



## **Monitoring local sea surface by onboard GPS, tide gauge data and satellite altimetry.**

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The Vanuatu archipelago, South West Pacific is part of the « ring of fire », where plates are quickly converging. In this area, movements are very rapid and the seismic activity is intense, which gives a good opportunity to study deformation and seismic cycle. We conducted an experiment in this area to compare measurements from two tide gauges located beneath altimetry satellite tracks with sea surface altitude measurements from GPS and satellite altimetry. To get an integrate picture of vertical deformation over one plate and between the two plates, one needs to be able to monitor vertical movements even on underwater areas.

Two bottom pressure gauges are immersed since Nov. 1999 on Sabine bank (15.90°S; 166.14°E) and Wusi Bank (15.34°S; 166.55°E), West of Santo island, Vanuatu. In order to perform absolute calibrations of JASON and ENVISAT altimeters that overfly the Wusi and Sabine banks, respectively, we performed GPS measurements of instantaneous sea surface altitude.

Due to the intense tectonic activity, local geoid variations are huge around Santo Island. Several sea surface surveys were conducted on the West (Sabine and Wusi banks), South (Malo to Mallicolo islands) and East (Sarami Bay) of the main island in 2003 and 2004, using onboard GPS (R/V Alis) and an on purpose designed GPS buoy. These high rate data were processed in kinematic mode using a scientific GPS software and related to sea surface height using calibration sessions to estimate the antenna height. Instantaneous sea surface height map was thus obtained with a few centimetre precision. Tide gauges data from Sabine and Wusi Bank as well as ocean tide models for the East Santo coast provide us tide corrections. We therefore get

a local map of the sea surface height, which can be compared to satellite altimetry mean surface. The global agreement is good but some discrepancies are likely to be explained by dynamical topography or local sea surface variations.