

INTERNATIONAL INDIAN OCEAN EXPEDITION
30 East 40th Street . New York 16, N. Y. . LEXington 2-6533

Coordinator
ROBERT G. SNIDER

Cables
SCORDINOC . NEWYORK

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CURRENT STATUS OF PLANNING FOR PARTICIPATION IN
THE INTERNATIONAL INDIAN OCEAN EXPEDITION

Rough notes arising from R. G. Snider's Trip 13 November -
16 December 1960 to the Middle East and the East Coast of
Africa and correspondence to 1 January 1961

UNITED
KINGDOM

The United Kingdom has set up working groups in the following fields: Physical and chemical oceanography and meteorology; marine biology; and geology, geophysics, and bathymetry. In addition to cruises in both monsoons in the latter part of 1962 and first half of 1963 by the new R/V DISCOVERY across five E-W lines from the Arabian Peninsula and Northeast Africa to India and points South, the Admiralty hydrographic vessels will also run one cruise in early 1961 in HMS DARLYMPLE along the Arabian Peninsula Coast from the Red Sea to the Persian Gulf. HMS OWEN will run five lines in a period from October 1961 to the Spring of 1962 in a Northeasterly direction Southwesterly direction in the upper half of the Arabian Sea going as far South as Rodrigues and Mauritius. In addition, the East African Marine Fisheries Research Organization operating out of Zanzibar with probable support through the Royal Society, in addition to its usual support with the East African High Commission and CD&W funds, will operate from the East African Coast on a number of cruises well to the Eastward of Madagascar.

The Royal Society is also considering a cruise for botanical and geological observations in the islands of the upper Southern part of the Indian Ocean. Current plans call for oceanographic observations in conjunction with this cruise which may occur in 1962-1963. Islands to be visited are Amsterdam and St. Paul, Kerguelen, the Crozets, and Marion. Plans contemplate systematic oceanographic work not only along the ship's track but also in the general area while the land party is carrying on its investigation.

PAKISTAN

After extended planning and discussions, it appears that Pakistan will have 2 vessels, the PMS ZULFIQUAR and PMS MADADGAR which will operate in the Indian Ocean, roughly North of 16° North. ZULFIQUAR, the Pakistan hydrographic vessel, will be available for about two or three years operating for about 6 months in each year. MADADGAR, which is a fleet tug (Ex USS YUMA ATF 94) will be available for a distance out to 400-500 miles from the Coast since she must stand ready duty for rescue purposes. Pakistan will probably be able to equip these vessels with oceanographic gear but there may be problems in obtaining deep sea winches and precision depth recorders. This is being investigated. These ships can take one to two senior scientists and

several technicians. ZULFIQUAR goes into refitting in April 1961 and will start its cruising in January 1962.

Admiral Khan the Chief of Naval Staff has indicated that Naval berths at Karachi will be available at no charge to Expedition vessels, and that visiting ships will be given other assistance. Furthermore, representations are being made to the Government of Pakistan for ship reception facilities at Karachi and at East Pakistan ports. Pakistan's total effort in the Indian Ocean Expedition has been estimated at 59 lakhs of rupees (slightly over \$1,000,000 U.S.).

INDIA

A meeting with a portion of the Indian National Committee in New Delhi on 23 November revealed that a 2,000 ton naval frigate would probably be made available by the Indian Navy for 4-6 months a year for a period of 2 years. A mine sweeper would also be available on the same basis. Two fisheries vessels about 150 tons and 95 ft. length would also participate, as would 2 small ships from Andhra University and University of Kerala.

In general India plans to work on or close to the continental shelf in both the Arabian Sea and the Bay of Bengal, but will also go as far as 5-7 degrees South of the Equator.

The National Committee under D. M. Wadia has set up 4 working groups to design an Indian national plan. These groups are:

1. Meteorology and physical Oceanography.
2. Marine Biology and Fisheries.
3. Marine geology and geophysics.
4. Chemical Oceanography and radioactivity.

These working groups are expected to report in January 1961. They will identify physical facilities and personnel available for the Expedition as well as deal with hospitality, available buildings, etc.

