REPUBLIC OF ALBANIA
STATE AUTHORITY FOR GEOSPATIAL INFORMATION (ASIG)

NEW GEODETIC REFERENCE FRAME OF ALBANIA

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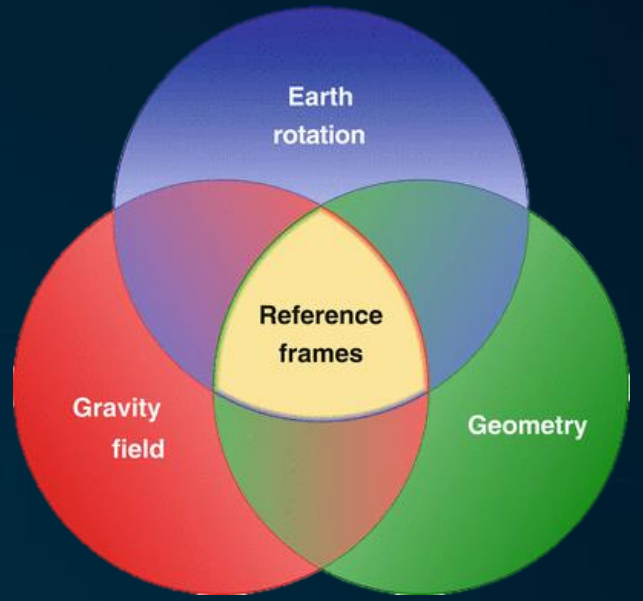
CURRENT SITUATION OF G.R.F IN ALBANIA

- **Based on Law 72/2012 (& D.C.M. 699, date 7.8.2013), ASIG is the responsible organization for the establishment of the New Geodetic Reference Frame in Albania, including:**

1. State GNSS Network (Active (CORS) + Passive Network)
2. State Levelling Network
3. State Gravimetric Network
4. State Tide Gauge stations Network
5. State Magnetometric Stations Network



- Following the EU requirements related to **CRS-EU (ETRS89 & EVRS)** we are establishing a modern **Geodetic Reference Frame**, based on GNSS technology and precise gravimetric geoid that will support accurate and efficient horizontal and vertical positioning throughout Albania.

CURRENT SITUATION OF G.R.F IN ALBANIA

State GNSS Network (Active & Passive Network)

Passive GNSS Network

- 42 points which are called the Geodetic Datum of Albania
- 21 points are active and passive and 21 are only passive points

Active GNSS Network – ALBCORS

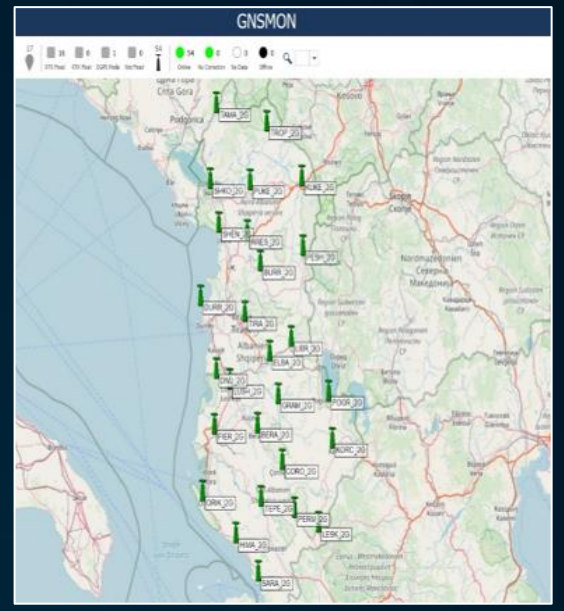
- 27 CORS stations - ETRF2000 (2014.177)
- Currently running in Albania since December 2019
- Control Center – GNSMART (*Geo ++)*
- Two main services: RTK (2-3cm,2D-3D) & PP (1cm, 3D)
- Currently, 200 users working with ALBCORS
- Agreement: Kosovo-data exchange

Future Activities :

- Calculation of velocity vectors of 27 stations (working for more than 3 years)
- More agreements with other countries
- **Application for one or multiple GNSS station(s) of ALBCORS to become part of the EPN following EUREF guidelines**

