MONACO EXPLORATIONS
Reconnecting Humanity and the Sea

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OVERVIEW OF MONACO EXPLORATIONS INDIAN OCEAN EXPEDITION

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1. General Framework

The "Indian Ocean Expedition" is the first item of the "Monaco Explorations" project endorsed as a contribution to the United Nations Decade of Ocean Sciences for Sustainable Development 2021-2030.

The project is coordinated by Monaco Explorations, a collective platform funded by the Government of the Principality of Monaco, which brings together under the aegis of the Government, the Prince Albert II of Monaco Foundation, the Oceanographic Institute, the Scientific Centre of Monaco and the Yacht Club of Monaco, to serve the commitment of HSH Prince Albert II of Monaco to knowledge, sustainable management and protection of the Ocean.

The expedition will cover the area between Reunion Island, Mauritius, and Seychelles (see Figure 1) with the following objectives:

- to understand through a multidisciplinary scientific approach the ecosystemic status and functioning of the area explored and to advise stakeholders through a holistic scientific approach (sustainability science);
- to share the issues and knowledge with the greatest number of people through an ambitious outreach programme;
- to mobilize governments, through diplomatic action, by making available information and analyses to support the sustainable management of maritime areas.

The expedition is expected to benefit from an extensive media coverage and should result in the production of a documentary film for international distribution and the writing of a book by a renowned author.

It is planned that the mission will be coordinated with an official visit to the region by HSH the Sovereign Prince. Other official activities of the Sovereign Prince related to the objectives of the mission, in particular His interventions in various forums dealing with the protection of the Ocean, may illustrate the context related to the political dimension of the expedition.

The science programme is guided by the four main themes of Monaco Explorations (the protection of corals, the protection of the megafauna, the development of marine protected areas and new exploration technologies). It focusses on meeting the needs of the Governments of Seychelles and Mauritius while also relating closely with relevant international and regional organs and initiatives, notably the United Nations Decade of Ocean Sciences for Sustainable Development (2021-2030) as already mentioned – including the GEBCO project Seabed 2030 and the continuation of the Second International Indian Ocean Expedition (IIOE-2 – 2015-2025).

Outreach activities will be based mainly on the scientific dissemination programme "Dialogue Science-Decision Makers for Integrated Management of Coastal and Marine Environments" (DiDEM) in the Western Indian Ocean basin (Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, United Republic of Tanzania) coordinated by the French Research Institute for Development (IRD). In addition, active collaboration will be requested from all the participating entities in order to optimize the use of the preparation, progress, contents, and results of this expedition for pedagogic and educational purposes and more generally for public outreach and communication.

Initially planned in April and May 2021, the expedition is currently planned for October and November 2022 through a charter, currently under negotiation, of the South African oceanographic vessel *S.A. Agulhas II* which would be made available from Cape Town from 1 October to 30 November 2022.

2. Scientific Programme

The scientific programme is being consolidated on the basis of eight projects. It focuses on two types of maritime areas:

- The joint Mauritius-Seychelles management area of Saya de Malha: this is a relatively unknown area, located beyond the exclusive economic zones of the two States. The expedition aims to gather scientific elements that could help consolidate the joint governance of an area with potential outstanding universal value. This area is the priority focus of the expedition.

- A selection of islands (or even seamounts): the main objective is to characterize the function of refuges for biodiversity and to help preserve it against the impacts of anthropic pressure and climate change.

The eight projects are as follows:

- A major structuring project: A1: Saya de Malha: multidisciplinary study of the joint Mauritius-Seychelles management area of Saya de Malha, led by Francis Marsac, IRD, French joint research unit "MARine Biodiversity, Exploitation and Conservation" (UMR MARBEC);

- Seven projects addressing specific themes relevant to the whole area or to particular sites:

    - A2: Megafauna: study of marine vertebrates around the islands and seamounts of the region, led by David Mouillot, University of Montpellier, France, on behalf of the international Megafauna Consortium.

    - B1: FROID: study of the functioning of surface and mesophotic reefs in the Indian Ocean (FROID), led by Christine Ferrier-Pagès, "Coral Ecophysiology" team from the Monaco Scientific Centre (CSM); this study will also contribute to the World Coral Conservatory project.

