

National Report of Spain

Instituto Geográfico Nacional



Spanish GNSS Reference Stations Network (ERGNSS)

- 50 permanent stations.
 - 3 IGS
 - 23 EPN
 - 42 GPS+GLO

- 7 EPN stations subm.:
 - MultiGNSS obs.
 - RINEX3.

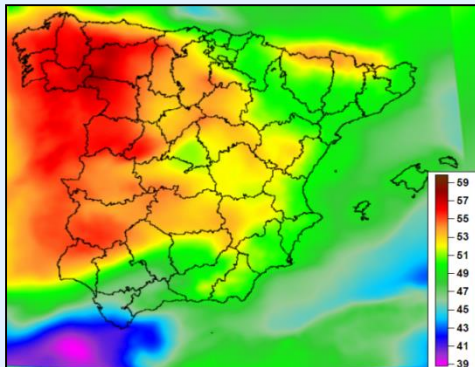
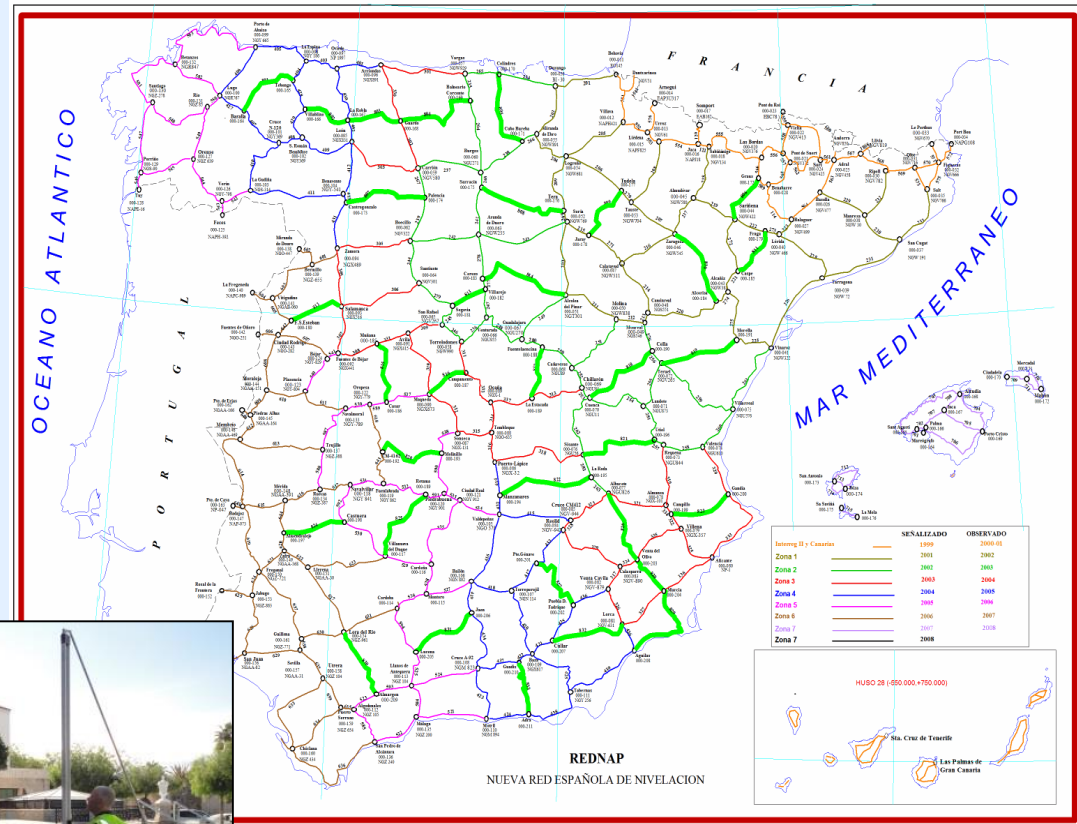
- EUREF Local Data Center:
 - <ftp://ftp.geodesia.ign.es>

- 2014: some new stations added and maintenance.



Spanish Vertical Reference Network (REDNAP)

- Total: about 20.000 Km & >30.000 benchmarks.
- Final densification stage.
- Currently: observing joins to ERGNSS network.
- Improving the combined EGM08_REDNAP geoid.



