

## INTERNATIONAL INDIAN OCEAN EXPEDITION

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### PART II

### T I D E   G A U G E S

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 with Dr. George F. Humphrey as Chairman of the Australian National Committee on Oceanic Research at Cronulla indicated that Australia would adopt the proposals made for tide gauge operations made for the Permanent Service for Mean Sea Level by Disney and modified by Chugh and Rossiter. This would call for continuation of the IGY gauges at Port Darwin, Port Hedland, Fremantle, Albany and Port Adelaide.

#### INDONESIA

An agreement was reached by MIPI, the Hydrographer at the Navy Department and the Ministry of Sea Communications on the installation and operation of one permanent tide gauge at Tjilatjap (Chilachap) and five sixty-day stations along the West and South coasts of Sumatra, Java and Bali at Salang (Tjalang) Bay, Padang, Benkulen (Benkoelen), Pelabuhan Ratu (Gontong Bay) and Benua (Bonos) in Bali. This is in accordance with the Disney proposal for the Permanent Service for Mean Sea Level as modified by Chugh and Rossiter. All three government agencies are involved in some aspect of the installation and operation. The Navy Hydrographer, Major Wardiman, and RADM. Martadinata, Chief of Naval Staff agreed that the Navy would take primary responsibility.

I had no opportunity to discuss a recent proposal for close observations of tidal change within a degree of the equator. Padang would fall within this category as would several small islands and even smaller ports. This matter can be explored further through the Madjelis Ilmu Pengetahuan Indonesia (MIPI) in Djakarta.

## MALAYA

Establishment and maintenance of tide gauges at appropriate places was discussed as one part of small-scale participation in the Expedition. No one present at the meeting in Kuala Lumpur was personally familiar with the actual tide gauge installations. There was a firm belief (confirmed by communication from Mr. Chugh of the Survey of India) that there is a permanent installation at Penang and another at Singapore. There may be tide gauges at Port Swettenham and Port Dickson.

When Malaya reaches a final decision on participation in the Expedition, it is likely that the Harbours and Railways Agency, responsible for tide gauges, will participate in the national committee and that Malayan tidal information will be available.

## CEYLON

Due to current fiscal difficulties it is unlikely that Ceylon will be able to expand its tidal observations at present beyond the existing gauge in Colombo harbor maintained by the Master of the Harbour. I pointed out that additional tide gauges at Galle and Trincomalee would be helpful.

## PAKISTAN

In accordance with previous discussions, the Survey of Pakistan will provide installation and operation of four tide gauges during the Expedition, probably two each in West and East Pakistan.

## INDIA

India has agreed to cooperate in continuing eight stations which operated during the IGY at Kandla, Veraval, Bombay, Mangalore, Cochin, Madras, Vizagapatnam, Sauger and they propose to establish a station at Minicoy Island. Mr. R. S. Chugh, Deputy Superintending Surveyor of the Geodetic and Research Branch of the Survey of India has been active in advising on the locations of Indian Ocean tide gauge installations for the Expedition.

## BURMA

Discussions with the Hydrographer of the Burmese Navy, the Nautical Surveyor of the Mercantile Department and the Port Surveyor of Burma revealed that there is a permanent tide gauge established at Elephant Point at the mouth of the Irrawaddi about 30 miles below Rangoon. This is under the operational control of U Ba Ngwe, the Port Surveyor.

If Burma makes a formal decision to participate, as seems most likely, information from this gauge will be available to fit into the network. The Burmese Hydrographic Office is interested in determining the cost of a twenty four component tide predictor and hopes to obtain one.

## THAILAND

Conversations with Captain AMPORN Penyapol of the Royal Thai Navy Hydrographic Office and with VADM, Desakorn Vicharn, Director and RADM, MAHAGHITA Sanith, Deputy Director of the Hydrographic Department revealed that there is a seven day automatic tide gauge at Phuket on Selang Island off the West coast of Thailand. This gauge has been in operation for at least eight or nine years and they can calculate for any hourly or other heights.

If Thailand participates formally in the Expedition, as seems probable, this gauge would help to complete the network of the Eastern side of the Bay of Bengal.

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## MAURITIUS

Lamont Geological Observatory, which owns the IGY tide gauge originally installed at Grand Port, is exploring with the Harbour Master of Mauritius the matter of its re-installation.

## GENERAL

A document prepared recently by the Physical Oceanography Working Group of the U. S. National Committee emphasizes the desirability of establishing tidal stations within one hundred miles of the equator. Such installations would be limited to a small section of the Southern Somalia coast which has been reported as having great lengths of extreme shallow water, a small part of the Southern end of the Maldives including Addu Atoll and a small part of the Western coast of Sumatra and some of its off-shore islands. Various participating nations are asked to give thought to planning such installations.

RGS/jas  
31 March 1961