CONSEIL INTERNATIONAL DES UNIONS SCIENTIFIQUES · INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS
SPECIAL COMMITTEE ON OCEANIC RESEARCH
(SCOR)

INTERNATIONAL INDIAN OCEAN EXPEDITION
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PART III

M E T E O R O L O G Y

Notes on Facilities Discussed During R. G. Snider's Trip 27 January to 3 March 1961 to the Eastern Half of the Indian Ocean.

AUSTRALIA

Discussions at Sydney and Canberra revealed that although there was meteorological representation on the Australian National Committee, no substantial meteorological research program had been drawn up as yet. However, Dr. George F. Humphrey, Chairman of the Committee and RADM. Beecher, Deputy Chief of Naval Staff undertook to stimulate the development of such a program from different angles.

It had been hoped that GASCOYNE and DIAMANTINA might carry out some of the weather ship functions proposed in the U. S. Meteorology Working Group program but their joint naval training and oceanographic responsibilities are such that they could not operate on a weather ship schedule. However, in their scheduled cruises these vessels will certainly make surface meteorological observations and possibly will undertake a radiosonde program. It is also probable that radiosonde and rawinsonde observations will be made on land based stations as part of the meteorological network. The possibility of equipping an Australian aircraft with the necessary sensing devices and other meteorological equipment to conduct investigations in the eastern part of the Indian Ocean is being explored. Australia will also consider the possibility of partial support of weather ships and meteorological instrumentation.

INDONESIA

The Indonesian Meteorological Service has expressed a willingness to participate in the Expedition network. Mr. Soekanto and Mr. Fatah of the Meteorological Institute, Djakarta said that their shore observations might have to be increased appreciably

to meet the Expedition's needs. They require specific plans in order to determine what added equipment would be necessary. Possible fund sources were discussed.

Ship-borne observations will unquestionably be undertaken on their new Marine Research Vessel, the JALANIDHI, being built in Japan for April '62 delivery (see Part I). The vessel as designed has meteorological observation, operations and analysis rooms and a main deck balloon filling station.

Since Indonesia feels helium will be difficult to obtain, the question was raised about ship board experience in other countries with generation of hydrogen. They feel that a deck load of 100 hydrogen bottles would be space consuming and that a hydrogen generator, if there has been substantial experience and satisfaction with safety procedures, would be preferable. Since this issue may affect the final revision of their ship plans, any experience or comments made to the Office of the Coordinator prior to the summer of 1961 would be appreciated. The question was also raised about the calibration of pyrheliometers.

A detailed Indonesian meteorological program will be forthcoming.

MALAYA

Although Malaya has not reached a final decision on its participation, there is a high probability that it will be able t cooperate in the meteorological network. At a meeting in Kuala Lumpur their Meteorological Department was represented by Mr. Ho Tong Yuen and encouraging correspondence has been exchanged with Mr. K. Rajendram, Director of the Malayan Meteorological Service in Singapore.

Radiosonde observations are taken at Singapore every six to twelve hours and also at the Royal Air Force base at Butterworth in northern Malaya near Penang. Increased observations would require additional staff and equipment. The University of Malaya at Kuala Lumpur is interested in increasing its meteorological training. Mr. W. L. Dale of its Department of Geography is the individual particularly involved.

CEYLON

Due to fiscal retrenchment, Ceylon at this time is unable to increase its existing activities without outside help. However, within existing limitations, Ceylon can be expected to participate in the network.

Mr. D. J. Jayasinghe and Mr. L. A. D. I. Ekanayake, Director and Deputy Director of the Ceylon Meteorological Office reported that radiosonde observations are made at Colombo airport at 1200 G.M.T. on alternate days but that radio wind observations are made daily at that time. There are also four pilot balloon stations in the island which make surface observations in addition. Mr. U. Rath of the International Civil Aviation Organization Regional Office at Bangkok was present during these discussions. He pointed out that the Expedition's requirements for the basic observations in the shore stations network were identical with the WMO and ICAO needs and that any increase in frequency of observations would have three uses.

INDIA

During a visit to Cochin in Kerala State in southwest India for other purposes, I made a casual investigation of the feasibility of locating an Expedition meteorological center there. Although space might be available the radio communication facilities here would be less satisfactory than Bombay. Furthermore, the air field now serves only planes up to approximately a DC-3 (Dakota) size although it might be able to handle a DC-4. Existing meteorological facilities are limited.

