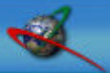


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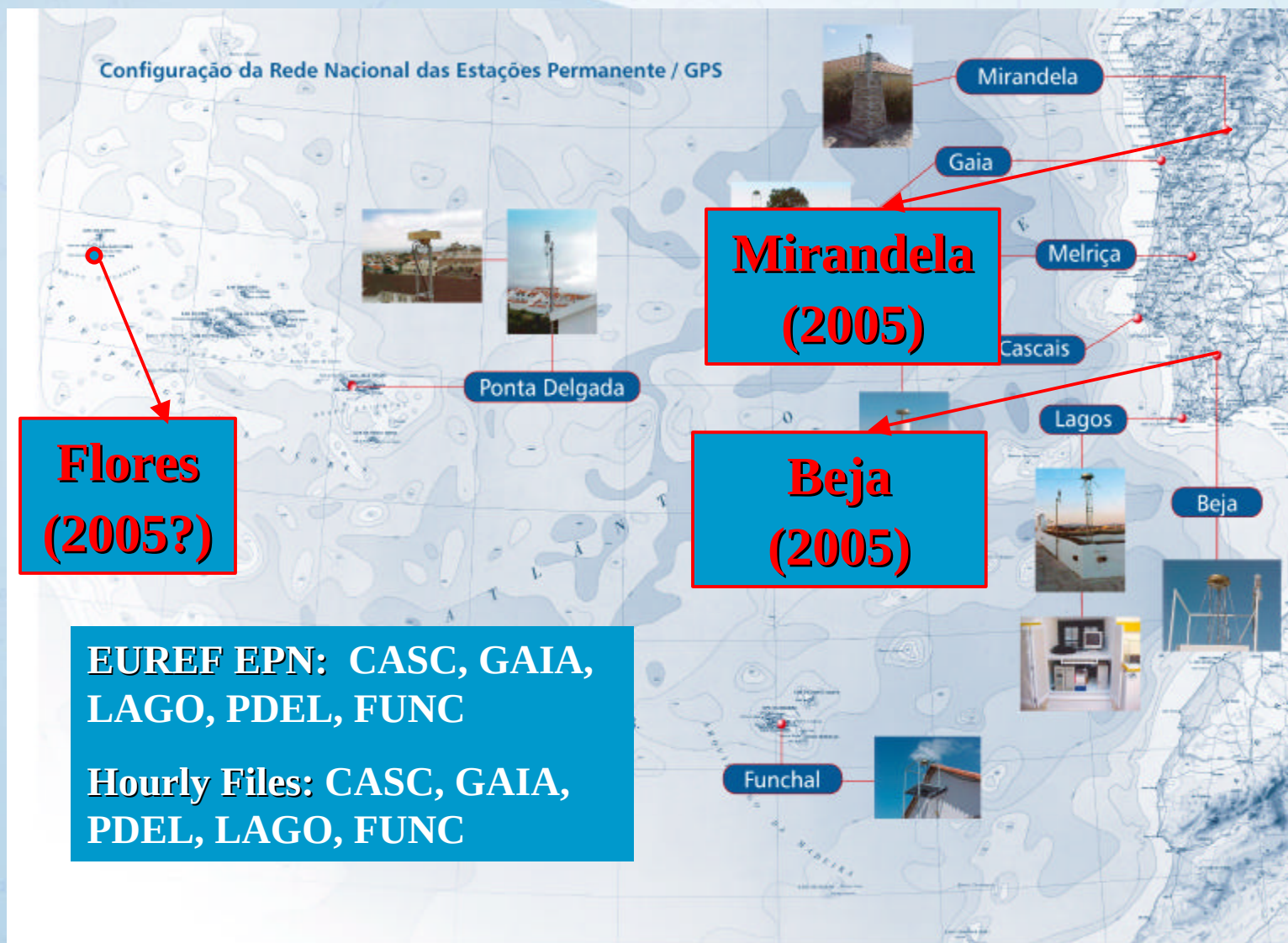
H. Kol, G. Crisóstomo, C. Martins,

