

M.S.49. SATHYANARAYANA MURTHY, A—Studies on storm surges and sea level variations along the east coast of India—1984—Dr. G.S. Sharma

About 15% of the tropical cyclones in the world originate in the Bay of Bengal and the Arabian Sea in an year which means to nearly 10 to 15 Cyclones cross the coast of India and Bangladesh every year. The dangerous part of the cyclones is the development of surge while they cross the coast line, particularly in the low lying areas. Loss of life and other kinds of damages can be minimised only if the magnitude and approximate time and place of occurrence of the surge could be predicted at least a day in advance. Therefore, an attempt was made to study the storm surges generated by the cyclones that strike the east coast of India and suggest a method of predicting them through nomograms.

This thesis is an outcome of some of the investigations carried out on storm surges and sea level variations along east coast of India. Its principal aim is to identify the areas that are maximum affected by the cyclones and suggest a method by which the surge of an impinging cyclone can be predicted with the knowledge of the pressure drop, the approximate size and the angle of incidence of a cyclone. The aim is achieved by estimating the wind induced surge for four cases of past cyclones that attacked the east coast of India and comparing the estimates with the computed surges for verification. For prediction of surgs at five important places (Nagapatnam, Madras, Masulipatnam, Visakhapatnam and Paradip) nomograms that represent surge height versus pressure fall with different radii of curvature of cyclones are prepared. These nomograms are prepared at two angles of incidence (90° and 135° from north) which are the two usual approaches of the cyclone. As the surge development depends on curvature of the coast line and bathymetry for the same cyclone, two different surges are developed by the same cyclone at two different angles of approach. The wind induced surge is computed from winds estimated using the gradient wind equation and actual bathymetry along the path of the cyclone. The pressure gradient is obtained from synoptic maps. In order to assess qualitatively the time of occurrence of the peak surge and its order of magnitude, residual sea level is computed by subtracting the hourly astronomical tide taken from the tide tables, from the recorded tide at the nearest tide gauge station of the landfall.

The mean seasonal and secular sea levels are also presented using the sea level data supplied by the Permanent Service to Sea Level, I.O.S, Bidston, U.K. The total sea level rise is estimated as the combined effect of wind surge, barometric forcing, the prevailing mean sea level and resonance due to phase of the tide.

The thesis comprises of six chapters. First chapter consists of introduction, description of the area and treatment of the data. Second chapter deals with the case studies of storm surges along the east coast of India. Third chapter discusses sea level variations along east coast of India. Fourth one presents nomograms. The last two chapters contain discussion, summary and conclusions respectively. The thesis carries a text of 141 pages with 71 figures and IX tables.