

Event Summary

Pan-CLIVAR Meeting 2025

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The Pan-CLIVAR Meeting 2025 was held in Bali, Indonesia, from 22nd to 26th of September 2025, attended by over 150 *in-person* participants from more than 35 countries. This was only the second Pan-CLIVAR Meeting after the [2014 meeting held in The Hague](#) which was instrumental for the development of the [current decadal CLIVAR science plan](#) (2018-2028). The 2025 Pan-CLIVAR Meeting was aimed at initiating the formulation of the next CLIVAR science plan and to mark CLIVAR's 30th anniversary.

Pan-CLIVAR 2025 brought together CLIVAR members from all panels, Research Foci (RF), and scientific steering group (SSG), guests, several representatives from partner projects and institutions, as well as ocean-climate researchers, professionals, and students who participated in the CLIVAR international symposium in the middle of the week. Pan-CLIVAR 2025 comprised of plenary sessions, meetings of the SSG, panels and RF, a session on early career researchers, two side events, and a symposium consisting of 12 sessions and 3 CLIVAR capability breakout sessions.

Day 1 Mon 22/09		Day 2 Tue 23/09	Pan-CLIVAR						Day 3 Wed 24/09	Symposium			
Room->	RM1		RMA	RM1	RM2	RM3	RM4	RM5		RMA	RMB	RMC	
		8:30-9:30	Plenary						8:30-9:30	Opening			
		9:30-10:30	SSG		PRP		IORP		9:30-10:30	Keynotes			
		10:30-11:00	Coffee Break							10:30-11:00	Coffee Break		
		11:00-12:30	SSG	TBI	PRP	MHW	IORP	GSOP	11:00-12:30	Session 1	Session 2	Session 3	
		12:30-13:30	Lunch							12:30-13:30	Lunch		
13:30-15:00	SSG	13:30-15:00	SSG	TBI	OMDP	SORP	ARP	CDP	13:30-15:00	Session 4	Session 5	Session 6	
15:00-15:30	Coffee Break	15:00-15:30	Coffee Break						15:00-15:30	Coffee Break			
15:30-17:30	SSG	15:30-17:00	SSG	TBI-PRP-CDP (TROPICS)	OMDP	SORP	ARP	MP	15:30-16:30	Poster viewing			
		17:00-18:00	Plenary						16:30-18:00	Session 7	Session 8	Session 9	
	Free time		Free time						18:30	Symposium Dinner			

Day 4 Thu 25/09	Symposium & Pan-CLIVAR						Day 5 Fri 26/09	Pan-CLIVAR		
Room->	RMA	RMB	RMC	RM1	RM2	RM3-5		RMA	RM1	RM2-5
8:30-9:30	Session 10	Session 11	Session 12				8:30-9:30	Plenary		
9:30-10:30	Session 10	Session 11	Session 12				9:30-10:30	Plenary		
10:30-11:00	Coffee Break						10:30-11:00	Coffee Break		
11:00-12:25	Breakout 1	Breakout 2	Breakout 3				11:00-12:30	Side Event 2	SSG	
12:30-13:00	Plenary						12:30-14:00	Lunch		
13:00-14:00	Lunch									
14:00-15:30	MHW Open Session	ECR Session	Side Event 1	SORP			13:30-15:00	OMDP-PRP	SSG	
15:30-16:00	Coffee Break						15:30	End of Event		
16:00-17:30	TBI Open Session	ECR Session	Side Event 1	SORP-NORP-OMDP						
18:30	Pan-CLIVAR Dinner									

Room Legend

RMA: Ballroom RMB: Bali RMC: Sedap Malam RM1: Sawu RM2: Nias RM3: Sahadewa RM4: Nakula RM5: Boardroom

Pan-CLIVAR 2025 Program Overview

Day 1: Closed SSG Meeting

Pan-CLIVAR 2025 was held online and in person at [Bintang Bali Resort](#) located near the international airport for a self-contained and accessible venue. It began with an SSG-only meeting on the afternoon of **Monday** 22nd of September dedicated to discussing CLIVAR internal matters such as terms of reference, membership guidelines, new CLIVAR logo, and financial matters. The SSG meeting continued to Day 5.