About 20 scientists will be working at sea and on the beach in connection with India's own effort. As in Pakistan and some other countries, concern was expressed about the cost and availability of some oceanographic equipment as well as precision depth recorders, and a question was raised about joint or cooperative purchasing by several nations in the Expedition. With regard to the Biological Research Center it was estimated that setting up new facilities including buildings would require about 6 months. Construction costs were estimated at \$4.00 per sq. ft. for brick construction including fittings or about \$3.00 per sq. ft. for the shell of a building. India is thinking in terms of a staff of about 35 people at a cost of about 5 lakhs of rupees per year (approximately \$100,000).

EAST AFRICA

Discussions were held with Mr. E. B. David, C.B.E. Administrator of the East African High Commission in Nairobi and with other members of his staff including Lt. Col. S. P. Fearon Administrative Secretary of the East African Council for Agriculture, Animal Husbandry and Fisheries

Research, Major P. F. Smith of the Fisheries Research Organization, Mr. J. M. Fogarty of the Railways and Harbors Administration, Mr. B. W. Thompson, Acting Head of the Kenya Meteorological Service, and Mr. D. N. F. Hall, director of the African Marine Fisheries Research Organization at Zanzibar.

It was agreed that this group of individuals or agency representatives would serve as the equivalent of a National Committee for East Africa. All formal correspondence with regard to East Africa's participation would go through Col. Fearon. It was readily agreed that tide gauge information (under the auspices of the Railways and Harbors Administration of the High Commission) would be available to the Expedition. In addition, the Meteorological Service would be willing to participate actively (see separate notes on meteorological facilities).

The Marine Fisheries Research Organization at Zanzibar is getting a new seagoing crew for its research vessel MANIHINE, and they will start the cruise reports beginning 1 January, 1961. They will be prepared to send hydrographic data to data centers and with the new oceanographic equipment expected from the United Kingdom, they will be prepared to do a full oceanographic job in all fields. A main concern is the problem of handling Chlorophyll since they have no one to carry this out. They are also interested in getting special collections from various parts of the Indian Ocean of single species of marine animals.

Given political stability and some outside financial assistance, part of which is already indicated, East Africa is likely to play a strategic part in the Expedition, and there is every indication of a high degree of cooperation.

MALAGASY
REPUBLIC
(MADAGASCAR)

Because of the strategic location of Madagascar, I had extended discussions with a variety of scientists and government officials in an attempt to get formal participation by the Malagasy Republic in the Expedition. My initial contact was with Dr. Renaud Paulian, Director, Institute for Scientific Research for Madagascar, P. O. Box 434 Tananarive, Republique Malgache. I also talked with the following individuals: M. Louis A. Maugé, his associate; M. Follin, Cultural Attaché at the French Embassy; M. Norbert Zafimahova, Head of the Foreign Affairs Department in the Ministry of Foreign Affairs; Captain Lionnel, in charge of the Department of Lighthouses and Harbors in the Ministry of Public Works; M. M. J. Scheidecker, Head of the Meteorological Services; M. Despeaux, Adjunct Deputy Director of Customs; M. John Rakadomanana, in charge of Public Land Administration and a close friend of President Tsiranana, and with Vice President TSIEBO Calvin. I also talked with M. Rozier of the Coast Guard under the Ministre de Traveux Publique, and to M. Lacoste of the Postoffice and Communications Service; M. Michel Truffard, Assistant Manager of Stan-Vac Oil, and to U. S. Ambassador Frederick Bartlett and his Counselor, Mr. Jacobs.

My talk with M. Zafimahova dealt with the matter of hospitality for visiting vessels. He is responsible for relations with foreign

countries rather than with those in the French Metropolitan Community, and he was President of the last Parliament. He said that in principle hospitality as requested by SCOR Indian Ocean Group could be offered by the Republique Malgache, but that arrangements would have to be made by individual ships or countries. As a result primarily of my discussion with him, a formal letter was addressed to President Tsiranana inviting the Republique Malgache to be an active and formal participant in the Expedition. This letter was designed to start the internal action with the Customs Service, Ministry of Finance and the Ministry of External Affairs, among others, to consider the needs of visiting ships.