A. Medeiro, M. Vasconcelos



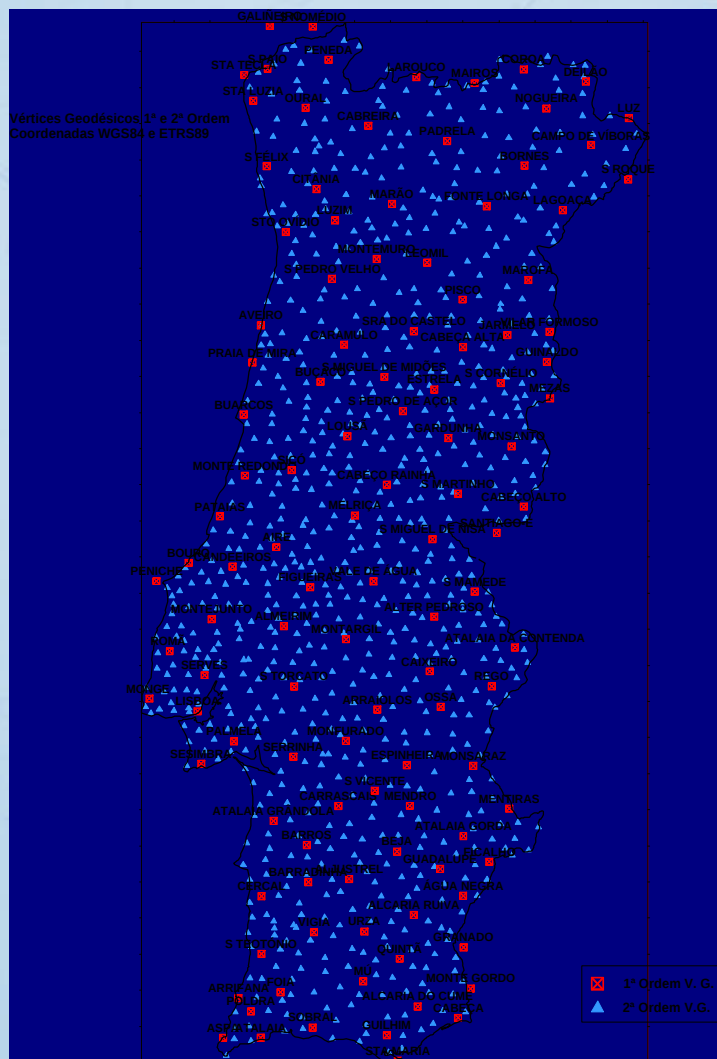
National Permanent GPS Stations Network

RENEP - GPS





National Geodetic Network measured with GPS

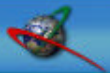


Mainland

1st and 2nd order network GPS
observation (1997 – 2004)

3rd order network will be
obtained by a transformation
method.

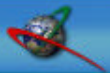
	VG Obs
VG 1 st Order	117
VG 2 st Order	854
Total	971



National Geodetic Network measured with GPS

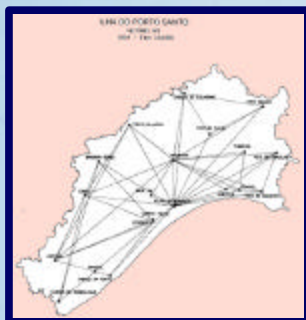
Porto Santo Island





National Geodetic Network measured with GPS

Porto Santo Island



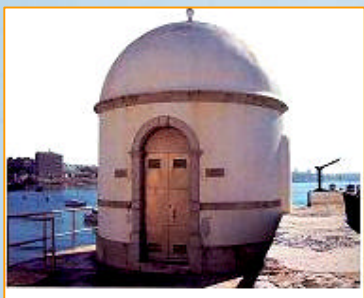
	Base SE ? max (m)
N	0.022
E	0.022
O	0.022

	ITRF 93 ? Max
?	0.013 (")
?	0.013 (")
O	0.010 (m)



