DETERMINATION OF GEOPOTENTIAL $W_{0,ALICANTE}$ AND ITS´ CONNECTION TO $W_{0,NAVD88}$

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SPECIAL STUDY GROUP
GLOBAL GEODESY TOPICS: SATELLITE ALTIMETRY APPLICATIONS (SSG GGSA)

RIGA, LATVIA, June 14 - 17, 2006

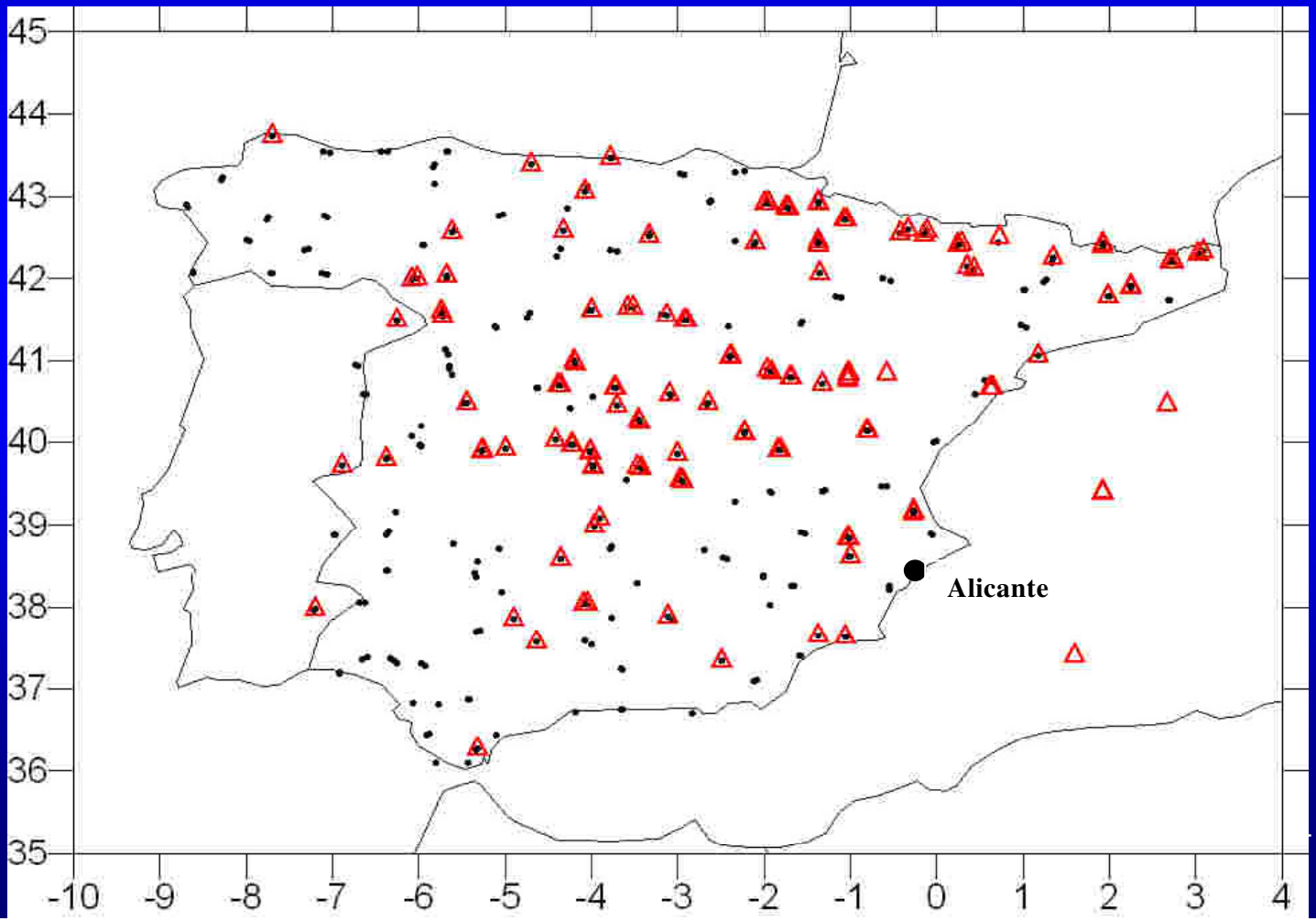
For a long time, SSG GGSA is working mainly at topics:

