



EUREF 2012 Symposium

NATIONAL REPORT REPUBLIC OF MACEDONIA



Agency for Real Estate Cadastre

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National Cadastral and Mapping Agency

**Founded in 1947 as Republic Geodetic Authority,
later State Authority for Geodetic works, now Agency for Real Estate**

Cadastral

- The Agency for Real Estate Cadastre (AREC) is an entity of the state administration authorized for:

- basic geodetic works
- survey
- cadastre
- registration of the real property rights
- maintenance of the survey and the real estate cadastre



- cartographic production
- establishment, maintenance, public display of the NSDI
- establishment and maintenance of the spatial unit registry ...

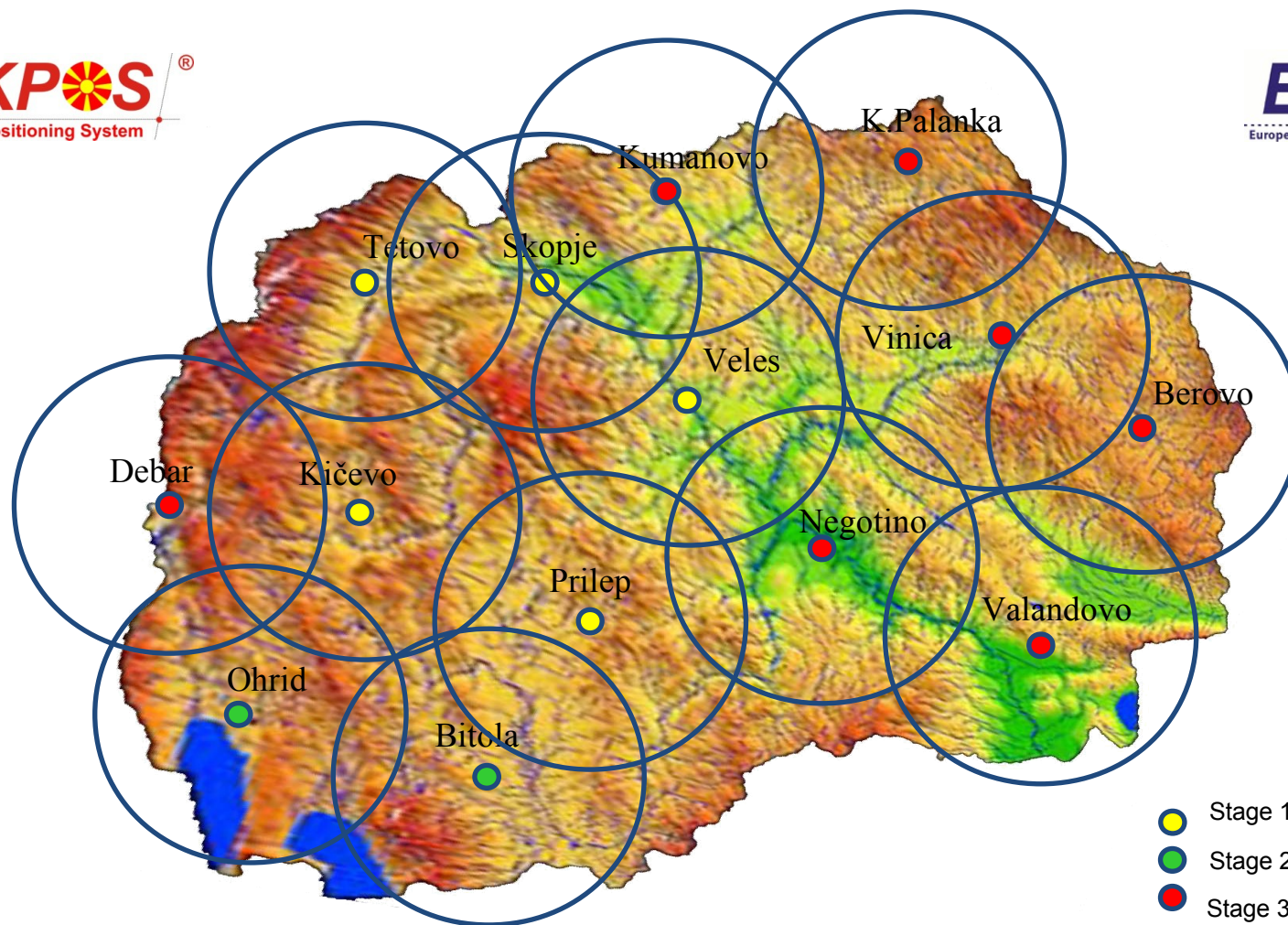
Department for Geodetic Works:

- Unit for geodetic networks, survey, and land classifications
- Unit for photogrammetry
- Unit for cartography

Responsibilities:

- Establishment, maintenance and development of geodetic reference networks (trigonometric, network of permanent GNSS stations, passive GNSS network, levelling network, gravimetric network etc ...)
- Maintenance and marking of the Macedonian state border
- Geodetic works of special importance for R. Macedonia
- Geodetic survey
- Land classifications
- Production of digital topographic maps and Ortophoto productions

ACTIVE GNSS NETWORK - MAKPOS



- Stage 1 - 2008
- Stage 2 - 2008
- Stage 3 - 2009

MAKPOS equipment



Reference stations

Leica 1200GRX receivers
Leica AR25 antennas



Network software

Leica GNSS Spider / QC / WEB

MAKPOS – Services

24/7/365

<i>No.</i>	<i>Description</i>	<i>Service</i>	<i>Accuracy</i>	<i>Data format</i>	<i>Data transfer</i>
1.	Positioning through applying differential methods (<i>DGNSS</i>)	MAKPOS DGNSS	0.30 - 0.50 m	RTCM 2.x	Wireless Internet (GPRS) NTRIP protocol
2.	Positioning through applying real time kinematics (<i>RTK</i>)	MAKPOS RTK	0.02 - 0.04 m	RTCM 2.x RTCM 3.x	Wireless Internet (GPRS) NTRIP protocol
3.	Positioning through applying additional data processing (<i>PP</i>)	MAKPOS PP (RINEX)	≤ 0.01 m	RINEX	Internet (FTP, e-mail)