    - B2: OCEsANte: study of the impact of human activity and ocean warming on the emergence of pathogenic bacteria led by Dorota Czerucka and François Seneca, CSM "Ecosystems and Immunity" team, in collaboration with
      B8: MADCAPS: characterization of plastic debris potentially carrying coral pathogenic microorganisms led by Margot Thibault, French joint research unit "Tropical Marine Ecology of the Pacific and Indian Oceans" (UMR ENTROPIE).

    - B3: GECOS: study of the genetic structure and levels of contamination and stress in marine turtles led by Quentin Schull and Jérôme Bourjea, UMR MARBEC.

    - B4: 4Sea: study of the combined impacts of coastal human activities and climate change on marine ecosystems led by Sylvain Bonhommeau, Ifremer Indian Ocean Delegation and Julien Barde, UMR MARBEC.

    - B5: BGC-Argo-IO: extension of the international BGC-Argo monitoring programme led by Hervé Claustre, Oceanography Laboratory of Villefranche-sur-Mer, France.

    - B6: EMPREINTE ILOI: study of the footprint of islands and geomorphological structures through the analysis of stable isotopes of carbon and nitrogen and environmental DNA led by Sébastien Jaquemet, UMR ENTROPIE.

The activities related to the investigation of the Saya de Malha Bank are set out in Annex 1. The activities envisaged around the islands and seamounts are described in Annexes 2 and 3. The expedition will also include underway activities which are indicated in Annex 4. **These activities may be adjusted subject to the partners involved and the actual availability of equipment**.

The participation of partners from Mauritius and Seychelles as well as other institutions active in the region is being consolidated both at the level of individual projects and at the level of Monaco Explorations. A preliminary list of partners is provided in Annex 5.

A particular effort will be devoted to the restitution of the expedition, notably the investigation of the Saya de Malha area, when drafting the expedition report, in a holistic approach, based not only on the elements collected during the expedition but integrating as much as possible all the available knowledge on the area, including historical and socio-economic aspects, so as to propose well-founded guidance for the sustainable management of the area in a logic of sustainability science.

3. Outreach and Communication

The outreach and communication plan will take into account:

- the participation of Monaco Explorations in the DiDEM programme, including:
    - the scheduling of events likely to be coordinated with the visit of HSH the Sovereign Prince, for example in connection with:
        - the application of the "The Future of" approach to the development of the blue economy of the Seychelles,
        - the animation of the PAREO community (*PAtrimoine RÉcifal de l'Océan Indien dans nos mains*[1]) by the setting up of an Educational Marine Area (EMA) in Seychelles (including possible twinning with the EMA of Monaco);
    - the setting up of post-expedition activities, including the restitution of the expedition's work, in particular in relation to:
        - the legal study on the governance of maritime areas beyond national jurisdictions,
        - the thematic school on reef geosystems,
        - events organized by the Western Indian Ocean Scientific Association (WIOMSA);

- the outreach activities of the expedition itself, to be articulated with DiDEM, including:
    - participation of students and early career ocean professionals from Mauritius and Seychelles in the expedition mission (data collection, post-processing, etc.),
    - on-board school during the expedition (feasibility to be investigated),
    - live broadcasts with the research vessel including dialogue with scientists,
    - school visits aboard the research vessel (Reunion Island, Mauritius, Seychelles),
    - school exchanges/collaborations Monaco-France / Seychelles-Mauritius-Reunion,
    - the definition and implementation of scientific projects in partnership with the regional and national entities concerned,

- other expedition-specific activities, for example:
    - the articulation with the "Sea Explorers and Citizens" scheme concerning the high schools of Nice Academy,
    - the development of interactive educational tools for Monaco national education system,
    - contributing to the redesign of the "Monaco and the Ocean" exhibition at the Oceanographic Museum of Monaco.

[1] Indian Ocean Reef Heritage in Our Hands.

Communication about the expedition should be based on the following elements:

- a 90 min documentary;

- multimedia products associated with the documentary, including:
    - video clips for television and social media,
    - content for TV magazines,
    - an educational series of about fifteen 5/7 min films;

- an artistic production, including an author's book, photographic coverage, an illustrated travelogue…;

- a presence on social media, newspapers, and TV magazines.

The outreach and communication plan will cover not only the Expedition itself but also pre- and post-expedition activities.

4. Management structure

The overall coordination of the Expedition is led by the Directing Board of Monaco Explorations chaired by the Minister of State of the Principality of Monaco.

