NATIONAL REPORT
REPUBLIC OF NORTH MACEDONIA

AGENCY FOR REAL ESTATE CADASTRE

Department for Geodetic Works

KATASTAR

Ljubljana, *May 26 – 28 2021*

ACTIVE GNSS NETWORK - MAKPOS

MAKPOS Timeline

START **2007** ..... **2021** CONTINUE

Main characteristics:

- Number of stations: 15
- 14 monumentend with steel pillars
- 1 IGS/EPN – Ohrid (concrete pillar)
- Interdistance: ~50 km

MAKPOS reference station – status 2021

GNSS Receivers & GNSS Antennas

Leica GR10 – 4 stations **Leica AR25 – 14 stations**
Leica GR30 – 11 stations **Leica AT504 – 1 station**

MAKPOS services: DGPS, RTK, PP

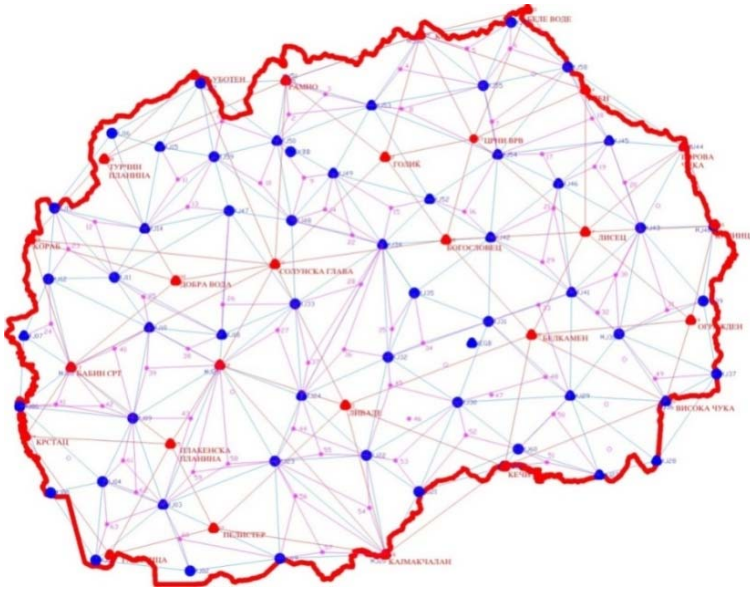
Since January 2020
3G NETWORK: GPS/GLONASS/GALILEO

ACTIVE GNSS NETWORK - MAKPOS

MAKPOS planned activities

- Replacement of 1 GNSS antenna (Leica AT504 to Leica AR25) ;
- Upgrade of the MAKPOS SW for Bei Dou (Compass) capabilities
- Introduction of New MAKPOS services;
- Implementation of the Unique transformation model for whole territory of the country through MAKPOS system;
- EPN densification with few MAKPOS station;
- Exchange of GNSS data with neighboring countries (Greece, Albania and Bulgaria – with Serbia and Kosovo is already established);

PASSIVE GNSS NETWORK - MAKREF



Monumentation of MAKREF points

Main characteristics:

- Number of points: 210
- Inter-distance between the points: ~10-15 km
- Static measurements: min 3 hours
- Fixed on EUREF MAK points
- Adjusted in ETRS89

MAKREF 2020 GNSS campaign

- Re-measurement of the all 210 MAKREF points
- Static measurements: min 3 hours
- Re-adjustment is ongoing (Leica Infinity SW)

ETRS89 Introduction

Introduction of ETRS89 as official coordinate system in North Macedonia

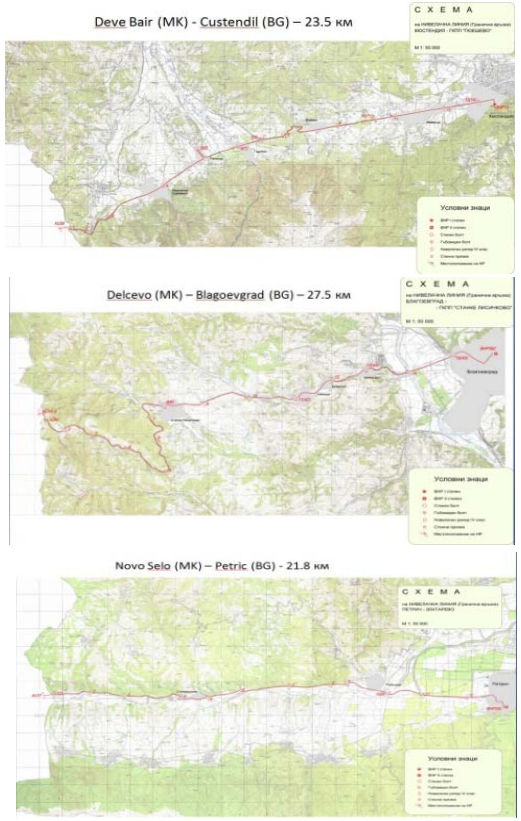
- Strategy is under development (supported by Sida Project), working on preconditions
- Study for implementation of new official geodetic reference systems in North Macedonia;
- Study for new state cartographic projection in North Macedonia
- Planned for 2022-2023;
- Materialization ETRS89 done through the EUREF MAK + MAKPOS + MAKREF points;

