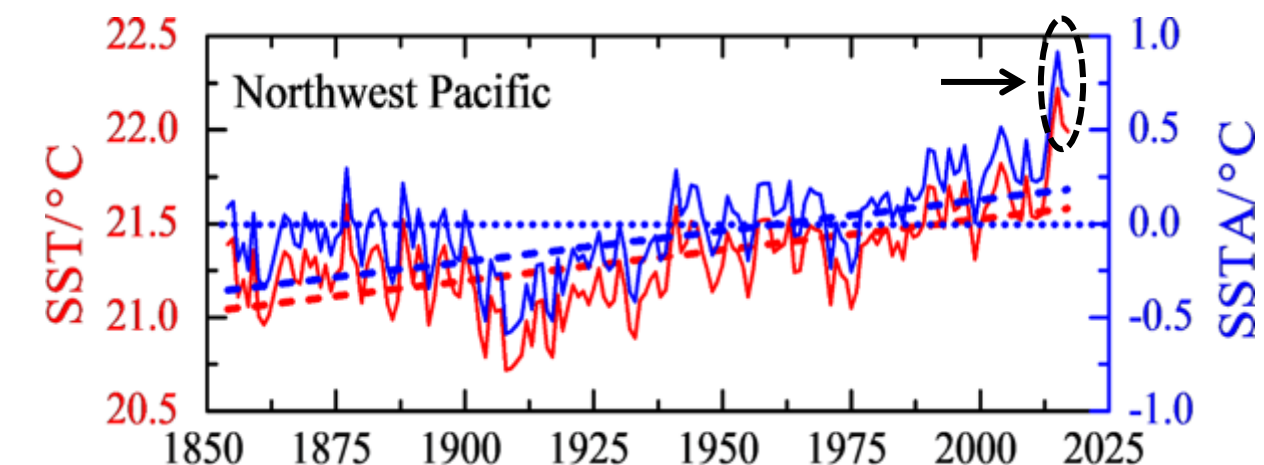
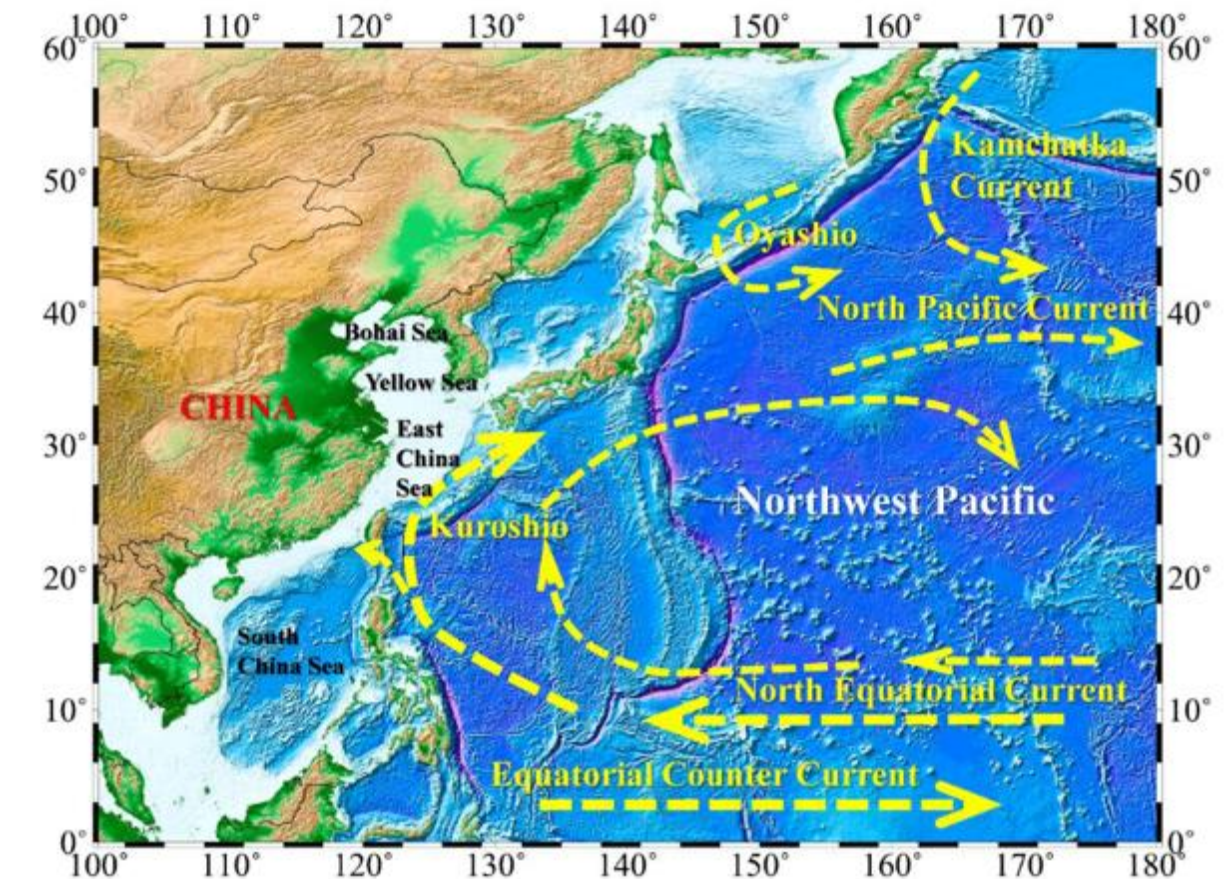
→ **Research addressing these regional challenges is needed.**