The preparation of the Expedition is guided by an International Advisory Committee composed of fourteen experts and chaired by Mr Carl Gustaf LUNDIN (Mission Blue Managing Director, formerly IUCN Global Marine and Polar Programme Principal Scientist). The International Advisory Committee warrants that the Expedition implements a holistic approach based on a multidisciplinary programme including natural and social sciences.
In that perspective, the Committee ensures that the scientific projects contributing to the Expedition are relevant and properly integrated. To this end, it draws not only on the elements collected during the Expedition but on all the information available on the area, from oceanographic data to historical, cultural, sociological, and economic aspects, in order that the Expedition outcomes provide relevant advice for the sustainable management of the area, in accordance with the maxim of Monaco Explorations: "Reconnecting Humanity and the Sea".

The Expedition will be managed by an Executive Board composed of representatives of the main partners and chaired by the Chief Operation Officer of Monaco Explorations.

5. Cruise Plan

The ship will be chartered from Cape Town; mobilisation and demobilisation are envisaged in Port Louis, Mauritius. It should be possible to board and disembark in Cape Town at the beginning and end of the charter.

Figure 2 indicates the tentative cruise plan. It will be adjusted to allow a meeting with H.S.H. the Sovereign Prince, in principle in Aldabra (Seychelles). A stopover in Reunion Island is envisaged, rather at the beginning of the expedition, and a stopover in Mahé (Seychelles) rather in the middle of the expedition.

Two islands are envisaged for the activities described in Annex 2: Aldabra and Saint-Brandon.

Transits between Cape Town and Mauritius and back could also be "valorised" provided that the ship is not slowed down too much in order to maximise the time spent in the area.

6. Terms of participation in the Expedition

6.1 Financing

Monaco Explorations will cover the chartering cost and the logistical and operational costs during the Expedition from the port of departure to the port of arrival.

Subject to exceptional circumstances, which will be considered on a case by case basis, the logistical costs before and after the Expedition (costs up to boarding and from disembarking, transport to / from the port of departure / arrival of equipment and samples, etc.) are normally the responsibility of the participants.

6.2 Relevant regulations

Participation in the Expedition implies a commitment to comply with the provisions of the United Nations Convention on the Law of the Sea relating to marine scientific research and the Nagoya Protocol as well as the principles of good practice of the OSPAR Code of Conduct for Responsible Marine Research[2].

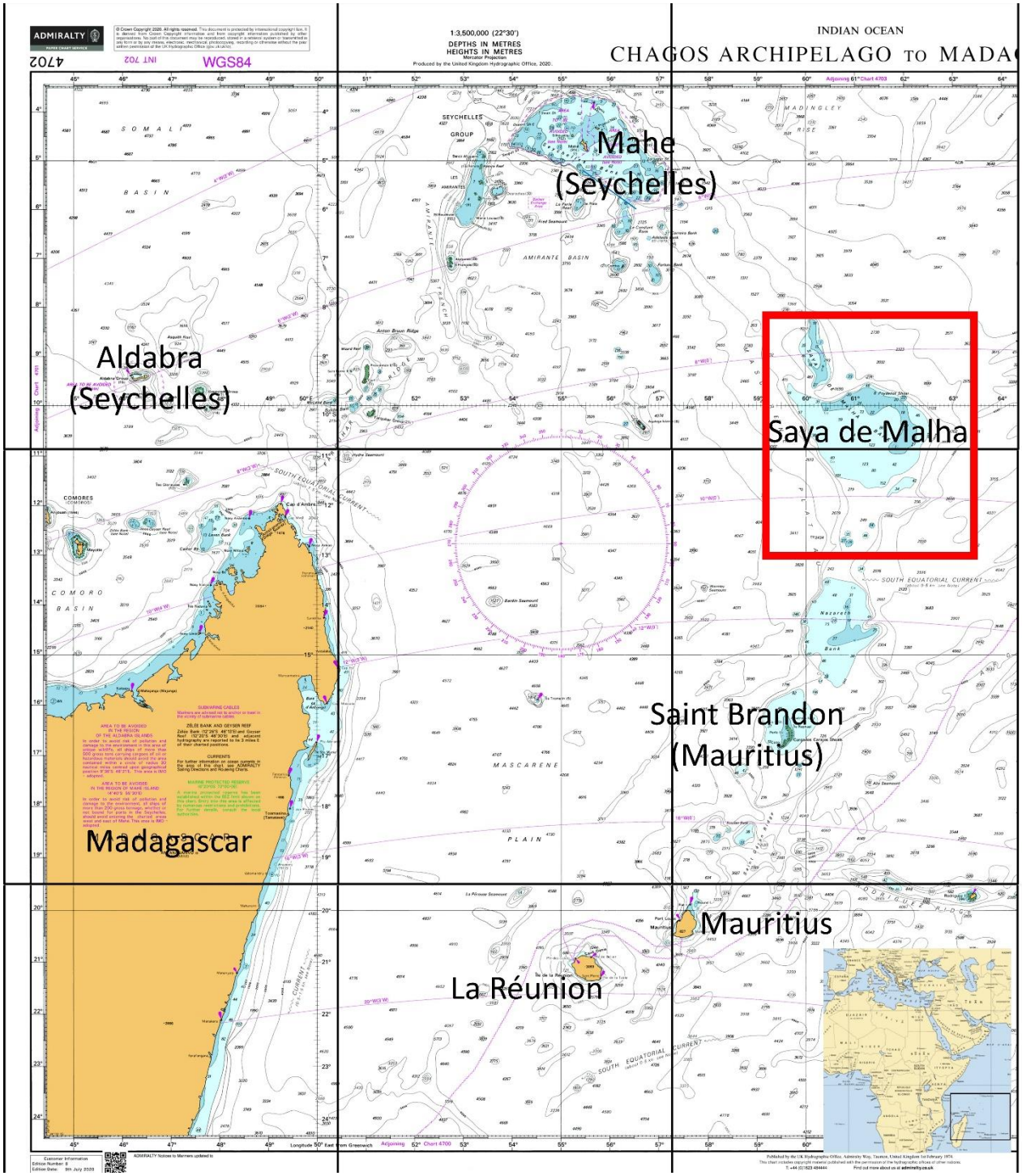
Particular attention will be paid to the control of environmental impact risks.