A brief visit in Bombay to the Colaba Observatory of the Indian Meteorological Department and subsequent discussions in New Delhi with Mr. Krishna Rao, Director of the Indian Meteorological Service and Mr. C. Ramaswamy of the Meteorological Department and Dr. K. R. Ramanathan a member of the Indian National Committee and an eminent research meteorologist, revealed that India would welcome the establishment of an international meteorological center for the Expedition at Bombay which would be their first choice although New Delhi could handle this. The Colaba Observatory is housed in a reinforced concrete two story building about ten minutes by taxi from the center of Bombay close to the Tata Institute of Fundamental Research.

One quarter or one half of the floor (three to six comfortable sized offices) would be made available immediately if desired. Any requirement over 10,000 square feet would unquestionably require new facilities. There is also another building on the Colaba Station which is a geomagnetic research headquarters. The main geomagnetic station is fifty miles to the south. Furthermore, the main Indian meteorological research center is at Poona about eighty miles to the southeast of Bombay.

Bombay is responsible for forecasts in the area bounded by 5 $^{\circ}$ N, 20° N and 60° W and both meteorological and naval radio facilities at Bombay are excellent. Bombay is also a major transportation center with an international airport capable of handling and servicing any type of plane. Bombay Port can handle

any Expedition vessels which might need to be in close contact with the meteorological center. Dr. Krishna Rao indicated that India would probably be able to provide the physical accommodations for the center. Housing for staff could certainly be found in the metropolitan area.

India now makes radiosonde and rawin observations at 0000 and 1200 G.M.T. at Veraval, Bombay, Trivandrum, Madras, Vizagapatnam and Calcutta, and Port Blair in the Andamans. Furthermore, pilot balloon observations are made at Minicoy Island, Cochin, Mangalore and Vengurla at 0000, 1200 and 1800 G.M.T. and at Bombay and Trivandrum at 0600 and 1800 G.M.T. I did not get information on the east coast minor stations.

New Delhi now has radio teletype direct connections with Moscow and Tokyo, fitting into the Northern Hemisphere Meteorological Collection and Exchange Center network which includes Moscow, Frankfort, New York and Tokyo. New Delhi will have a Northern Hemisphere Analysis Center in April 1961 and by July 1961 will have facsimile broadcasting facilities. It will be necessary to tell the Indian Government and the Indian Meteorological Service what facilities are required for the International Center.

India had not thought of making upper air observations until the U.S. Meteorology Working Group draft report came to their attention. They are now considering carrying out upper air observations on the frigate which will be made available to the National Committee by the Indian Navy. They have had no ship-board experience with hydrogen, however, and will welcome any suggestions or guidance.

During the early spring of 1961 India expects to indicate what part of an international meteorological program they might undertake basing their comments on the U. S. preliminary draft. Indian representatives felt that it was rather unlikely that they would be able to assume any financing of weather ships or Mamos buoy operations unless strong representations by outside groups were made to the Central Government Ministries involved.

PAKISTAN

The Meteorological Service will cooperate fully in the Expedition's meteorological network. Their meteorological observations will include those at shore stations and on their ships operating in the Arabian Sea and the Bay of Bengal north of 16° N and in passage between West Pakistan and East Pakistan. Most equipment requirements have been noted and budgets have been drawn up indicating total financial requirements for presentation to Government. The Pakistan National Data Center for analysis of their Expedition data will be established under the Meteorological Service with assistance of their C.S.I.R.O.

The Pakistan National Committee will hold a meeting in May 1961 at which they plan to decide on what elements of the international meteorological program they can undertake. They are interested in having the International Meteorological Center for the Expedition established in Karachi. The Director of the Meteorological Service, Mr. S. D. Naqvi wants at least one weather ship in the Arabian Sea. This is also urged by the Acting Director of the Meteorological Service in East Africa (q.v.).

Mr. Naqvi has also proposed that specific intensive observations of meteorological phenomena be carried out on specified "Days" as in the IGY, based on sun spot activities or meteor showers. He also called attention to the difficulties in providing meteorological forecasts based on enciphered data for which receiving stations had no code. He cited Indonesia as one country practicing this procedure.

Major funds have been voted by East Pakistan for research on tropical cyclones and their prediction. Dr. Gordon E. Dunn, Director of the National Hurricane Research Center at Miami, Florida, U.S.A. (U.S. Weather Bureau) has been working with Mr. Naqvi on this East Pakistan research program. Mr. HAMEEDUDIN Ahmed, Joint Secretary of the Ministry of Defense, to whom the Meteorological Service reports, suggested that some of the funds for such research in the Bay of Bengal might be directed to fundamental research for the Expedition's meteorological program, since the cooperative international venture could contribute to the understanding of tropical cyclone prediction for East Pakistan.