COSMEC (Collaborations for Northwest Pacific Marine Ecosystem Prediction):
An international, integrated and collaborative science platform that brings together regional expertise, observations, and modelling to advance **prediction** and **understanding of marine ecosystem changes in the Northwest Pacific.**



Official endorsement	: September 2025
Lead institutions	: WPI-AIMEC and IOC/WESTPAC
Implementation period	: 1 April 2025 – 31 December 2030



Wu et al. (2020) <https://doi.org/10.5194/os-16-83-2020>

WESTPAC-XVI, 10-12 November 2026, Hangzhou, China

2. COSMEC objectives

- **Objective 1 – Understand:** To improve our scientific understanding of marine ecosystem status, dynamics, and changes as the foundation for improved predictive capability, and
- **Objective 2 – Predict:** To develop next-generation Earth System Models (ESMs) that integrate **marine ecosystem processes** and generate **actionable predictive information** to support science-based decision-making and sustainable ocean management.



**By 2030: Establish a collaborative regional framework
connecting observations → understanding → modelling →
prediction → science-based action.**

3. Major Activities and Outputs

- 13-15 Mar:** 15th IGS, Tokyo
- Sep:** Official endorsement
- Nov-Dec:** ISG nomination

- 20-23 Apr:** WESTPAC and UN Decade Regional Conference

2025

2026

2027

- 4 Feb:** 1st ISG Meeting
- 5 Feb:** Joint symp.
- 24 Feb, 11 Mar, 13 May:** Follow-up ISG meeting
- 28 May:** JpGU session
- 5 Aug:** AOGS session
- 10-12 Nov:** 16th IGS, Hangzhou

Call for projects

Implementation

Review of actions

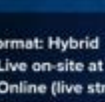
WPI-AIMEC and Nature Positive Core Joint Symposium on the UN Ocean Decade Actions:

COSMEC & ANEMONE Global

5 FEBRUARY 2026
MUROMACHI MITSUI HALL & CONFERENCE, TOKYO, JAPAN
OPEN SYMPOSIUM

Fusion Science for a Changing Ocean: From Understanding to Global Actions
By uniting COSMEC and ANEMONE Global under the UN Ocean Decade Actions, this joint symposium will be a launch and celebration of co-design, a space where science, technology, policy, and society converge to chart a course toward a resilient and sustainable ocean.

COSMEC-ANEMONE Global Joint Symposium Speakers

 Toshio Suga Director WPI-AIMEC	 Michio Kondoh Professor Tohoku University	 Yutaka Michida Chairperson IOC/UNESCO	 Julian Barbieri Global Coordinator UN Ocean Decade	 Wenxi Zhu Head WESTPAC	 Mitsutaku Makino President OPRI of the Sasakawa Peace Foundation
 Sayaka Yasunaka Professor Tohoku University	 Clara R Vives Project Researcher JAMSTEC	 Michio Kawamiya Principal Researcher JAMSTEC	 Hisashi Yamakawa Researcher JAMSTEC	 Akihiko Kasai Professor Hokkaido University	 Akifumi S Tanabe Assistant Professor Tohoku University
 Fumio Inagaki Vice Director WPI-AIMEC	 Swadhin Behera Director Application Laboratory JAMSTEC				