NEW HIGH ACCURACY LEVELING NETWORK (LN3)

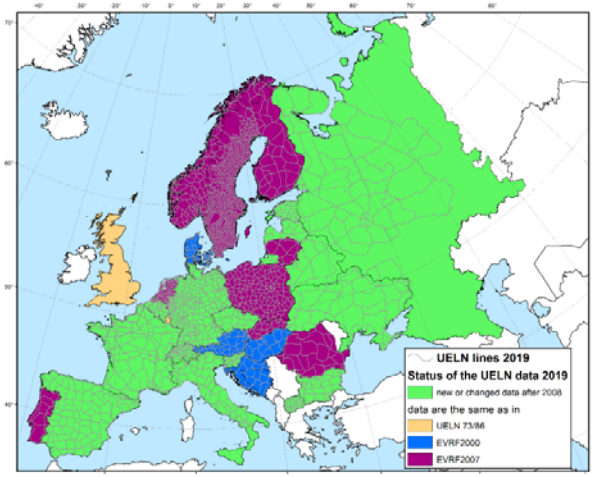
- All Precise city leveling networks are connected to LN3
- New High accuracy levelling network (LN3) became part of the UELN

High accuracy levelling network

- Number of polygons: 19
- Number of leveling lines: 49
- Total length of leveling lines: ~2200 km
- Number of benchmarks: 1098
- Interdistance between benchmarks: ~2km



MK-BG Connection lines

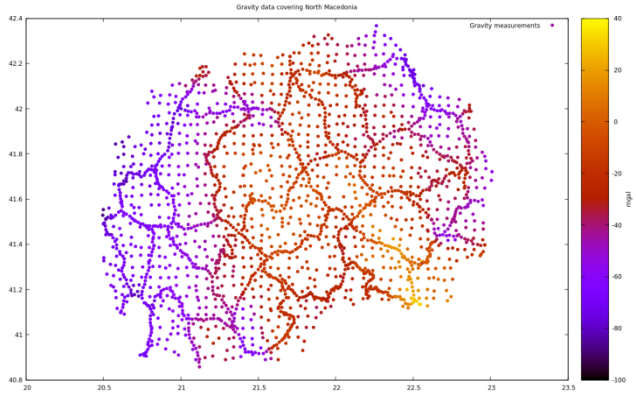


UELN 2019 - EVRF2019 Realization

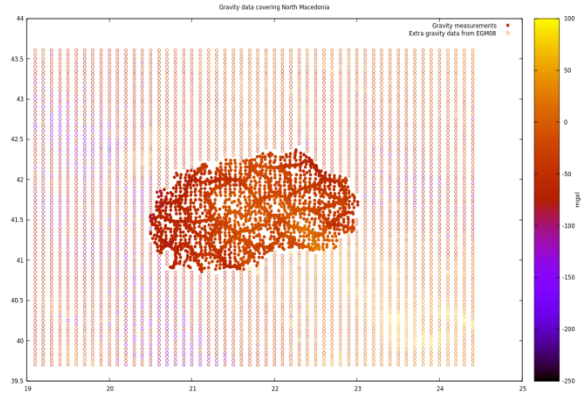
New national height system is planned to be introduced (NAP based)

FIRST OFFICIAL Q/GEOID MODEL OF NORTH MACEDONIA

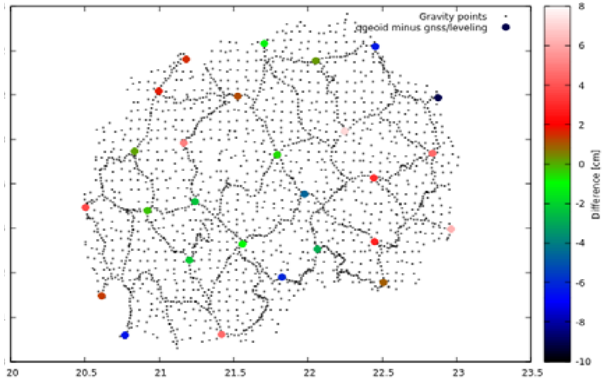
Geoid calculations performed in 2020 (support by Norway - Statens Kartverk)