SSG Meeting 22 September 2025

Day 2: Pan-CLIVAR Meeting



Pan-CLIVAR Meeting 2025 participants.

On **Tuesday** morning of 23rd September, the Pan-CLIVAR Meeting was opened with a series of speeches. The Director of the International CLIVAR Project Office (ICPO), Agus Santoso welcomed the participants, illustrated the intricacy of the program, covered logistics including WCRP code of conduct, and thanked the participants, volunteers, sponsors, and the organising committees that made the event possible.

An introduction to CLIVAR and the Pan-CLIVAR Meeting was delivered by the CLIVAR SSG Co-Chair, Gokhan Danabasoglu, highlighting the extensive CLIVAR structure and linkages with external projects that require the panels and partners to gather to advance progress. Gokhan gave an overview of the current CLIVAR Science Plan based on four elements: 1) fundamental understanding of the climate system, 2) predictions of near-term evolution of the climate system, 3) long-term response of the climate system, 4) bridging climate science and society; and the implementation strategy covering 2018-2028 period.



View of Pan-CLIVAR Meeting 2025 opening on Tuesday morning: participants registering (top left), plenary in the Ballroom (centre), technical support (top right), welcome remark (left), and CLIVAR SSG co-chairs and ICPO director convening (bottom left).

The co-chair of the World Climate Research Programme (WCRP) joint scientific committee, Professor Cristiana Stan, then provided an overview of WCRP as the parent organisation of CLIVAR. She highlighted that WCRP building blocks are the core projects, lighthouse activities, and the academy – most representatives attended the Pan-CLIVAR Meeting in person. She remarked that the core projects are communities that focused on ocean, cryosphere, land, and atmospheric processes, modeling and observations, and regional climate information; while the lighthouse activities are designed to rapidly respond to more pressing societal priorities, and the academy focuses on capacity building in climate science. She then remarked on how CLIVAR fits into the bigger picture of WCRP.

The vice president of the Ocean University of China (OUC), Prof. Houjie Wang congratulated CLIVAR on the 30th Anniversary. He expressed how OUC, as one of China's top tier universities and global leader in marine-related fields, has proudly served as the host of the ICPO that supports CLIVAR. He remarked that the project office is located in the OUC's Frontier Science Center for Deep Ocean Multispheres and Earth System (DOMES) which serves as a key platform for interdisciplinary research, scientific innovation and collaborations, and it is at this hub where the strengths of OUC and Laoshan Laboratory that co-hosts the ICPO merged with CLIVAR for greater collaborations and contribution to societal development.

Laoshan Laboratory representative Dr. Yanheng Xiao (Executive Director of the Leading Group for Foreign Affairs) acknowledged the organisers, sponsors and local hosts, and introduced the Qingdao based laboratory in China as a national oceanography research centre with a mission to explore the mystery of the ocean and translate the knowledge into societal benefits. He highlighted that the national laboratory has been committed to providing unwavering support for the ICPO in partnership with OUC with the recognition that climate variability and change is one of the most urgent and complex challenges of our time. Dr Xiao stressed the importance for international collaboration to understand ocean and climate, as reflected by the Pan-CLIVAR Meeting that has brought together leading scientists from across the globe.



Pan-CLIVAR opening featuring Gokhan Danabasoglu (bottom left), Cristiana Stan (middle top), Houjie Wang (middle with Francois Engelbrecht), Yanheng Xiao (top left), Melissa Hart (top right), Chris Lennard (bottom right).

The opening session concluded with a plenary presentation titled 'Connecting the WCRP Academy and the CLIVAR Community' by Dr. Chris Lennard and Prof. Melissa Hart, co-chairs of the WCRP Academy SSG, introducing the history, purpose, and activities of the academy. The presentation profiled the academy's online catalogue of training opportunities and announced a plan for WCRP Futures Leaders Program with the vision to empower and build capacity of climate science leaders.