■ **Format: Hybrid**
• Live on-site at the Muromachi Mitsui Hall & Conference, Tokyo, Japan
• Online (live stream via Zoom webinar)

■ **Language:** English (simultaneous interpretation into Japanese available)

■ **Registration required:** <https://e-ve.event-form.jp/event/120717/wpi-aimec>

Registration Deadline:
Monday, February 2, 2026
12:00 PM (JST)



Hosts:      Under the auspices of:   Supported by:  

3. Major Activities and Outputs



International Steering Group (ISG):

- 8 ISG members: Japan (3), Indonesia (2), Republic of Korea (2), and China (1)

WPI-AIMEC and Nature Positive Core Joint Symposium on the UN Ocean Decade Actions: COSMEC and ANEMONE Global

Theme : Fusion Science for a Changing Ocean: From Understanding to Global Actions

Date, place : 4-6 February 2026, Muromachi Mitsui Hall & Conference, Tokyo

Format : Hybrid



4 Feb 2026: 1st COSMEC ISG meeting

Agenda:

- COSMEC governance, Science action plan, General discussion

Participants: 20 (15 in-person, 5 online)

- Experts and non-experts, 5 affiliated countries



5 Feb 2026: COSMEC & ANEMONE Global Joint Symposium

Agenda:

- Welcome remarks, Introduction of the Ocean Decade, Keynote presentations, Scientific talks, Panel discussion

Participants: 165 (79 in-person, 86 online)

- Experts and non-experts, 18 affiliated countries



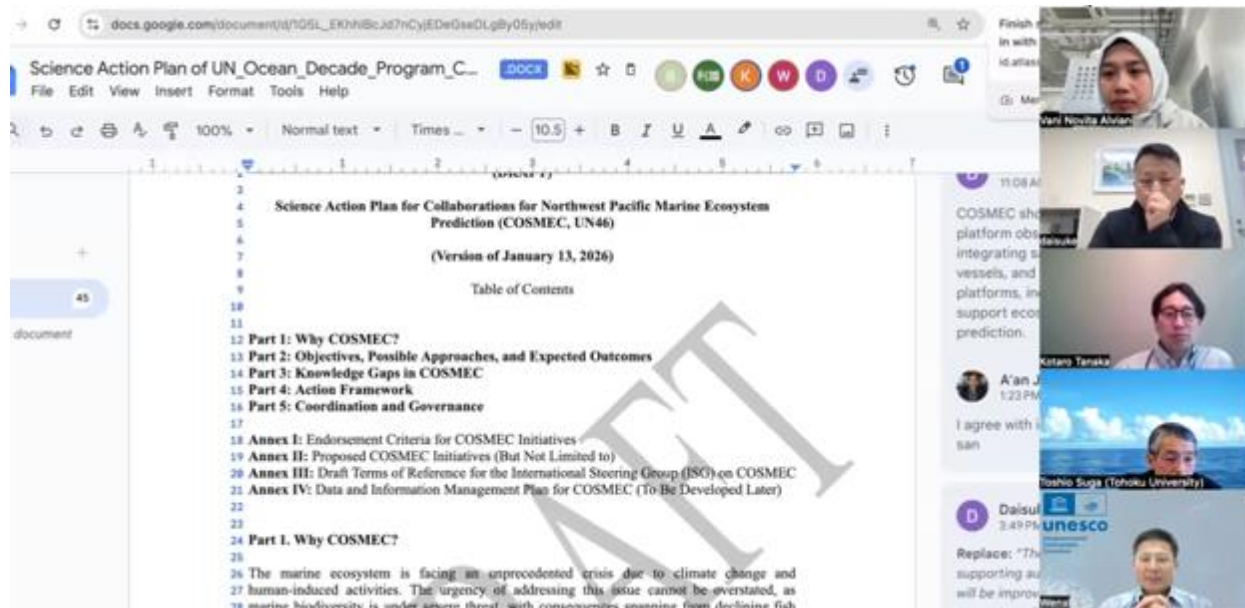
WESTPAC-XVI, 10-12 November 2026, Hangzhou, China

3. Major Activities and Outputs



Scientific engagement through conference sessions:

- **JpGU-AGU 2026** – U07: Ecosystem fluctuations in the Northwest Pacific and their linkages to global environmental change (28 May 2026, Chiba, Japan)
- **AOGS 2026** – OS15: Multiscale variabilities in the western Pacific Ocean and their impacts on multi-disciplinary aspects (jointly organized with CSK-2) (5 August 2026, Fukuoka, Japan)



Regular online ISG meetings:

- **Science Action Plan** discussions (24 Feb, 11 Mar, 13 May, 22 July)

4. Anticipated activities and outputs in 2027

Regional scientific engagement:

- **12th WESTPAC IMSC and 3rd UN Ocean Decade Regional Conference**
(Manila, 20-23 April 2027)



IOC WESTPAC 2027
MANILA, PHILIPPINES

Scientific session: Marine Ecosystem Change, Variability, and Its Modelling in the Northwestern Pacific and Adjacent Regions (under sub-theme A: Ocean Processes and Climate Change)

Workshop: UN 46: COSMEC Advancing Models and Observations for Marine Ecosystem Prediction in the Northwest Pacific



Program development:

- **Call for Sub-actions**
- **In-person ISG Meeting**

5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1 st H	Y1-2 nd H	Y2-1 st H	Y2-2 nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
HLO 1 — HEALTHY OCEAN AND SUSTAINED OCEAN ECOSYSTEM SERVICES									
Expected Result 1.1 (Sub-obj. 1.1): Regional ocean biodiversity and ecosystem observations and FAIR data strengthened									
1.1.1	COSMEC: Integrated observations and knowledge-gaps assessment • Assess observation requirements for ecosystem prediction • Promote integrated and coordinated marine ecosystem observations • Promote comparative ecosystem studies and facilitate coordination of BGC-Argo, satellite, ship-based, moored, autonomous, coastal and emerging observations including eDNA	• Observation requirements and priority gaps for marine ecosystem prediction in the Northwest Pacific are identified and addressed	•	•	•	•		40,000	• COSMEC support office (WPI-AIMEC) • COSMEC sub-action leads
1.1.2	COSMEC: Data and information management • Develop COSMEC data inventory and information management	• Interoperable data and information resources are available to support COSMEC modelling, prediction and downstream use	•	•	•	•		20,000	• COSMEC support office (WPI-AIMEC)

5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1 st H	Y1-2 nd H	Y2-1 st H	Y2-2 nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
HLO 1 — HEALTHY OCEAN AND SUSTAINED OCEAN ECOSYSTEM SERVICES									
Expected Result 1.2 (Sub-obj. 1.2 + 1.3): Scientific knowledge for ecosystem management developed and ecosystem-based management applied									
1.2.1	COSMEC: Ecosystem modelling, data assimilation and prediction • Advance regional and Earth System ecosystem modelling • Develop ecosystem prediction experiments and prototype products, investigate responses to climate variability, marine heatwaves and other major drivers, assess predictive skill	• Regional capability to represent, evaluate and predict marine ecosystem change is strengthened • Prediction experiments completed • Prototype ecosystem prediction products and assessment of predictive skill produced	•	•	•	•		50,000	• COSMEC support office (WPI-AIMEC) • COSMEC sub-action leads

5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1st H	Y1-2nd H	Y2-1st H	Y2-2nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
HLO 3 — RESILIENCE TO CLIMATE CHANGE AND CONTRIBUTION TO ITS MITIGATION									
Expected Result 3.1 (Sub-obj. 3.1+3.2): Regional ocean-climate observations, data and scientific knowledge enhanced									
3.1.2	COSMEC: Co-design, science-policy interface and applications - Identify stakeholder needs and priority prediction applications - Develop science-to-policy and application-oriented products	- COSMEC science and prediction capabilities are co-designed with stakeholders and translated into actionable knowledge - Stakeholder needs and priority applications documented and incorporated into COSMEC implementation - Policy/science products disseminated, science-policy dialogue and application pathways demonstrated	•	•	•	•		10,000 Budget use: Stakeholder engagement, policy/science products, publications and communication	• COSMEC support office (WPI-AIMEC)



