



*Agency for Land Relations and Cadastre of the Republic of Moldova*

# **POSITIONING INFRASTRUCTURE FOR SUSTAINABLE LAND ADMINISTRATION: THE CASE STUDY**

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# ***Content***

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- Geodetic datum of the Republic of Moldova
- From geodetic datums to Position Infrastructures
- Positioning Infrastructure in sustainable Land Administration
- Conclusion

# The Republic of Moldova



- Total area – 33,7 thousand km<sup>2</sup>
- Capital – Chisinau
- Population – 4,3 mln
- Real Estate – 5.7 mln

## Territorial division

- 32 regions
- 65 cities
- 1 548 localities



# ***Historical review***

- **The Land Reform in Moldova started soon after the country became independent from the Soviet Union (1991).**
- **Mass distribution of national property (1992);**
- **Foundation of the Agency for Land Relations and Cadastre (1994);**
- **Law of Real Estate (1994);**
- **Law of Land Code Signing of an agreement concerning the credit between Republic of Moldova and Agency for International Development (AID) for Development Cadastre System (1998);**
- **Government Resolution on establishment of the National Geodetic Network and accession of the territory of Moldova to the Global Geodetic System WGS-84, nr.244 of 31 March 1999;**
- **Law of Geodesy and Cartography (2000);**
- **Implementation of the First Cadastral Project in Moldova (1999 – 2007).**

## ***Historical review: System's Condition (1994)***

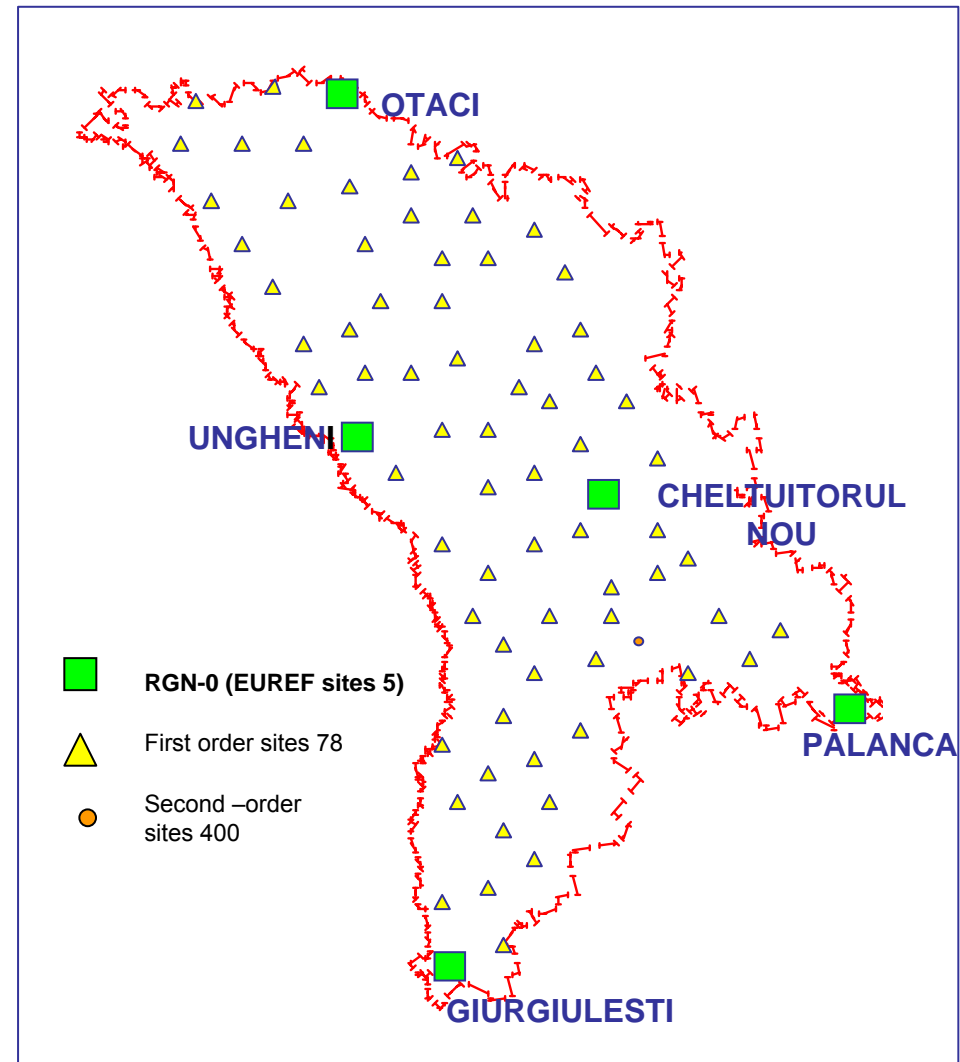
- Coordinate system –secret;
- Insufficient technical base for maps drawing;
- Lack of the Geodetic datum;
- Lack of private sector for services provision in registration domain: cadastral measurements, evaluation, notaries.