My talk with M. Despeaux revealed that harbor dues were under the Merchant Navy Bureau and were applied only at Tamatave and would probably be waived for Expedition vessels. Fuel tax would also be exempted, and other taxes would be subject to decision by the Minister of Finance. He said there would be no difficulty for vessels coming in with explosives at any port since they can be put in secure storage and then the ships could come alongside. He further said that Customs would give all possible help to vessels. He felt that the Republique Malgache would be able to give the participating vessels the same courtesies as those given to diplomats. It was suggested that whenever ships plan to arrive at ports in Madagascar, they should advise Dr. Paulian's organization (Institute for Scientific Research for Madagascar) well in advance, and this organization would make appropriate arrangements for their reception.

Much of my subsequent discussions dealt with tide gauge installations and meteorological facilities, both of which are noted in separate memoranda thereon. With regard to the Woods Hole proposal for measuring current in the Mozambique Channel by electrical potential differential, I found that there is no cross-channel cable. There is one cable running from Zanzibar to Durban. However, preliminary discussions were held to make tentative arrangements for installation of shore stations on the West Coast of Madagascar and in Mozambique, if these were desired. The narrowest crossing of the Mozambique Channel is from Mozambique Island to Cap St. André on the Western shoulder of Madagascar. However, there is no electricity at Cap St. André, and any shore installation there would require a portable generator. The nearest public power is at Majunga. The crossing from Mozambique to Cap St. André is slightly less than 230 miles. The principle for establishing a shore station for such measurement was discussed with Capt. Lionel, and he would be the individual responsible for making arrangements. In principle he saw no objections to this.

M. Maugé of the Institute listed the senior personnel and facilities of the research station at Nossy-Bé. M. Menache is the Director of the station and is a Physical Oceanographer. M. Fourmancir is a specialist in the biology of fish. M. Crosnier is a specialist in the technology of fishes, and M. Frontier, in plankton. They have a crew for 2 ships and administrative personnel totalling 35 persons, including workers and labor. They have a library, good laboratory, (45 ft. by 24 ft.) and a 30 cubic meter aquarium with direct sea water.

M. Rozier of the Coast Guard indicated that some ships, particularly State vessels, are now relieved of pilotage fees but a formal arrangement must be worked out with the Ministry of Public Works. M. Rakadomamana agreed with statements of other individuals that in principle it would be perfectly feasible to get the use of land for shore stations such as current measuring stations, but he pointed out, as did others that final decision rested with the President, who is unquestionably the positive leader of the country.

Col. Gaetan, who is Military Attache at the French Embassy, said that the repair facilities at the major French Naval Base at Diego Suarez no doubt be later available to ships of the Expedition. Communications should be directed to the Naval Base maintained at Diego Suarez and preliminary negotiations would have to be worked out with the French Naval authorities in Paris, particularly in order to get priorities for emergency work. Any use of Diego Suarez radio communication facilities would have to be arranged in France.

Although the Island of Juan de Nova is under the control of the Ministre d'Outre-Mer in France, the economic activity is controlled from Mauritius. This island in the Mozambique Channel might serve as a shore base for a party investigating nearby problems. It has an airport with capacity of handling DC-3's and smaller aircraft and there are quarters for 10 persons on the island. There is an anchorage 1-1/2 miles north of the island, and there is radio communication to Tananarive. In Mauritius I saw Hector Pateroe of St. Pierre, Mauritius, (Tel. Moka 212) who is a Director of Rogers & Co. which controls the cocoanut plantations guano collection, and other activities on the island. He reported that Mr. Amedie Maingard controls the M/V Mauritius for Rogers & Co. M. Maingard represents CAL-TEX, AIRFRANCE and various shipping interests. Mr. Pateroe said that if any part of the Expedition was to use Juan de Nova they might write direct to him in detail to receive any assistance he could give. I talked also to M. La Coste of the Post-Telegraph Department about communications. There is a high frequency station at Tamatave which relays to Tananarive. On CW they work to Suez and on R/T for about 100 miles from Tamatave. They also work Kerguelen and Amsterdam.

M. Truffard, the assistant manager of Standard-Vacuum East Africa came to see me at my hotel about the possible fuel requirements of ships in the Expedition. He said that at the present time there is no bunkering at Tamatave but there may be in a couple of years. At the present time they can only supply fuel at the Naval installation at Diego Suarez. Two months notice is required to Stan-Vac to supply fuel there.

