

ARA GEODETIC AND GNSS ACTIVITIES TO SUPPORT THE SEA LEVEL CHANGES AND THE EPN DENSIFICATION PROJECT

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J. Zurutuza, M. J. Sevilla, M. C. Ruiz, A. Antzizar, A. Aguinaga

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M. Elorza



Outline

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- a) Tide Gauge
- b) Gravity
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Introduction

- ARANZADI was founded in 1947.
- The Department of Applied Geodesy was established in 2008, and its aim was to provide a new branch of research of Earth Sciences.
- Since then, we have been steadily growing despite the economic crisis throughout Europe.
- In late 2015, Prof. M. J. Sevilla, retires and teams us up after several years of cooperation.



GeolabPasaia (TG+GNSS+Levelling+...):

- •Tide Gauge in the harbor of Pasaia + GNSS station PASA + linked to Spanish first order levelling Network REDNAP (UELN) +
- •The TG is a pressure device that has been working since 2007, same as the GNSS receiver.
- •The GNSS+TG are operated by the ARA-OC, together with AZTI.
- •IGNspain has been welcome to participate
- Anyone interested in participating will be welcome!





May 25th - 27th, 2016

GeolabPasaia

In order to monitor the local vertical stability of the building and local deformations, yearly we level the benchmarks.
Spirit levelling and simultaneous & reciprocal trigonometric levelling are performed.

The crustal deformations are provided by the GNSS Network.
Once stability was verified scientific community has been informed: SONEL, TIGA





Gravity

•From 2005 to 2007 a gravimetric campaign was carried out throughout Gipuzkoa.

•A Fundamental Network was established: 10 core stations.

In 2008, a densification campaign was carried out: 250 sites/2000 km²
In PASA, 15 days of continuous gravity were observed: due to the high industrial and lorries activity during working days, the data were too noisy to be considered. An absolute measurement is being planned.
The harbor is being transformed in a residential area, so we hope that within a few years, we will be able to have good gravity values!





Levelling+gravity

•The former levelling Network was observed back in 1987.

•In 2005, boosted by the IGN's REDNAP Project, a first order densification network starts (+600 km: benchmarks each km).

•Main objective is to provide accurate height to all the towns in Gipuzkoa. Currently +1100 benchmarks of different accuracies are available and referred to the IGN height datum.

•We hope to have this done by 2020





Donostia - San Sebastia May 25th - 27th, 2016

GNSS Activities: NRT

- Since late 2015, a NRT is being routinely computed. A 8 hour sliding window-session is considered.
- Not only coordinates are monitored, but also ZTD in order to get PWV values, since all the sites we operate have meteorological device.
- Results are provided in some 15 minutes after the RINEX files are generated and are promising, though more research is a must.



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GNSS Activities: Active Network

- The Active Network being monitored has very short baselines (45 km).
- Former Network (first observations from 2005): all sites from neighboring networks considered. 3 French sites included (to harmonize RTK solution across borderlines).

Map Satellite

- IGb08 compliant (repro2)!
- Currently 8 sites are being monitored.
- EUREF's guidelines are strictly followed.
- PAS2/PASA (same antenna):





N and E components: fully agreement.

U component: PAS2 is much more amplified! The long term (2007-2016) U coordinates are very similar (<1 mm difference).



GNSS Activities: ARA-OC

- Currently, 4 sites are operated by ARA.
- +200 sites are routinely computed and sent in a weekly basis to FOMI.
- Details at: <u>http://geolabpasaia.org/gnss/ARA-euref/</u>:
 - ✓ Weekly solution summary,
 - ✓ Cumulative solution,
 - ✓ Time series
- Additional data: upon request
 - ✓ ZTDs,
 - ✓ PWV,
 - ✓ Velocities (if +3 yrs data)



 \P Densification site \P ARA-OC operated site \P EPN A class site



Conclusions

- The GNSS/geodetic works done so far, despite our short history, are quite large to tackle the challenging short or mid-term GNSS/geodesy needs:
 - ✓ GALILEO inclusion in routine analysis (successful tests already conducted, but only a few sites provide GAL),
 - ✓ Gravity + levelling,
 - Levelling + GNSS (geoid tailored-Altimetric Reference Surface already computed, but not in use),
 - ✓ NRT-GNSS weather,
 - ✓ Who knows...
- We are ready and willing!



Thank you for your attention