6.3 Available means and equipment

The characteristics of *S.A. Agulhas II* and the equipment available are specified in Annex 6.

[2] https://www.ospar.org/documents?d=32633

Figure 1
Location map



Source: Admiralty Chart GB 4702

Figure 2

Monaco Explorations
Indian Ocean Expedition
Tentative
Cruise
Plan
05°S
10°S
15°S
20°S
065°E
050°E
060°E
Seychelles
28 Oct – 01 Nov 2022
Saya de Malha
03-18 Nov 2022
Saint-Brandon
19-21 Nov 2022
Start Mauritius
11 Oct 2022
End Mauritius
23 Nov 2022
La Reunion
12-15 Oct 2022
Aldabra
19-25 Oct 2022
MADAGASCAR

Annex 1

Investigation of the Saya de Malha Bank

Project	Activities	Comments
A1 Saya de Malha	Underway measurements - bathymetric survey with shallow water MBES - surface temperature and salinity; current profile - XBT profiles - eDNA filtering	
	Station measurements - vertical profiles of temperature, salinity, dissolved oxygen and fluorimetry with simultaneous water sampling at different depths (CTD+ rosette) - vertical profiles with Underwater Vision Profiler (UVP) and Acoustic Zooplankton Fish Profiler (AZFP)	
	Low speed measurements (1 to 2 knots) - transects with ROV ECA H800 - oblique transects with Bongo nets - transects with Manta net - towed gear (suprabenthic sled, beam trawl, Warén dredger)	
	Sampling of benthic biodiversity by divers (visual, BlueROV2 drone, underwater sucker, brush)	
A2 Megafauna	Non-destructive sampling (biopsy, netting, fishing) Scuba diving in the 0-20m zone	Subject to pooling with A1. Operations requiring three tenders, each with a capacity of 4 persons + diving equipment.
	eDNA filtration 5 surface transects around the area, 5 mesophotic transects Counting reef fish by divers Scuba diving in the 0-80m zone	
	eDNA filtration 10 deep sampling around the area (water and sediment) on board the research vessel	
	Deployment of reef cameras on transects sampled with eDNA. Scuba diving in the 0-40m zone	
	Drone operated from the research vessel	
B2 OCEsANté B8 MADCAPS	Shallow (30 m) and/or deep-sea sediment sampling	Subject to pooling with A1.
B4 4SEA	Data collection using various platforms (autonomous instrumented board, drone, kitesurf, paddle, snorkelling) operated in seagrass areas	Subject to pooling with A1. Offer to support the other projects when not active.
B5 BGC-ARGO-OI	Deployment of floats and/or profilers Hydrology stations Sampling of zooplankton with a towed net	Subject to pooling with A1.
B6 EMPREINTE-ILOI	CTD casts down to 500 m or 20 m from the seabed	Subject to pooling with A1.

