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DESIGN BASIS TROPICAL CYCLONE FOR THE EAST COAST OF INDIA

Indian east coast is subject to cyclones generating and intensifying in the Bay of Bengal. To mitigate the hazards of the potential coastal flooding, information regarding maximum design basis storm surge is needed. The coastal installations should be safely above this design basis surge level. Δp , the pressure drop associated with a cyclone plays a major role in peak surge generation. Mathematical modelling of storm surge requires the pressure drop, Δp , as input. Simulation of surge time history for Δp 's of various return periods of interest is needed. In this note, Δp 's of various return periods are presented based on extreme value analysis of annual maximum Δp 's associated with cyclonic storms landfalling the east coast.

2. From 1925 to 1983, estimates of maximum Δp 's for cyclones forming in the Bay of Bengal and crossing the east coast are available (India Met. Dep. 1953, 1955, 1956-60, 1961-1965, 1966-70 and Mishra & Gupta 1976). Gumbel's technique is adopted in carrying out the extreme value analysis on central cyclonic pressures.

3. The least-square-fit line, $Y = -18.79X + 978.44$ gives the relation between central cyclonic pressure (P_C) and the reduced variate shown in Fig. 1. P_C can be read for 10, 50, 100, 500 and 1000 year return period.

4. Table 1 gives the design basis Δp 's for various return periods. The peripheral cyclonic pressure is taken as 1010 mb.

5. Depending on the life of coastal structure of interest, appropriate Δp of suitable return period can be chosen from Table 1. These Δp 's can be used in a nomogram (Ghosh 1977) for peak surge estimation or in a numerical model (Johns *et al.* 1981) to arrive at the time history of the design basis surge.

References

Ghosh, S.K., 1977, Prediction of storm surges on the east coast of India, *Indian J. Met. Hydrol. Geophys.*, 28, pp. 157-168.

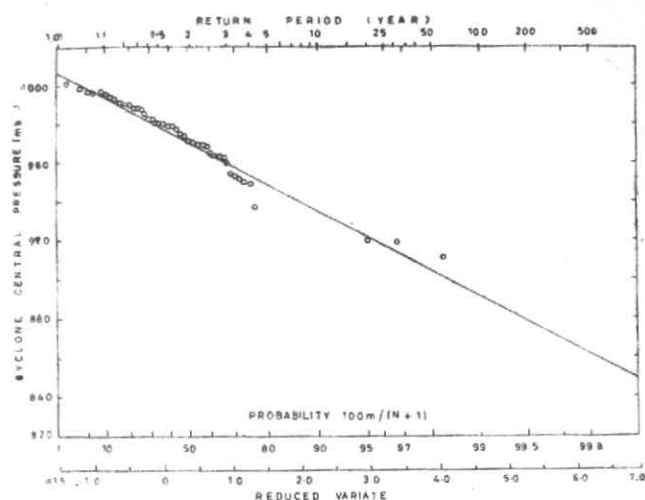


Fig. 1. Extreme value analysis of central cyclonic pressure

TABLE 1
Derived pressure drops of various return periods

Return period (yr)	Central pressure P_C (mb)	Pressure drop p (mb)
10	936.2	73.8
50	905.1	104.9
100	892.0	118.0
500	861.7	148.3
1000	848.7	161.3

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