A group of participants then stayed on for SSG session on partners engagement, and the rest joined parallel meetings of several CLIVAR panels and Research Foci.





Parallel CLIVAR panels and Research Foci meetings in the boardroom, and Sawu, Nias, Nakula, Sadewa rooms on Tuesday 23rd September 2025.

Day 2 SSG Session. The SSG session served as a forum for engagement among the various programs and organisations to identify gaps, synergy and cross-cutting issues to sustain and foster collaborations. The session contained a series of presentations on various activities by CLIVAR (Gokhan Danabasoglu, Francois Engelbrecht) and several partner project/organisation representatives: WCRP CliC (Keith Alverson, Online), SCOR (Emily Twigg, Online), My Climate Risk (Regina Rodrigues), POGO (Hui Zhou), NPOCE (Hui Zhou), SOLAS (Li Li), DITTO (Joanna Staneva), OOPC (Weidong Yu, Online), PAGES (Aixue Hu), PICES (Antonietta Capotondi), ESMO (Harun Rashid, Online), GEWEX (Jason Evans), RIFS (Naomi Goldenson), CORDEX (Angelique Melet, Jason Evans), EPESC (Shoshiro Minobe), APARC (Olaf Morgenstern, Online), IMBeR (A'an Johan Wahyudi), US CLIVAR (Ruby Leung), OUC (Xiaopei Lin), and ISC (Jia Gensuo). The presentations highlighted several synergistic activities with some cross-cutting issues that could be pursued collaboratively, e.g., coastal impacts associated with sea level and climate extremes, dealing with big data and data sharing, as well as translating science for societal relevance.

Approaching the evening, all participants reconvened in the Ballroom for three plenary presentations to conclude the day. The first presentation was delivered by Prof. Fredolin Tangang of University Brunei Darussalam (Brunei) on 'CORDEX Southeast Asia Climate Projections and Their Relevance to Society', which highlighted efforts by CORDEX to produce multi-model climate projections on a 5-km resolution for Southeast Asia, a region vulnerable to the impact of climate change. Moving from land to the ocean, Dr. Anna-Lena Deppenmeier of University of Liverpool (UK) presented a talk 'Towards reliable SST predictions in the Tropical Pacific Cold Tongue', demonstrating the importance of ocean observations for vertical mixing to improve simulation of the Tropical Pacific cold tongue – a ribbon of relatively cold sea surface temperature (SST) extending off South America towards central Pacific which is a key region for the formation of El Niño Southern Oscillation (ENSO). In a pre-recorded video, Dr. Angela Kuhn of Scripps Institution of Oceanography (USA) presented a talk 'Understanding regional pCO₂ model biases and uncertainties in the Biogeochemical Southern Ocean State Estimate (B-SOSE)', demonstrating the importance of observing ocean biogeochemistry (BGC) to improve

parameterisation of phytoplankton growth and mortality rates to correctly represent the partial pressure of oceanic CO₂ (pCO₂) in a model.



Representatives of various partner programs speaking at the Pan-CLIVAR 2025 SSG Session on partnerships. Plenary speakers (two bottom right panels) picturing Anna-Lena Deppenmeier (with Gokhan Danabasoglu) and Fredolin Tangang.

Day 3: CLIVAR Symposium



CLIVAR Symposium participants.

The morning of **Wednesday 24th** of September proved to be busy yet lively with additional participants arriving to join the symposium.

The symposium commenced with the national anthem 'Indonesia Raya' as customary practice for major event opening in Indonesia. Dr Intan Nurhati of BRIN (National Research and Innovation Agency of Indonesia), a CLIVAR member for the Indian Ocean Region Panel, served as the symposium opening host. Intan welcomed the participants, Professor Anak Agung Suryawan (Udayana University) who represented the Governor of Bali, and members of the local BRIN representing the Mayor of Denpasar capital city of Bali.