He also indicated that for refueling in the South Indian Ocean they could store ANY amount of oil in drums at Kerguelen. The supply vessel serving Kerguelen is under the control of the Mission Des Terres Australe which is part of the Ministre d'Outre-Mer in France. She goes annually to Kerguelen in September or October picking up oil in Tamatave. He also said that he did not know of the varieties of fuel available at Port Louis. He says that Durban has everything and there is a refinery there. Other major fueling points are Dar-es-Salaam, Mombassa, and Djibouti.

MAURITIUS

My visit to Mauritius was for the purpose of finding out what assistance the British Colonial Government could give to the Expedition. I have had discussions in London with Mr. C. E. Lambert of the Colonial Office who had informed the local government of my impending visit. As a consequence, the Colonial Secretary had arranged a number of conferences for me.

I saw the following people in Mauritius:

Mr. F. M. Lassemillante, (Acting Principal Assistant Secretary,
Ministry of Agriculture and Natural Resources.)
Mr. Jean Baissac, (Fisheries Officer)
Mr. S. Staub, (Acting Deputy Director Agriculture.)
Mr. J. Vinson, (Director of the Institute of Mauritius.)
Dr. R. E. Vaughan, retired Director of the Institute.)
Hon. S. Boolell, (Minister of Agriculture.)
Mr. A. North Coombes, O.B.E., (Acting Director of Agriculture.)
Hon. A. L. Nairac, C.B.E., Q.C. (Minister of Industry, Commerce and
External Communications)
Lt. Commr. A. G. Booker (Harbor Master)
Mr. A. D. Swan (Director of Meteorological Services)
Mr. A. N. Bott (General Manager, Central Electricity Board)
Mr. G. Bunwaree (Principal Assistant, Ministry of Industry,
Commerce and External Communications)
T. D. Vickers, Esq. C.M.G. (Colonial Secretary)
Sir Colville Montgomery Deverell K.C.M.G., C.V.O., O.B.E.
(Governor of Mauritius)

The Colonial Office and the individuals I saw all made it clear that Mauritius would not be able to undertake any extra expenditures for the Expedition because of their very delicate financial condition. However, since Port Louis is an excellent port well into the Indian Ocean and the Mauritius Government controls islands to the East and North as far as approximately 1200 miles away, this is a strategic center.

In my discussion with various individuals I stressed the matter of assistance in tide gauge and meteorological installations (for details see separate memoranda on each of these), and on hospitality for visiting ships.

Mauritius is also interested in putting trainees on some passing ships for work particularly in Biological Oceanography and also in participation with shore parties on coral island investigations. They can arrange for return of personnel from East African ports. In regard to tide gauges, their assistance can be substantial. With regard to meteorological observations, most of the cost including that of operation might have to be assumed by other governments.

A special problem arises in connection with wave recording. They are interested in the possibility of electrical power generation either from waves or waves plus tidal impoundments. Mr. Bott indicated that some reef studies in connection with this had been carried out by Louisiana State University and that L.S.U. had offered some financial support to Mauritius for this. With regard to hospitality,

all of the points in the SCOR Indian Ocean Working Group memorandum were agreed upon in principle. Arrangements in detail are to be made according to Mr. Vickers, Colonial Secretary, through Mr. G.

Bunwaree, Principal Assistant Secretary, Ministry of Industry, Commerce and External Communications. Mr. Bunwaree will be the individual who will be the coordinator, for the Colonial Secretary, of activities of the local committee which will probably be set up to enlist the participation of all agencies and individuals in Mauritius who might assist the Expedition.

