



MONACO EXPLORATIONS
Reconnecting Humanity and the Sea

INDIAN OCEAN EXPEDITION 2022

POST-EXPEDITION
PRESS KIT

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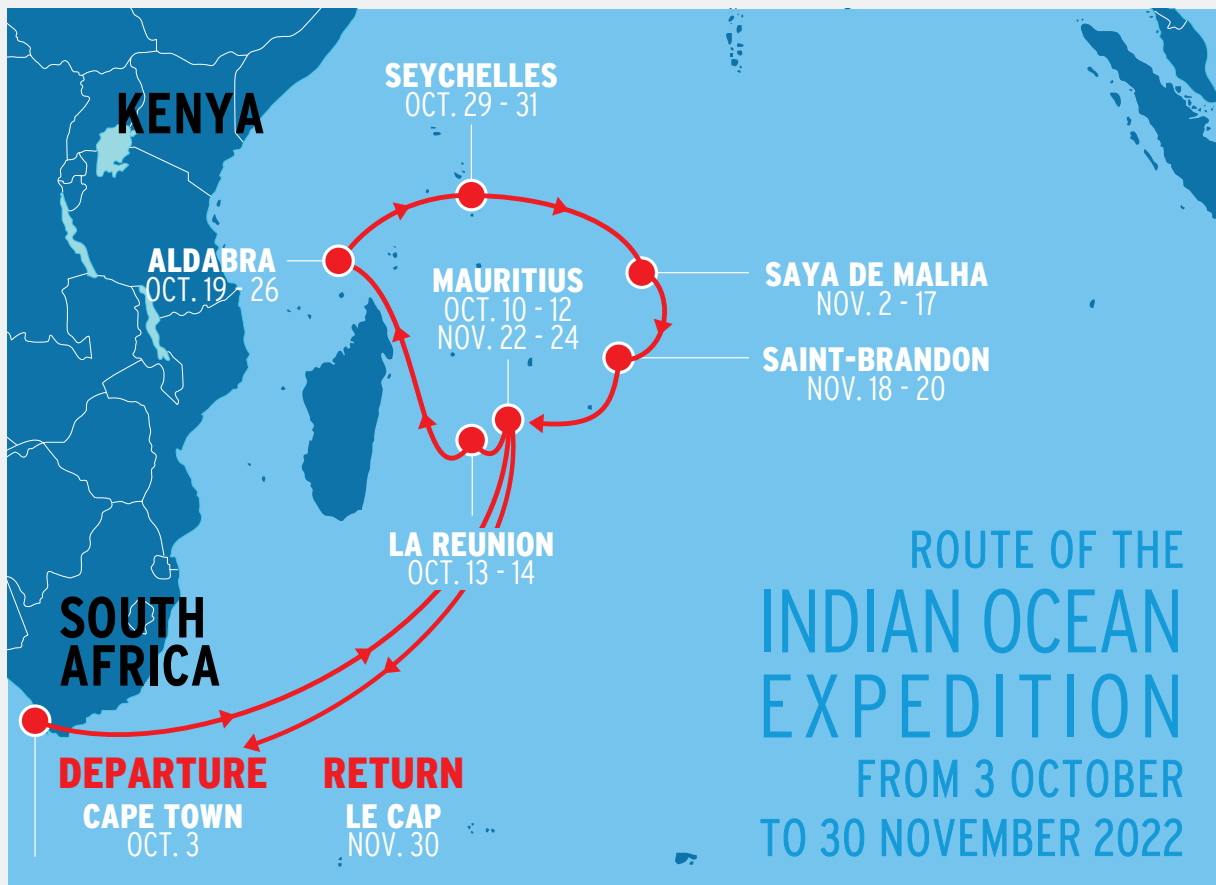


MONACO EXPLORATIONS

- As a platform serving the commitment of H.S.H. Prince Albert II of Monaco, Monaco Explorations supports Monegasque institutions by carrying out collective and international expeditions that combine scientific research, public outreach and government cooperation in line with sustainability science.
- 16 expeditions led or supported by Monaco Explorations worldwide since 2017 to understand, share and mobilize for the protection and sustainable and concerted management of the Ocean **"Reconnecting Humanity and the sea"**.

THE "INDIAN OCEAN" EXPEDITION

- First expedition of the "Monaco Explorations" project, endorsed as an action of the United Nations Decade of Ocean Sciences for Sustainable Development 2021-2030 (known as the "Ocean Decade").
- Expedition endorsed as a contribution to the Second International Indian Ocean Expedition (IIOE-2 - 2015-2025), a major scientific programme developed over ten years by the international scientific community to progress knowledge of the Indian Ocean.
- The Expedition focused on two categories of maritime areas in the Western Indian Ocean between Mauritius, Réunion and Seychelles: the Saya de Malha Bank on the Mascarene Plateau, and two islands: Aldabra, belonging to Seychelles, and Saint-Brandon, belonging to Mauritius.