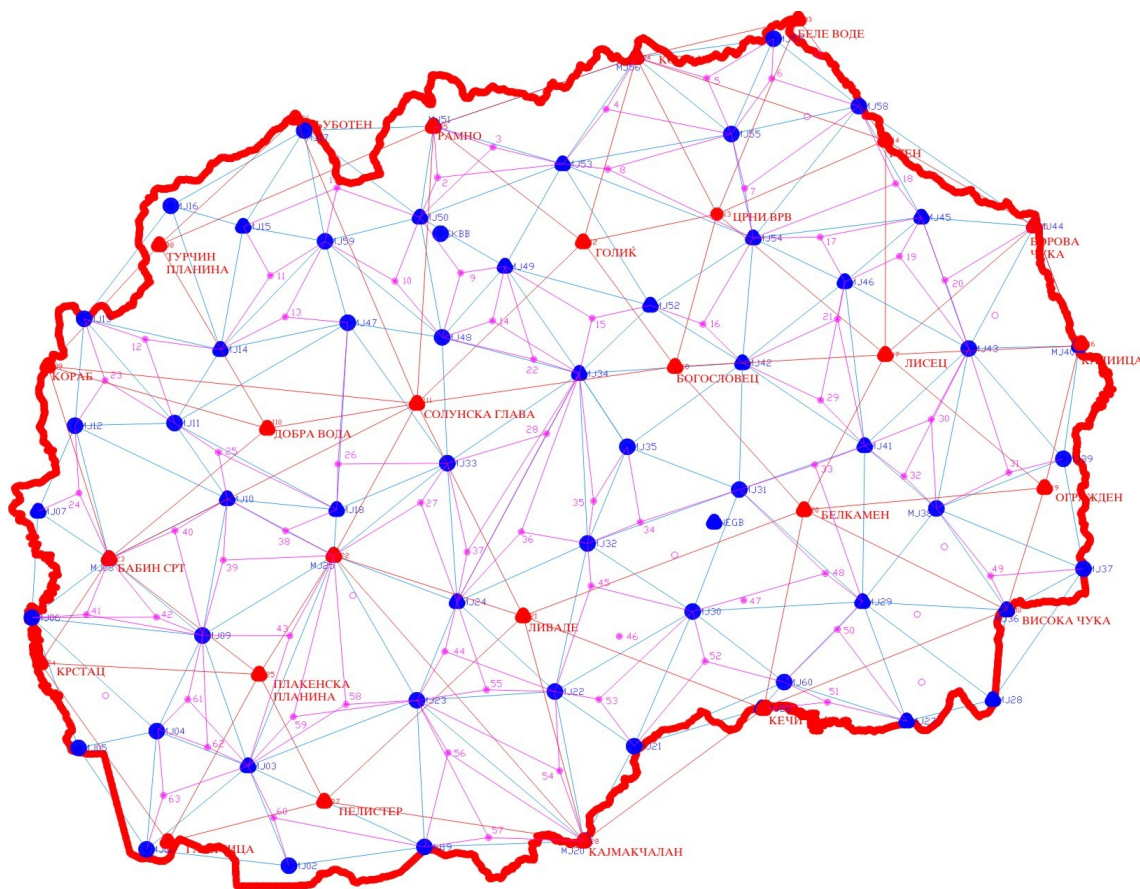
PASSIVE GNSS NETWORK

Phase 1 – 2004

Phase 2 – 2009

Phase 3 – 2010

Total $\approx$ 200 points

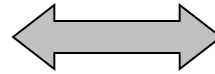


Adjusted in ETRS89

COORDINATE TRANSFORMATIONS

TRANSFORMATION PROJECT:

Macedonian State
Coordinate System

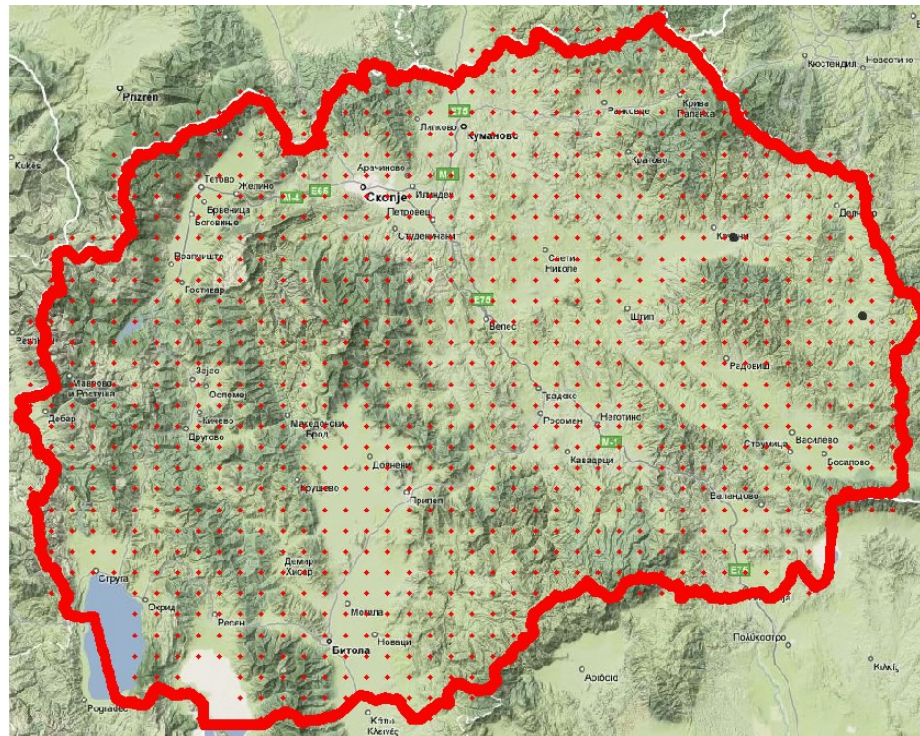


ETRS89

Planned for realization in 2013

Grid

3 x 3
km



First step
Helmert (7 parameter)
transformation

Second step
Grid transformation

OLD LEVELLING NETWORK

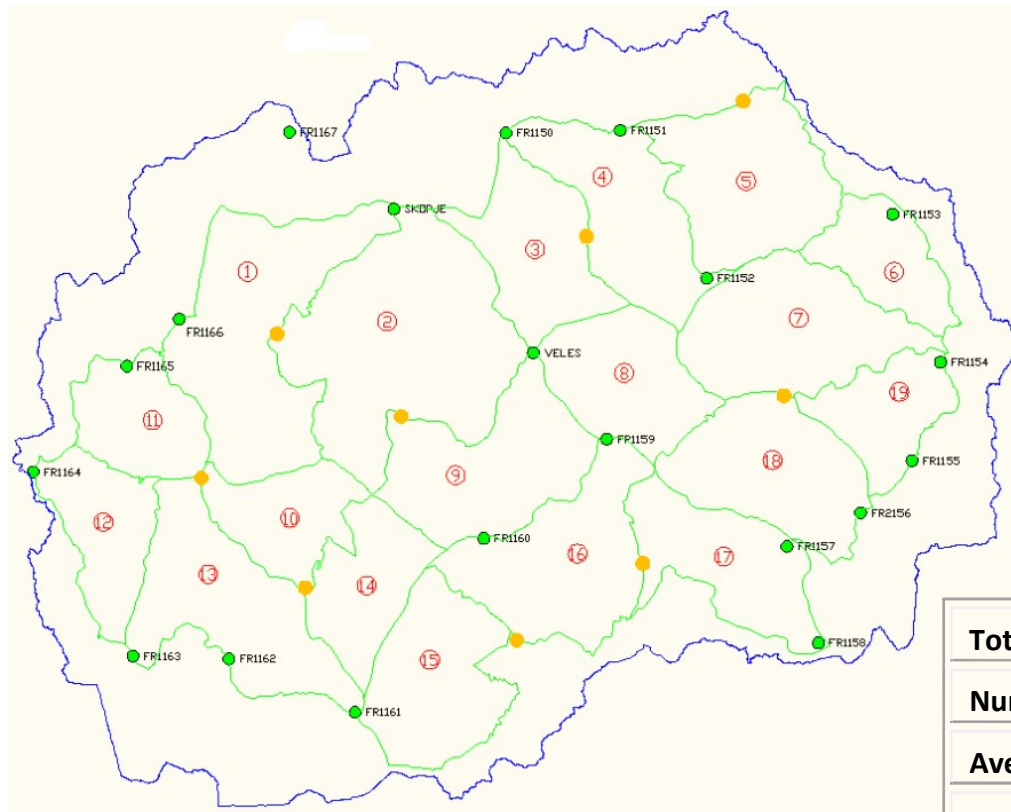
High Precision Levelling network in Macedonia



- Vertical datum: *Mareograph in Trieste*
- Poligons: 2
- Fundamental Benchmarks: 19

NEW LEVELLING NETWORK

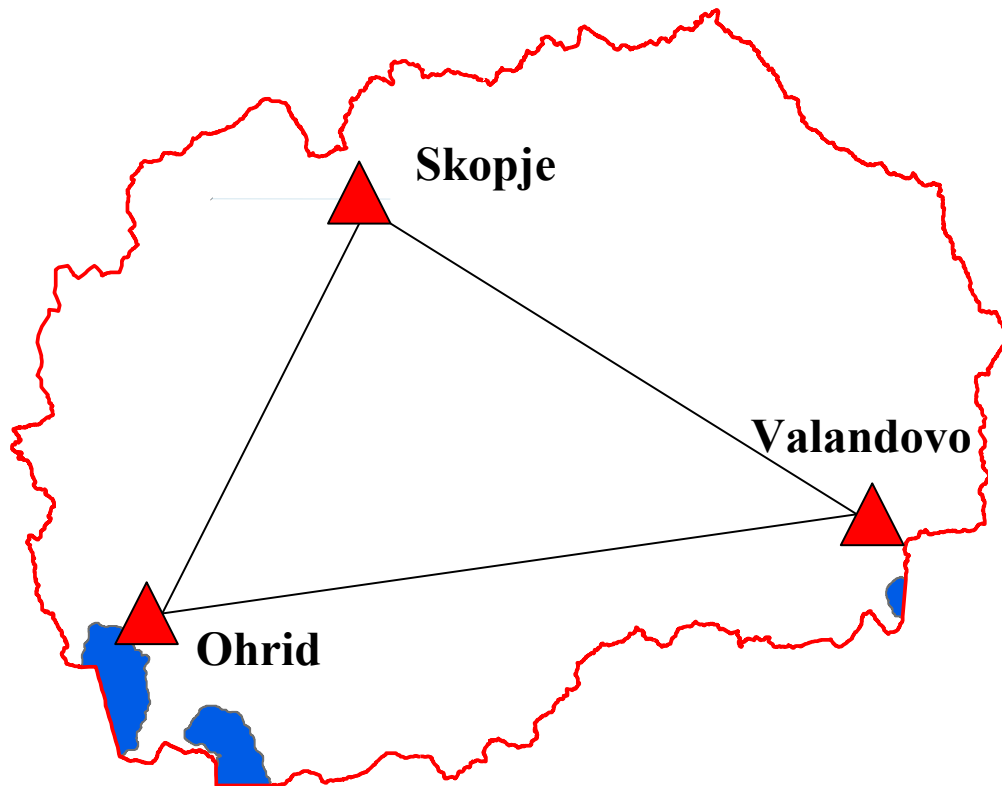
Planned for realization in 2012/2013



Total length of lines [km]	1739
Number of polygons	17
Average length of polygons [km]	156
Number of benchmarks – interdistance 2 km	871
Number of benchmarks – interdistance 1.5 km	1161

