

Climatic change and sea level variations off Alexandria, Egypt

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The mean annual air temperature over Alexandria region increased by about 2.24°C during the study period (1974-2006), with a rate of about 0.6°C/decade. Changes in water levels at Alexandria are analyzed for the same study period. The recorded hourly values of water level varied between 5cm and 90 cm above the zero level of the tide gauge. The monthly mean water levels are between 37.2 cm in March and 58.1 cm in August. The annual mean sea level increases by 9.95 cm over the study period giving a sea level rise of 3 mm/year. The probability of occurrence of different water levels is presented and the most pronounced frequency was concentrated in the level 50 cm. Estimation of abnormal water levels obtained in order to extrapolate the trends of the frequencies necessary to determine the optimum height for sea coast protection. The results indicated that; the water level may reach 165 cm once in 100 years and may reach 181 cm once in 500 years. No extreme years has been observed during the study period and the high extreme level of 80 cm have a return period of 100 years and their design lifetime has a risk of 0.64. Three scenarios could be predicted from the present study; a sea level rise of 15-20cm by 2020 would be of little consequence, augmentations over 30-50cm by 2050 would have more serious effects, and a sea level rise of 100cm by 2100 could flood land within 30km of the coast or more, affecting 12-15% of Alexandria's land.