CHALLENGER 150

Year 3 Highlights

CELEBRATING

33 RESEARCH CRUISES

12 REGIONAL GROUPS

This year the Challenger 150 programme has continued to focus its efforts on training and capacity building to broaden the deep-sea science base and support early career researchers joining the field. Key activities have been the development of an Africa-focused report, online training and standardisation workshops in image analysis, and support via the regional working groups for new Principal Investigators to develop ship-time proposals for submission to programme partners Schmidt Ocean Institute.

The African Network of Deep-water Researchers (ANDR) released "Practical Actions to Strengthen Capacity for Deep-water Research in Africa". This report proposes a series of short-, medium-, and long-term measures to strengthen Africa's capacity for deep-water research. It was released alongside the 2024 Ocean Decade Conference (Barcelona, April 2024), highlighting work since the beginning of the Ocean Decade. Understanding deep-water ecosystems is key for their management, but there are substantial discrepancies in countries' abilities to achieve this.

Through a series of online workshops, the ANDR brought together 98 individuals from 19 African nations to discuss challenges for deep-water research in Africa, identify solutions to overcome these, and propose practical actions.

Also at the UN Ocean Decade Conference, Kerry Howell was a panellist on "*Ocean Census: Discovering Marine Life*", while Ana Hiário and Amelia Bridges were panellists on "*Gathering Forces for Science-Policy Nexus, Innovation, and Funding*". Challenger 150 was featured prominently at the Deepening the Decade booth - convened by DOSI - alongside other Ocean Decade programmes, and had a poster on permanent display throughout the conference.

Challenger 150 has signed an MoU with Seabed 2030 to cooperate on mapping the ocean floor. Seabed 2030 maps together with biological data from Challenger 150 will provide essential information for the creation of habitat maps and species distribution models in the deep sea.

Finally, Kerry and Ana have been recognised by the UK Science and Innovation Network in Portugal for promoting international collaboration.