Captured moments at the opening plenary of the CLIVAR Symposium.

Prof. Suryawan delivered a welcome remark on behalf of Governor of Bali, Dr. I Wayan Koster. Prof. Suryawan introduced himself as the head of Centre of Excellence in Tourism at Udayana University and a member of economy task force established to assist the governor of Bali. He remarked that hosting the Pan-CLIVAR event is incredibly relevant for Bali and Indonesia, as the location of the archipelago that is made up of 17,000 islands makes it a key component of the global climate system, while making it susceptible to the impacts of climate variability and change, affecting agriculture, fisheries and tourism. He said that the theme of the symposium carries a profound meaning as the scientific understanding is not only to be confined in scientific journals but integrated into decision-making process that directly impacts people's lives; in alignment with Indonesia's growing leadership in climate relations and sustainable development with Bali playing an important role. Before officially opening the symposium and welcoming participants, he stated that the Bali government is committed in achieving environmentally friendly and sustainable development in harmony with Balinese culture and spiritual values; and that the knowledge and innovation resulting from the meeting are expected to serve as a tool to face future challenges.

Opening remarks by WCRP were delivered by Dr. Hindumathi Palanisamy who is a WCRP scientific officer, in association with the World Meteorological Organization, and is Pan-CLIVAR organising committee member. She reiterated Cristiana Stan's message on WCRP which involves working with

more than 1000 international experts from all around the world through the six core projects which include CLIVAR, forming the fundamental pillars of WCRP. Hindumathi reminded the purpose of why participants gathered in Bali, with CLIVAR pushing the frontiers in climate and ocean science for 30 years now, to express what they know of their climate science priority, to work together to advance climate science knowledge and impact science, and to build long-lasting connections. On behalf of the organising committee, she thanked the local hosts, Bandung Institute of Technology (ITB) and BRIN, as well as OUC and Laoshan Laboratory, and the staff of Bintang Bali Resort for the excellent hospitality.

The co-chair of CLIVAR SSG, Prof. Francois Engelbrecht, next addressed the symposium with an overview and perspectives of CLIVAR. He started off with a reflection on the flood disaster that affected Bali leading up to the Pan-CLIVAR 2025, which reminded him of the worst flooding disaster in his country, South Africa in April 2022 following heavy rain on the east coast that led to more than 500 human lives lost and more than 40,000 people displaced. He elaborated how subsequent scientific studies attributed this disaster to climate change associated with the capacity for a warmer atmosphere to hold more moisture and an increasingly warm Agulhas Current that flows along the east coast of South Africa fuelling more intense storms. This then reminded him of why CLIVAR was formed 30 years ago with a focus on the role of the ocean in climate variability and change, as well as predictability that is important to help safeguard communities and the environment against future climate change impacts. He reiterated Gokhan's presentation on CLIVAR structure consisting of several panels and working groups that involve more than 300 scientists across the world, with the regional panels playing an increasingly important role in linking science to societal impacts in different regions of the world. He emphasised the important role of the ICPO in supporting CLIVAR and thanked the OUC and Laoshan Laboratory for hosting and sponsoring the ICPO. Francois reminded the participants to reflect on what CLIVAR has achieved over the last decade and think about the next 10 years in terms of the scientific focus. He ended his remarks with a reminder of an Open Call for CLIVAR Membership, encouraging participants to apply.



Speakers in the CLIVAR Symposium opening session: Prof. Ocky Karna Radjasa (top left), Prof. Anak Agung Suryawan (top centre), Dr. Muh Farid (top right), Prof. Francois Engelbrecht (bottom left), Ms. Ning Wang (bottom centre), Dr. Hindumathi Palanisamy (bottom right).

The next two opening remarks were delivered by the local organising committee members, Prof. Ocky Karna Radjasa of BRIN and Dr. Muhammad Farid of ITB.

