

Introduction

Our ability to predict the tidal levels and currents through coastal waterways is of great importance to a number of human activities. The beneficiaries of this information include commercial and recreational users, the Navy and a host of others. Sea level monitoring also provides key data for coastal authorities responsible for the determination of property boundaries, and for planners and engineers in the construction of waterfront buildings, bridges, and jetties.

It may be argued that for tidal prediction it is no longer necessary to continuously monitor sea level. Indeed, the greater part of the tidal fluctuations are regulated so closely by clockwork-like astronomical variations that the tides can be predicted with a high degree of precision for many years into the future. Nonetheless, the monitoring of sea level and currents remains an essential task, even in tide prediction, which is only as good as the data on which it is based, and is continuously improved as the data set lengthens. One reason for this is that water level and currents are controlled by transient environmental factors as well as astronomical motions, and accurate records of both are often required in retrospect for legal, scientific, environmental, maritime safety, and planning purposes. From a broader perspective, we might consider that the global ocean, so closely tied to climate, is very sparsely sampled, and so we must do all in our power to maintain the best possible record of its variability at our shorelines.

Over the past several decades, sea level monitoring has taken on a new and important role in climate prediction, particularly for the El Niño Southern Oscillation (ENSO) and the estimation of long-term sea level variability. In the early 1990's, the advent of reliable satellite altimeter data, combined with numerical models, gave rise to the belief among some that conventional tide gauges would soon become obsolete. However, this has not proven to be the case. Tide gauges have proven to be the most reliable and accurate source of coastal sea level data, and have even turned the tables on satellite altimeters, providing evidence of drift in the latter technology.