UNION OF
SOUTH
AFRICA

On 8 December in Pretoria, I talked with Mr. C. G. Hide, Senior Liaison Officer, Scientific Cooperation Division of the South African Council for Scientific and Industrial Research (CSIR). He brought in Mr. M. F. Baxter, the CSIR financial officer for preliminary discussion of the South African program. They pointed out that the presently planned South African effort exclusive of ship time, would run to about £ 100,000. The AFRICANA II is the best ship they have for research. She belongs to the Fisheries Administration and is used at the present time primarily for biology but she is fitted for deep sea oceanography and can probably handle geology also. AFRICANA II has no geographic limitations and is scheduled for a cruise out to 12-1500 miles to the East of South Africa and then Southwestward following or crossing the Agulhas current. She is scheduled for a 2 months cruise in 1961. In discussions later in Cape Town with Mr. DuPlessis, Director of Fisheries, I found she would probably be available in the same mid-year season in 1962 and 1963. The NATAL is a naval hydrographic vessel fitted for oceanographic and biological work but limited to about 500 miles off the coast and to points South of a line extending Eastward from the Northern border of the Union. JOHN D. GILCHRIST is a trawler attached to the University of Cape Town limited by its capabilities to about 200 miles from the shore. In addition, there is a new research vessel for use in the Antarctic which will be available in early 1962. This is an existing hull of about 3000 tons being strengthened and fitted for all types of meteorological and oceanographic research in addition to support of Antarctic parties in Queen Maud's Land. £ 32,000 extra is available for equipment and specific projects to be conducted by various universities and CSIR. This is above the ordinary outlays. On top of this the ships are provided by the Navy, the Ministry of Transport, and Fisheries Department.

South Africa is interested in carrying out sedimentary analysis and Carbon 14 measurements, but needs equipment for both of these. For Gravimetry they have budgeted £ 10,000 for equipment but they need additional £ 20,000 for stabilizing equipment. Discussions with Mr. M. P. Van Rooy, Director of the Weather Bureau, and his associates are outlined in a separate memorandum on meteorology.

I paid my respects to U. S. Ambassador Philip Crowe whom I had known for some time, and left a copy of the basic documentation on the Expedition with Mr. P. R. Cook, his Economic Counsellor, and Cdr. Oliver Norman, U.S.N., Assistant Naval Attaché.

I met Dr. S. M. Naudé, President of CSIR and Chairman of the South African Oceanographic and SCOR National Committee, and Dr. E. J. Marais, Director, National Physical Laboratory, one of whose institutes is the Oceanographic Unit. Mr. Anderson of this Unit has just moved his headquarters from Cape Town to Durban. I discussed the plans of other countries in the Expedition and pointed out that many were setting up special working groups to develop plans for each of 3 or 4 disciplines. I think South Africa has done considerable planning on this project and I believe they will follow the general pattern including the development of substantial meteorological programs. The National Physical Laboratory is interested in doing water dating and they want to develop C_{14} and Tritium programs. Faced with existing budgetary limitations, they are wondering whether to give up a gravimetry program in the place of the C_{14} program. The cost would be less, and one question in their minds is which would be considered the most important for the Expedition.

With regard to hospitality for ships, I saw Mr. Peter Philip, Head of the Political Division for Scientific International Relations in the Ministry of External Affairs. Since South Africa is not a member of UNESCO, he suggested that the correspondence for obtaining hospitality for visiting ships be undertaken by the President of SCOR rather than UNESCO, since South Africa has official connection with SCOR. Mr. Philip personally saw no problem in providing the facilities for ships which are desired. He feels that South Africa would approve the matter in principle, but would require notification for each arriving ship.

Mr. Hide agreed to serve as the Coordinator for all arrangements between the Expedition and South Africa. He said that if we desired to set up logistic centers at South African ports that these would be handled by CSIR, probably under the local administration at Cape Town of Professor John Day, and at Durban by Dr. David Davies. He also pointed out in connection with navigation that the Pretoria Observatory repeats the WWV time signal with the appropriate time correction for differences in location. They may be able to provide full Indian coverage for this.

In Durban I talked with Dr. David H. Davies, Director of the South African Association for Marine Biological Research at the University of Natal; Mr. Alan O. Simpson, President of the Association; Dr. George Campbell, Chairman of the Association's Board; Mr. F. Anderson and Mr. Christo Stavropoulos of the Oceanography Division of CSIR's National Physical Laboratory at Durban and some others. I visited the Centenary Aquarium which combines research and public display and saw the plans for the substantial extension of this institution primarily for research purposes. Since Dr. Davies is both a member of the South African National Committee and SCOR's Indian Ocean Working Group, I reviewed the progress and plans for the Expedition. My discussions with Mr. Anderson and Mr. Stavropoulos dealt largely with their plans for systems of automatic recording of oceanographic phenomena, South African salinometers developed by Anderson and their general plans for physical oceanographic work on AFRICANA II during her cruises as far East as Mauritius (58° E) and Southward to 38° S.