5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1 st H	Y1-2 nd H	Y2-1 st H	Y2-2 nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
UN OCEAN DECADE (2021-2030) — REGIONAL CONTRIBUTIONS AND DECADE ACTIONS									
Expected Result D.1: [Regional Decade Actions endorsed and implemented]									
D.1.1	COSMEC: Governance and coordination • Coordinate implementation and periodic review of the COSMEC activities (e.g., coordinate ISG and technical working-group activities, monitor COSMEC sub-actions, review scientific priorities, prepare annual progress reporting and recommendation, etc.)	• COSMEC implementation framework operational • Annual progress reviewed • Priorities and recommendations documented	•	•	•	•	5,000	40,000 Budget use: ISG/working-group meetings, coordination, reporting, communications	• COSMEC support office (WPI-AIMEC) • COSMEC ISG • WESTPAC secretariat • COSMEC sub-action leads

5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1st H	Y1-2nd H	Y2-1st H	Y2-2nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
UN OCEAN DECADE (2021-2030) — REGIONAL CONTRIBUTIONS AND DECADE ACTIONS									
Expected Result D.1: [Regional Decade Actions endorsed and implemented]									
D.1.1	COSMEC : Workshop, synthesis and dissemination • Organize COSMEC Workshop (e.g., bring COSMEC sub-actions and partners together to share results, review implementation, identify synergies, refine priorities and develop collaborations, etc.) • Prepare regional synthesis and disseminate COSMEC outcomes (e.g., synthesize progress across observations, data, modelling, prediction and capacity development, communicate results through reports, publications, symposia and Ocean Decade channels, etc.)	COSMEC progress, knowledge and partnerships are reviewed, synthesized and communicated (e.g., COSMEC Workshop successfully convened, progress and next-step priorities documented, synthesis and dissemination products produced COSMEC contribution to Ocean Decade outcomes documented)					5,000	100,000	• COSMEC support office (WPI-AIMEC) • COSMEC ISG • WESTPAC secretariat • COSMEC sub-action leads



5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1 st H	Y1-2 nd H	Y2-1 st H	Y2-2 nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
UN OCEAN DECADE (2021-2030) — REGIONAL CONTRIBUTIONS AND DECADE ACTIONS									
Expected Result D.1: [Regional Decade Actions endorsed and implemented]									
D.1.2	COSMEC: Partnership and resource mobilization • Strengthen regional partnerships and resource mobilization (e.g., expand participation of WESTPAC Member States and regional/international partners, develop collaborative proposals, link COSMEC with complementary Ocean Decade Actions, etc.)	• New partnerships and joint initiatives established • Resource-mobilization opportunities identified		•	•	•	5,000	15,000 Budget use: Working-group meetings, coordination, reporting, communications	• COSMEC support office (WPI-AIMEC) • COSMEC ISG • WESTPAC secretariat • COSMEC sub-action leads