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

CHALLENGER 150

MEET SOME OF THE TEAM

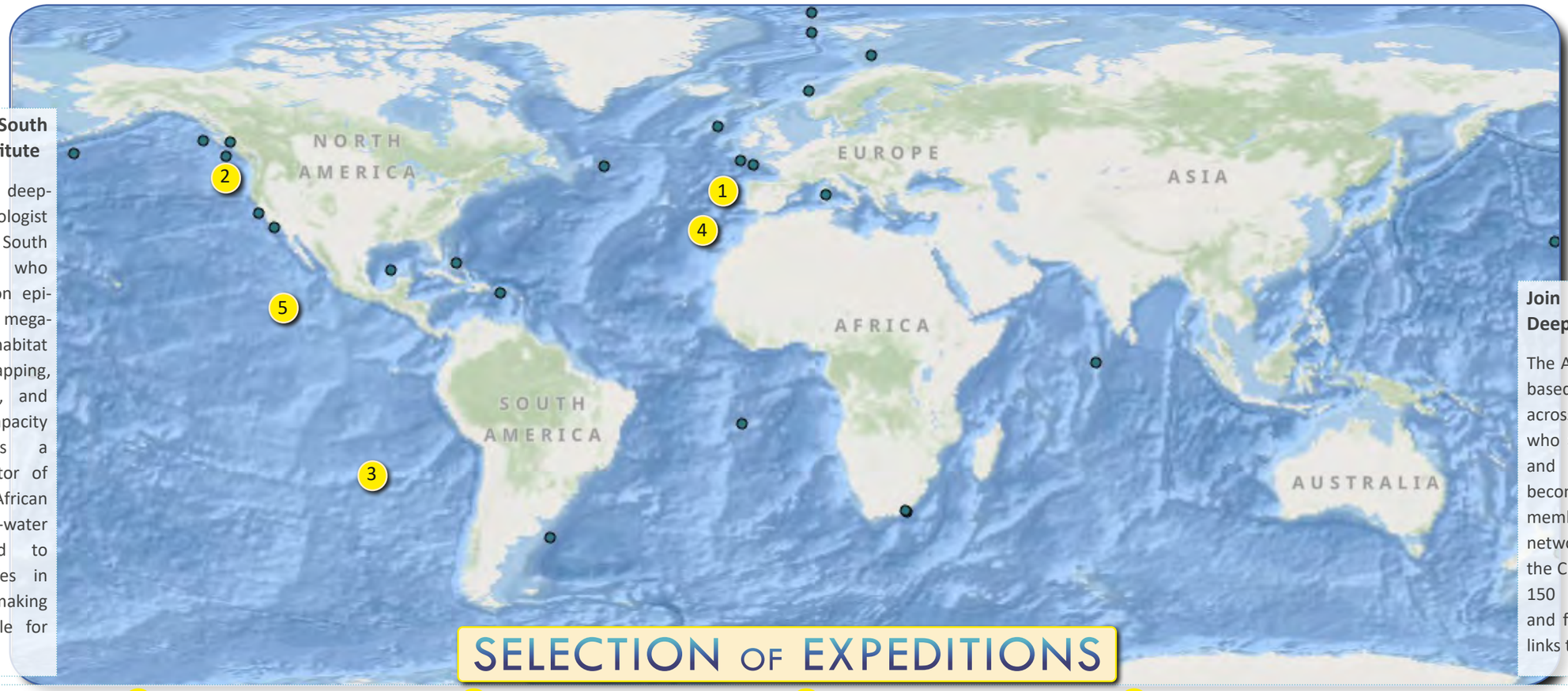
WORKING TOGETHER ACROSS FIVE OCEAN BASINS

DEEP-OCEAN STEWARDSHIP INITIATIVE

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Kirsty McQuaid, South African Biodiversity Institute

Kirsty is deep-sea ecologist based in South Africa who focuses on epi-benthic mega-fauna, habitat classification and mapping, marine spatial planning, and deep-sea research capacity development. She is a cofounder and coordinator of the Challenger 150 African Network of Deep-water Researchers, established to address global disparities in deep-water capacity by making the field more accessible for African researchers.



Join the African Network of Deep-water Researchers

The ANDR is open to individuals based in African institutes across disciplines and sectors who are interested in deep-sea and offshore research. To become a member of the network, visit the Challenger 150 webpage and follow the links to ANDR.

SELECTION OF EXPEDITIONS

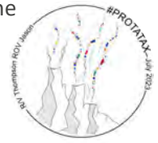
1 Deep-Ocean Training - DOT

In April/May 2024, the first DOT expedition took place onboard the Spanish RV *Sarmiento de Gamboa*, exploring the Aveiro Canyon off Portugal. DOT expeditions are designed to expand knowledge of deep-sea ecosystems in poorly known regions and build capacity in deep-sea biology. The expedition trained a new generation of deep-sea researchers, including graduate and undergraduate students from Portugal, Spain, Angola and Malaysia. They learned that weather conditions at the sea surface play an key role in deep-sea research.

2 PROT-ATAX

In July 2023, researchers **Julie Huber**, **Maria Pachiadaki** and **Sarah Hu**, in collaboration with WHOI aboard the RV *Thomas G Thompson*, led an expedition to Axial Seamount, a deep-sea volcano located in the northeastern Pacific Ocean, about 300 miles off the Oregon coast.

They studied protistan interactions with microbes, as these influence the distribution and diversity of microbial populations, as well as the flow of carbon, nutrients, and energy within deep-sea ecosystems.

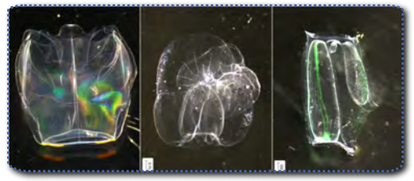


3 Unexplored seamounts of the Salas y Gomez Ridge

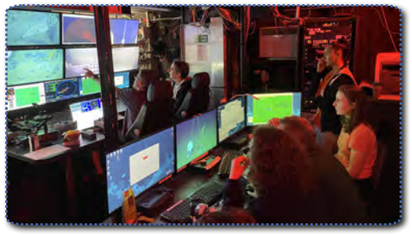
In April 2024, **Erin Easton** led an expedition aboard RV *Falkor (too)* to the Salas y Gomez Ridge, which extends from Chile to Easter Island in the Central Pacific Ocean. The remote Ridge provides unique habitats for deep-sea organisms, with many species found nowhere else. It remains largely underexplored. The cruise studied the biodiversity and connectivity of the area, focusing on how organisms reproduce, mature and disperse through ocean currents. The data gathered will be used to support the designation of a high-seas marine protected area.

4 JellyWeb Madeira

Jan Dierking and **Henk-Jan Hoving** led the JellyWeb Madeira research cruise in February 2024 aboard the RV *Maria S Merian*. This expedition focused on the biodiversity and functional roles of gelatinous plankton in food webs around Madeira in the North Atlantic. High-resolution habitat mapping was also performed using video transects and multibeam sonar. This research provided crucial baselines for assessing future changes in deep-sea ecosystems affected by climate change and other human pressures.