Annex 2

Activities around the islands

Project	Activity	Comments
A2 Megafauna	Non-destructive sampling (biopsy, netting, fishing) Scuba diving in the 0-20m zone	Operations requiring three tenders, each with a capacity of 4 persons + diving equipment Programme to be adapted for Mauritius and Mahe (research vessel alongside).
	eDNA filtration 5 surface transects around the island, 5 mesophotic transects Counting reef fish by divers Scuba diving in the 0-80m zone	
	eDNA filtration 10 deep sampling around the island (water and sediment) on board the research vessel	
	Deployment of reef cameras on transects sampled with eDNA. Scuba diving in the 0-40m zone	
	Drone operated from the edge of the island or from the research vessel	
B1 FROID	ROV investigation of mesophotic corals	ROV operations subject to the navigational safety of the research vessel. Implementation of the dives conditioned by pooling with A2. Programme to be adapted for Mauritius and Mahe (research vessel alongside).
	Diver investigation of surface corals	
B2 OCEsANte B8 MADCAPS	Shallow (30 m) and/or deep-sea sediment sampling Collection of plastic debris on the beaches	ROV operation subject to the navigational safety of the research vessel.
B3 GECOS	Prospection of areas hosting sea turtle juveniles and sampling of turtles Possible reinforcement of the Aldabra beacon network	Operation requiring a tender with a capacity of 4 people + equipment Operations conducted independently of the research vessel in Mauritius and Mahe. Pooling with B4. Consider any possible pooling with A2.
B4 4SEA	Data collection using various platforms (autonomous instrumented board, drone, kitesurf, paddle, snorkelling) operated from the coast.	Pooling with B3.
B6 EMPREINTE-ILOI	CTD casts down to 20 m from the seabed	Consider any possible pooling with A2. Stations in daytime (fluorescence profiling) Check feasibility of stations around Mauritius and Mahe.

Annex 3

Activities around seamounts (on an opportunity basis)

Project	Activity	Comments
A2 Megafauna	Non-destructive sampling (biopsy, netting, fishing) Scuba diving in the 0-80m zone	Operations requiring one tender with a capacity of 4 persons + diving equipment.
	eDNA filtration 10 deep sampling around the seamount (water and sediment) on board the research vessel	
	Deployment of deep-water cameras on the seamount from the research vessel	
	Drone operated above the seamount from the research vessel	
B6 EMPREINTE-ILOI	CTD casts down to 500 m or 20 m from the seabed	Consider any possible pooling with A2. Stations in daytime (fluorescence profiling)
Seabed 2030	Detailed bathymetric survey	Subject to the equipment available on board

Annex 4

Underway activities

Project	Activity	Comment
B2 OCEsANte B8 MADCAPS	Water sampling at stations with Niskin bottles. Sampling of plankton and plastics with a towed AVANI plankton net at regular intervals.	Pooling with B5 and B6.
B5 BGC Argo IO	Deployment of floats and/or profilers Hydrology stations (CTD) Sampling of zooplankton with a towed net	Pooling with B6 and B8.
B6 EMPREINTE ILOI	Hydrology stations (CTD)	Pooling with B5 and B8. Stations in daytime (fluorescence profiling).
Seabed 2030	Recording of MBES bathymetry data underway	Subject to equipment available on board
	Investigation of altimetry signals related to possible seamounts	Investigation associated with activities of project A2 of appropriate (see annex 3).

