

NOTES

WAVE CHARACTERISTICS OFF GOA FOR THE PERIOD, NOVEMBER TO MAY

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ABSTRACT

Waves were recorded off Calangute, Goa, from November, 1973 to May, 1974. The records were analysed for various wave parameters, and their distributions were studied. For the particular period of observation, the significant wave height was found to be low (maximum 75 cm). About 90% of the wave periods (zero-crossing periods) ranged between 5 sec and 8 sec. The spectral-width parameter values concentrated within 0.55 and 0.80. The energy spectrum and the period distribution correspond to the low-velocity wind system present in the Arabian Sea during the season.

This work has been carried out as part of the programme for studying the wave conditions along the Goa coast. The present study is limited to the distributions of various wave parameters during the fair-weather season. And this forms a basis for the future study of the wave characteristics during the rough weather.

Wave recording was conducted at a station of 15 m. depth off Calangute, Goa (Fig. 1). Continuous recording was done using an OSPOS (Off Shore Pressure Operated Suspended) wave recorder from November, 1973 to May, 1974 for varying durations (Table I). The recorder was operated at a level of about 1.5 m below sea surface, kept buoyant here by anchoring it by a tripod at bottom. The sensor depth, varying with tide, could correctly be read out from the records. The effect of wave-pressure attenuation with depth was accounted for station depth, recorder level and zero-crossing period using the nomograms supplied by the manufacturer. The period of observation from November to May has fair-weather wind conditions (Auflage, 1960) and hence all the eighty three 10-min records were grouped together for analysis.

The records were analysed according to the method suggested by Tucker (1961) (see also Draper, 1967). Height of highest crest above mean water level, and depth of lowest trough below mean water level were read out along with number of upward zero-crossings (N_z) and number of crests (N_c) in each record. From these, true height corrected for attenuation of

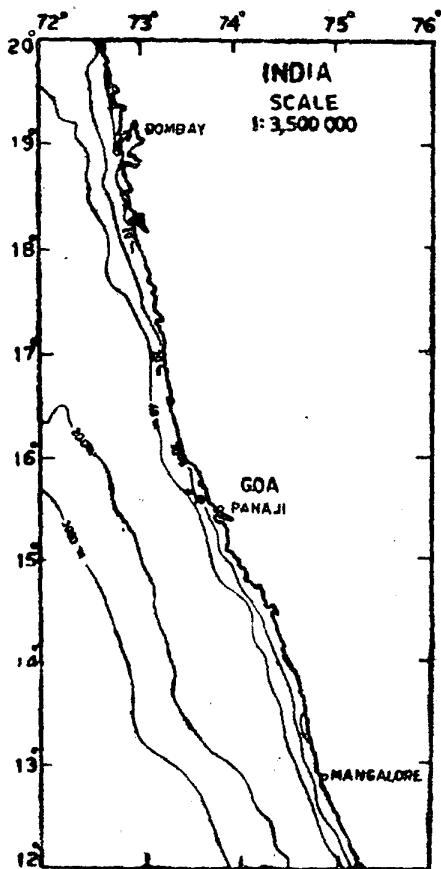


Fig. 1. The location map of Station.

Table I

Date	Time of observations (hrs.)	Number of 10..Min Records
8.11.1973	0840 — 1645	45
5.02.1974	0910 — 1415	20
28.03.1974	0850 — 1450	6
17.05.1974	0910 — 1300	12

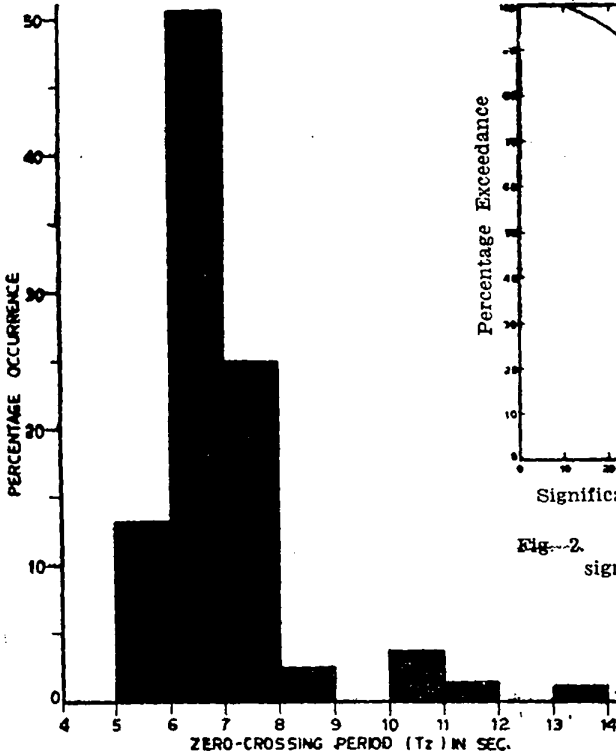


Fig.-3. Distribution of zero-crossing period.

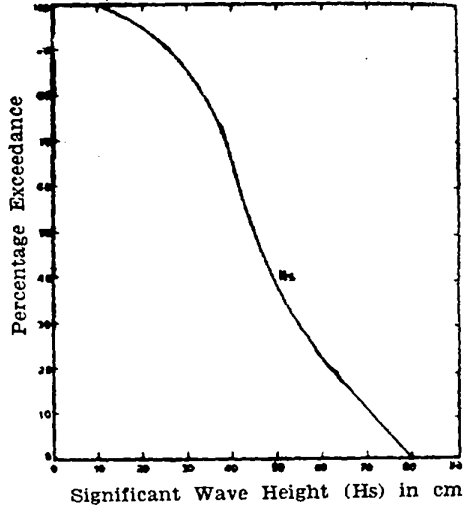


Fig.-2. Cumulative distribution of significant wave height.

waves with depth and response of the instrument, mean zero-crossing period (T_z), mean crest period (T_c), significant wave height (H_s), spectral width parameter, $\epsilon = \sqrt{1 - \left(\frac{T_c}{T_z}\right)^2}$, and root mean square height (D_{rms}) were all computed.

