Challenger 150 Halfway Highlights

January 2026

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

DOSI
DEEP-OCEAN STEWARDSHIP INITIATIVE

CHALLENGER 150

Halfway Highlights

CELEBRATING

COMMUNITY	RESEARCH	PARTICIPATING	PUBLISHED
65	42	52	5
SPEND ($m)	CRUISES	COUNTRIES	PAPERS

At the halfway mark of the UN Ocean Decade, Challenger 150 has significantly expanded global engagement in deep-sea research. With members from over 52 nations and growing, the programme is energised by early career leadership, collaborative proposals, strategic reviews, and international training initiatives. We continue to build toward our original five objectives, with clear progress in training, sampling, and early-stage policy integration.

Key facts

- 42 research cruises contributed by the community
- $65 million in estimated community spend to date
- 52+ participating nations (more than double that at the start of the programme)
- Regional working groups have matured, and new proposals for ship time are advancing globally
- Five published papers with more in development

Training and ECOP Leadership

We set ourselves an objective to engage with early career ocean professionals (ECOPs) and extend global capacity for deep-sea research, particularly in small island developing states (SIDS) and least developed countries (LDCs).

Achievements so far:

- Eight ECOPs serve as co-leads across our Regional Working Groups, gaining critical leadership experience and international networking
- The African Network of Deep-water Researchers (ANDR) has not only been established in this time, but has expanded to include 231 members across 27 African nations, from over 140 institutions, with 76% early career researchers. In 2024, ANDR published *Practical Actions to Strengthen Capacity for Deep-water Research in Africa*, identifying and proposing a series of short-, medium-, and long-term measures to strengthen Africa's capacity for deep-water research.
- Collaboration with other UN Decade Programmes (e.g., DOOS) to establish the Deep Ocean ECOP Task Team, whose objectives are (1) to connect ECOPs with ongoing deep ocean decade programmes and projects, (2) to provide tailored training, workshops and mentorship, and (3) to form Topical Working Groups based on community needs and scientific knowledge gaps.

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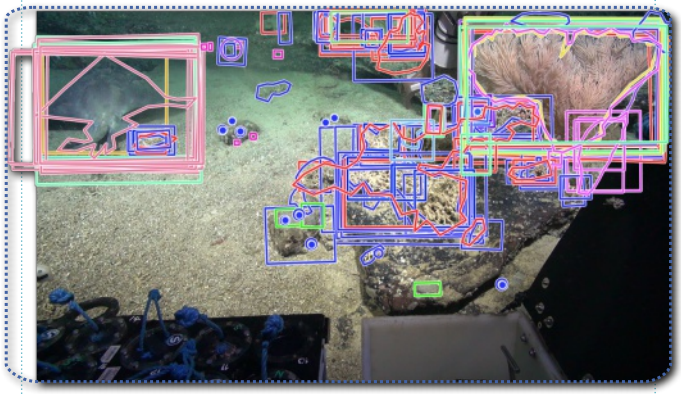
Training Initiatives

Training and development remain central to the Challenger 150 vision of transforming global deep-sea science through collaboration, inclusivity, and the elevation of ECOPs. Over the past five years, the programme has significantly invested in targeted training efforts to extend deep-sea expertise, particularly in underrepresented regions and career stages. These training initiatives have offered hands-on experience, encouraged interdisciplinary learning, and strengthened regional capacity through a combination of in-person, field-based, and virtual platforms. Examples of such training efforts include:



– The Image-based Megafaunal Working Group delivered a successful online training session focused on standardised approaches to benthic image analysis. The session engaged 62 participants from 19 countries and all career stages, delivering practical experience in image annotation and interpretation. The training not only improved technical capacity but also helped develop a shared methodology to enhance comparability across regional studies.

– An immersive two-week Deep Ocean Course in Costa Rica, led by Elva Escobar and conducted in Spanish, targeted both undergraduate and graduate students from multiple disciplines. The course introduced participants to core concepts of deep-sea science, encouraged cross-disciplinary collaboration, and was pivotal in fostering deep-sea expertise in Latin America.

– A unique public outreach initiative, the Floating Classroom Satellite Activity (IceDivA project), was ed by Saskia Brix, linking deep-sea scientists aboard the RV *Sonne* with audiences at the Senckenberg Museum in Germany. Through real-time broadcasts and interactive sessions, the Floating Classroom showcased live deep-sea exploration and promoted wider awareness of ocean research and its relevance to a sustainable future.