## ***Historical review: What System have we created?***

- Juridical security - high
- Cadastral System and Registration System - unified
- Access to the register - free
- Transaction costs – minimal
- Registration procedures – simple
- The process of citizens' assessment of property rights on land has accelerated:
  - 99% of owners of agricultural parcels possess the authenticity title of owner's right on parcel;
  - Within the project's framework cadastral works are being completed at about 700 localities out of 1550 existing ;

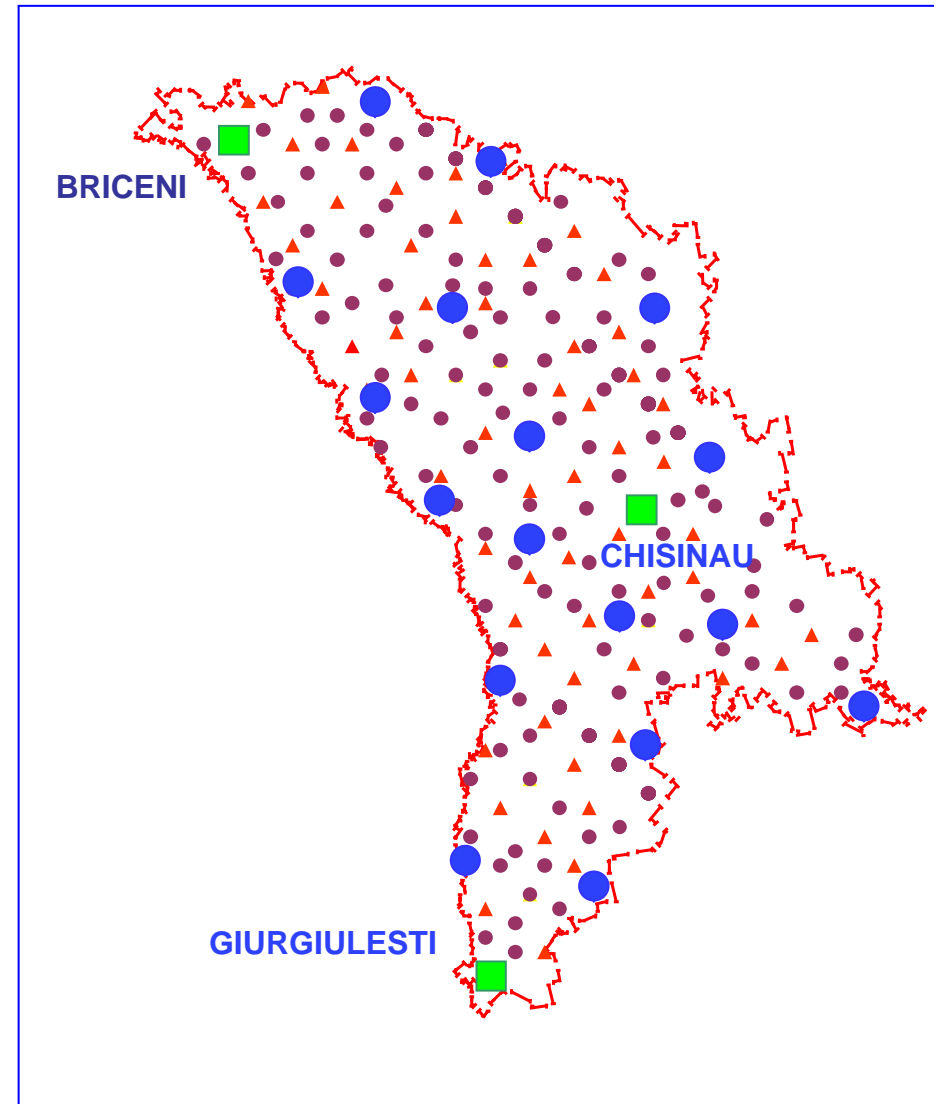
# Geodetic datum of the Republic of Moldova