- **Geopotential model testing**
- **Development of geopotential value W_0**
- **Development of World Height System**

SSG GGSA very close cooperates with ICP- 1.2 of IAG (Dr. Ihde)

For this topics we have been collected necessary data, i.e. GPS/leveling sites – it covers about 70 % of the World

SSG GGSA has been available current GPS/leveling sites from territory of Spain



It´s opportunity to apply developed methodology for determination of geopotential $W_{0,\,\mathrm{ALICANTE}}$ and its´ connection (for example) to $W_{0,\,\mathrm{NAVD88}}$ described in (Burša et al., 1999, 2002)

1st STEP:

the Helmert orthometric heights on the territory of Spain were transformed into the Molodensky's normal heights, the tidal corrections were applied, i.e. tide-free model was used

2nd STEP:

The following constants have been adopted:

$GM = (398\ 600\ 441.8 \pm 0.8) \times 10^6\ m^3 \cdot s^{-2}$

$\omega = 7\ 292\ 115 \times 10^{-11}\ rad \cdot s^{-1}$

$W_0 = 62\ 636\ 856.0\ m^2 \cdot s^{-2}$

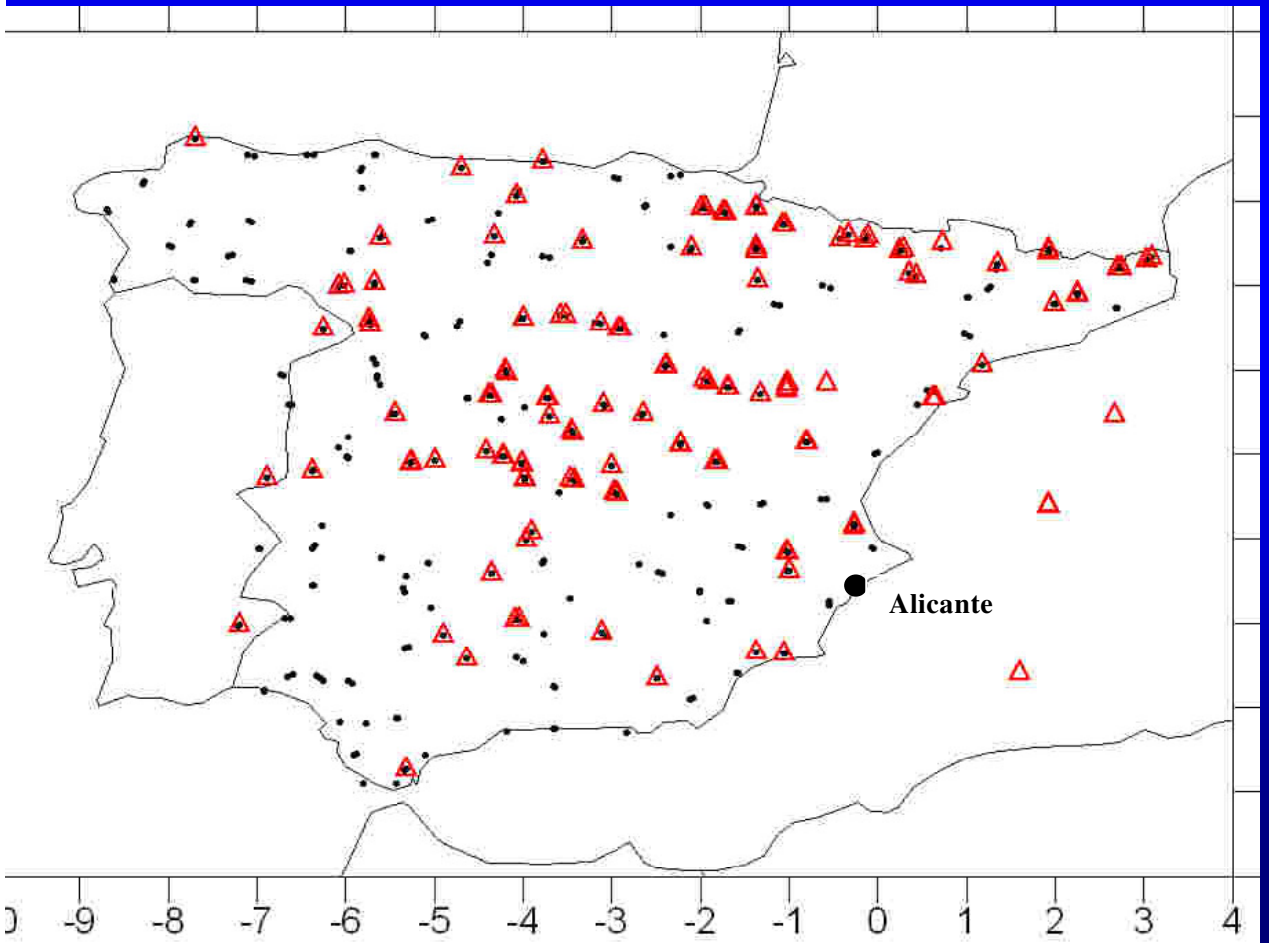
the numerical value of W_0 value is currently discussed in IAG, ICP - 1.2