– As part of the BAIT Project, Teresa Amaro and Amelia Bridges delivered practical, in-field training on the deployment and analysis of drift camera systems. This initiative gave participants direct experience with deep-sea monitoring equipment, reinforcing observational skills essential for data acquisition in challenging deep-sea environments.

– The COBRA Project, under the leadership of Beth Orcutt and Julie Huber, continues to deliver deep-sea masterclasses, blending scientific content with skills development in stakeholder engagement and policy-relevant research design, and equipping participants to navigate the science-policy interface.

– The DeepOGen Project, led by Tim Shank and Rachel O'Neill, provides early-career workshops, cruise and proposal-writing masterclasses, as well as hands-on production of genomes from deep-water corals and hydrothermal vent-endemic fauna.

– The NEPDEP Project, led by marine experts from Federal and Indigenous governments, provides unique and invaluable capacity sharing opportunities through annual expeditions to proposed and existing Marine Protected Areas. It offers *in situ*, inclusive experience for participants at all levels, supporting co-created science, place-based knowledge integration, and authentic co-management of the MPAs NEPDEP has helped to establish.

Expanding Deep-Sea Knowledge

A central ambition of Challenger 150 has been to significantly expand the spatial and temporal coverage of deep-sea biological observations, with a particular focus on underexplored regions, both in areas beyond national jurisdiction and within the exclusive economic zones of SIDS and LDCs. This global-scale ambition underpins the programme's contribution to the UN Decade of Ocean Science for Sustainable Development by enhancing our knowledge-base and supporting equitable access to deep-sea science.

At the halfway point of the UN Ocean Decade, our members have collectively undertaken 42 deep-sea research cruises (see overleaf) and Challenger 150 continues to catalyse new expeditions through Regional Working Groups and partnerships. The strategic coordination of these efforts has helped bridge critical knowledge gaps, establish collaborative networks, and lay the groundwork for long-term, sustainable exploration and monitoring of deep-sea ecosystems.

Challenger 150's scientific roadmap was laid out through two foundational publications - a vision paper in *Nature Ecology & Evolution* and a global blueprint in *Frontiers in Marine Science* - which articulated the goals, structure, and methodology for a globally coordinated deep-sea research programme. These documents have since guided our efforts across all major ocean basins and provided a framework for assessing progress, refining priorities, and coordinating across scales.

Benchmarking existing knowledge was a critical first step. To this end, several regional review papers have been published or are under development:

Published reviews:

– Central & South Atlantic

– Arctic

Submitted/in progress:

– North Atlantic (submitted)

– NE Pacific (near-final)

– Indian Ocean, NW Pacific (in development)

These reviews, led by Regional Scientific Research Working Groups (RSR-WGs), assess the state of knowledge, identify key gaps, and support targeted expedition planning and funding applications.

Workshops and basin-scale collaboration

In addition to publications, Challenger 150 has facilitated collaborative science planning through a series of high-impact workshops:

– DASCAO Workshop (March 2023, Arctic RSR-WG): Focused on ecosystem sustainability in the Central Arctic Ocean, this workshop brought together international experts to align scientific priorities with policy discussions on Arctic governance.

– NW Pacific RSR-WG Workshop (July 2022): Explored how the group could work across local, regional, and global scales to integrate and scale deep-sea science activities.

– WIOMSA Symposium (Indian Ocean October 2022): Enabled discussion of key regional science gaps and supported the ongoing development of an Indian Ocean regional review and expedition proposals.

– All-Atlantic Deep-Ocean Biodiversity Mapping Workshop (Year 3): Laid the foundation for quantitative mapping and modelling of deep-sea biodiversity and contributed to efforts toward a deep-ocean digital twin.

– UK SIN Brainstorming Workshop (February 2024): Facilitated co-development of new collaborative projects for deep-water research in Nigeria and Kenya.

