

Monthly Wave Characteristics of the Arabian Sea

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ABSTRACT. The monthly wave characteristics of the Arabian Sea are reported, based on an analysis of the wave data published in the *Indian Daily Weather Reports* of the India Meteorological Department for the period 1960-1964. June and July are the roughest months in the Arabian Sea and October the calmest. The maximum height of the highest ten per cent wave which has actually occurred in the month of June is 12·6 m. The direction of approach of such waves ranges between W and SW.

1. Introduction

The knowledge of the sea state will be of use in problems related to naval architecture, navigation and naval warfare (Srivastava 1964). No map giving the detailed monthly sea state conditions for the Arabian Sea and the Bay of Bengal has been published so far. The presently available publications (Bigelow and Edmondson 1952 and U.S. Navy Hydrogr. Office 1948, Mar. Div., Lond. Met. Office 1958) give only the qualitative picture of the wave conditions.

Quantitative wave data are published since the last few years in the *Indian Daily Weather Reports* of the Meteorological Department and a preliminary analysis for a short period was made earlier relating to Bay of Bengal (Chakravorty and Bhattacharjee 1957). An analysis of the wave data reported for the five-year period 1960-1964 and monthly charts of wave characteristics are presented in the paper.

2. Analysis of the data

The data presented in the *Indian Daily Weather Reports* are based on visual estimates reported by naval and merchant vessels. The data are not likely to represent the roughest sea conditions since these vessels will normally avoid rough weather areas not to say the eyes of hurricanes and typhoons.

In the present analysis the wave data for each month was grouped for each 2°-square. It is assumed for the purpose of this analysis that the height reported is the significant height and the periods and directions of wave the average. The average of the significant wave height, the standard deviation of the significant wave height, predominant wave period and direction were determined for each group. Maps depicting the average significant wave height, the standard deviation of the significant wave height, the predominant wave period and predominant wave direction were prepared for each month. A typical map for the

month of June is presented in Fig. 1.

It has been shown by Longuet-Higgins (1952) that the ratio of the average height of the highest 10 per cent waves to the significant wave height is 1·27. An estimate of the maximum of highest 10 per cent waves which could possibly occur in 2°-square can be obtained by multiplying the maximum significant height reported in each 2°-square for each month by 1·27. The maximum of the highest 10 per cent waves thus found were plotted for each zone for each month and contoured. A typical map for the month of June is presented in Fig. 2. The areas shown by dots in the map represent the low wave activity and the value given therein represents the lowest value recorded. Similarly, the areas shown by dash represent the high wave activity and the value given therein represents the highest value recorded.

3. Conclusion

A complete set of 24 maps depicting the monthly wave characteristics of the Arabian Sea has appeared in the INPL Departmental Report (*see Ref.*).

A study of the maps shows that June and July (Figs. 1 and 3) are the roughest months. The direction of approach of waves during these period ranges between W and SW. The maximum highest 10 per cent wave which could have probably occurred has a height of 12·6 metres (Fig. 2), October appears to be the calmest month in the Arabian Sea and the direction of waves, if any present, is of a random pattern (Fig. 4).

The area bounded by latitudes (5°N to 10°N) and longitudes (75°E to 79°E) is mostly rough throughout the year. The gulf of Cambay is calm almost all the year round. The coastal area of the West Coast of India is characterised by a number of alternate zones of calm and rough seas.

4. Acknowledgement

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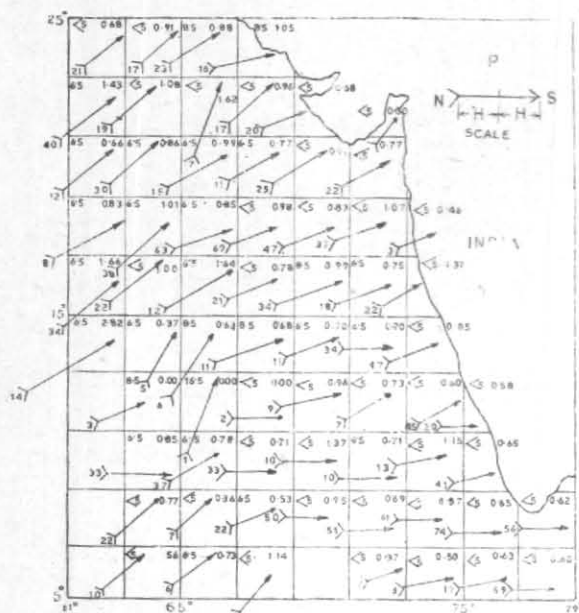


Fig. 1. Wave characteristics — June

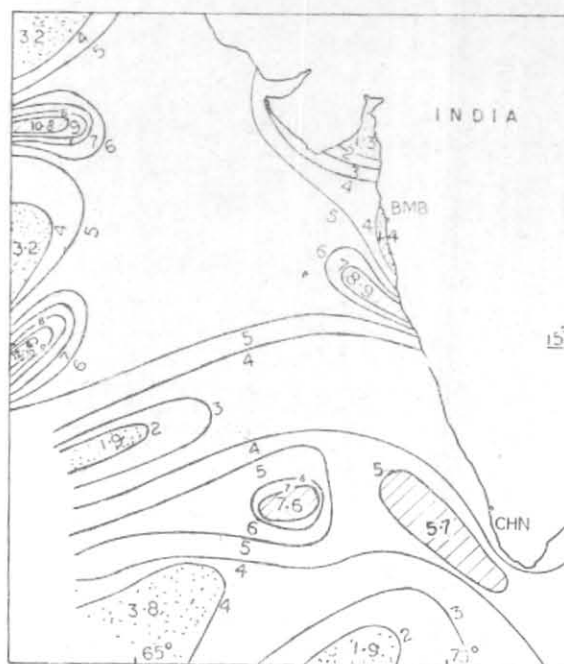


Fig. 2. Highest 10 per cent high waves — June

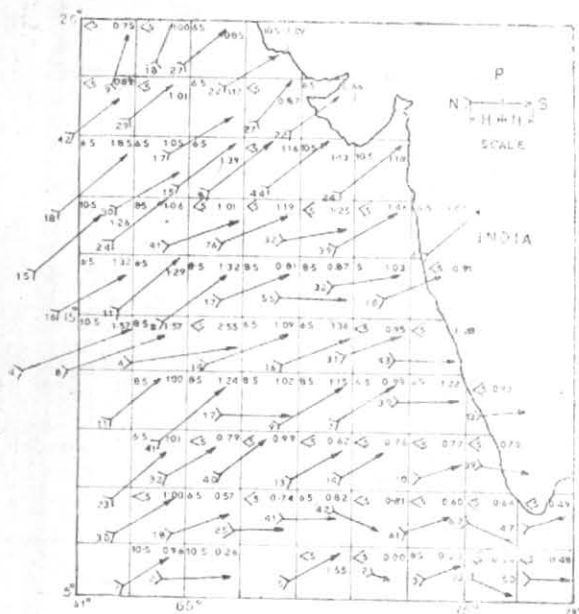


Fig. 3. Wave characteristics — July



Fig. 4. Wave characteristics — October

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