Tide Gauges

1882



Cascais

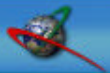
Lagos

1908



2003





Gravimetric Network



FG5 Absolute Gravimeter of the Finnish Geodetic Institute



Cascais



● Relative Measurements

■ Absolute Measurements



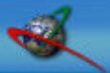
Astronomic Measurements

**Astro - geodetic field campaign
in Portugal
4.-13.9.2004**

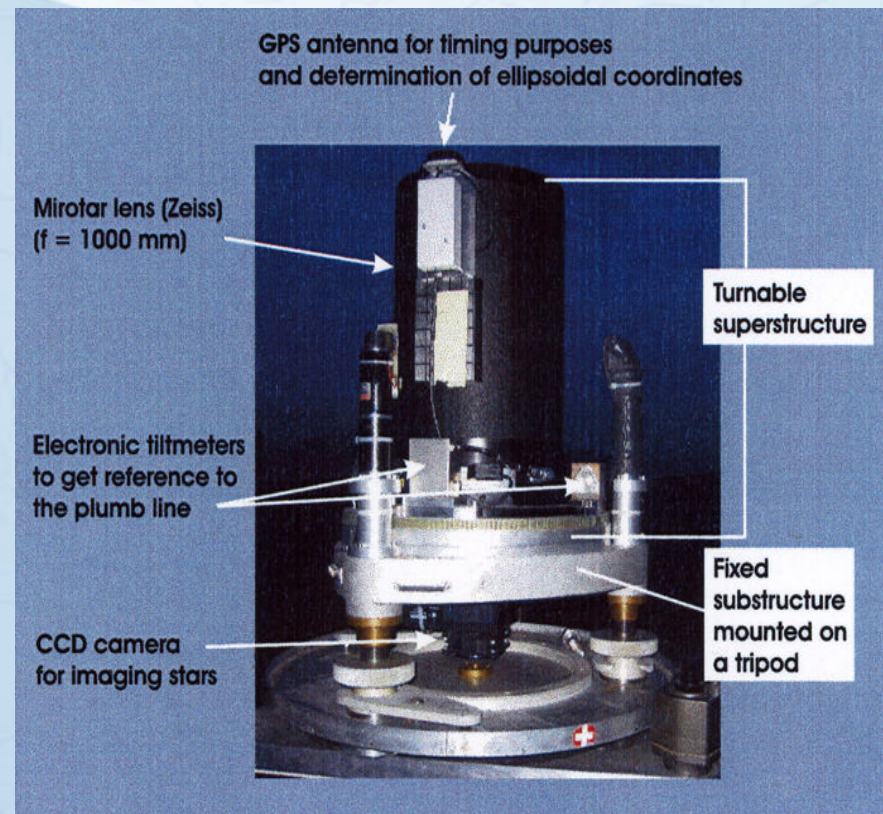
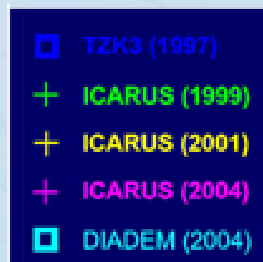
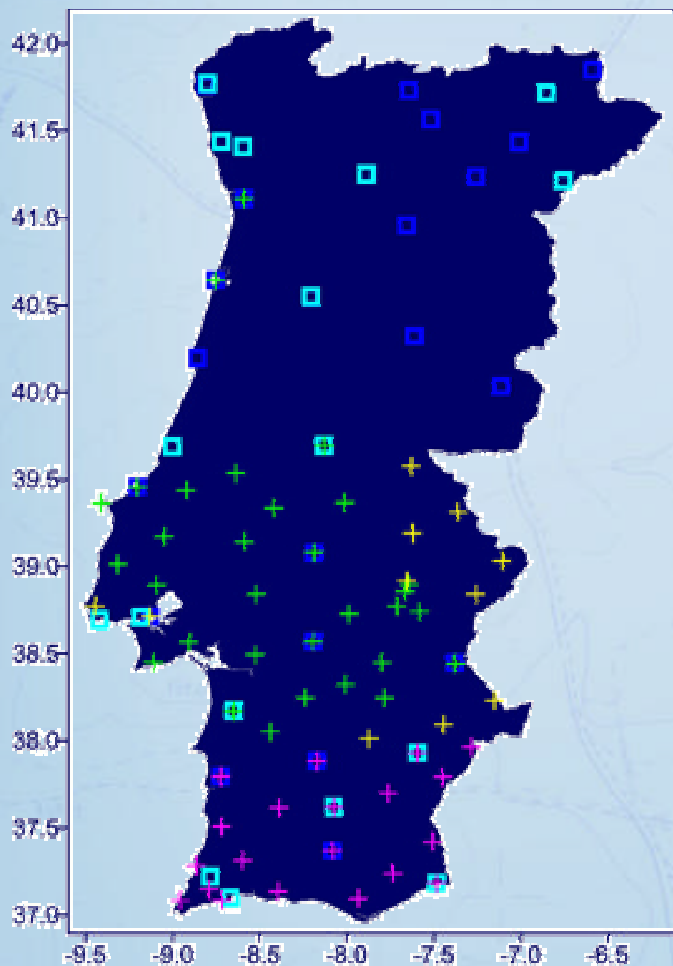
**Instituto Português
de Cartografia
e Cadastro (IPCC)**