In Cape Town I talked with Dr. John H. Day, Professor of Oceanography at the University of Cape Town; CDR. J. K. Mallory, SAN, the Hydrographer of the South African Navy; Professor Trotti, Visiting Professor of Oceanography from the University of Genoa; Professor Orens, the new head of University's Department of Geochemistry; Mr. C. G. du Plessis, Director of Fisheries; Dr. B. Vandyk de Jager, Assistant Director of Fisheries; Mr. James Curran, U. S. Vice Consul in Cape Town, and a number of other individuals connected with the Expedition at the University, the headquarters of the Fisheries Department, Hydrographic Office and on board the AFRICANA II, the NATAL and the JOHN D. GILCHRIST. Day, Mallory, and du Plessis are members of the South African National Committee for SCOR.

Professor Day will be leaving South Africa on a year's leave of absence in early February to work in the U. K. During this time professor Eric Simpson of the Department of Geology at the University of Cape Town will take Professor Day's place as Chairman of the South African National Committee's Oceanography Steering Committee. Day described the organization of his department of oceanography in which he has formally established cooperation with a number of related disciplines by bringing in professors from other fields into the department on a part-time basis while maintaining a central oceanographic core. He went on to point out that the University of Cape Town is especially interested in the Agulhas current whereas the Fisheries Department has devoted most of its effort heretofore in the Benguela current of the West coast.

Day went on to describe the activities of some individuals and institutions in South Africa that I was unlikely to see. The Museum and Oceanarium at Port Elizabeth might operate a ship in the latter part of the Expedition working out to about 100 miles from the coast. Dr. G. R. Mc Lachlan is the Director of this museum. Professor A. L. Hales and Professor Sax of the Bernard Price Geophysical Institute, University of the Witwatersrand; Dr. Van Veeck of the Seismological Observatory under the Trigonometrical Survey and Professor Simpson of the University of Cape Town are particularly interested in geophysical problems. Mr. Frank H. Talbot, Deputy Director of the South African Museum is a physical oceanographer and works closely with Day. Talbot is also interested in tuna.

Professor Orens is interested in establishing a service for the Expedition in his laboratory to analyse all cores taken in the Expedition. They are equipped to do spectographic analysis and full physical and chemical analysis of cores. They have the money to support one or possibly two scientists of their own and they would be prepared to analyse cores in terms of a large number of elements. They are interested in a large number of samples but they might need additional personnel. Professor Orens indicated that if there were 1,000 samples they would need additional equipment, manpower and space. He is preparing a proposal to be submitted to the South African National Committee for consideration. I raised the question of how this might fit in with the core analysis either proposed or under way by Lamont, the U. S. Geological Survey, Cambridge University and others.

Professor Day suggested that a regional meeting of representatives of National Committees from Mozambique, the Malagasy Republic, South Africa, Mauritius and East Africa be held somewhere in the region - preferably at Lourenco Marquês sometime after the South African National Committee meets on March 6 and 7, 1961. The purpose of such a meeting would be to compare and coordinate national plans for the East Coast of Africa and the Southwestern part of the Indian Ocean. He also urged that the Commission for Technical Cooperation South of the Sahara (CCTA) be kept advised of Expedition plans through M. E. Postel the Inter African Coordinator of CCTA. Day was also very interested in obtaining details of the Woods Hole Agulhas Current program. Day was also concerned about obtaining funds for transportation and subsistence for trainees from his or any country to undertake the special post-doctoral training proposed for the Expedition. He pointed out that a six months tour in the U. K. for instance, would probably run to some £ 750 and wondered if there were possible sources of such funds outside the Indian Ocean area.

I talked to him also about his oceanographic and marine biological bibliography. He has cards on 2,000 to 2,500 items but it deals only with the African part of the Indian Ocean and in general the references do not deal with anything North of 20° S. He is making this bibliography available to the Expedition and strip films of the cards should be forthcoming during January 1961. These will be incorporated into the Indian Ocean bibliography being prepared under the direction of Dr. John H. Ryther of the Woods Hole Oceanographic Institution who is Chairman of the U. S. Indian Ocean Panel's Working Group on Biological Oceanography. In addition to Day's material the bibliography will draw heavily on a FAO bibliography, material in the WHOI library and other sources.

Discussions with CDR. Mallory are outlined in a separate memorandum dealing with tide gauges (q.v.).