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The African Network of Deep-Water Researchers (ANDR)

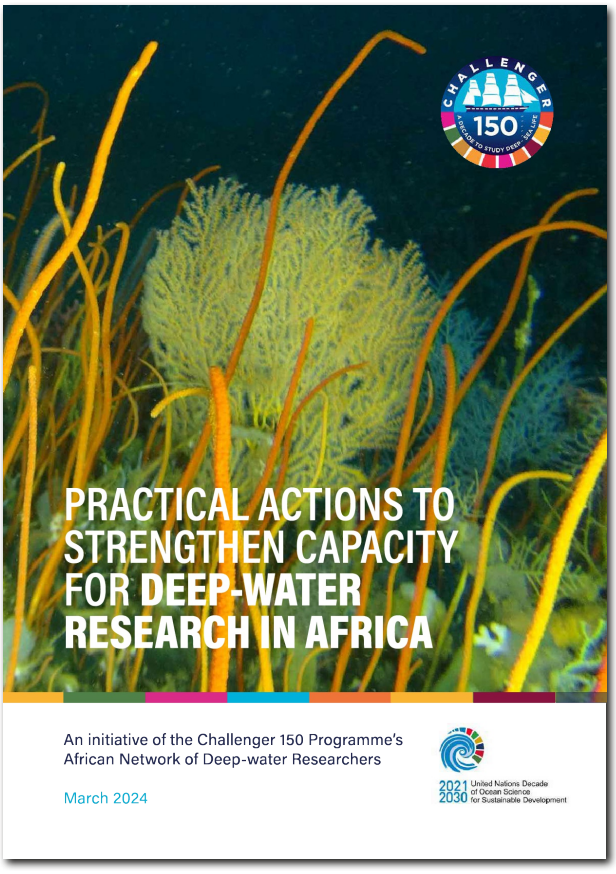
Coordinators: Kirsty McQuaid (South Africa), Agnes Muthumbi (Kenya) & Isa Elegbede (Nigeria)

The ANDR currently has over 300 members from 27 African nations, representing over 140 institutions with 76% early career researchers. As a pan-African initiative, ANDR connects East, West, Central, and Southern African researchers to foster inclusive, cross-cutting deep-water science.

Activities have included producing a report on practical actions to strengthen training for deep-water research in Africa, co-development of project proposals, supporting African participation in international cruises and training and a monthly seminar series for networking and news dissemination.

Next steps for the network include regional reviews on knowledge baselines, infrastructure availability and research activities, further co-development of research proposals and partnerships to support training.

ANDR is positioning Africa as a leader in equitable deep-ocean research.



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Advancing Observations Through Expeditions

With guidance from regional reviews and workshops, Challenger 150 has catalysed multiple new expedition proposals - especially targeting regions where data remain sparse. Several regional groups have successfully developed proposals for ship time, often in partnership with the Schmidt Ocean Institute (SOI) and other supporters:

- South & Central Atlantic RSR-WG: Members have submitted multiple proposals, with three cruises approved for 2025 and three further submissions made for 2026. Plans for four expressions of interest are under development for 2027, including through the African Network of Deep-water Researchers.
- SE Pacific RSR-WG: Members have been actively involved in joint SOI cruises and plan to reconvene to define new expedition goals.
- Indian Ocean RSR-WG: Currently developing cruise proposals alongside a systematic literature review to better understand regional data gaps.
- NW Pacific RSR-WG: Coordinating with JAMSTEC and Ocean Census to support multiple upcoming cruises focused on chemosynthetic ecosystems, including those led by Prof. Qian's Digital Depth program.

These efforts reflect a growing ecosystem of coordinated, science-driven exploration with increasing global representation.

The Challenger 150 programme hosts and supports a total of eleven Ocean Decade Projects, which are all delivering insights into deep-ocean environments globally, specifically focusing on underexplored regions.

AleutBio Project: AleutBio investigated the species composition of the Bering Sea at two stations and the unknown abyssal and hadal Aleutian trench. Moreover, an analysis of species connectivity across large geographical distances between the Bering Sea, Kuril-Kamchatka Trench and the Aleutian Trench was conducted for selected species.

SMARTEX Seabed Mining & Resilience To EXperimental impact (SMARTEX) Project: The SMARTEX project has been officially recognised by UNESCO as a

"Decade Action" under the UN Decade of Ocean Science for Sustainable Development 2021–2030 (Project No. 109.2) under the international UN research program Challenger 150. SMARTEX has investigated the deep-sea environment on two expeditions to Pacific Clarion Clipperton Zone, focused on understanding abyssal ecosystems. As well as making new observations and collections directly, the project is also synthesising other observations in the CCZ to generate regional scale understanding of biodiversity, biogeography and connectivity. The project also has advanced our understanding of resilience of abyssal ecosystems to anthropogenic disturbance associated with deep-sea mining.