Annexe 5

Preliminary list of partners

Country	Organization	Project
Australia	Reef Life Survey	Megafauna
Canada	Fisheries and Oceans Canada	BGC-Argo
Denmark	Université d'Aalborg	GECOS
France	Ecole pratique des hautes études (EPHE)	Megafauna
	French Research Institute for Exploitation of the Sea (Ifremer)	Megafauna GECOS 4 SEA
	Kelonia	GECOS
	National Centre for Scientific Research (CNRS)	Saya de Malha
	National Museum of Natural History (MNHN)	Saya de Malha
	Oceanography Laboratory of Villefranche-sur-Mer	Saya de Malha BGC-Argo
	Research Institute for Development (IRD)	Saya de Malha Megafauna 4 SEA
	University Centre of Mayotte	Megafauna
	University of La Réunion	MADCAPS EMPREINTE
	University of Montpellier	Megafauna
	University of Nice Côte d'Azur	OCEsANte
Israel	Bar Ilan University	FROID
	University of Tel Aviv	FROID
Mauritius	Albion Fisheries Research Centre	Saya de Malha
	Mauritian Wildlife Foundation	Megafauna
	Mauritius Oceanography Institute	Saya de Malha
	Mauritius Marine Conservation Society	GECOS
	Reef Conservation Mauritius	FROID
	University of Mauritius (Faculty of Science - Department of Biosciences & Ocean Studies)	Saya de Malha FROID EMPREINTE
Monaco	Scientific Centre of Monaco	FROID
Poland	Université de Lodz	Saya de Malha
Seychelles	Marine Conservation of Seychelles	GECOS
	Nature Seychelles	GECOS
	Seychelles Fishing Authority	Megafauna
	Seychelles National Parks Authority	Saya de Malha Megafauna FROID
	Seychelles Islands Foundation	Saya de Malha FROID GECOS 4 SEA EMPREINTE
	Sustainable Ocean Seychelles	FROID
	The Ocean Project Seychelles	OCEsANte MADCAPS
	University of Seychelles (Blue Economy Research Institute)	Saya de Malha Megafauna

Country	Organization	Project
South Africa	Nelson Mandela University - Ocean Sciences Campus - South African National Biodiversity Institute	Saya de Malha 4SEA
	Southern Ocean Carbon and Climate Observatory (SOCCO)	BGC-Argo
United Kingdom	Foundation Bertarelli The Zoological Society of London	Megafauna
	Liverpool John Moores University	EMPREINTE
	University of Lancaster	Megafauna
	University of Southampton	FROID
United States	University of Maine	BGC-Argo

Annex 6

Specifications of *S.A. Agulhas II*

‘S.A. AGULHAS II’

Steel Hulled, Ice strengthened Antarctic Supply/Oceanographic Research Vessel

SPECIFICATIONS

Classification	DNV + 1A1 Passenger Ship
Built	2011 STX Finland Oy, Rauma, Finland
Flag	South Africa
Port of Registry	Cape Town
IMO Number	9577135
Call Sign	ZSNO

MAIN DIMENSIONS

Length OA	134.0m
Breadth	22.0m
Moulded Draft	7.70m
GRT	12897T
NRT	3870T

Main Engines	4 x 3,000kW
Power	9000kW shafts
Prop. Motors	2 x 4,500kW
Cruising speed	14.0 knots
Maximum speed	18.0 knots
Range	15,000 nautical miles
Endurance	90 days
Complement	144 comprising 44 crew and 100 scientific/other staff
Affiliation	Department of Environmental Affairs, Republic of South Africa
Directorate	Antarctica and Islands

PROPULSION

Four uni-directional Wartsila 6L32 turbo-charged and intercooled 6 cylinder 4 stroke diesel engines directly coupled to four Converteam B128P8 Generators.
Total power MCR 12,000kW, service power at 85% MCR 10,200kW
Two Converteam N3HXCH2LL8CH Propulsion motors, Total power 9,000kW
Two 750kW Rolls-Royce TT2000 DPN FP Bow thrusters, Total power 1,500kW
One 1,200kW Rolls-Royce TT2400 DPN FP Stern thruster, Total power 1,200kW
Bunker oil capacity: Maximum 3,009 tonnes, at 95% 2,858 tonnes.

ELECTRICAL POWER

Generated for propulsion at 3.3kVA, 3 phase, 50Hz, by the Wartsila/Converteam combination mentioned above
From the above Hotel Services are supplied at 3 phase, 50 Hz, 400V
Harbour Generator: Mitsubishi S12R-Z3MPTAW-4 diesel engine, developing 1351kVA, 3 phase, 50Hz, 400 v. Generator Stamford PM734CZ
Emergency Generator: Volvo-Penta D 16MG diesel engine, developing 490kVA, 3 phase, 50Hz, 400V. Generator Stamford HCM534E-1
220v AC, 50Hz domestic supply
220v AC, 50Hz stabilized domestic supply.