OBJECTIVES : UNDERSTAND, SHARE AND MOBILIZE

- Using a multi-disciplinary scientific approach to understand the status and functioning of ecosystems of relatively little-known areas to advise stakeholders using a global scientific approach (sustainability science).
- An ambitious outreach programme to share the issues and knowledge with as many people as possible.
- Mobilize governments through diplomatic action, providing information and analyses for the sustainable management of maritime areas.
- A partnership-based approach: a programme co-designed with numerous partners: the authorities of Mauritius and Seychelles, and some sixty scientific institutions and civil society entities, and guided by a committee of international experts, ensuring links with international and regional organizations and initiatives.
- An international team of about **150 people of some twenty nationalities**, with a wide range of backgrounds: senior scientists, young researchers and students, artists, filmmakers and photographers, divers, communicators and civil society representatives.
- The chartering of one of the largest oceanographic vessels in service, the *S.A. Agulhas II*, belonging to the Government of South Africa.
- 10,000 nautical miles in two months.

TOWARDS THE PROTECTION OF SAYA DE MALHA, THE "INVISIBLE ISLAND"



Sampling by divers on the Saya de Malha Bank © Sven Bender - Autentic / Monaco Explorations

With an area of 40,000 km², the Saya de Malha Bank is one of the largest underwater seagrass beds in the world. It is home to little-known ecosystems that are remote and difficult to access but are under threat from heavy fishing pressure.

- This shallow bank has no landforms and is referred to as an "invisible island".
- Located on the high seas, it enjoys only very partial protection under the United Nations Convention on the Law of the Sea, under the continental shelf extension regime co-managed by Mauritius and Seychelles and limited to resources attached to the seabed and subsoil.



- The Expedition's ambition is to collect information to determine whether this area requires special protection and, if so, to identify the management measures to be considered in the context of the future treaty on the conservation and sustainable

use of the marine biological diversity of areas beyond national jurisdiction, known as the "BBNJ" treaty, the text of which was adopted on 20 June by the Intergovernmental Conference meeting under the aegis of the United Nations.

THE POLITICAL DIMENSION



Working meeting co-chaired by the President of the Republic of Seychelles and H.S.H. the Sovereign Prince of Monaco at the State House
© Nicolas Mathys - Zeppelin / Monaco Explorations

- Visit to Seychelles of H.S.H. Prince Albert II of Monaco:
 - Visit to Aldabra Atoll
 - Embarkation on *S.A. Agulhas II*
 - Official visit to Mahe
- Visit by the Vice-President of the Republic on board *S.A. Agulhas II* during the stopover in Mauritius at the end of the expedition

▷ HSH Prince Albert II of Monaco signs the Argo float handed over to the Republic of Seychelles by the Principality
© Nicolas Mathys - Zeppelin / Monaco Explorations



THE SCIENTIFIC PROGRAMME

OBJECTIVES

- Documenting and taking stock of little-known and isolated environments, taking stock of biodiversity, and gaining a better understanding of the physico-chemical and bathymetric characteristics of the environments studied
- A project in line with the logic of sustainability science: science at the service of sustainable development, transcending disciplinary boundaries and focusing on solutions-oriented research programmes.
- Ensuring "open" access to the scientific data collected during the expedition.



THREE MAIN COMPONENTS

- Multidisciplinary study of the Saya de Malha Joint Management Area between Mauritius and Seychelles, located beyond the Exclusive Economic Zones of the two States
- Targeted investigations on two islands: Aldabra (Seychelles) and Saint-Brandon (Mauritius)
- Contribution to the study of regional ocean dynamics

SCIENTIFIC OUTCOMES

- Océanography
 - 60 multi-parameter vertical profiles (CTD) or temperature profiles (XBT)
- Habitat mapping
 - 22 mapping and photogrammetry sessions using autonomous surface vehicles
 - 12 remotely operated underwater vehicle (ROV) dives for video coverage
- Habitat sampling
 - 13 sites explored with towed gears (46 transects)
 - - 20 sites explored by divers

- 51 floats deployed (29 Argo profiling floats, 4 SVP drifting buoys with a 15 m drogue, 18 surface drifting floats)

- 45 Manta, Bongo or Multinet net casts to sample plastic pollution and plankton



S.A. Agulhas II off Aldabra
© Filip Kulisev - Amazing Planet / Monaco Explorations

COMMUNICATION AND OUTREACH

- On-board school on oceanographic instrumentation for 30 students or young researchers of 13 different nationalities
- Three training sessions for young researchers: two on processing the data acquired during the expedition and one on the international law of the sea and its relationship with marine sciences
- Eight live interactive sessions with schools in France and Monaco
- Artistic and photographic production and features
- Documentary filming
- More than 500 visitors during the stopovers
- More than 150 press articles on the expedition

FIRST RESULTS

SAYA DE MALHA

More than 2,500 batches containing 1 to 10 specimens of a given class each were compiled from samples collected by the divers and the towed gears. They reveal a rich benthic biodiversity (attached to the seabed) comprised of numerous species of organisms, generally small in size, including what is probably a large proportion of endemic species (present only in this area).

Three new species have already been identified, yet to be described by taxonomists. The detailed inventory will make it possible to specify the sensitivity of the ecosystem of the Bank and its regional connections to the various anthropic pressures and to deduce the management measures that the "BBNJ" treaty now makes it possible to envisage in the high seas.



