Active GNSS network in MACEDONIA

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Agency for Real Estate Cadastre

✓ The Agency for Real Estate Cadastre (AREC) is an integrated system of professional activities within the field of geodesy, law and informatics.

✓ The Agency for Real Estate Cadastre (AREC) is a legally independent institution;

✓ It represents an individual state institution that administers the managerial and technical works in the field of geodesy, cadastre, photogrametry, mapping and registration of real estate rights on the whole territory of Republic of Macedonia (the only register).
Current projects in AREC

1. Project: Real estate cadastre and registration
   (World Bank)

   (Sida donation)

3. Project: Realization of MAKPOS
   (Self financing and donors: JICA and Sida)

4. Project: e-Cadastre
   (government and donors)
Trigonometrical network from 1. order – still in use

1. Network in Serbia, Montenegro, and Macedonia
2. Point Ruj
3. Points Pitulaš and Bobuluj
4. Network in Vojvodina
5. Network in Srem and part from Bosnia
6. West state network
7. Montenegro network
8. Slavonija network
9. New network for the new region
10. Network "North Adriatic"
11. Network on border with Italy
12. Point Brezovo Polje
13. Part of the MGI network but not re-measuremet
GPS Activities in the Republic of Macedonia

• International GPS campaigns:
  
  - EUREF MAK 96
  - EUVN 97

• JICA campaign 2004

• Permanent GPS stations

  - Ohrid - 1998
  - Skopje - 2006
Passive GPS network in Macedonia

Points: 30 + 60
Distance: average 35 km
Next year: 60 new point
Goal: Point on every 10 km
BALcan Geodetic Observing System (BALGEOS) –
A SCIENTIFIC CHALLENGE FOR THE BALCAN COUNTRIES
Sofia, 3 – 5 December 2008
Classical 3D Transformation Report

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**Sigma a priori:** 1.0000 m  
**Sigma a posteriori:** 0.6056 m  

Residuals m
ACTIVE GNSS NETWORK IN MACEDONIA

BASIS:
“Study for development of referent GNSS basis in the Republic of Macedonia”

University “Sv. Kiril i Metodij” - Skopje
Faculty for Civil Engineering
Department for Geodesy

Project:
Stations: 14
Distance: ~50 – 70 km
Control centre: AREC
Communications: VPN, ADSL
Distributions: GPRS, GSM, Internet
ACTIVE GNSS NETWORK IN MACEDONIA

- logo -

МАКПОС - МАКедонски ПОзиционен Систем
МАКПОС – MACedonian POsitioning System
ACTIVE GNSS NETWORK IN MACEDONIA

- design -
WHY A NETWORK OF ACTIVE GNSS STATIONS?

Legend:
- Accuracy from 2 cm
- Accuracy from 10 cm

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BENEFITS FROM THE MAKPOS SYSTEM

- It will enable a fast and reliable way for acquiring geospatial data on any position on the territory of the Republic of Macedonia, for any purpose;

- It will accelerate the realization of the project 'Real Estate Cadastre and Registration in Macedonia' by enabling a faster and more secure way of measuring of real estate;

- It will provide the conditions for a more efficient and more cost effective work of the private surveying companies;

- It will enable more efficient realization of the projects from the field of land management, physical planning and environmental protection;

- It will enable continuous real time monitoring of the coordinates for the needs of crisis management;

- For first time we will have a unique and homogenous geodetic network on the all territory of Macedonia;

- There will be conditions for the placing in use the European ETRS89 coordinate system, in accordance with the EU recommendation (INSPIRE).
CURRENT REALIZATION

Stations:
5 (five)

Locations:
Skopje, Tetovo, Kicevo, Prilep and Veles

Coverage:
~ 45% territory from R. Macedonia

Equipment:
4 sets Leica GNSS
1 set Trimble GPS

Control centre:
AREC
(Leica GNSS SpiderNET)

Comunications:
VPN, ADSL

Coordinate:
WGS84, ETRS89,
State coordinate system
CURRENT ACTIVITIES

Stations:
2 (two)

Locations:
Ohrid and Bitola

Coverage:
~ 60% territory from R. Macedonia

Equipment:
1 sets Leica GNSS
1 set (procurement procedure)
LOCATIONS
Local cadastral offices in cities

Kicevo

Prilep

Veles

Tetovo

Skopje
EQUIPMENT OF ONE ACTIVE GNSS STATION

- Computer equipment
- GNSS receiver
- Communication equipment
- GNSS antenna
Control centre – users

Communications:
1. Post Processing
2. Real Time Kinematic
Post Processing

1. Measurements
Post Processing

1. Measurements

2. Request via internet
   http://makpos.katastar.gov.mk
Post Processing

1. Measurements

2. Request via internet
   http://makpos.katastar.gov.mk

3. Download RINEX
Post Processing

1. Measurements

2. Request via internet
   http://makpos.katastar.gov.mk

3. Download RINEX

4. Position (Y, X, H)
Real Time Kinematic

1. Request
   (NTRIP 80.77.147.61)

   GPRS, GSM
Real Time Kinematic

1. Request
   (NTRIP 80.77.147.61)

2. Corrections (RTCM)

GPRS, GSM
Real Time Kinematic

1. Request
   (NTRIP 80.77.147.61)

2. Corrections (RTCM)

3. Position (Y, X, H)
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DISTRIBUTION OF DATA

Transformation parameters for cities:

✓ Skopje
✓ Veles
✓ Prilep
✓ Kicevo
✓ Gostivar
✓ Ohrid
✓ Kocani

Concept for network solution:

✓ Master-Auxiliary Concept (MAC)

Corrections:

✓ RTCM 2.0 up to 3.1
✓ CMR+
✓ DGPS

Computation service:

✓ Post Processing
✓ Kinematic with post processing
FUTURE ACTIVITY

1. Completing of GNSS system 2009

2. Campaign for promotions of GNSS system 2008, 2009

3. Educations
   - Managing the MAKPOS system
   - Maintenance of the MAKPOS system
   - Using MAKPOS system
   - Quality control
   - Technical support for the customers
   - Development of new services 2008, 2009, 2010

4. Legal regulations (bylaw, instructions...) 2008, 2009


Finish ≈ 2012

EU Coordinate system ETRS 89

Start 2008

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Don't forget this information:

http://makpos.katastar.gov.mk

E-mail: makpos@katastar.gov.mk

Download for RINEX:
http://makpos.katastar.gov.mk

Real Time measurement (NTRIP):
IP address: 80.77.147.61
Port: 9001
THANK YOU FOR YOUR ATTENTION
TIME FOR QUESTIONS