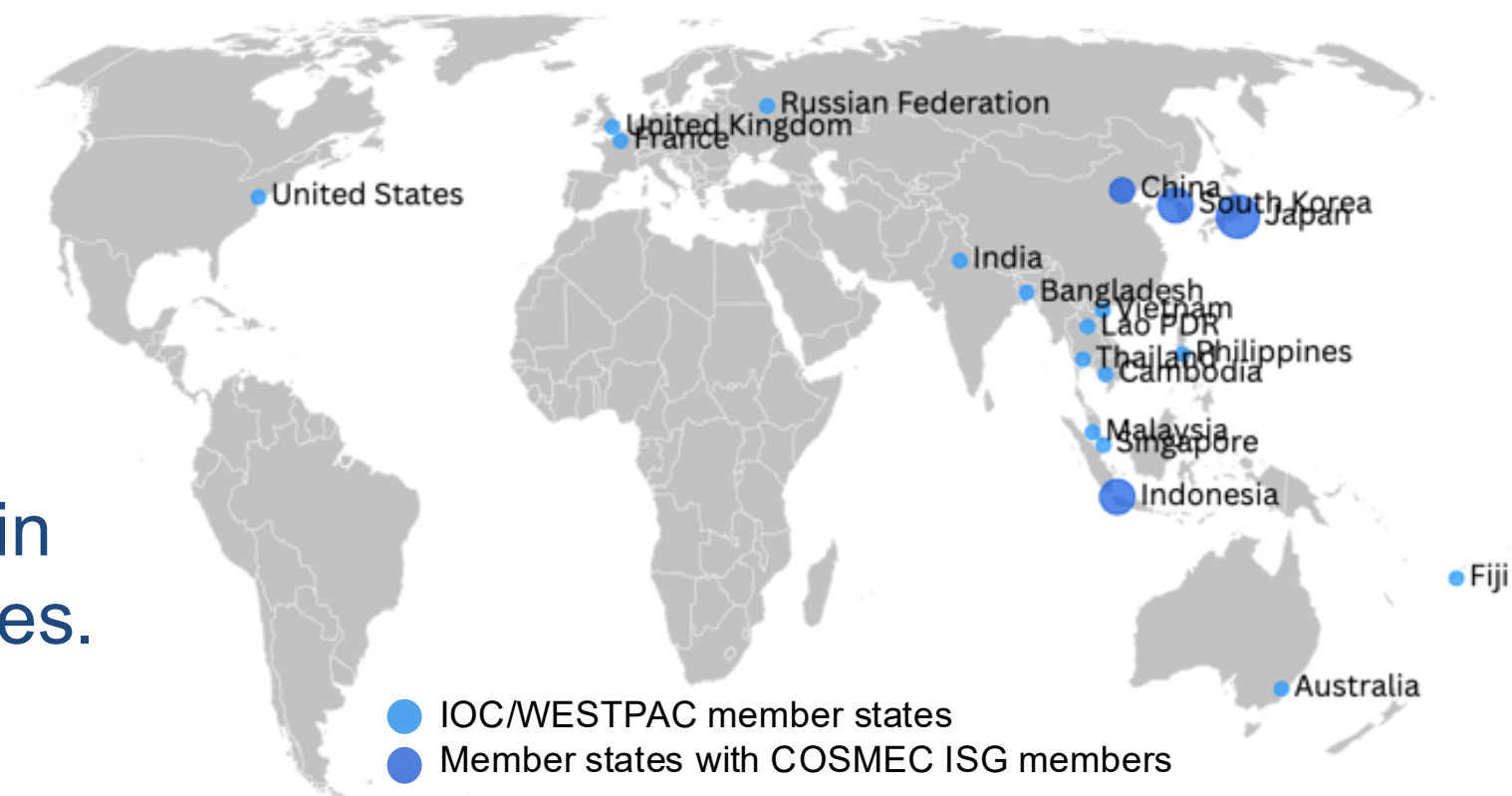
5. Biennial Workplan for 2028-2029

No.	Activity / Output Description	Expected Result / Output	Y1-1st H	Y1-2nd H	Y2-1st H	Y2-2nd H	IOC RP Budget (USD)	XB Required (USD)	Lead Responsibility
UN OCEAN DECADE (2021-2030) — REGIONAL CONTRIBUTIONS AND DECADE ACTIONS									
Expected Result D.1: [Regional Decade Actions endorsed and implemented]									
D.1.2	COSMEC: Capacity development, technology transfer and ECOP engagement • Deliver regional training and knowledge exchange (e.g., organize training on ecosystem observations, data management, modelling, data assimilation and prediction, share methods and practical resources, etc.) • Promote technology transfer and participation of developing Member States (e.g., support region-specific observation, process studies and technical activities, facilitate access to methods, tools and expertise, encourage co-leadership of COSMEC sub-actions, etc.) • Support students and Early Career Ocean Professionals (ECOPs) (e.g., facilitate scholarships, exchange visits, mentoring, networking and participation in COSMEC research and scientific meetings)	• Capacity to conduct, interpret and apply marine ecosystem prediction is strengthened across participating countries and generations (e.g., regional training activities delivered, researchers and practitioners trained, participation and regional ownership strengthened, technology/knowledge transfer activities implemented, increased student/ECOP participation, exchange and mentoring opportunities established)					15,000	45,000	• COSMEC support office (WPI-AIMEC) • COSMEC ISG • WESTPAC secretariat • COSMEC sub-action leads

6. Strategic recommendations for future development



- **Engage more** WESTPAC Member States, institutions and relevant stakeholders.
- **Build synergies** with existing WESTPAC programmes and complementary UN Ocean Decade Actions.
- **Develop sub-actions** by converting priority areas identified in the Science Action Plan into concrete, implementable activities.
- **Deliver tangible outputs** by highlighting shared datasets, modelling advances, scientific outputs, capacity-building activities and applications for sustainable ocean management.
- **Increase visibility** by developing regular communication, regional workshops and dissemination of COSMEC activities and outputs.



Connect existing expertise and initiatives → create focused collaboration → demonstrate tangible outcomes → communicate impact