NEW GRAVIMETRIC NETWORK

Absolute Gravimetric Network



Established in 2010

Station	Height above the point (m)	Gravity, g (μGal)	Approximate standard error, σ_g (μGal)	# of drops used
Ohrid	1.200	980 057 787.9	2	2394
	0.000	980 058 229.7	4	
Valandovo	1.200	980 251 082.9	2	2340
	0.000	980 251 433.0	4	
Skopje	1.200	980 238 061.3	2	2399
	0.000	980 238 303.8	4	

NEW GRAVIMETRIC NETWORK

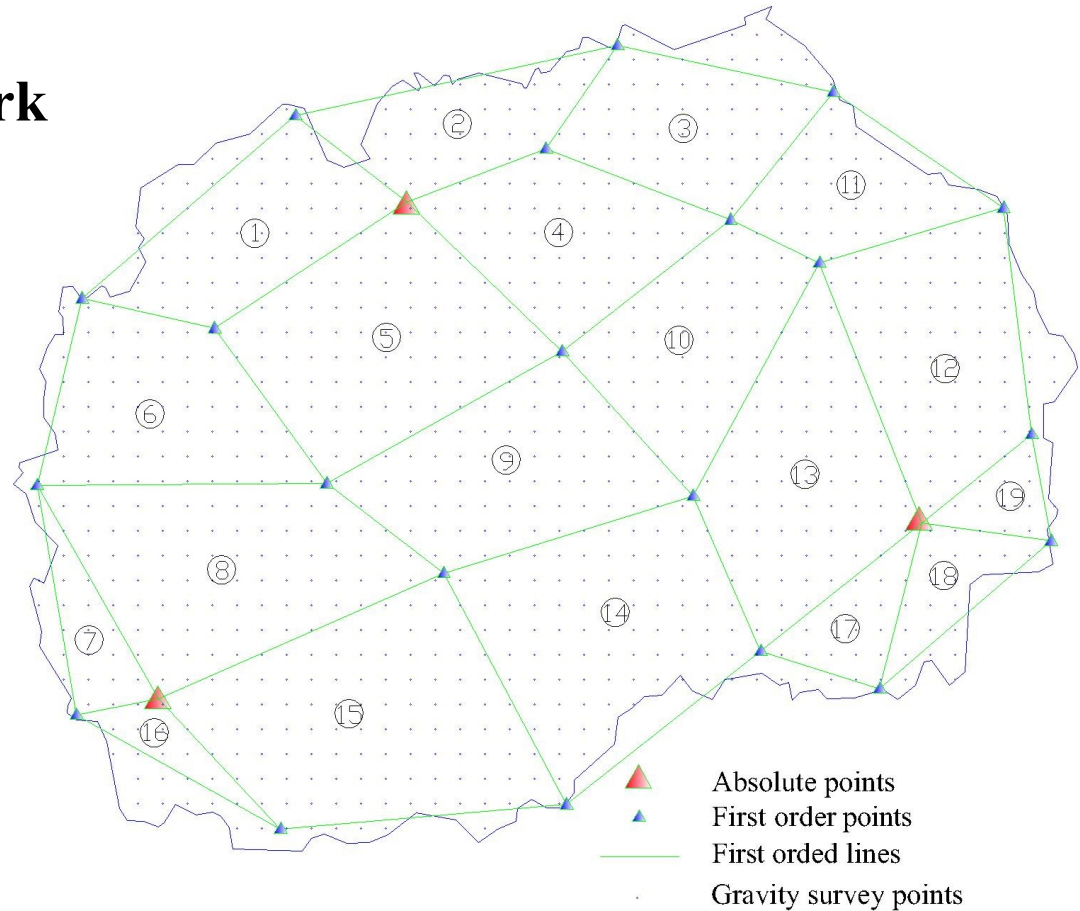
Planned for realization in 2013

Relative gravimetric network

- Number of points : 24

Gravity Survey

- Resolution: 5 km grid
- Number of points : 2814



THANK YOU FOR YOUR ATTENTION

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