ABSTRACT

The Use of Geodetic Techniques to Determine Vertical Deformation along the West and East Coasts of Trinidad

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Vertical deformation of land can take two forms: uplift and subsidence, with both forms having a destructive impact on land. In the study area of Trinidad a large percentage of its major settlements, infrastructure and other tourism related activities are located within 1 kilometre of the coastal areas. These locations are vulnerable to future sea level rise as a result of both global warming and land subsidence. This paper is primarily concerned with determining the magnitude of land subsidence along the coastline.

This research investigates vertical deformation on the west and east coasts of Trinidad. The analysis was achieved using a combination of first order precise levelling data and semi-continuous GPS observation. The vertical changes per year were computed for eighteen selected Lands and Surveys Division benchmarks between the years 2006 and 2007. The elevations were processed to a precision of +/-5 mm for both the precise levelling and GPS techniques.

The highest subsidence rate of 18 mm per year occurred at BM334 in the region of La Brea, and the highest rate of uplift of 15 mm per year occurred at SBM37 in the region of Mayaro. Conclusions were drawn from this study; the first is that subsidence is occurring in the south west coast of Trinidad. This could be due to both geologic and human activities. The second is that the rapid uplift rate in the south east of the island can be a result of geological faults located in that area. The results of this study prove that continuous monitoring of the Trinidad coastlines is necessary to aid in any efforts to mitigate the slow disaster threatened by vertical land movement.

Keywords: Arleene Atwell-Martinez; Vertical Deformation; Precise Levelling, GPS.