2. ESTIMATES OF EUSTATIC SEA LEVEL RISE

2.1 INTRODUCTION

Eustatic sea level rise is the global average sea level rise primarily due to: 1) additional water mass in the oceans through release of water contained in polar ice caps and alpine glaciers, and 2) steric expansion of water presently in the oceans due to increased temperature, thereby increasing the volume of an existing water mass. Sea level change data from 20,000 years before present (BP) to 1,000 years BP have been obtained from radiometric dating of plants and animals that lived only in intertidal or shallow marine waters. Data from the last 100 or so years are based on measurements from long-term tide gages. Both of these sources include not only the "signal" of eustatic sea level change, but the "noise" or contamination by local vertical movement of the land where the measurements are made. Additionally, local and temporal oceanographic and meteorological factors may contribute to anomalously high or low water levels for periods of many years. The degree of contamination in any one tide gage record may be severe with the annual contamination exceeding up to 40 years of eustatic trend. Much of the contamination is spatially and temporally coherent over fairly long distance and time scales and the physics of this contamination is poorly understood. If the available tide gage data provided a representative distribution over the world's oceans, the noise could be eliminated by simply averaging over these gages. However, the available tide gage data are heavily concentrated in the northern hemisphere and along continental margins.

Tide gages measure the local relative sea level which is important and is the water level relevant to that area. However, an understanding of recent eustatic sea level rise is critical, because models developed for predicting future sea level rise are calibrated based on estimates of recent rise. Most of these estimates suggest a rate of 10-15 cm/century (1 to 1.5 mm/yr) with some investigators inferring an increase in the rate of rise over the past 40 or so years. Most of the studies leading to the above estimates have been based on gages located in reasonably stable low- to mid-latitude areas. Clearly the most significant neotectonic contribution to relative sea level rise is the earth's rebound from the ice loading in the polar regions during the last (Wisconsin) ice age. This rebound is causing uplift in the high