- New Geodetic Network based on GPS measurement is created;
- Geodesic system with the reference to MOLDREEF-99 based on the ETRS89 and ITRS97 established;
- Basis for creation of cartographical products, including creation of topographical planning with cadastral purpose, is created;
- UTM projection replaced the original Soviet coordinate system SK-42;
- Connection of the National Geodetic Network with the European Geodetic Frame EUREF was done.



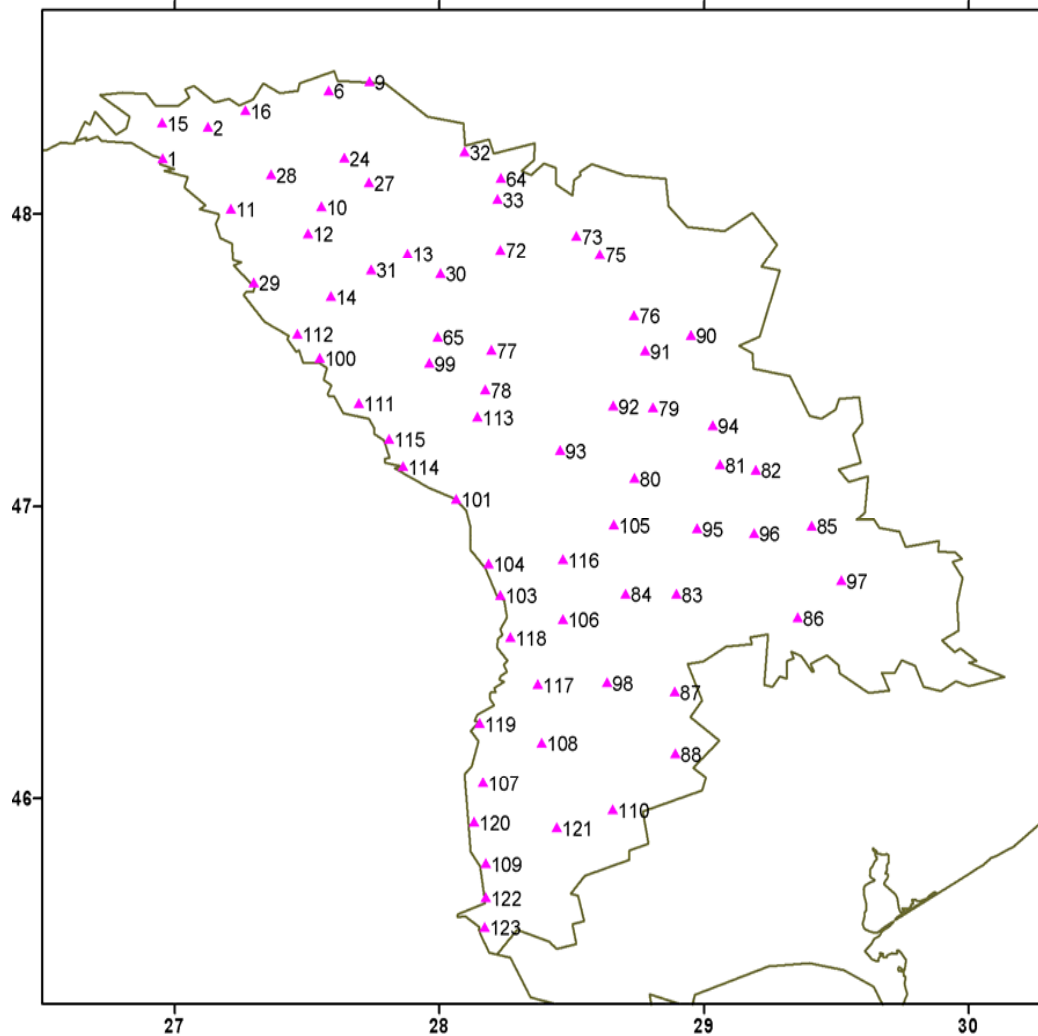
# Gravity Network "MOLDGRAV 06"