and

**Geodesy and Geodynamics Lab (GGL),
ETH Zurich, Switzerland**



Astronomic Measurements



DIADEM Camera

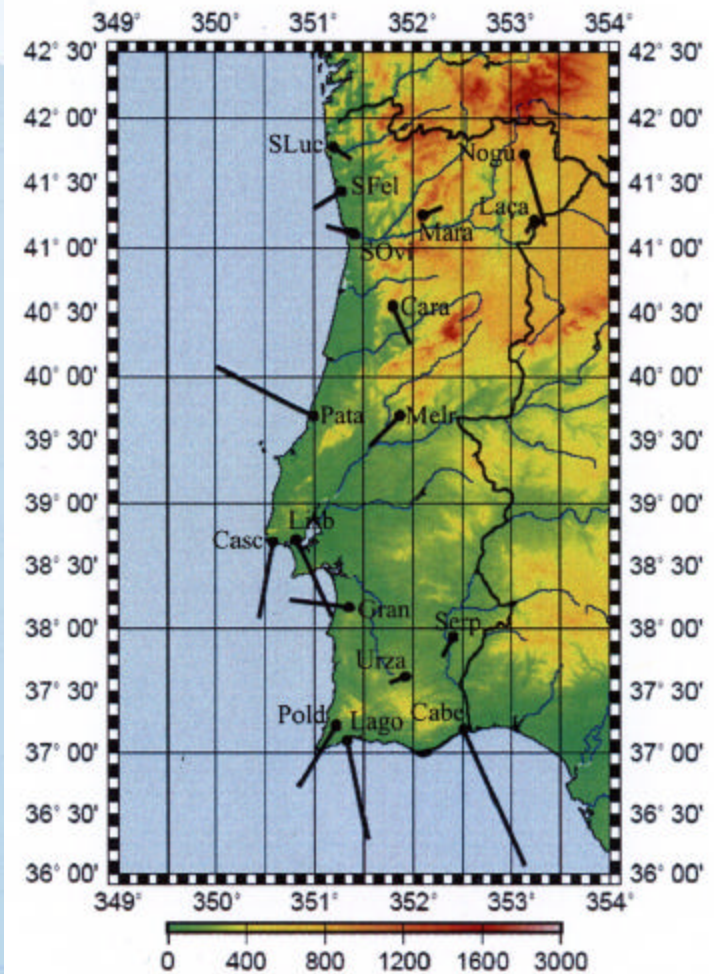


Astronomic Measurements

RESULTS of the DIADEM CAMPAIGN in PORTUGAL

GPS: accuracy < 10 cm, WGS 84 system

Stations				GPS			DIADEM				relative acc. ["]
Ind.	Session	Station	Nr.	phi	lam	height	PHI	LAM	xi	eta	
				[°]		[m]	[°]	[°]	["]	["]	
1	20040904	Lagoaça	1000	41.210687	-6.758587	941	41.210395	-6.758843	-1.05	-0.69	0.2
2	20040905	Nogueira	2000	41.717573	-6.855096	1379	41.715761	-6.854404	-6.52	1.86	0.1
3	20040906	Marao	3000	41.248268	-7.887208	1466	41.248467	-7.886618	0.72	1.60	0.1
4	20040907	S.Lucia	4000	41.770796	-8.799791	458	41.770523	-8.799225	-0.98	1.52	0.1
5		S.Felix	5000	41.435041	-8.715302	254	41.434613	-8.716240	-1.54	-2.53	0.1
6	20040908	S.Ovidio	6000	41.106240	-8.589054	285	41.106442	-8.589970	0.73	-2.49	0.1
7		Caramulo	7000	40.548667	-8.201838	1057	40.547714	-8.201288	-3.43	1.50	0.1
8	20040909	Pataias	8000	39.686802	-9.001411	176	39.688059	-9.004618	4.53	-8.88	0.1
9		Melrica	9000	39.694330	-8.129980	642	39.693561	-8.130969	-2.77	-2.74	0.2
10	20040910	Lisboa	1100	38.710030	-9.187434	143	38.708073	-9.186248	-7.04	3.33	0.1
11		Cascais	1200	38.693895	-9.418505	63	38.691963	-9.418967	-6.95	-1.30	0.1
12	20040911	Grandola	1300	38.169256	-8.645556	379	38.169448	-8.647459	0.69	-5.39	0.2
13		Urza	1400	37.618416	-8.072645	343	37.618259	-8.073128	-0.56	-1.38	0.3
14	20040912	Poldra	1500	37.219306	-8.780448	302	37.217754	-8.781652	-5.59	-3.45	0.1
15		Lagos	1600	37.098682	-8.668579	55	37.096066	-8.667990	-9.42	1.69	0.2
16	20040913	Cabeça	1700	37.186558	-7.487324	102	37.183066	-7.485368	-12.57	5.61	0.1
17		Serpa	1800	37.929452	-7.593892		37.928992	-7.594221	-1.66	-0.94	0.1