Prof. Ocky Karna Radjasa, chairman of BRIN's Research Organisation for Earth Sciences and Maritime, introduced BRIN, the National Research Innovation Agency, established in 2021 as the only home for non-university researchers in Indonesia. He detailed that BRIN's role as policy maker funding agency and executive agency for research and innovation through 12 research organisations and 92 research centres stretching across the archipelago, which include research organisation for earth sciences and maritime that has six research centres: oceanology, deep sea, limnology and water resources, climate and atmosphere, geological resources and geological disaster; with two heads of the research centres for oceanology, climate and atmosphere present at Pan-CLIVAR 2025 (A. Sulaiman, A. J. Wahyudi). He outlined BRIN's infrastructure and facilities which are open to researchers in Indonesia and international collaborators, as well as programs in providing research internships, visiting research, scholarships, talent awards, and degree by research through collaboration with Indonesian and international universities, and research collaborative platforms.

The importance of collaboration was further emphasised by Dr. Muh Farid. He remarked how growing threats like sea level rise, coastal inundation, and flood which recently affected Bali pose risks to Indonesian cities, thus underscoring the importance to understand climate variability and change for national resilience and survival for which ITB's Centre for Coastal and Marine Development led by Dr Farid is committed to advancing knowledge and solutions. He asserted that a single country or institution cannot tackle these challenges alone and that ocean and climate processes know no political boundaries, underlining the purpose of the Pan-CLIVAR 2025. He continued that hosting the Pan-CLIVAR 2025 is not only a recognition of Indonesia's vulnerability but also Indonesia's capacity to contribute to global science, ending the speech with: *"... this symposium is a milestone for our region and the global climate community. Together, we have the expertise, the patience, and the responsibility to generate knowledge that matters to guide the society towards resilience and sustainability in a changing climate"*.

A speech by Ms. Ning Wang wrapped up the opening ceremony by further profiling an institution's role in facilitating international collaboration. Ms Wang, head of the Cooperation and Planning Department of the Laoshan Laboratory China, introduced Laoshan Laboratory's initiatives in global marine innovation such as establishing joint ocean research centres through partnerships with various countries, organising the Global Ocean Summit (GOS), initiating Global Ocean Research Union (GIORi), supporting the functioning of the UN Decade [CSK-2 project](#), CLIVAR through the ICPO, and OceanObs'29 conference that will be held in Qingdao in 2029. She provided an update on the organisation process of the OceanObs'29 – a once-in-a-decade conference series that played a crucial role in advancing global observation systems and efforts in the past few decades. She also announced that the next GOS will be held in 2026 in Hong Kong. Before ending her speech, she introduced GIORi, an international academic and non-profit organisation voluntarily formed by institutions and individuals engaged in marine-related research and technology development worldwide with a goal to establish a global shared platform for marine science and technology.

The symposium proceeded with Prof. Mat Collins, the lead member of the symposium committee, introducing the CLIVAR Symposium and a [research topic in Frontiers in Climate](#) journal created specially for the event, with fee waivers available, encouraging participants to submit relevant papers as a permanent record of the symposium presentations.

Two keynote presentations concluded the morning session. Dr. Supari, head of Climate Variability Analysis Division at BMKG (Badan Meteorologi, Klimatologi, dan Geofisika) in Indonesia, spoke on 'El

Niño 2023/24 and the Skill of Drought Warning Issued by BMKG'. The presentation highlighted the crucial role of the national agency BMKG in supporting the government's efforts to maintain national food security through early drought warning leading up to the occurrence of the strong 2023/24 El Niño event.

Dr. Angelique Melet, head of Ocean Climate Team at Mercator Ocean International in France, presented on 'Coordinated regional ocean climate projections: why, where are we and where are we going? – A CLIVAR-CORDEX task force'. The presentation elaborated the motivation to bridge gap between models used for future climate projections with the demand for information at societally relevant resolution through dynamical downscaling, to manage risks such as sea level rise, particularly given that Southeast Asia is a sea level risk hotspot. It introduced a new joint task force between CLIVAR and CORDEX for an internationally coordinated regional ocean climate projections.