African Marine Solutions Group (Pty) Ltd
31 Carlisle Street, Paarden Eiland, 7405
P.O. Box 1339, Cape Town, 8000
+27 21 507 5777 amsol@amsol.co.za
www.amsol.co.za

NAVIGATION EQUIPMENT

Integrated Navigation System by Raytheon Anschutz, GMBH, Kiel, Germany

Gyrocompass	2 x Anschutz Type 22 Digital
Autopilot	Anschutz NautoPilot 2025
Radars	1 x Raytheon Anschutz S-Band 30kW ARPA Chartradar Blackbox System 2 x Raytheon Anschutz X-Band 25kW ARPA Chartradar Blackbox Systems. One fitted with a high-speed scanner. 1 x Sigma S6 Integrated Radar Processing System, for ice navigation
GPS	2 x Saab R4 DGPS Receivers
ECDIS	2 x (Main + Secondary) Raytheon Anschutz ECDIS Blackbox Version with overlay
Speed log	Skipper DL850 2 Axis Doppler Log
Echo Sounder	Raytheon Anschutz GDS101 50/200kHz
Conning Screen	The ship's operating parameters such as position, speed, propeller pitch, rudder angle, wind direction, wind speed, etc. are displayed either in graphic or alpha numeric form on the bridge and in the Captain's cabin.

METEOROLOGICAL EQUIPMENT

2 x Lambrecht Weather Sensors, indicating wind speed and direction, air temperature, barometric pressure and relative humidity.
Sea temperature given by the Skipper Log

DYNAMIC POSITIONING SYSTEM (LEVEL 1)

- 1 x Navis 4001 DP System
- 1 x Navis 4011 Joystick Control System
- 1 x Model LID3-G1 DGPS Receiver for the DP system

COMMUNICATIONS

Radio and Satellite Equipment, to GMDSS Sea Area 4

BRIDGE Communication Console

- 2 x Raytheon Anschutz MF/HF DSC Radio Controllers CU 5100
- 1 x Raytheon Anschutz VHF DSC Controller RT 5022
- 1 x Sailor Inmarsat C Message Terminal TT3606E
- 3 x Raytheon Anschutz printers H1252B/TT-3608A for above
- 1 x Raytheon Anschutz GMDSS Alarm Panel AP 5042
- 3 x Sailor GMDSS VHF Portable Radios, SP 3520
- 1 x ICOM Air band Portable VHF Radio (With headset and microphone)

Bridge Main Console

- 1 x Raytheon Anschutz VHF DSC Duplex Controller RT 5020
- 1 x Motorola GM 360 UHF radio
- 1 x Raytheon Anschutz GMDSS Alarm Panel AP 5065

Bridge Helicopter Console

- 1 x Raytheon Anschutz VHF Radio Controller CU 5000
- 1 x Becker Air band VHF Radio
- 1 x Motorola VHF Radio DM 3600

Bridge Starboard Console

1 x Sailor VHF Radio 6210

Bridge Port Console

1 x Sailor VHF Radio 6210

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31 Carlisle Street, Paarden Eiland, 7405
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Bridge, After Bulkhead
2 x SARTs, Sailor 6913A-SART (1 Port, 1 Starboard)
1 x EPIRB, TRON 40S Mk II 406 Mhz

Monkey Island (Deck 10)
1 x EPIRB (Float Free), TRON 40S Mk II 406 Mhz
1 x VDR Capsule

Bridge, Office
22 x UHF Radios, Motorola
Navtex Receiver, NCR-333
Weather Facsimile Receiver, Raytheon Anschutz Blackbox FAX-30

ECHO SOUNDING EQUIPMENT

Raytheon Anschutz GDS 101 50/200 Hz Echo Sounder
Simrad EA 600 Deep Sea Echo Sounder

WINCHES

- 1 x Hatlapa Electric Windlass with 2 x 160kN @ 5/15m/min. Cable Lifters and 2 x 150kN @ 15/30m/min. Warping Drums
- 2 x Hatlapa Electric Capstans, 100kN @ 15/30m/min
- 1 x Rapp Hydema HW 2300 E CTD Winch, 6,000m x 11.73mm conductor cable
- 1 x Rapp Hydema HW 2300 E CTD Winch, 6,000m x 12mm Kevlar cable
- 1 x Rapp Hydema HW 200 E Vertical Plankton Winch, 1,650m x 6.35mm conductor cable
- 1 x Rapp Hydema DSW-4006 E Deep-water Coring Winch, 5,000m x 14mm SWR
- 1 x Rapp Hydema HW 500 E Plankton Towing Winch, 2,500 x 11.73mm SWR
- 1 x Rapp Hydema HW 500 E General Purpose Towing Winch, 2,500m x 12mm SWR
- 1 x Rapp Hydema HW 500 E Undulating Vehicle Winch, 760m x 8.41mm SWR (100m faired)
- 1 x Rapp Hydema CF 600 E General Purpose Capstan, 3.0T @ 12m/min

LABORATORIES

- Meteorological laboratory
- Operations Room
- Underway Sampling Laboratory
- Wet Biological Laboratory
- Dry Biological Laboratory
- Wet Geological Laboratory
- Liquid Scintillation Counter Laboratory
- General Chemistry Laboratory.
- Provision made for 6 “Own-User” Container Laboratories on deck aft.