BURMA

Although Burma has not made a final decision on participation in the Expedition, it is probable that its meteorological observations will fit into the Indian Ocean Expedition network. Dr. Po E, Director of the Burmese Meteorological Department and Chairman of the Burmese IGY Committee, stated that they make radiosonde observations at Rangoon every alternate day at 000 G.M.T. and they hope to do this daily. They plan to make similar observations at Meiktila, about ninety miles southwest of Mandalay within six months. They make no radar wind observations but they are considering installing one station in 1962. There is one pilot balloon station on the Coco Islands north of the Andamans and several pilot balloon stations along the east side of the Bay of Bengal. They have no plans for radiosonde or rawin at any of these.

When Burma makes a formal decision to participate, its National Committee will probably be built around its Maritime Coordination Committee in which meteorology is represented. Dr. Po E suggested that a special prefix should be established for meteorological reports from Expedition vessels and others contributing to the meteorological program for the Expedition.

THAILAND

VADM. BUNNAG Charoon, R.T.N., Director of the Thai Meteorological Service indicated that there are three major meteorological stations making radiosonde observations once daily at 0000 G.M.T. These are at Bangkok, at Songkla in south Thailand at about 5° N and at Chingmi in the north at about 19° N. They also have a pilot balloon station at Phuket making regular observations at 0000 G.M.T. and some observations at 0600, 1200, 1800 G.M.T. This station was established in 1940.

Admiral Bunnag said that they had tried several radiosonde observations a day during the IGY but found it too costly. Costs at that time were about 1,000 Bhat (Ticals) or approximately $50 US per upper air sounding for gas and transmitter.

A communication dated 21 March 1961 indicates the high probability that Thailand will participate at least on a small scale which will include the meteorological network.

NATIONALIST CHINA

Discussions with the National Committee at Taipei, Taiwan revealed that they would like to send trainees to the International Meteorological Data Center when established.

JAPAN

Japan plans cruises from 8° N to 32° S along 78° E, 86° E and 94° E, and from approximately 8° S to 32° S along 102° E, 106° E and 110° E, and from 8° S to 24° S along 114° E. All of these cruises will involve "regular meteorological observations" and "study of the mechanism of boundary layer phenomena". These cruises will be carried out between December '62 and March '63. An effort is being made to organize similar cruises in this general area, without duplication in the same period 1963-64. One Meteorological Agency vessel will conduct observations along the 86° E meridian.

Discussions with Dr. Kiyoo Wadachi, Director of the Japanese Meteorological Office, Dr. K. Terada of their Division of Maritime Meteorology and Dr. S. Syono of the University of Tokyo revealed a substantial interest in the international meteorological program. They indicated, however, that a formal request from SCOR would be required to obtain Japanese decision on a contribution to the support of weather ships or Indian Ocean Expedition meteorological research and also for participation in the supply of meteorological

equipment for use at various shore and ship-borne meteorological stations in the Indian Ocean. A decision on these procedures for specific requests to various nations for extra-national activities should be reached by SCOR in the very near future.

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GENERAL COMMENTS AND NOTES FROM OTHER NATIONS

EAST AFRICA

The Acting Director of the Meteorological Service of East Africa, Mr. B. W. Thompson, has submitted specific comments on the U.S. Working Group proposal for a meteorological program.

UNITED STATES OF AMERICA

Conversations in Bangkok with Colonel Jones, USAF, Commanding Officer of the Third Meteorological Wing based at Honolulu and Major Terry, USAF based at Clark A.F.B. in the Phillipines suggested a possible substantial interest in tropical meteorology by the United States Air Force. Further follow-up of this interest should be made. Conversations at Scripps Institution of Oceanography at La Jolla with Dr. Tj. H. Van Andal revealed that Portuguese Timor has forty surface meteorological stations and that Dr. Marciano Viegas Baptista is Chief of the Meteorology Department there. He felt that Portugal might be able to contribute meteorological observations for the eastern end of the Indian Ocean.

WORLD METEOROLOGICAL ORGANIZATION

WMO, implementing Recommendation 30 (CMM-III), has invited appropriate action on the part of member countries on various elements of participation in the Expedition. Replies are reported from twenty five members including twelve members bordering on the Indian Ocean.

INTERNATIONAL ASSOCIATION OF METEOROLOGISTS AND ATMOSPHERIC PHYSICISTS

IAMAP is organizing an ad hoc committee to advise SCOR on a meteorological research program for the Expedition. Ten countries have been asked to participate. The U. S. Meteorological Working Group program may serve as a point of departure for this body.