IGE Analysis Centre

- Local Analysis Centre of EUREF
 - Final products.
 - Rapid products.
 - Densification: EUREF Dense Velocity Field project (~ 360 stations).
 - Repro-2 (125 EPN stations, 1996 → 2015).
- Other projects
 - IBERRED Project (coord, time series) → About 360 stations.
 - E-GVAP Project , EUMETNET (ZTDs) → Same stations.
 - Volcanic Alert System (Canary Islands).



- BSW 5.2.
- 67 EPN stations (23 IGN)
- 50 GPS + GLONASS.
- 10 individual calibration.
- Final & rapid products.

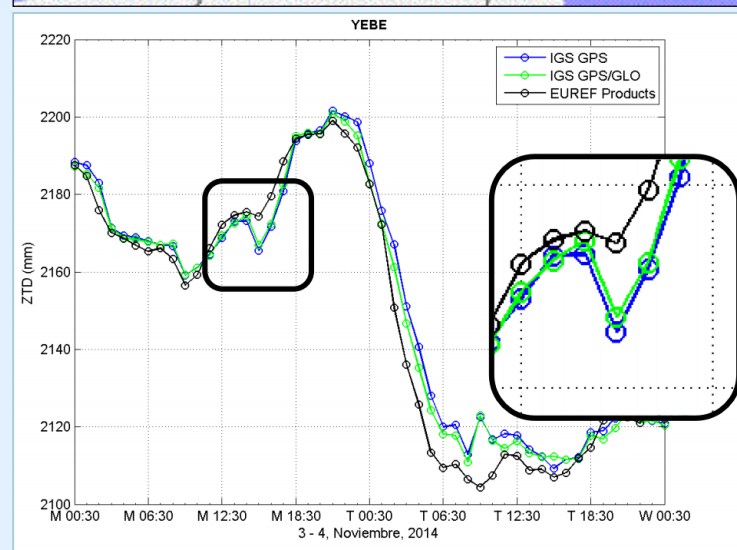
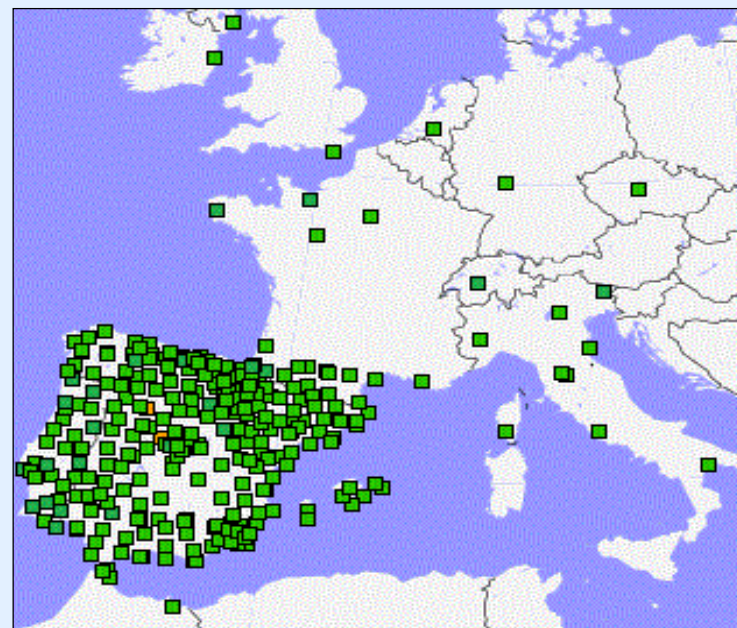


- Main characteristics:

-
- A map of Europe showing the locations of 50 airports. The airports are marked with red triangles and labeled with their three-letter IATA codes. The map includes a grid and a scale bar from 0 km to 1000 km. The airports are distributed across the continent, with a higher density in Western and Central Europe. The following table lists the airports and their codes:
- | Airport Code | Location (Approximate) |
|--------------|---------------------------|
| FLRS | Faroe Islands |
| TERC | Terceira, Azores |
| PDEL | Pico del Air Base, Azores |
| FUNC | Funchal, Madeira |
| LPAL | Lisbon, Portugal |
| TZAN | Tanzania, Portugal |
| MAS1 | Madeira, Portugal |
| RABT | Rabat, Morocco |
| CEUT | Ceuta, Morocco |
| SFEA | SFEA, Morocco |
| LAGO | Lagos, Portugal |
| HUEL | Huelva, Spain |
| CASC | Casablanca, Morocco |
| COBA | Coblenz, Germany |
| ALAC | Alcala, Spain |
| MELI | Melilla, Spain |
| ALBA | Albany, Spain |
| WALE | Wales, UK |
| GORR | Gorizia, Italy |
| TERO | Toronto, Canada |
| EBRE | Barcelona, Spain |
| BELL | Bell, Spain |
| LLIX | Llivia, Spain |
| ESCO | Escorial, Spain |
| TLSE | Toulouse, France |
| SCOA | Scotland, UK |
| CANT | Cantabria, Spain |
| ACOR | A Coruña, Spain |
| VIGO | Vigo, Spain |
| GAIA | Gaia, Spain |
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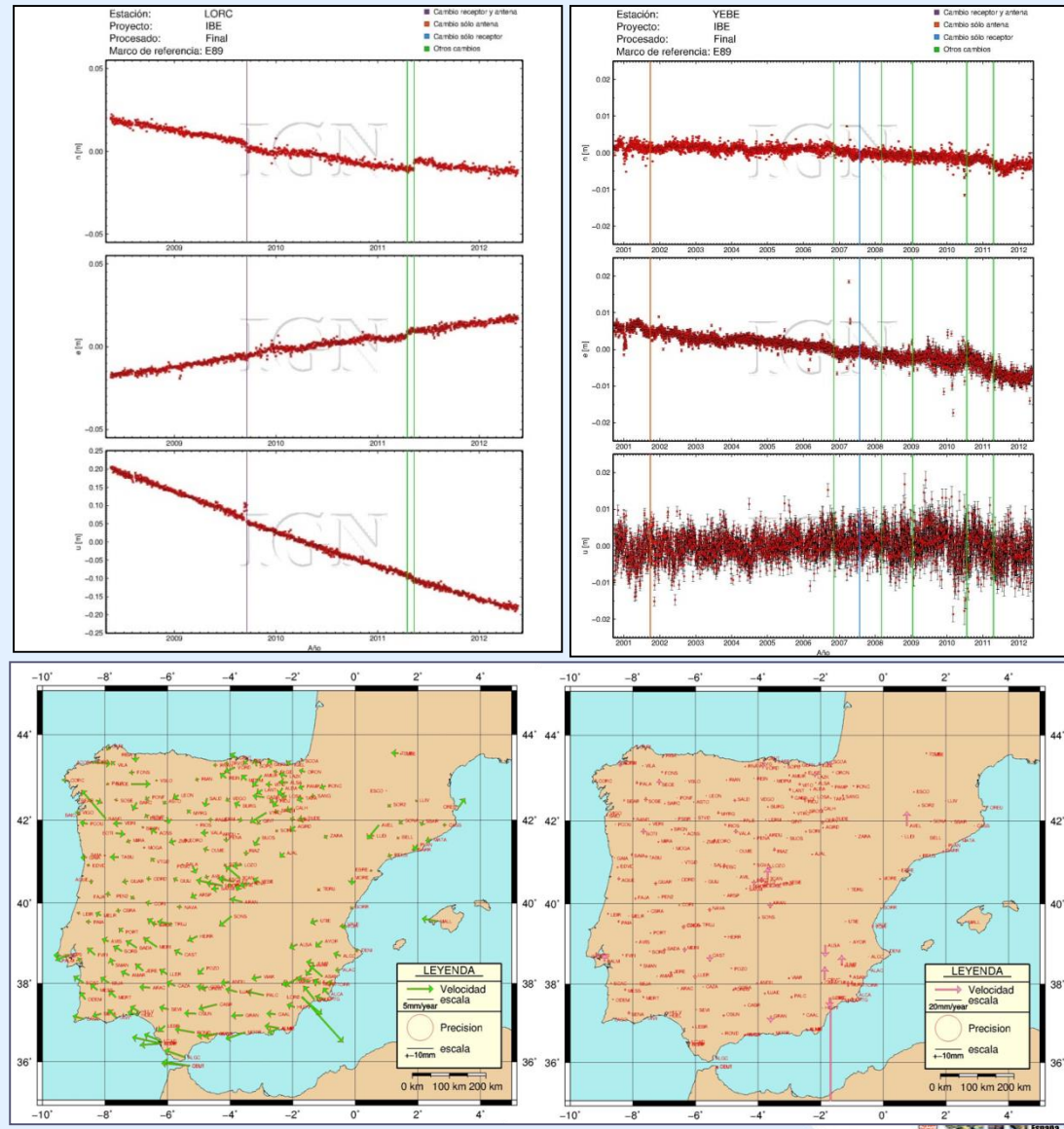
E-GVAP processing