SLuc: St. Lucia Laca: Lagoaça Lisb: Lisboa Gran: Grandola
 SFel: St. Felix Cara: Caramulo Urza: Urza Cabe: Cabeça
 SOvi: St. Ovidio Pata: Pataias Pold: Poldra
 Mara: Marao Melr: Melrica Serp: Serpa
 Nogu: Nogueira Casc: Cascais Lago: Lagos



Astronomic Measurements

DIADEM Camera



Stations					DIADEM							
Ind	Session	Station	Nr.	Single Sol.	phi*	lam*	height	PHI	s_Phi	LAM	s_Lam	xi eta
					[°]		[m]	[°]	["]	[°]	["]	["]
1	20040904	Lagoaca	1000	41	41.210687	-6.758587	941	41.210395	0.23	-6.758843	0.28	-1.05 -0.69
2	20040907	S.Lucia	4000	63	41.770796	-8.799791	458	41.770523	0.24	-8.799225	0.24	-0.98 1.52
3	20040908	S.Ovidio	6000	80	41.106240	-8.589054	285	41.106442	0.19	-8.589970	0.17	0.73 -2.49
4		Caramulo	7000	60	40.548667	-8.201838	1057	40.547714	0.19	-8.201288	0.18	-3.43 1.50
9		Melrica	9000	78	39.694330	-8.129980	642	39.693561	0.22	-8.130969	0.25	-2.77 -2.74
5	20040910	Lisboa	1100	70	38.710030	-9.187434	143	38.708073	0.23	-9.186248	0.19	-7.04 3.33

Tab.2: Astronomical parameters and Deflections of the vertical determined in 2004

Stations		TZK 3							
Ind	Station	phi ell.	lam ell.	PHI astr.	s PHI	LAM astr.	s LAM	xi	eta
		[°]		[°]	["]	[°]	["]	["]	["]
1	Lagoaca	41.210682	-6.758534	41.210344	0.30	-6.758850	0.30	-1.22	-0.86
2	S.Lucia	41.762955	-8.807797	41.761914	0.30	-8.808931	0.30	-3.75	-3.05
3	S.Ovidio	41.107920	-8.587211	41.107931	0.30	-8.588689	0.30	0.04	-4.01
4	Caramulo	40.547273	-8.202045	40.546214	0.30	-8.202206	0.30	-3.81	-0.44
5	Melrica	39.694142	-8.130146	39.693244	0.30	-8.131464	0.30	-3.23	-3.65
6	Lisboa	38.713698	-9.133160	38.711853	0.30	-9.133481	0.30	-6.64	-0.90

Tab.3: Astronomical parameters and Deflections of the vertical at common stations determined in 1997/1998

Stations		Differences	
Ind	Station	d_xi	d_eta
		["]	["]
1	Lagoaca	-0.16	-0.16
2	S.Lucia	-2.77	-4.56
3	S.Ovidio	-0.69	-1.52
4	Caramulo	-0.38	-1.94
5	Melrica	-0.46	-0.91
6	Lisboa	0.40	-4.23

Tab.4: Differences in deflections of the vertical measured with DIADEM and TZK 3.



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