The following gravity models have been adopted:

EGM96 (Solution I)
EIGEN-CG01C (Solution II)
EIGEN-CG03C (Solution III)

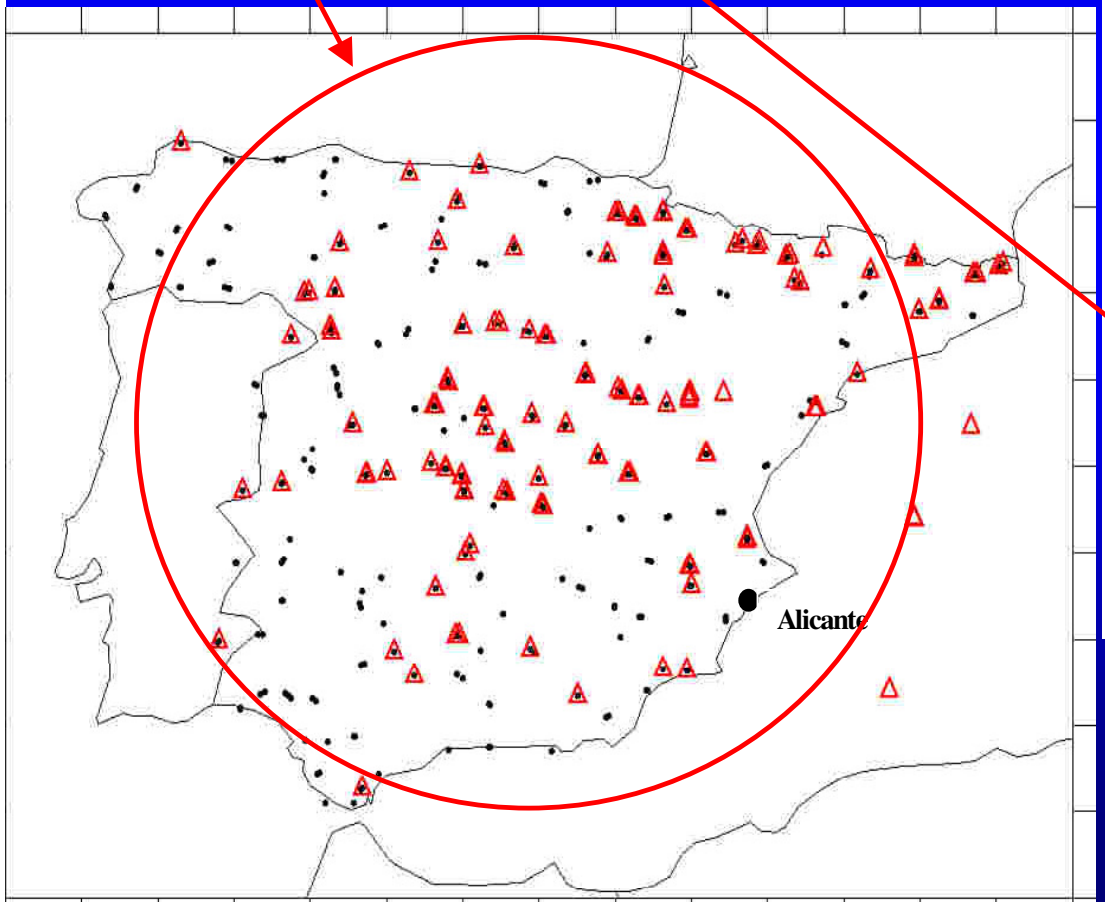
Development of $W_{0,ALICANTE}$ (Spain)