- Submitting nrt ZTDs from 2008:
 - > 350 stations in the area:
 - Spain
 - Public (regional networks).
 - Private.
 - Portugal and France (south).
 - Public stations (IGP & IGN)
 - Data collected from 22 different networks.
- Two solutions: BSW 5.0 and 5.2.
 - Tested ZTDs with dif. options →
- Hourly NRT (CRD from IBERRED):
 - Double differences.
 - GPS & GPS+GLO solutions.
 - Ultra rapid IGS and CODE products.
 - Finally → last 6 h combined.
- Participating in COST ES1206 action.



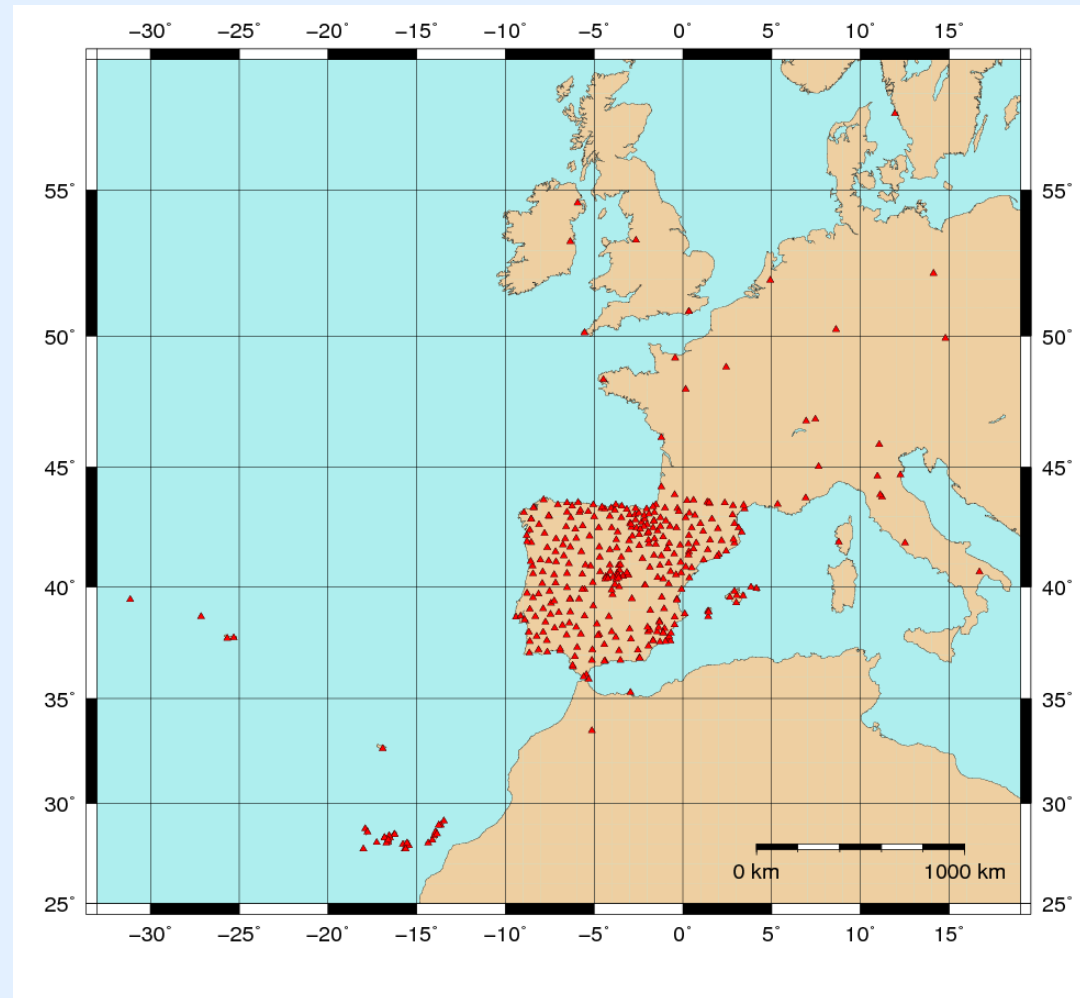
IBERRED

- Bernese 5.0. & 5.2 Repro
- Proccessing all existing stations in Iberian Pen.
- About 370 stations.
- Objectives:
 - Positions requested by some GNSS networks.
 - Coordinates for EGVAP hourly processing.
 - Atmosphere products.
 - Time series.
- Velocity maps in Iberian Peninsula (ETRF2000).