Mr. du Plessis said that not only would AFRICANA II be available for two months during the summer of '61 for its cruise well to the East and South of South Africa but that it would also probably be available in the same season for a similar length of time in this area in both 1962 and 1963. A decision on these future plans will probably be made by April or May 1961. He said that it is very difficult to change the season because AFRICANA II is supported in part through a contract with the Government of Southwest Africa which calls for work on the West coast of Africa during other seasons.

He also said that there were no present plans to carry out geological or geophysical investigations on AFRICANA II although they will possibly do some collection of benthic organisms and some dredging. They find it difficult to do a mid-water trawl from AFRICANA II particularly, I believe, because of her high freeboard. However, they expect to do a full biological and physical and chemical oceanographic program on AFRICANA II as well as some exploratory fishing. They could also do radio sonde observations and would be prepared to do so with the assistance of the South African Weather Bureau.

AFRICANA II is an excellent research vessel with capacious laboratory facilities, excellent quarters and ample deck room. She could possibly take one visiting scientist who would be required only to pay a small mess bill. Such arrangements, however, could not be worked out until cruises in 1962 and 1963. The Fisheries Department is interested in sending a small number of trainees at an advanced level but they find it difficult to move rapidly through their Civil Service regulations. The Fisheries Department Library and shore based laboratory facilities seem excellent. The library has 1,100 journals and receives 700 to 800 currently and there are some facilities for visiting scientists in the laboratories.

I also visited the NATAL, the South African Naval Hydrographic vessel and the JOHN D. GILCHRIST. NATAL is well fitted as a hydrographic vessel and also handles deep sea oceanographic and geological and geophysical work. Her laboratory is less generous than on AFRICANA II but she seems to be a first class vessel. Radio sonde observations can be made from NATAL. The JOHN D. GILCHRIST is a converted trawler which at the moment is not fitted for deep sea work. She is 95 gross tons and 75 feet long. At the present time she is fitted with a 140 fathom echo sounder. Dr. Day is trying to get a precision depth recorder but would settle for any deep echo sounder such as might be available as surplus in the U.K. or the U.S. The present unit is a Marconi Graphite type 848, serial 663, 48 KC unit. One question raised was whether a different driver and receiver amplifier can be installed with the existing transducers in order to get greater range.

I also saw from a distance the PROTEA, about 1,000 gross tons and 200 feet long. She has been decommissioned and was up until 1956 a hydrographic vessel with a major conversion from the Flower Class Corvette. I asked CDR. Mallory to send me as much information as he could on her with the thought that if she were sufficiently longlegged and could attain a "quiet ship" condition she might be useful as a shooting ship for geophysical work. The details of her characteristics will be given limited circulation and if she appears at all satisfactory, an approach could be made to the South African Ministry of Defense to charter her and then man her with a small civilian crew.

In the course of my discussions in Cape Town it was suggested that perhaps during the meeting of various oceanographic vessels at the Tenth Pacific Science Congress in Honolulu a direct comparison be made between the salinometers from different sources and with titration on the same water samples. This occasion might also be an opportunity to make a direct comparison between other equipment and analytical processes.

MOZAMBIQUE My visit to Lourenco Marquês was cut short because of a plane delay in Mauritius. However, with the invaluable assistance of Professor José Pinto-Lopes, Director of the Instituto de Investigacao Cientifica de Mozambique, P. O. Box 1780, Lourenco Marquês, (telephone Boane 010) I was able to see virtually all the people I needed to during the twenty hours I was there. Notes on meteorology and on tide gauges are contained in separate memoranda (q.v.).

I talked with Con. Almirante Moreira Rato whom the Governor had designated as the individual to discuss the general plans of Mozambique for possible participation in the Expedition. He indicated that so far as ship operation was concerned, this would depend upon the Chief of the Hydrographic Brigade who is also Commanding Officer of the ALMIRANTE LACERDA and upon action by the Portuguese government.

With regard to hospitality and facilities for ships, he felt that all the arrangements requested by the SCOR Working Group could be taken care of and he agreed to take the initiative in making preliminary arrangements. In connection with the establishment of a possible current measurement station at Mozambique Island, he said that he felt this could probably be worked out satisfactorily.