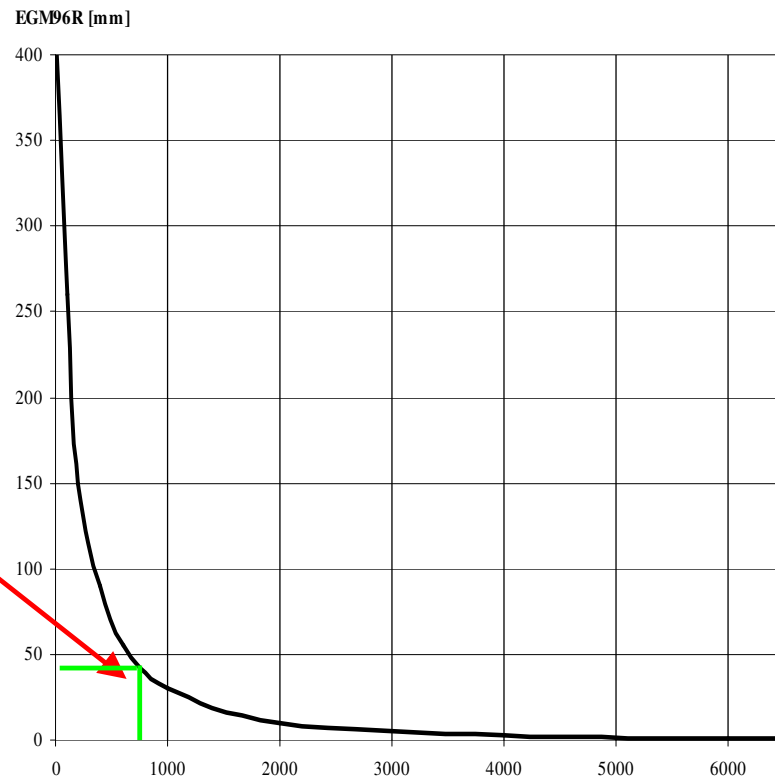
The national territory of Spain is uniformly covered by the GPS/leveling sites



Distribution of GPS/leveling sites on the territory of Spain (325 black points) and geopotential numbers (128 triangles)$_9$

The mean diameter of the area is about 750 km, so the resolution of EGM96 is about 0.046 m





Solution of ALICANTE I, II, III

Solution 325 GPS sites	$W_{0,ALICANTE}$ $[m^2.s^{-2}]$
I EGM96	62 636 860.56 ±0.70
II EIGEN-CG01C	62 636 861.88 ±0.70
III EIGEN-CG03C)	62 636 862.11±0.73

Solution of ALICANTE Ia, IIa, IIIa

Solution 128 geopotential numbers	$W_{0,ALICANTE}$ [$m^2.s^{-2}$]
Ia EGM96	62 636 861.37±0.59
IIa EIGEN-CG01C	62 636 862.55±0.59
IIIa EIGEN-CG03C)	62 636 862.45±0.58

Solution of NAVD88

Solution	$W_{0,NAVD88}$ $[m^2.s^{-2}]$
U.S.A. , EGM96	
5 186 GPS sites	62 636 861.27±0.51
1 804 geopot. numbers	62 636 861.22±0.51
Canada, EGM96	
1 311 GPS sites	62 636 861.54±0.53
1 248 geopot. numbers	62 636 861.98±0.51

RESULT

The mean $LVD_{0,ALICANTE}$ vertical shift with respect to $LVD_{0,NAVD88}$

$\delta H(ALICANTE) - \delta H(NAVD88)$

$\approx$ (-3.2 ± 4.2) cm

CONCLUSION

By this way could be developed:

- **mutual vertical shifts of all LVDs´**
- **vertical shifts of all LVDs´ to the geopotential value W_0**
- **World Height System**

All this question are discussed in IAG, ICP 1.2

SSG GGSA papers on GVRS, GVRF, and W_0

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