SCIENTIFIC WORKING AREAS

Helicopter flight deck and hangar, when available
Enclosed poop deck space of 400m² with a 50m² wooden working deck served by a hydraulic A-frame with 6 loading points and a vertical sliding stern gate.
Also on the after deck is a 4T SWL Deep Corer Davit by Triplex, with a 1T SWL Deep Corer handling Frame attached.
The Environmental Hangar boasts a Triplex A-Frame for CTD deployment, with a SWL of 7T

ON BOARD SCIENTIFIC SYSTEMS

A Network Data System acquires data from selected navigational, meteorological and scientific instrumentation. The data is sent to a dedicated server once per second and mean values logged once per minute. The real time data is transmitted continuously over the LAN and the logged data is made available in a shared folder on the network.

- Seabird 911 CTD and Rosette Sampling System
- Seabird S38 Remote Temperature Probe
- Seabird SBE 45 Thermosalinograph and De-Bubbler
- Kongsberg Topaz P18 Sub-bottom Profiler
- A Moon Pool, dimensions 2.4 x 2.4m, for CTD deployment in ice covered waters

A Drop Keel, extending to a depth of 3.0m, containing:

- Scientific Echo Sounder, Simrad EK 60, 38/120/200kHz
- Scientific Deep Water Echo Sounder, Simrad EA 600
- Acoustic Doppler Current Profiler, RDI Instruments Ocean Surveyor II, 75kHz

HABITABILITY

All officers and crew are housed in single quarters. Vessel is air conditioned as well as heated for Antarctic conditions.

Passenger accommodation:

- 2 VIP suites
- 16 single berth cabins,
- 15 two berth cabins
- 13 four berth cabins
- Upper and lower passenger lounges
- Library
- Live TV, via satellite, streamed to all cabins
- Full laundry facilities
- Fresh water capacity is 290T supplemented by a 28T/day fresh water generation capability when at sea
- Hospital with surgery facilities
- Doctor normally carried
- Small gymnasium, with sauna, shower and change room facilities
- Baggage Room

CARGO CAPACITIES AND CARGO HANDLING EQUIPMENT

Three cargo hatches, all with tween deck and lower hold.

Total dry cargo capacity:

Bale	3801m³
Grain	4602m³
Refrigerated space	79.4m³
Cargo oil capacity	510m³/408T

1 x TTS 35T @ 27.5m at 17m knuckle boom cargo crane on forecastle head
2 x TTS 10T @ 10m knuckle boom cargo cranes forward
1 x TTS 5T @ 18m knuckle boom stores crane aft
Two large 10m inflatable rafts with a working capacity of 15T per paired rafts
One 2 ton Electric Forklift Truck.

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HELICOPTER SUPPORT AND FACILITIES

Enclosed hangar facilities for two PUMA size helicopters
Manual sprinkler system for hangar
113T JetA1 bunker capacity
Helicopters fitted with flotation gear, winches and cargo slings
Long range tanks available
Skid fittings
Radar and GPS receivers fitted

Radios:

- 1 HF SSB transceiver
- 2 VHF (AM) aeronautical transceiver, and
- 1 VHF (FM) marine band transceiver

OTHER FEATURES

Roll damping tank
Ice breaking heeling tank/pump system
Closed circuit television available to points around the ship
2 x 200hp 10 man SOLAS Fast Rescue Craft
1 x 230hp Weedo 710 Tug/Workboat, Bollard Pull 2.2T
1 x 40hp 4 man inflatable dinghy for inshore scientific work
CO2 flooding system for machinery spaces and cargo holds
Automatic water sprinkler system for accommodation spaces
Inert gas system for JetA1 pump room/tank space
Foam monitor cannons for flight deck and cargo deck helicopter operations
Remote control fire retarding doors for accommodation space
Cross flooding system for damage stability
CATHELCO impressed current, cathodic protection, system

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