Deep-Ocean Genome Project: Woods Hole Oceanographic Institution (Tim Shank) and the University of Connecticut's Institute for Systems Genomics (Rachel O'Neill) have partnered to create the Deep-Ocean Genomes Project, an affiliated project of the Earth Biogenome Project.

The project employs cutting edge next generation sequencing technologies and comparative genomics methods to obtain fundamental new knowledge of the organisation, evolution, functions, and interactions of life in the deep ocean.

Marine Research Cruises in Remote Areas (CIMAR Project): coordinated by the National Oceanographic Committee of Chile, during 2022 and 2023, cruises have been conducted between the American continent and Rapa Nui (Easter Island) and Desventuradas Islands (San Felix and San Ambrosio), also covering the Salas y Gomez Ridge and areas beyond national jurisdictoin. During these cruises, different scientific projects have been developed by Chilean researchers.

Others

- Building capacity to protect marine biodiversity (BAIT)
- Northeast Pacific Deep-sea Exploration Project (NEPDEP)
- Co-designing science for biodiversity and resilience in the deep ocean (COBRA)
- Icelandic marine Animals meet Diversity along latitudinal gradients in the deep sea of the Atlantic (IceDivA)
- Conservation of the deep-sea in light of mining (DEEP REST)
- Vulnerability of the deep-sea facing exploitation (LIFEDEEPER)
- One Ocean Hub Research Programme 4

All expeditions conducted to date under the Challenger 150 programme are mapped and described on the Challenger 150 website (scan QR code below).

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Regional Activity Summary

Regional Scientific Research Working Groups (RSR-WGs) are the operational backbone of Challenger 150, driving collaborative, place-based science and training across ocean basins. Over the next five years, these groups will play a pivotal role in delivering co-designed science, advancing regional reviews, building biogeographic coherence, and developing basin-scale research strategies aligned with the programme's global goals. Below is a regional overview of current progress and forward-looking priorities.

North Atlantic

Coordinators: Louise Allcock (Ireland) & Veronique Merten (Germany)

The North Atlantic RSR-WG, with over 100 members, meets quarterly and has produced a comprehensive review of deep-sea species and ecosystems in the North Atlantic. This effort provides an essential benchmark of ecological knowledge and complements the wider Challenger 150 aim to map Atlantic deep-ocean life. Submission of this Atlantic-wide integrative review paper, developed with extensive contributions from the Western Tropical Atlantic represents a major milestone. This synthesis sets the stage for harmonised biogeographic assessments and deepens trans-basin coordination. Ongoing collaboration with the South & Central Atlantic RSR-WG focuses on identifying data gaps and research priorities to guide joint fieldwork and sampling strategies.

South & Central Atlantic

Coordinators: Kirsty McQuaid (South Africa) & Kerry Howell (UK) - temporary

This RSR-WG of over 80 members published a landmark review in 2023: "*Review of the Central and South Atlantic Shelf and Deep-Sea Benthos: Science, Policy, and Management*." With input from 45 authors across 18 nations, it is the most detailed summary to date of this under-explored region. The group thrived under the co-leadership of Dr Maila Guilhon who stepped down in 2025, and is now seeking new leadership from the South American continent.

In parallel with publication efforts, the group has been active at sea, conducting biodiversity surveys around Ascension and St Helena Islands. The group is now advancing basin-scale research through Expressions of Interest to the Schmidt Ocean Institute. Three cruises were approved for 2025, with an additional four proposals in development for the period 2026-2027. The group is also collaborating with the North Atlantic RSR-WG on data synthesis to improve biogeographic coverage and guide sampling strategies.

Eastern Central Pacific / Western Tropical Atlantic (Tropical Atlantic)

Coordinators: Erik Cordes (USA) & Elva Escobar (Mexico)

The Tropical Atlantic RSR-WG has made key cross-regional contributions, co-authoring the Atlantic review and integrating deep-sea themes into the IOCARIBE Capacity Development Strategy (2023-2025). The group also participated in high-level ocean literacy and training efforts, including the All-Atlantic Blue Schools initiative and the 6th Session of the IOC Group of Experts on Capacity Development. These actions strengthen regional science training and stakeholder engagement in the Western Tropical Atlantic.