Geodetic Datum

ALBCORS



2. CURRENT SITUATION OF G.R.F IN ALBANIA

Terrestrial gravimetric measurements

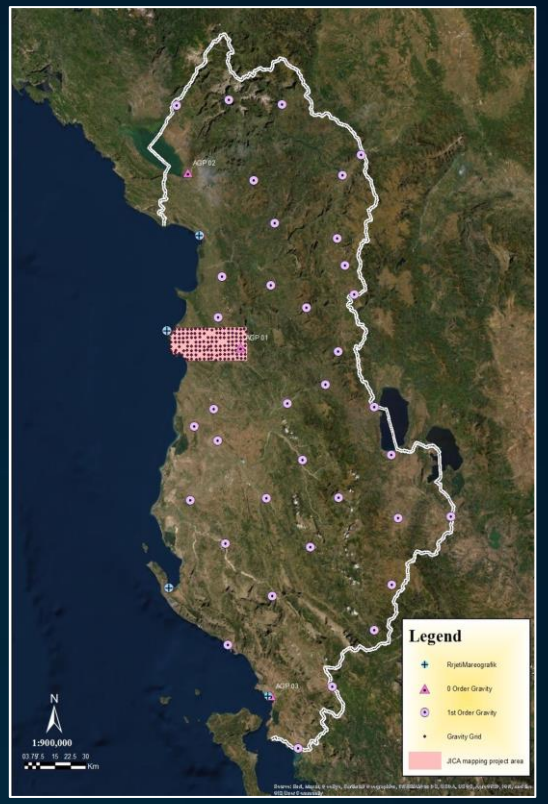
State Gravimetric Network (4-order)

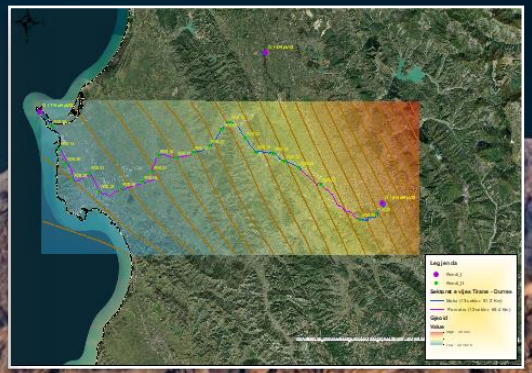
Implemented

- 0-order (3 Absolut gravimetric points-FG5, measurement was done with Norwegian support in 2015)
- 1st order (42 points, CG5- Relative Gravimeter, 2018, accuracy 10 μGal)
- 2nd & 3rd order (38 points & 138 points, Tirana-Durres area, accuracy 20-30 μGal, test Geoid)
- View data at the address: *krgjsh.asig.gov.al*

Projected:

- 2nd order points are common with the leveling BMs and 2nd order GNSS network, ≈ 500 points, accuracy 20 μGal;
- 3rd order: 2x2km flat areas & 5x5km rural & mountainous areas, ≈ 4740 points, accuracy 30 μGal.





2. CURRENT SITUATION OF G.R.F IN ALBANIA

State Levelling Network

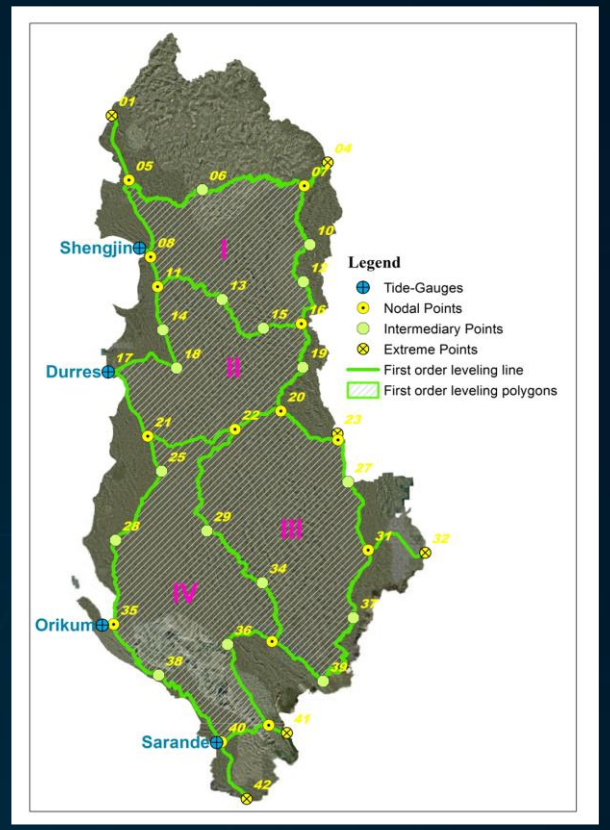
- Designed - Project of State Levelling Network
  - 4 polygons
  - Leveling lines will follow the main routes in Albania
  - Existing BMs (ALB86) will be included in the new network of levelling
  - Levelling lines length: ≈ 1441.324 Km, Benchmarks: : ≈ 430 BMs
- Not implemented yet - (high cost, time consuming)