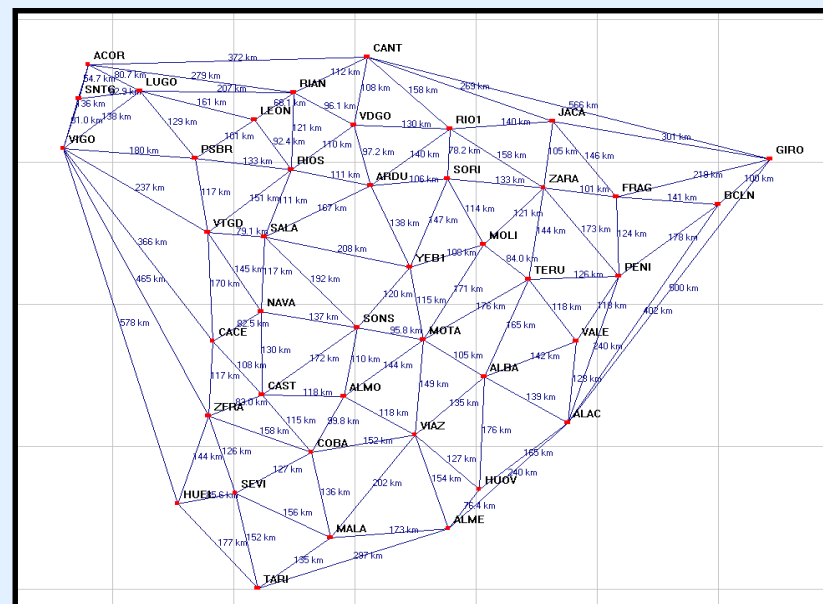
Contribution to EUREF Dense Velocity Field project

- Bernese 5.0, IBERRED
- 370 EPN + non-EPN stations.
- EPN + IGN + 12 regional networks + Portugal (IGP)...
- Iberian area.
- Current status: submitted SNX until Wk 1840 (now).
- Currently changed this project to BSW 5.2 and Repro:
 - GPS+GLONASS.
 - GMF a priori trop.
 -
 - Same options that in EUREF LAC project.