CLIVAR Symposium on Day 3: Mat Collins (top left) introducing symposium keynote speakers, Angelique Melet (top centre) and Supari (top right), in the Ballroom before the start of the first session. Parallel sessions at Sedap Malam Room (bottom left) and Bali Room (bottom right).

The symposium continued with three parallel sessions on *Atmospheric Processes and Climate Dynamics*, *Ocean-Climate Observations and Modelling*, *Biogeochemical Processes and Climate Interactions*, *Artificial Intelligence: Role in Climate-Ocean Research and Prediction*, *Cascading and Compound Event - Climate Variability and Change*, *Ocean Processes and Extremes*, and a session on *Societal Impact*. There was a dedicated poster viewing in the afternoon at the foyer, providing a forum for collegial exchanges among the participants. Poster presenters were also allocated lightning oral presentations at the dedicated sessions to increase exposure of their work. In total, the symposium had 84 oral presentations and 35 poster presentations, led by 36 conveners. The day concluded with a cultural Balinese dinner reception.



The CLIVAR Symposium provided unique opportunity for academic, professional, and social interactions for all of the participants and organisers.

Day 4: CLIVAR Symposium and Pan-CLIVAR Meeting



CLIVAR Symposium continued in Day 4, pictured here a breakout session on the Indo-Pacific Ocean, Climate and Linkage (top left), speakers and conveners in the Ballroom, Bali and Sedap Malam rooms.

The symposium continued in the morning of **Thursday 25th** of September for the second part of sessions Climate Variability and Change, Ocean Processes and Extremes, and Societal Impact, followed

by three breakout sessions on CLIVAR capabilities: 1) Climate, atmospheric processes, societal impacts, 2) Ocean processes, modelling, observations, biogeochemistry, and 3) Indo-Pacific Ocean, Climate, and Linkage (a PRP-IORP-TBI RF joint-session). These focus breakout sessions were aimed at assessing CLIVAR capabilities and identifying gaps to drive future initiatives.

Participants then gathered in the ballroom for a closing plenary where representatives of the breakout sessions summarised their sessions. Symposium chair Mat Collins synthesised the overarching message in that the symposium stressed the importance of interactions between the ocean and atmosphere in climate variability and change with a number of research gaps: 1) in observational network, 2) remaining problems in models, 3) in our understanding and theories of how the climate system works, and lastly one of the biggest and important gaps 4) bridging science and society. He remarked that closing these gaps requires a concerted effort in making our science applicable for the real world which will in turn galvanise funding that further promotes progress. He thanked the sponsors, committee members, and volunteers including those provided by Udayana University in Bali.



Day 4 afternoon activities picturing moments at the symposium closing plenary that included session representatives reporting on their achievements, a group discussion in the foyer, and some speakers at the side event and sessions.

The rest of the afternoon was occupied by parallel sessions: *Marine Heatwaves (MHW) Open Session*, *Tropical Basin Interaction (TBI) Open Session*, *Early Career Research (ECR) Session*, and a *Side Event: Enhancing International Ocean-Climate Research Collaboration in a Changing Climate*.

The MHW and TBI Open Sessions were dedicated to the CLIVAR research focus (RF) groups on the respective topics to provide a forum for interactions between the groups and the wider community. These sessions consisted of presentations by the research focus group members and invited guests. The MHW Open Session presented a synthesis of the marine heatwaves related presentations at the symposium followed by three presentations by the MHW research group members on drivers of marine heatwaves in various regions and the coasts as well as on biogeochemical extremes and their interactions with physical extremes. The TBI Open Session had presentations associated with the four TBI working groups: TBIMIP, Interbasin linear inverse model, pan-tropical observation system, and

paleo; as well as two invited speakers who provided their perspectives on the future of TBI research: Prof. Wenju Cai (Laoshan Laboratory) emphasised the need to account for TBI in understanding the impact of tropical modes of variability, while Prof. Jin-Yi Yu (UC Irvine) demonstrated the need to consider extratropical interactions especially as global warming ensues. The TBI RF then discussed on the legacy of their work as the RF is sunseting at the end of 2025.

