Radar Altimeter Calibration using a GPS buoy in Corsica

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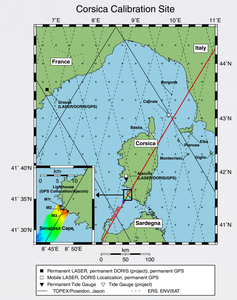


Configuration of the Corsica site.
Contour map represents the geoid heights determined from Catamaran GPS measurements.

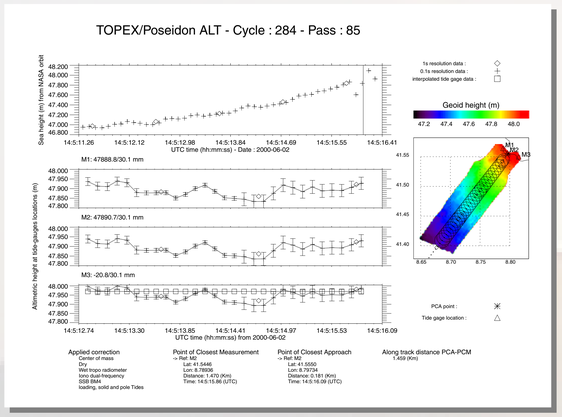
The absolute calibration site of Corsica allows us to realize the closure equation with a GPS buoy and to compare results with those obtained in a "classical" approach. In this study, GPS data have been acquired with a Sercel receiver and processed using the Geogenius software. GDR from PODAAC are used for altimetric data processing.

First results are very encouraging but more determinations are necessary to be statistically significant. In that way, GPS buoy measurements will be performed on a regular basis from now to at least the end of Jason-1 validation phase.

Tide Gauge: the coastal approach

Advantages
- Works whatever the weather and 24 hours a day
- Few months of autonomy
- No regular manpower needed except for getting data
- Geodetically linked to global network (ITRF)

Disadvantages
- Not close to altimetric measurements
- Possible drift of measurements which can be not linear



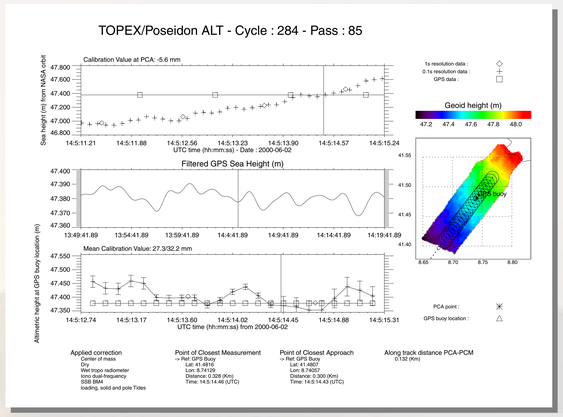
In both approaches altimetric data are corrected from geoid slope using a process described in the poster "Latest News from the Absolute Calibration Site in Corsica".

In the case of the GPS buoy a linear interpolation of the two closest altimetric measurements is also performed at the Point of Closest Approach (PCA).

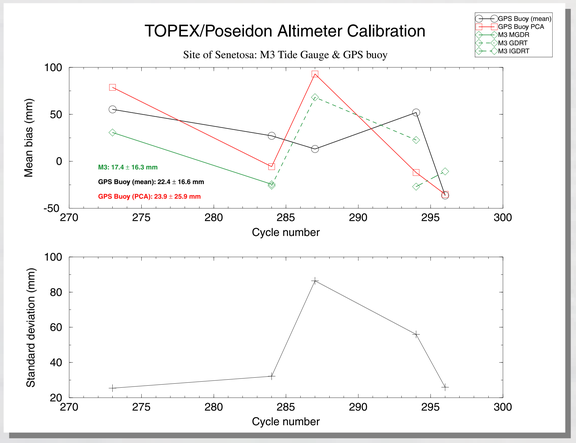
GPS Buoy: the closest approach

Advantages
- Very close to altimetric measurements
- Geodetic link at the time of overflight (differential GPS)
- No drift in the data aquisition process

Disadvantages
- Needs on site manpower
- Difficult to realize with bad weather conditions or during night
- Measurements sensible to sea state (tilt of the antenna)

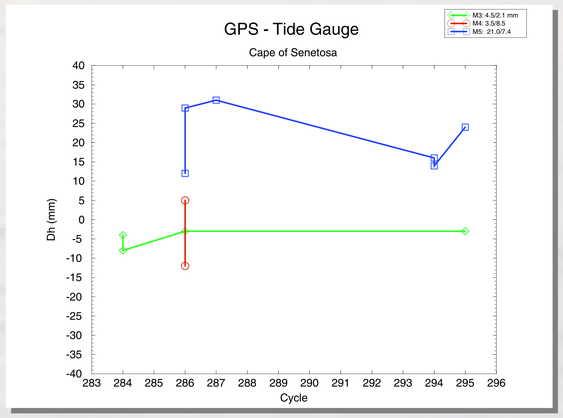


Corsica: both approaches on the same site



For 5 common overflights differences between biases, for T/P ALT-B altimeter, determined by tide gauge or GPS buoy data are at a few millimeters level.

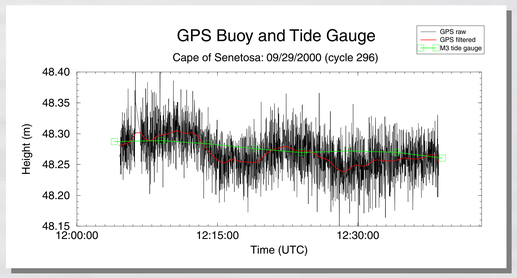
Tide gauge versus GPS: a reciprocal control



After and/or before each overflight the GPS buoy is deployed over the tide gauges for a 30 minutes session. This provides a very good control for either GPS or tide gauge data.

Preliminary results show a bias of 25 mm between M3 and M5 tide gauges which has been also identified in the classical calibration process.

On the other hand, such control can also show problems in the GPS data processing. For example, a difference of 17 mm appears between GPS sessions (before and after cycle 286 overflight) which is coherent for either M4 or M5 tide gauge.



GPS buoy and tide gauge also give complementary information on sea level variations due to a different data sampling (1 second and 5 minutes respectively).

Abstract

At the verification site of Corsica, operational for the absolute calibration of the TOPEX/Poseidon altimeters, and in preparation for Jason-1, a new series of experiment has been performed: it uses a kinematic GPS technique to monitor sea level heights. A reference receiver is placed at a geodetic point (near the lighthouse) while the other is floating on the sea.
Since February 2000, for each T/P overflight (during day) a GPS buoy is placed under the ground track about 10 km off-shore. GPS and altimetric sea heights are then compared to deduce altimeter biases. Systematic controls are also performed using measurements above the three tide gauges before and after the overflight. First results are presented.

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