



Determining vertical deformations in underwater areas

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The Vanuatu archipelago is part of the Pacific “ring of fire”, where plates are rapidly converging. In this area, movements are rapid and the seismic activity is intense, which makes it an interesting location to study deformation and seismic cycle, and how those deformation can be detected/constrained using gravity data. As the area is mostly covered by water, to get the full picture of the vertical deformation, it needs to be monitored both underwater and in emerged areas. We study this deformation using bottom pressure gauges and altimetry satellite data using constraints from kinematic GPS data. Two bottom pressure gauges are recording data since Nov. 1999 on the two sides of the subduction zone, so that differential motions can be observed. Water height data provided by seafloor tide gauges is a combination of sea-level variations and ground motion. These signals need to be separated to be physically interpreted. To separate the two contributions and retrieve the ground motion signal, we use together GPS and satellite altimetry data. Our results are analyzed in comparison with vertical movements observed on-land at Wusi permanent GPS station which is located a few kilometers East of the tide gauge, as well as in comparison with the long term variation in the local gravity field as observed by the GRACE satellite.