△ New species: from left to right, A crab of the family *Ethusidae* • A gastropod of the subfamily *Lamellariinae* • a shrimp of the genus *Stenopus* © Grégoire Moutardier - MNHN / Monaco Explorations

6

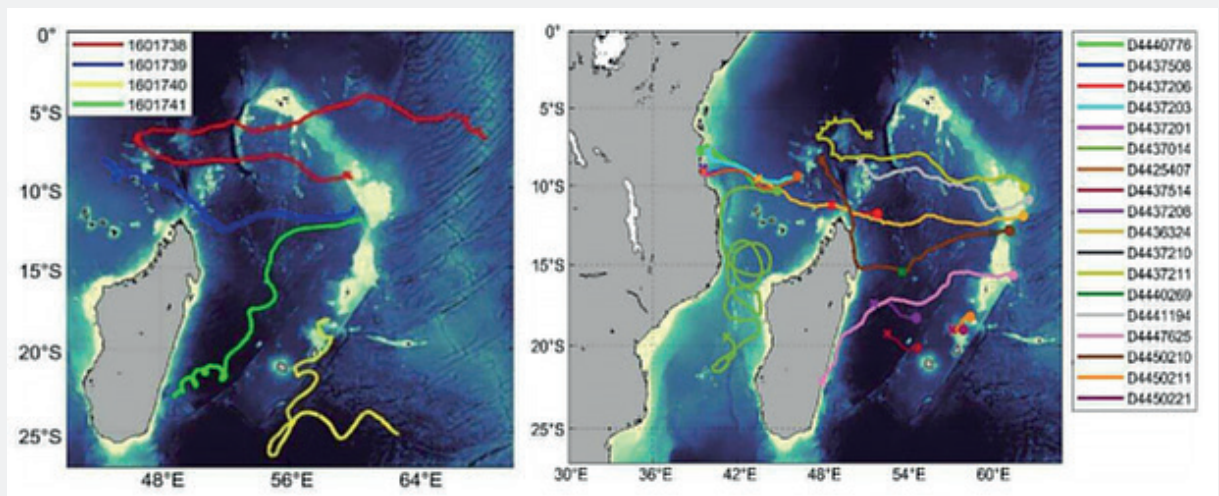
OCEAN CIRCULATION

Eighteen floats drifting with the surface current and four buoys fitted with a drogue to drift with the currents at a depth of 15 m were deployed during the expedition to record surface temperature and current data from the analysis of their satellite-tracked trajectories.

between larval production zones and species development zones.

These trajectories reveal the oceanic flows that determine regional biological connectivity

The trajectories to the north of Madagascar clearly show the south-equatorial current which crosses the region in a westerly direction and the opposite counter-current further to the north. Between Madagascar and the African coast, large eddies are observed.



△ SVP Buoy trajectories

© Nick D'Adamo - UWA / Monaco Explorations

△ SSD Floats trajectories

© Nick D'Adamo - UWA / Monaco Explorations

MARINE TURTLES

The study of Aldabra sea turtles had three objectives:

- To compare the genetic structure of the turtles with those observed in the western Indian Ocean
- To estimate the physiological state of the turtles by analysing inorganic contamination and stress-related parameters, and
- To use Argos tags to assess whether the size of the turtles' home range is similar to those observed at other sites in the Indian Ocean.

Thirty green turtles and ten juvenile hawksbill turtles were captured for physiological sampling (biometric measurements, biopsies, blood samples and scale samples); 2 juvenile green turtles were fitted with Argos tags.

Results are expected by the end of 2023.

▽ A GPS tracking device is fitted to a marine turtle in Aldabra
© Quentin Schull - Ifremer / Monaco Explorations



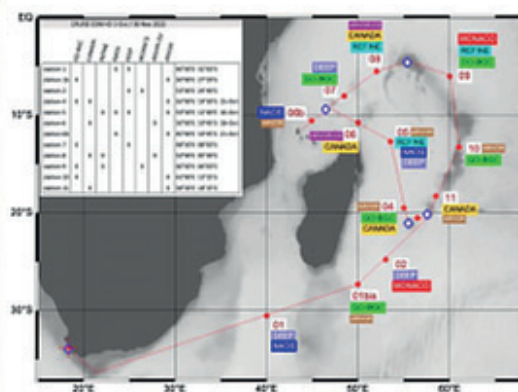
BGC ARGO

Twenty-nine profiling floats were deployed in a hitherto poorly equipped area. They measure physical, chemical and biological variables at depths of between 0 and 2,000 metres, which are essential for understanding the evolution of the ocean's health and its response to climate change. Their lifespan is generally between five and seven years.

Twenty-seven of the twenty-nine floats deployed are operating nominally. Each float sends its data every ten days. **This data is accessible in real-time to the entire scientific community.**



△ Argo float status - 1 October 2022
© BGC Argo / Monaco Explorations



△ Argo float deployment plan
© BGC Argo / Monaco Explorations



△ Argo float status - 31 May 2023
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