Gravity data covering North Macedonia



Gravity data covering North Macedonia and extra data from EGM08

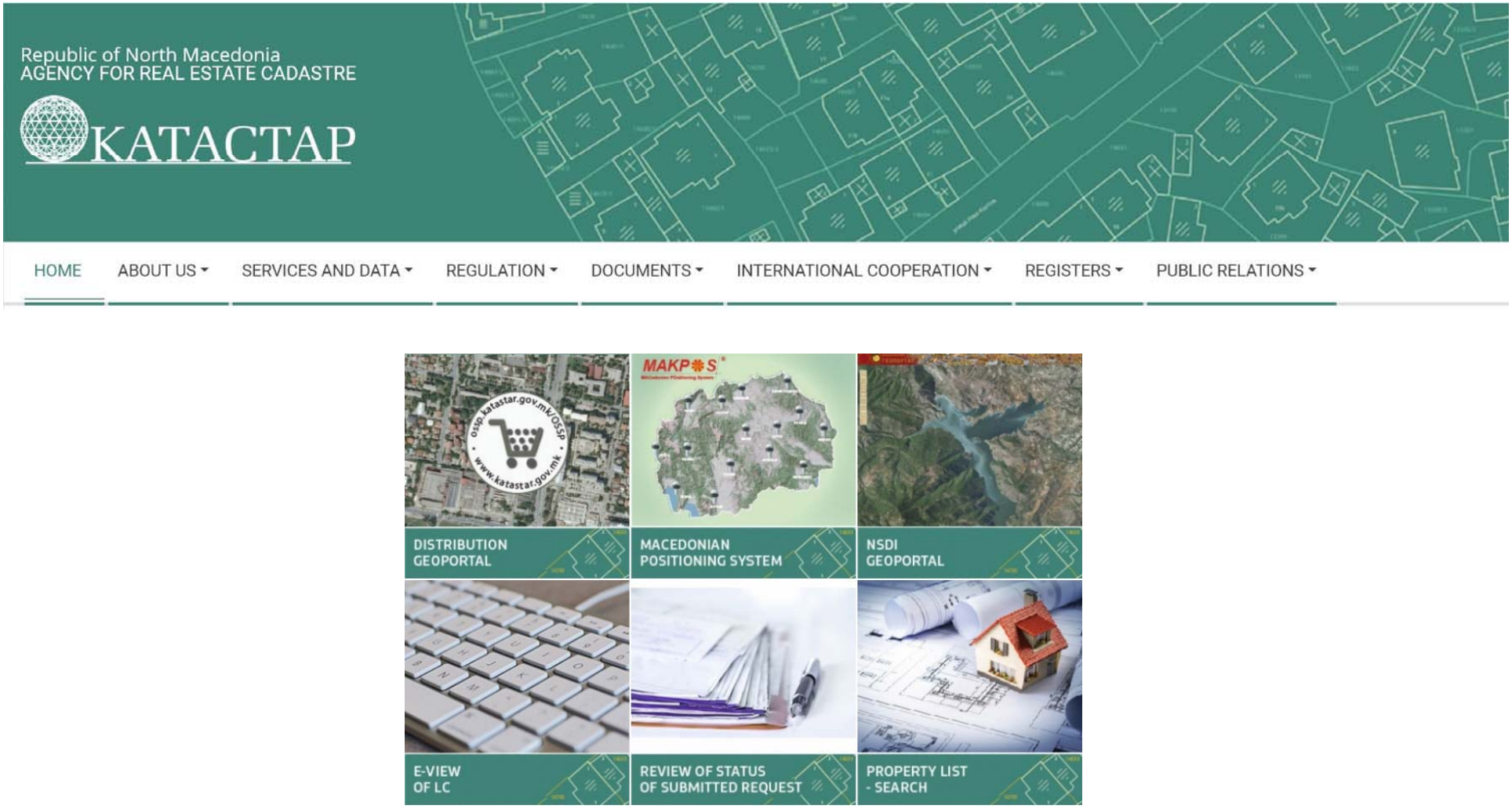


GNSS/leveling data

- 2310 gravity points (all LN3 benchmarks + grid 5x5 km)
- 27 GNSS leveling points
- gravity data from EGM08 in a ~150 km area around North Macedonia

Compared to the official height system using 27 GNSS leveling points calculated quasigeoid give a fit/std.dev. of 4 cm.

http://www.katastar.gov.mk/en/home/



THANK YOU FOR ATTENTION