Day 4 ECR Session. The ECR Session led by Dr. Shikha Shingh (IORP co-chair) and Dr. Philip Tuchen (ARP member) was attended by a mix of ECRs and senior researchers such as Cristiana Stan (WCRP JSC co-chair), Masa Kageyama (CLIVAR SSG member), Francois Engelbrecht (CLIVAR SSG co-chair) and Chris Lennard (WCRP Academy SSG co-chair) who shared their extensive experience and advice in terms of academic progression, career, personal aspects, and in being involved in WCRP/CLIVAR. The second part of the session was dedicated for brainstorming a potential ECR-led panel in CLIVAR.



Afternoon sessions on Day 4: ECR Session (top), MHW Open Session (bottom left), TBI Open Session (bottom right).

Day 4 Side Event. The side event on *Enhancing International Ocean-Climate Research Collaboration in a Changing Climate* led by Prof. Fei Chai (Xiamen University), Prof. Juliet Hermes (WCRP SSG member), Prof. Xiaopei Lin (Ocean University of China), and Dr. Agus Santoso (ICPO director), was aimed to outline current and anticipated scientific and institutional opportunities and challenges in ocean-climate research that could benefit from an enhanced international collaboration. It covered 8 topics: OceanObs'29 (Fei Chai), Global Ocean Summit and Global Ocean Research Union (Agus), sea level rise (Hindumathi Palanisamy), ocean oxygen change and links to heat and carbon (Lijing Cheng), paleoclimate (Jens Zinke, Sujata Murty), ocean observations in Indonesia (Nelly Florida Riama), ocean-climate research collaboration for the Bay of Bengal (Mohan Kumar Das), and 2nd Cooperative Study of the Kuroshio and its Adjacent Regions/CSK-2 (Xiaopei Lin). The session was concluded with a speech from Prof. Houjie Wang (OUC) who emphasised the importance of collaboration and reiterated OUC's commitment in supporting the implementation of CLIVAR project. The side event which was sponsored by OUC not only facilitated future collaborations in an increasingly challenging environment but is also overall relevant to formulating the next CLIVAR science plan and implementation strategy.



Participants of Side Event: Enhancing International Ocean-Climate Research Collaboration in a Changing Climate.

It proved to be yet another lively and fruitful day, despite the brief interruption in the afternoon by fortunately an uneventful tremor from a magnitude 5 earthquake that occurred in Bali Sea. To celebrate the successful week which was also dedicated for the 30th Anniversary of CLIVAR, participants gathered for a dinner reception by Kuta Beach behind the meeting venue which further promoted social interactions among members and guests.

Day 5: Pan-CLIVAR Meeting

The event conclusion on **Friday** 26 September remained filled with engaging scientific activities starting with a plenary session chaired by Gokhan and Francois that was aimed to help initiate the next CLIVAR science plan and implementation strategy. The session began with two plenary talks. Prof. Nicole Lovenduski (CLIVAR MHW member) presented on 'The Impact of Storms on Southern Ocean Energy and Carbon Cycling', exploring the issue using a novel high-resolution model and whether the existing biogeochemical Argo floats can measure the impact in a statistically robust way. Dr. Joanna Staneva (Hereon) presented on 'Digital Twins of the Ocean for Sustainable and Climate-Responsive Marine Management' which illustrated the integration of observations with physical and biogeochemical models enhanced by artificial intelligence (AI) to improve prediction skill and simulation of ocean-climate events, effectively bridging science to policy development, risk management and stakeholder engagement.



Closing plenary session of the Pan-CLIVAR Meeting 2025 with two speakers Joanna Staneva (top left) and Nicole Lovenduski (top centre with Gokhan) followed by discussions on the event led by CLIVAR panel representatives.