The direction of arrival of waves was estimated visually.

Fig. 2 describes the percentage exceedance curve for significant wave heights. For the particular period of observation the H_s values were found to be between 14 cm-77 cm. During 1971-72 for the same period the maximum H_s observed was 58 cm (Murty, et al. Personal communication). This variation is not of much significance compared to the rough SW-monsoon pe-

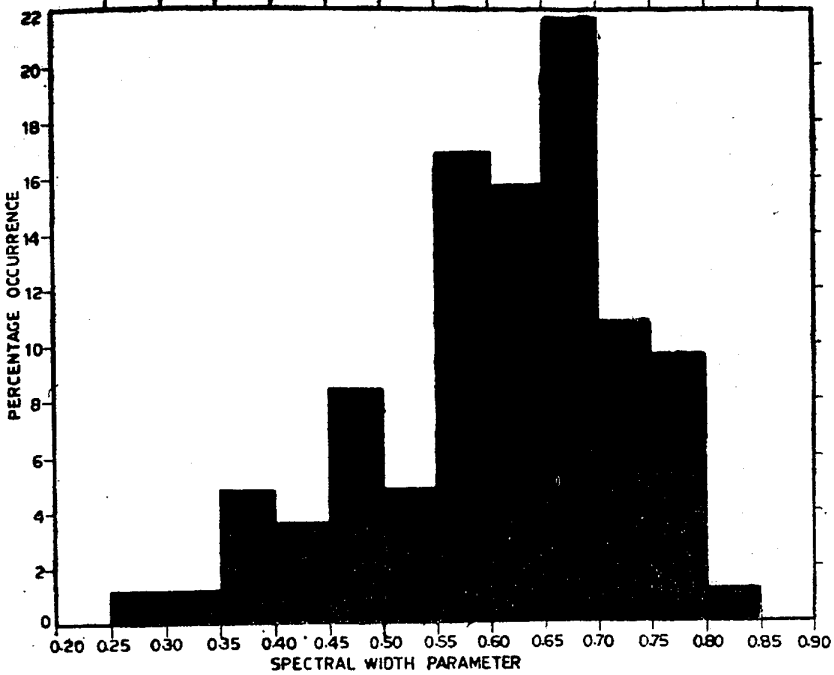


Fig. 4. Distribution of spectral width parameter.

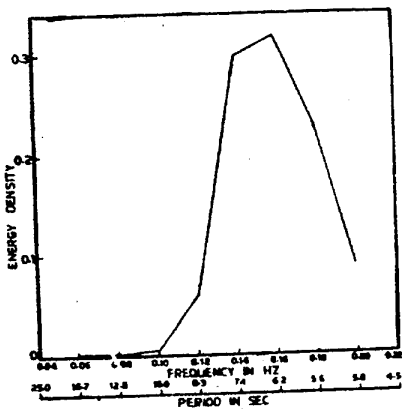


Fig. 5. Energy spectrum

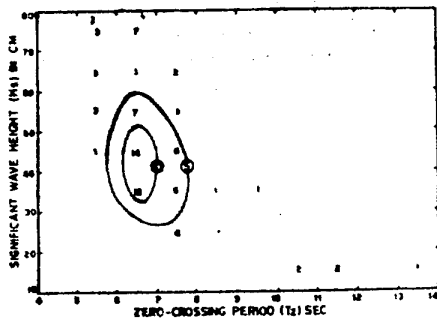


Fig. 6. Scatter diagram relating significant wave height to zero-crossing period.

riod, but might be of importance in comparison with wave conditions for the same period for different years or different localities.

The maximum wave height recorded was 122 cm. The value is comparable with the fair-weather wave heights reported by Dattatri (1973) and Sundararaman et al. (1974) for Mangalore coast.

The distribution of zero-crossing period T_z , which is the relevant wave period for many civil engineering purposes (Tucker, 1961), is shown in Fig. 3. About 90% of the wave periods ranged between 5 sec and 8 sec.

In Fig. 4, the distribution of spectral width parameter is given. The significance of this parameter is as follows: If the wave components cover a wide range of frequencies, the long waves will carry short waves on top of them and there will be many more crests than upward zero-crossings, so that T_c will be much smaller than T_z and ζ will be nearly one. If, on the other hand, there is a simple swell which contains only a narrow range of frequencies, each crest will be associated with a zero-crossing, so that T_c will approximately equal T_z and ζ will be nearly zero (Tucker, 1961). In this

study, ζ values were concentrated within the range of 0.55 to 0.80.

The energy spectrum was computed and is presented in Fig. 5. An overlapping grouping was adopted for the period classes in order to obtain a better plot with the available data (Bretschneider, 1961). The energy spectrum is concentrated between 0.12 Hz and 0.20 Hz (8 sec and 5 sec. respectively). The single-peaked low-energy spectrum corresponds to the low-velocity wind-system present in the Arabian Sea during the fair-weather season.

A scatter diagram was also prepared to represent the characteristic ranges of periods and significant heights (Fig. 6). They are found to be 5 sec to 8 sec. and 30 cm to 60 cm, respectively.

The direction of wave approach was observed to be west-northwest except in May when the direction was southwest. The corresponding shift in wind direction is observed for the region (Auflage, 1960).

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