Implemented

- Drafted the guidelines for the geometric levelling procedure
- Measured - 25 km levelling lines according to first class criteria with the purpose to control the Geoid in Tirana-Durres area.

Future Activities

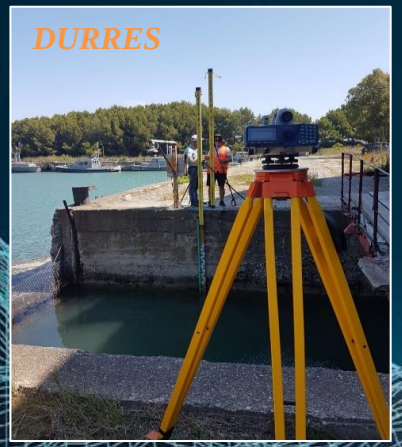
- Connect to UELN -United European Vertical Network (e.g.- through Kosovo or North Macedonia; EVRS/EVRF2019)
- Link with 4 Tide Gauge Stations
- Validate/control a geoid and determine the new vertical reference

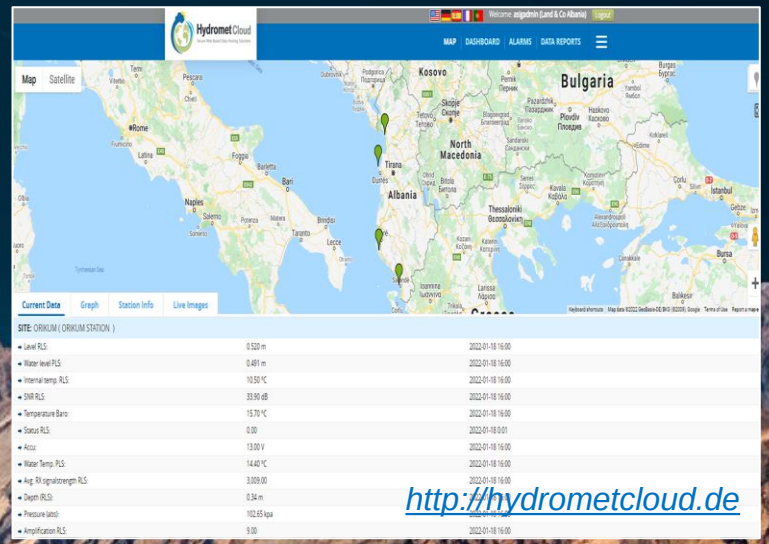


2. CURRENT SITUATION OF G.R.F IN ALBANIA

State Tide Gauge Stations Network

- 4 Tide Gauge stations (located: Shengjin, Durres, Orikum, Saranda)
- Working and collecting data since February 2018
- Control Center – Hydromet Cloud (located in ASIG) - which enables collecting, processing, and sharing of data for all users.
- Drafted the guidelines for Tide Gauges (Referred to Permanent Service for Mean Sea Level).
- Micro-networks (3 points BMs) - near each tide gauge.
- Measured the levelling lines according to first class criteria between BMs
- ***Purpose:*** Monitoring the MSL and determining a vertical ground movement
- ***Main Goal*****:** Determine the initial equipotential surface of the geoid (W0) based on the collected data from 4 tide gauges.