- Absolute gravity sites (3)
- RGS-1 (relative gravity first order sites -17)
- ▲ RGS-2 (relative second order sites - 112)
- RGS-3 (relative third order sites -1702)





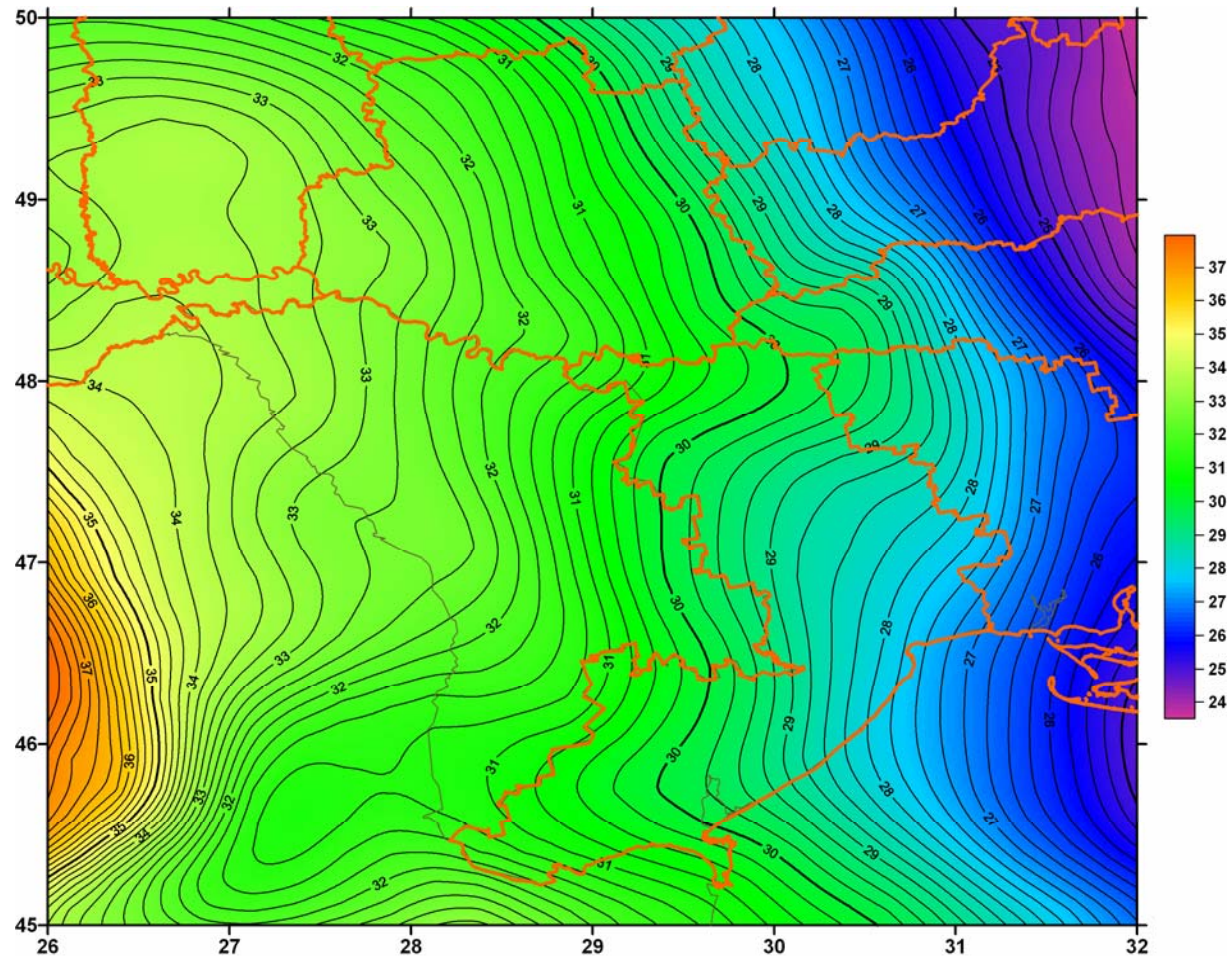
# (Quasy) geoid of Moldova



Medium accuracy of  
(Quasy) geoid elevation  
GM2005 for the Territory of  
Moldova make up 5-10 cm