Indian Ocean

Coordinators: Agnes Muthumbi (Kenya) & Baban Ingole (India)

With 45 members meeting quarterly, the Indian Ocean RSR-WG is conducting a systematic review of deep-sea biodiversity and data gaps across EEZ and ABNJ regions. This initiative is led by early-career researchers and provides a foundation for cruise planning in 2026 and beyond.

Members are now developing collaborative research proposals to the Schmidt Ocean Institute and other funders, aiming to launch multinational expeditions. This RSR-WG is poised to be a key driver in expanding deep-sea science capacity across one of the world's most populous and data-limited regions.

Northeast Pacific

Coordinators: Katie Bigham (USA), Fanny Girard (USA)

This RSR-WG of 68 members is nearing completion of a regional review, following an active year of cruises in areas such as the Aleutians, Juan de Fuca Ridge, Canadian Pacific, and Southern California. Planned outputs include imagery metadata, sample inventories, and educational materials tailored for both public and Indigenous audiences.

Leadership transitioned from Jim Barry and Amanda Kahn in 2025, and the group is preparing to host its first in-person meeting with a focus on integrating historical datasets into OBIS and producing regional ecosystem ID guides.

Northwest Pacific

Coordinators: Hiromi Watanabe (Japan) & Rachel Downey (Australia)

With 34 members, this RSR-WG is gaining momentum. A regional symposium in Chiba (February 2025) focused on deep-sea biogeography and included trench ecosystem sessions. The group is coordinating multiple upcoming cruises with JAMSTEC and Ocean Census, and is exploring opportunities for broader Pacific-wide collaboration. A shared activity spreadsheet and hybrid symposium format are strengthening connections. The group also celebrates the recognition of Angelika Brandt with the International Prize for Biology for deep-sea research.

South East Pacific

Coordinators: Patricia Esquete (Portugal) & Tanja Stratmann (Netherlands)

This RSR-WG secured three RV *Falkor(too)* research cruises across 2024-2025, spanning the Salas y Gómez Ridge, the Chilean subduction zone, and Antarctic waters. These missions targeted biodiversity, chemosynthetic habitats, and polar dynamics. Participants are now preparing a high-impact publication on Antarctic deep-sea faunal discoveries. Cruise planning continues, with strong engagement in upcoming Decade opportunities.

Mediterranean

Coordinators: Erik Simon Lledó (Spain) & Ariadna Mecho (Spain)

This newly formed RSR-WG is preparing for its first official meeting. It will focus on synthesising existing deep-sea data across Mediterranean subregions and aligning efforts with other Decade initiatives.

Arctic

Coordinators: Eva Ramirez-Llodra (Norway) & Heidi Meyer (Norway)

With growing interest due to sea ice retreat and industrial pressures, the Arctic RSR-WG has published a key review: "*The emerging picture of a diverse deep Arctic Ocean seafloor*." A follow-up paper on anthropogenic impacts is underway.

The group is fostering global collaboration, early-career researcher participation, and expanded observation across a region where most of the seafloor remains unexplored. Scheduled meetings will further coordinate Arctic deep-sea science.

Antarctic

Coordinator: Andrew Thurber (USA)

Efforts are currently underway to revitalise Antarctic engagement within the Challenger 150 framework. The Southern Ocean remains a critical frontier for deep-sea exploration and understanding, and the coordination team is actively reaching out to regional experts to capture ongoing and planned research activities.

Input is being gathered to document relevant cruises, research priorities, and opportunities for collaboration. This will inform the development of a cohesive regional strategy that aligns with Challenger 150 goals and ensures that the Antarctic is fully represented in global deep-ocean science initiatives.

Researchers with interests in Antarctic deep-sea ecosystems are encouraged to engage with this RSR-WG to contribute to upcoming planning efforts.

The Road Ahead: Creating a Platform for Legacy and Future Discovery

With a robust scientific and collaborative foundation established in the first half of the Ocean Decade, Challenger 150 now turns toward a transformative second phase. The years 2026-2030 will see the programme scale its impact, deepen regional engagement, and more fully align with global ocean sustainability agendas. This next chapter will prioritise co-designed, inclusive science while advancing the standardisation, integration, and open sharing of deep-sea knowledge to support effective policy and decision-making.

As Challenger 150 moves into its second half, it remains anchored in the goals of the UN Decade of Ocean Science: to deliver the science we need for the ocean we want. By empowering regional science communities, fostering global data integration, and influencing policy pathways via DOSI, the programme is not only uncovering the secrets of the deep, but building the collaborative research systems needed to steward it for generations to come.