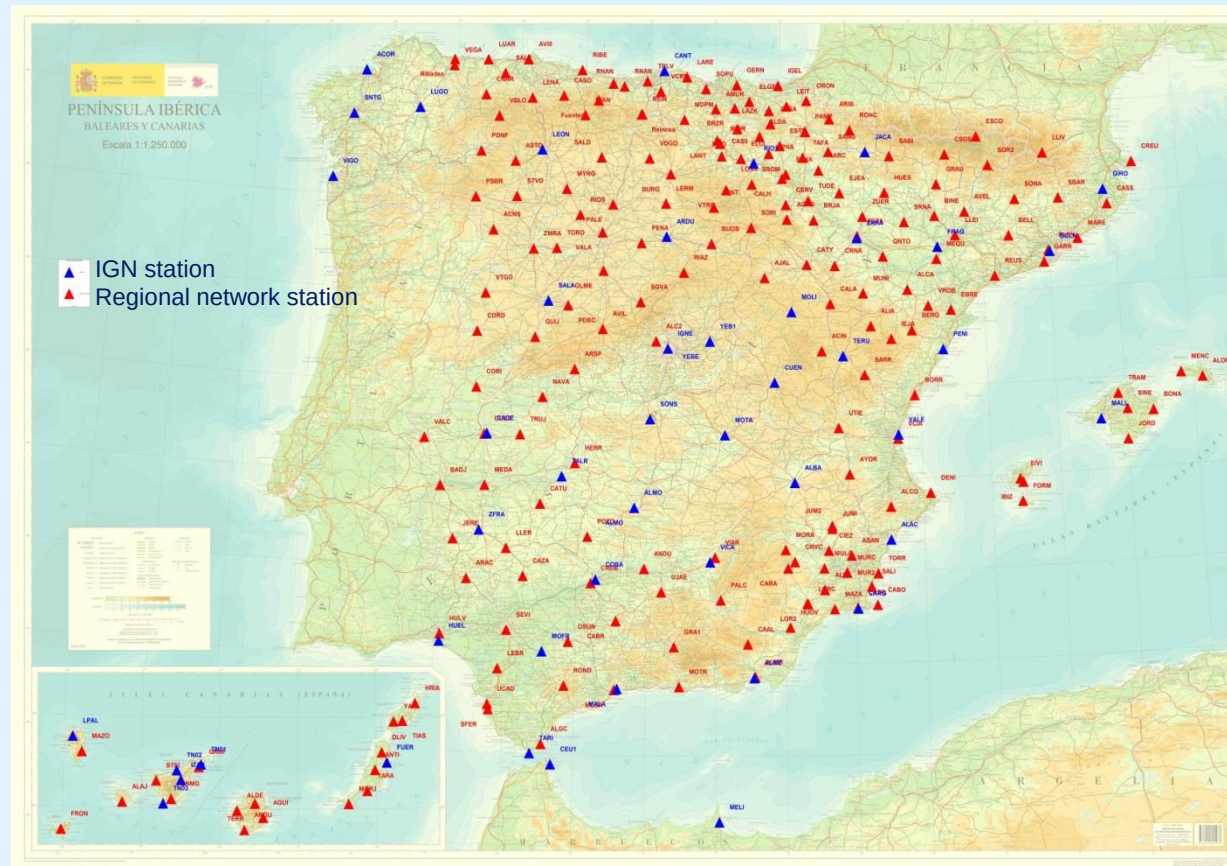
Real Time Services

- Single-point RTK (from 2003):
 - EUREF-IP Caster.
<http://ergnss-ip.ign.es>
- Next RTK network service (2015):
 - In collaboration with Autonomous Regions GNSS networks.
 - GNSMART (GEO++).
 - Current status: installed new servers, testing solutions.
 - Comparisons RTK vs post-processing.
 - Test distances between network stations 100-250 km.
 - FKP, VRS, MAC solutions.
 - GPS & GPS+GLONASS solutions.
 - Discrepancies better than 5 cm.
 - Free access to the service.



IGN + Autonomous regions networks in Spain for RT

- Establishing agreements between IGN & Autonomous regions for the new RTK service.
- There are 15 different networks whose main purpose is RTK:
 - Mapping & surveying.
 - Precision agriculture.
 - Civil engineering, construction.



Our thanks to those institutions that provide data for these projects:

- Instituto Geográfico Portugués (IGP) – Rede Nacional de Estações Permanentes (RENEP).
- Instituto Geográfico Nacional de Francia (IGN) – Réseau GNSS Permanent (RGP).

National
networks

- Instituto Cartográfico de Cataluña (ICC) – CatNet.
- Gobierno de Aragón – ARAGEA.
- Gobierno de Navarra – Red Geodésica Activa de Navarra (RGAN).
- Instituto Cartográfico de Valencia (ICV) – Red Geodésica Activa en Tiempo Real.
- Gobierno de Euskadi – Red de Estaciones de Referencia GNSS de Euskadi.
- Gobierno de La Rioja – Red de estaciones permanentes GNSS.
- Gobierno de Cantabria, Universidad de Cantabria – Red Geodésica Activa.
- Región de Murcia – REGAM y Meristemum.
- Instituto Tecnológico Agrario de Castilla-León (ITACYL) – Red GNSS Castilla y León.
- Junta de Extremadura – Red Extremeña de Posicionamiento (REP).
- Instituto de Estadística y Cartografía de Andalucía – Red Andaluza de Posicionamiento (RAP).
- SITIBSA – Xarxa de Geodesia Activa de les Illes Balears (XGAIB).
- GRAFCAN de Canarias – Red de Estaciones Permanentes (REP) de Canarias.
- Principado de Asturias – RGAPA.

Autonomous
regions

- Leica Geosystems – IBEREF.
- Lógica S.A. – Galicia.

Private
companies



Thank you for your attention



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