The plenary session proceeded with CLIVAR panels and research foci representatives to report on key points that came up at their meetings during the week which include: threats to ocean-climate observations especially the absence in the equatorial Western Pacific; reinforcing engagement with Pacific Island countries; the emergence of AI; model biases; understanding and simulating marine heatwave processes including impacts on biogeochemistry; engaging stakeholders and policymakers; reinforcing several ongoing collaborations among panels, RF, and external projects; new initiatives formed at Pan-CLIVAR 2025 (e.g., IORP's new task teams on paleo and Indonesian Seas), and new interactions among panels, such as GSOP with OMDP and MHW RF.

The plenary session was concluded with the announcement of the new CLIVAR logo, new ECR Award scheme, and acknowledgments.

Despite the plenary session formally closing the Pan-CLIVAR 2025, the event was programmed to continue into late afternoon. Before breaking to lunch, a side event and a closed SSG meeting ran in parallel.



Closing plenary session of the Pan-CLIVAR Meeting 2025 picturing Bintang Bali Resort staff, Cristiana Stan (top centre), and Catherine Michaut with two of the event volunteers (bottom left).

Day 5 Side Event. The interactive side event titled ‘Inclusive Innovation for Ocean and Climate Observations’, moderated by Juliet Hermes (CLIVAR SSG member) and co-sponsored by Rip Curl Asia, highlighted efforts in observing the ocean particularly in the coastal zones where observations are sparse and challenging. It was opened by Dr. Nelly Florida Riama, BMKG leadership and Data Buoy Cooperation Panel (DBCP) Chair, followed by a series of presentations. Patrick Gorringe (Swedish Meteorological and Hydrological Institute) presented examples of accessible, scalable technologies such as sensors that can be attached on fishing rods, an app that can measure ocean colour, sensors that can be taken during surfing and diving, and sensors on fishing nets as part of a major initiative Fishing Vessel Ocean Observing Network (FVON) which is an emerging network under GOOS. Lizzie Murray (A Liquid Future) then explained how the surfing community through implementation of surfboard sensors can close coastal data gaps. James Hendy, president director of Rip Curl Indonesia, gave a speech on the popularity of surfing in Bali and the coastal environmental issues facing the community, bringing along with him the CEO of Rip Curl School of Surf and a first female Balinese surfer who assisted participants at the beach. But before heading out, there were two more talks by Drs. Faruq Khadami and Lamona Bernawis from ITB who respectively spoke on low-cost AI-powered camera vision to monitor waste conditions in aquatic environments and Midi Secchi disc to measure water turbidity.



Side Event: Inclusive Innovation for Ocean and Climate Observations: Lizzie Murray with Juliet Hermes (top left), Nelly Florida Riama, James Hendy, Faruq Khadami, Lamona Bernawis (top right), Patrick Gorringer (centre), and surfing sensor app demonstration at Kuta Beach.

Day 5 SSG Session. Following a closed SSG meeting that was dedicated for discussing partnerships and proposals of new research foci, an open SSG session attended by CLIVAR members and partners was held. Led by Gokhan and Francois, the session outlined several considerations for the science plan and implementation strategy based on the input of the session participants.



There was also an address on OceanObs by Prof. Fei Chai illustrating the evolution of the initiative growing from 300 participants in 1999 in France of which Argo was started, to 600 in Italy 2009 that

launched a framework of ocean observations with detail on physics to biogeochemistry, and 1,500 in Hawaii 2019 leading to the UN Decade of Ocean Science. Currently OceanObs'29 is being planned with the vision for ocean observations beyond 2030, starting with an ad hoc committee of 19 members that are helping to select program committee members.

Further discussions on several issues that are relevant to CLIVAR continued. In summary, the SSG session provided ideas on how to move forward in terms of CLIVAR as a whole, science plan/implementation strategy, and engagement with OceanObs'29. Participants were invited to submit articles for [CLIVAR Exchanges](#), sharing their experience and what they learnt during the week in Bali.

The Pan-CLIVAR 2025 concluded with reinvigorated energy and friendships among the participants to drive activities for advancing ocean-climate science to the benefit of the environment and society.