Re-energising regional structures

Challenger 150's network of RSR-WGs has been a cornerstone of its basin-scale coordination. Over the next few years, the programme will:

- Reactivate and refresh RSR-WGs, particularly in underrepresented areas such as the South-East Pacific and Antarctic
- Support new leadership transitions, creating space for emerging scientists and early-career ocean professionals (ECOPs) to lead RSR-WG activities.
- Ensure regular inter-group dialogue, including through annual virtual meetings and dedicated hybrid workshops to align science plans and share progress.

Scaling continental and cross-basin networks

Challenger 150 will continue building inclusive, continental-scale platforms such as the ANDR and similar emerging initiatives in Latin America and Southeast Asia. These networks aim to:

- Bridge geographic and disciplinary gaps across EEZs and areas beyond national jurisdiction.
- Increase visibility of deep-sea research and support national marine science agendas.
- Facilitate regional leadership in decision-support, data stewardship, and cruise planning.

Advancing scientific standardisation

To enhance comparability, interoperability, and reusability of deep-sea data globally, Challenger 150's technical scientific research working groups (TSR-WG) will prioritise:

- International standards for image-based analyses, including QA/QC frameworks and shared reference libraries.
- Trait-based ecological assessments, enabling ecosystem functioning studies and predictive modelling.
- Harmonised protocols for marine litter classification, facilitating linkage with pollution databases and sustainable waste management efforts.
- Metadata collection and archiving, supporting FAIR data principles and long-term accessibility via open repositories such as OBIS, PANGAEA, and others.

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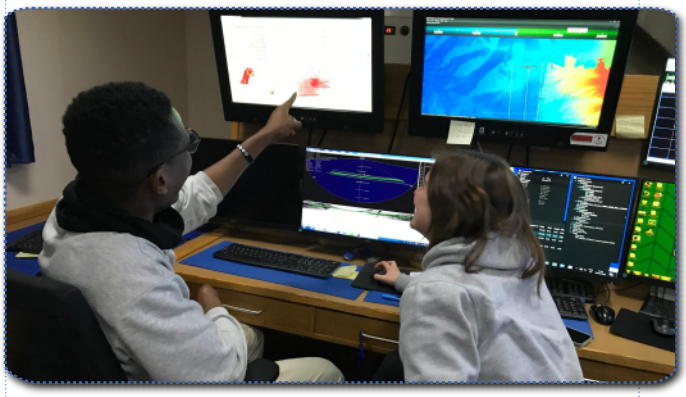
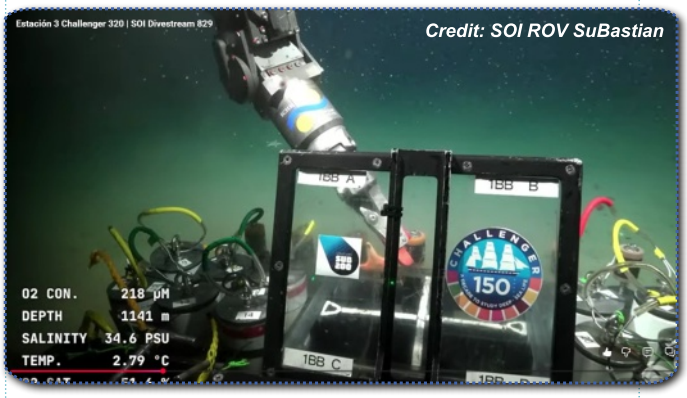
Expanding the Deep Ocean Training (DOT) initiative



Training remains central to Challenger 150's mission. The next phase will:

- See growth of the DOT initiative through our partnership with REV Ocean, combining research expeditions with onboard and virtual training.
- Partner with other vessels of opportunity to expand geographic coverage and equip the next generation of deep-sea scientists.
- Develop thematic training modules, including sessions on deep-sea taxonomy, imaging, sampling ethics, and co-design with Indigenous and coastal communities.



Decision-making Support and Policy Integration

Deepening DOSI engagement

Challenger 150's close alignment with the Deep-Ocean Stewardship Initiative (DOSI) will remain central as international governance frameworks evolve. Over the next few years, the programme will work with DOSI to:

- Support the development of science-based decision tools, such as ecosystem models, habitat sensitivity maps, and knowledge briefs for policymakers.
- Contribute to global and regional fora, including the BBNJ negotiations, CBD, ISA, and other UN bodies, offering actionable insights from deep-sea science.
- Strengthen links between science and diplomacy, especially for small-island developing states (SIDs) and least-developed countries (LDCs).