http://hydrometcloud.de

2. CURRENT SITUATION OF G.R.F IN ALBANIA

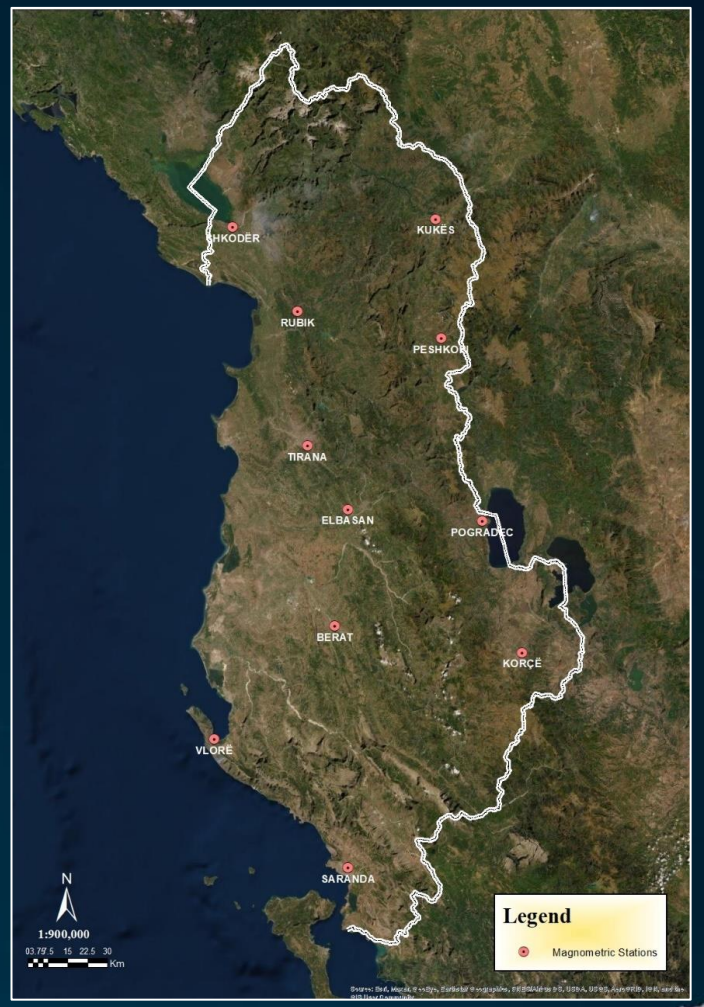
State Magnetometric Stations Network

- Contain 11 "*Repeat Stations*"

- The network will serve to determine:
  1. Magnetic declination **D**
  2. Magnetic inclination **I**

- Magnetometric measurements in Albania were carried out in 1997, 2002, 2007, 2011, 2015 and the last measurement campaign finished in 2018 from ASIG.

State Magnetometric Stations Network



3. FUTURE ACTIVITIES OF ASIG

The main activity for the years 2023-2025 is to prepare technical specification for the precise geoid model of Albania with an accuracy of 2-3 cm

The activities of ASIG for this year (2023) are:

- To build 300 points of the second order of the State Gravimetric Network in all territory of Albania with density:
  - 5x5 km for field areas
  - 10x10 km for rural or mountainous areas
- To perform GNSS and relative gravimetric measurements based on the absolute points and first-order points of the State Gravimetric Network
- To create a test gravimetric geoid with these data

Currently , we are in the tendering phase of this project

The activities of ASIG for next years are:

- To implement the third order of the State Gravimetric Network according to the terrestrial gravimetric technique with around 4000 points or *"Airborne Gravity"* technique
- To calculate the precise gravimetric geoid with an accuracy of 2-3 cm
- To link 4 Tide Gauges Stations and to link with UELN through levelling, with the main purpose of controlling gravimetric geoid

GOALS AND CONCLUSIONS

SUMMARY OF GOALS

- Implementation of the Precise Gravimetric Geoid as the most important component of our New Geodetic Reference Frame.
- Linking with 4 Tide Gauges Stations and with European United Levelling Network (UELN) through levelling with the main purpose of controlling gravimetric geoid and to define a New Vertical Geodetic Reference in Albania.
- Application for one or multiple GNSS station(s) of ALBCORS to become part of the EUREF Permanent Network (EPN) following EUREF guidelines.

CONCLUSIONS

- Create and maintain cooperation with international agencies, especially in Balkan region in the field of Gravity, GNSS and Levelling which are important for the determination of geoid model; share data and experience with neighbouring countries.
- Need for technical support, assistance and training in the field of Gravity and Geoid for determination, control and maintenance of a New Vertical Geodetic Reference in Albania.
- Time for implementation the New Geodetic Reference Frame will depend on the financial resources of our organization.
- We welcome any kind of support from other countries.

THANK YOU FOR YOUR ATTENTION !