The Director of the Meteorological Service of Mozambique is responsible for seismology and geomagnetism. He pointed out that Seismographic Observatory is being built about 90 kilometers Southwest of Lourenco Marquês and that this will be in operation by 1962. A Geomagnetic Laboratory has been started at a point 150 kilometers North of Lourenco Marquês and may be ready by 1962. During the IGY there was a seismograph and geomagnetic station in Lourenco Marquês. The Meteorological Service is also planning wave measurements and sea temperature measurements along the middle and northern coasts of Mozambique.

On the ALMIRANTE LACERDA I talked with LCDR. G. Lobo Fialho. He reported that the Captain (CDR. Barahona Fernandes) who was in Lisbon, had written him that Portugal is setting up a National Committee for the Indian Ocean and that the ship will get some new oceanographic equipment and will probably participate. The ship can now take soundings, bathythermograms and bottom samples for hydrographic purposes. Her cruising range is twelve days at economical speed (about 10 knots). They also take water samples, plankton samples, make the ordinary hydrological stations and take surface current measurements with RADIST on which they currently get a range up to 150 miles but might go to 180 miles. In plotting these current measurements they fare out the inconsistent observations. They currently have 7 officers - 6 hydrographers and 1 engineer - and they could possibly take one visiting scientist. Their echo sounder for which they claim 1% accuracy is an ELAC electro-acoustic sounder with "built-in" Voltage regulation. It has a depth range of 4,000 meters. As a reserve echo sounder they have an old Admiralty A/S 82. Both the ship and its boat have Hughes wet paper 180 meter sounders and there is also an Atlas Werke 800 meter sounder for the boat. At present the ship has a small winch forward with 2,500 fathoms of wire.

Dr. Pinto-Lopes' laboratory which was started only three years ago now has a substantial physical plant, seven scientists and a total staff of over forty. Its library is limited but growing. Scientific investigations are carried out in a variety of fields. Pinto-Lopes expressed considerable interest in the Expedition and will serve as the chief contact in Mozambique at the present time. His institute has recently taken over a marine biological library on a large island off Lourenco Marquês and there are plans to develop a substantial research program there.

It is not possible at this time to determine the extent to which Portugal (Mozambique) will actually participate in the Expedition. Indirect reports indicate a favorable prognosis however. Further contact will be developed with the appropriate authorities in Lisbon.

OTHER
COUNTRIES

No substantial changes have been reported since the publication of the Coordinator's report of Helsinki, 23 July 1960 from Japan, Taiwan, Indonesia, Ceylon, U.S.S.R., Germany, Denmark, France and Israel.

Australia has announced plans for 1961 cruises by DIAMANTINA and is working on plans for later cruises.

The United Arab Republic has expressed an interest in participating and is reported to be considering refitting MAHABISS.

The United States has made substantial progress in developing a detailed national plan. During October and November 1960 thirty-one scientists, most of whom will be actually participants in the Expedition, have drawn up plans in each of five fields (geology, geophysics and bathymetry; physical and chemical oceanography; biological oceanography; marine meteorology; and data handling and analysis). These documents have been considered by the U. S. National Committee for SCOR and are now undergoing minor final modification. It is expected that they will be completed within the first two months of 1961 to be ready for final approval at the U. S. National Committee meeting in La Jolla on 4 and 5 March. These will be published and available for wide dissemination.

The United States ship participation at the present time appears to be as follows: ARGO and HORIZON from Scripps Institution of Oceanography to participate in '62 and '63; a new vessel and possibly VEMA from Lamont Geological Observatory for '62 and '63; a newly constructed vessel from Woods Hole Oceanographic Institution in the same period; the USS SERRANO and the USS REQUISITE of the U.S. Navy Hydrographic Office working respectively in the Malacca Straits and in the Persian Gulf and Arabian Sea areas in early 1961 at least; and a vessel from the National Aeronautics and Space Administration (NASA) working East and South of Mauritius from mid '61 through 1962 conducting meteorological and possibly some oceanographic work. There is also the possibility of the U. S. Coast and Geodetic Survey's research vessel PIONEER operating in the Bay of Bengal in 1963 and a serious attempt is being made to obtain a new vessel whose primary mission will be biological oceanography to carry out the program recently developed by U. S. biological oceanographers. In general, the tracks and areas indicated on the chart in the Coordinator's report for each U. S. institution still hold.

RGS:jas

New York
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