To learn more about the Challenger 150 programme and its global activities, scan the QR code or contact:

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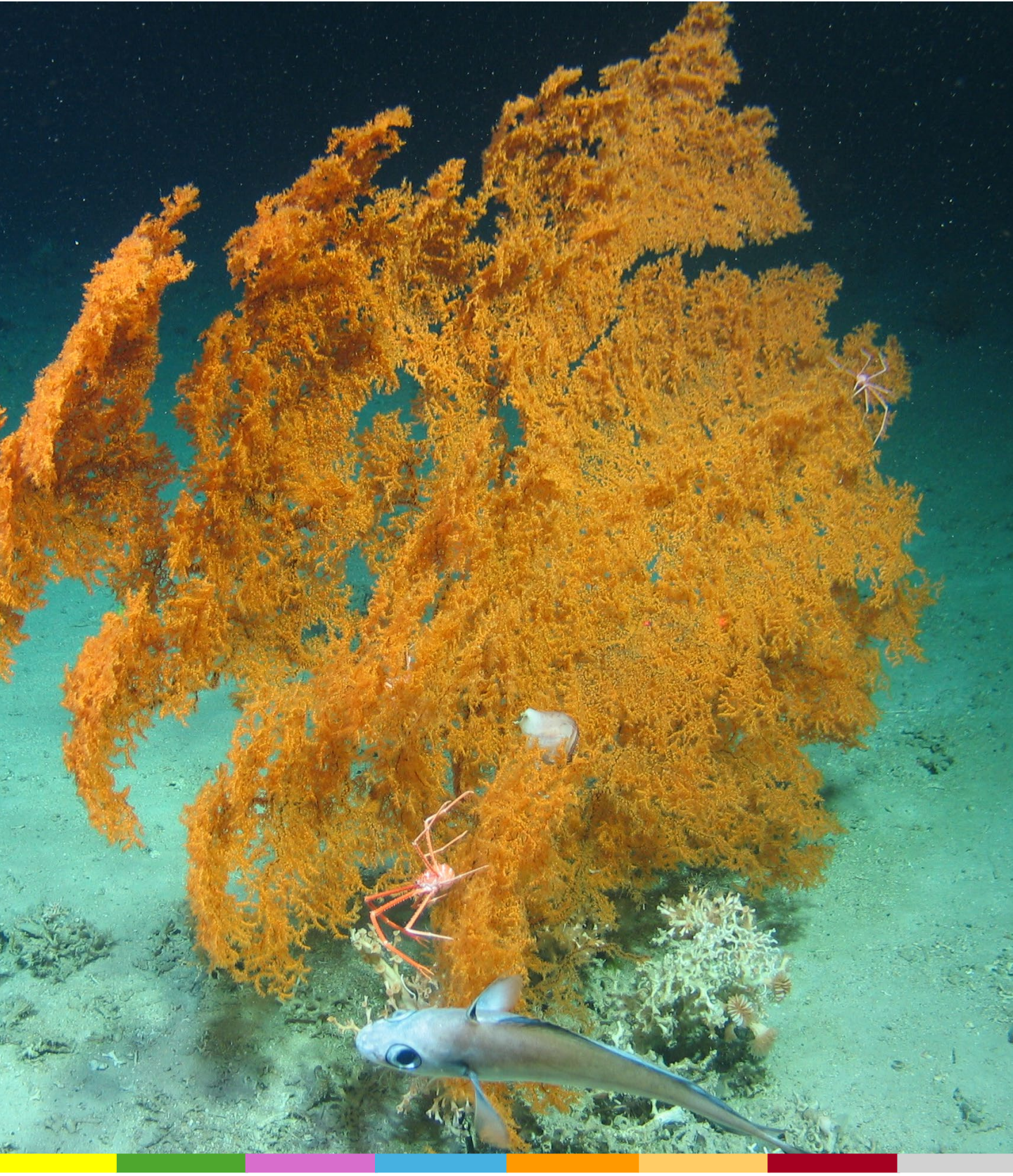

CHALLENGER 150
A DECADE TO STUDY DEEP-SEA LIFE

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