5 SMARTEX 2 - JC257



Also in February 2024, **Adrian Glover** and **Daniel Jones** aboard the RRS *James Cook* led the second SMARTEX expedition to the Clarion-Clipperton Zone (CCZ) in the Northeast Pacific Ocean, to improve understanding of the abyssal ecosystem and its interconnections. They mapped seabed structures and linked them to biological patterns, studying the life histories and reproduction of organisms to understand their roles in biodiversity and food web maintenance. The aim was to establish baseline conditions in an undisturbed environment; critical information for assessing the environ-mental risks of future deep-sea mining activities.

SMARTEX

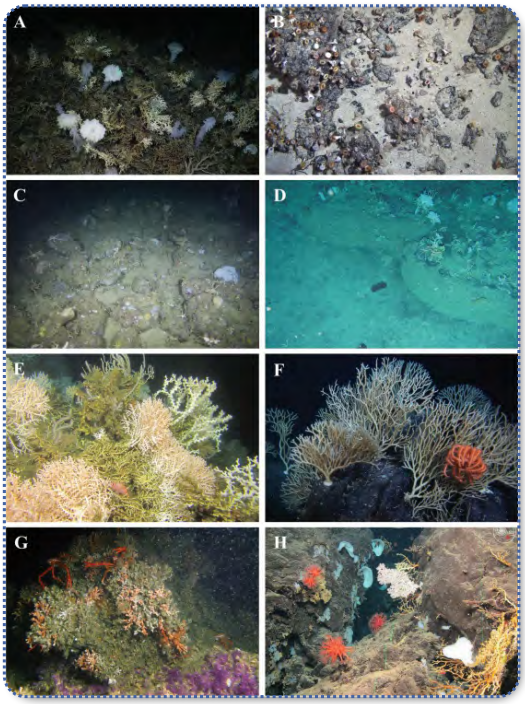
Photo credits:

1. Marta Tacao @MartaTacao twitter.com
2. Julie Huber @JulesDeep twitter.com
3. FKt-Dive636 Sample Recovery, schmidtocean.org
4. Siphonophores by Sonia KM Gueroun, MSM126 JellyWeb Madeira Blog, oceanblogs.org
5. x2 The National Oceanography Centre and the Trustees of the Natural History Museum, NERC SMARTEX project

DEEPENING REGIONAL KNOWLEDGE

Review of the Central and South Atlantic Shelf and deep-sea benthos: science, policy and management

In September 2023, the Challenger 150 Programme released its inaugural regional review focusing on Central and South Atlantic deep-sea ecosystems. Led by Amelia Bridges, the review involved 45 co-authors from 18 nations. It confirms that this region hosts a rich and diverse range of habitats, including thriving cold-water coral and sponge reefs. Yet like most areas, limited exploration has not stopped significant exploitation of its natural resources. Insufficient data hinders the sustainable management of activities like oil and gas extraction, fishing, and seabed mining, though some area-based management measures do exist in the region. The review highlights under-sampled areas like the Gulf of Guinea and the northeastern margin of South America, providing a baseline of knowledge and gaps as a guide for future research. It concludes by offering six consensus recommendations for research and management in the region. The full review and supporting database can be accessed for free here.



All Atlantic workshop on quantitative mapping and modelling of deep-sea biodiversity

In March 2024, the Centre for Environmental and Marine Studies (CESAM) in Aveiro, Portugal, hosted an international workshop to develop Atlantic-scale maps of the distribution of key species and habitats to inform a digital twin of deep-water biodiversity. The workshop was organised by the University of Aveiro and the University of Plymouth, and financed by the Department for Science, Innovation and Technology of the United Kingdom. Researchers from 12 countries (Portugal, UK, Norway, Iceland, Ireland, France, Spain, South Africa, Canada, USA, Brazil, Uruguay, and Argentina) contributed datasets, enabling modelling of current and future species distributions under climate change scenarios.

Predicting how the deep-ocean ecosystem responds to climate change, together with any associated impacts on society, is a key driver in the development of ocean digital twins. Digital twins enable simulations of possible outcomes from different decision pathways. However, they are based on thousands of observations across different regions to model responses to different scenarios, requiring significant international cooperation. The Challenger 150 programme is ideally placed to facilitate such cooperation and coordination of deep-sea biodiversity data sharing and research to inform sustainable development.

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

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