*Distribution of GPS points on the territory of Moldova*

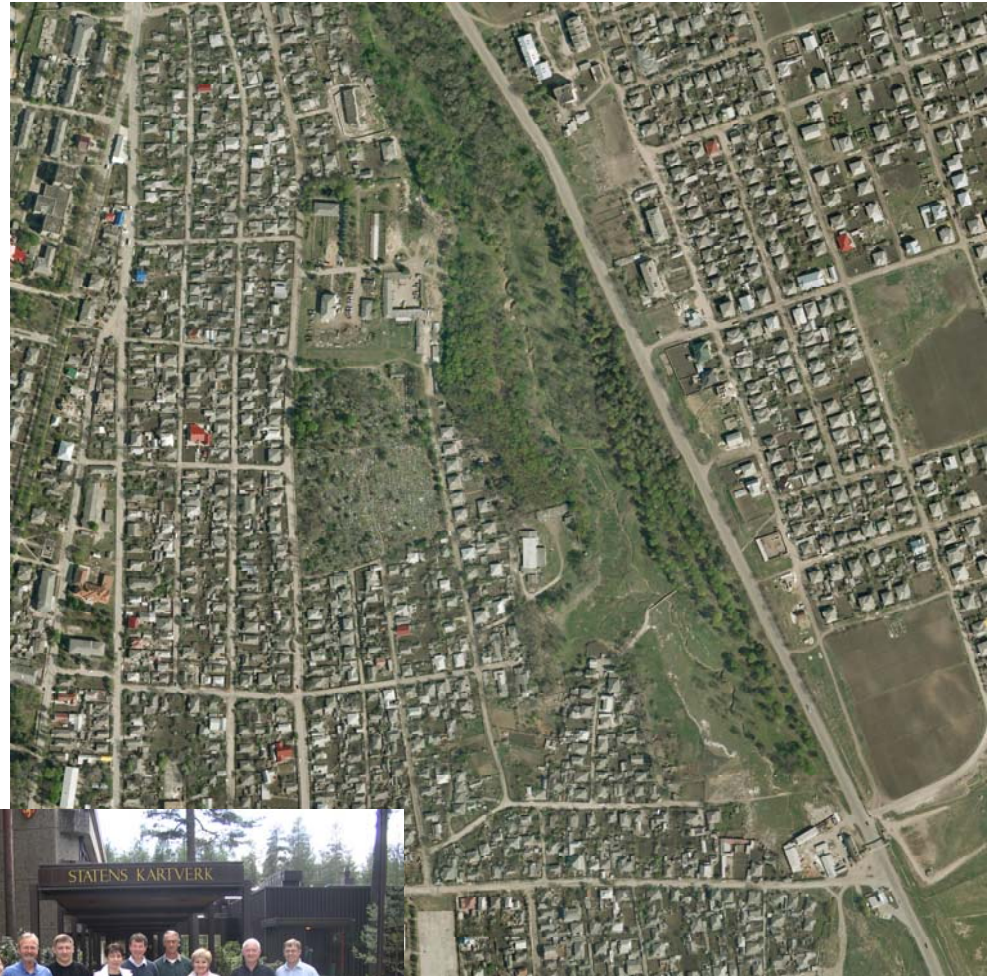
# (Quasy) geoid of Moldova



*European Quasigeoid Model of territory of Moldova and neighboring region*

# Moldova Orthophoto

- *The Norwegian Ministry of Foreign Affairs, acting on behalf of the Norwegian Government, allocated in 2007 an amount of NOK 5 500 000 towards the production of Orthophotos for the territory of Moldova.*
- *Statens Kartverk administrate the Project.*
- *The Moldova Orthophoto Project consists of production of digital ortophoto with resolution 40 cm of the entire territory excluding Transdnistrian and production of orthophotos with resolution 20 cm for urban areas.*
- *Norwegian Government allocated in 2008 an amount of NOK 4,2 mln for technical support*



# International cooperation

Since 2000 Moldova through ARFC is the active member of European Association of Mapping and Cadastre Agencies EuroGeographics

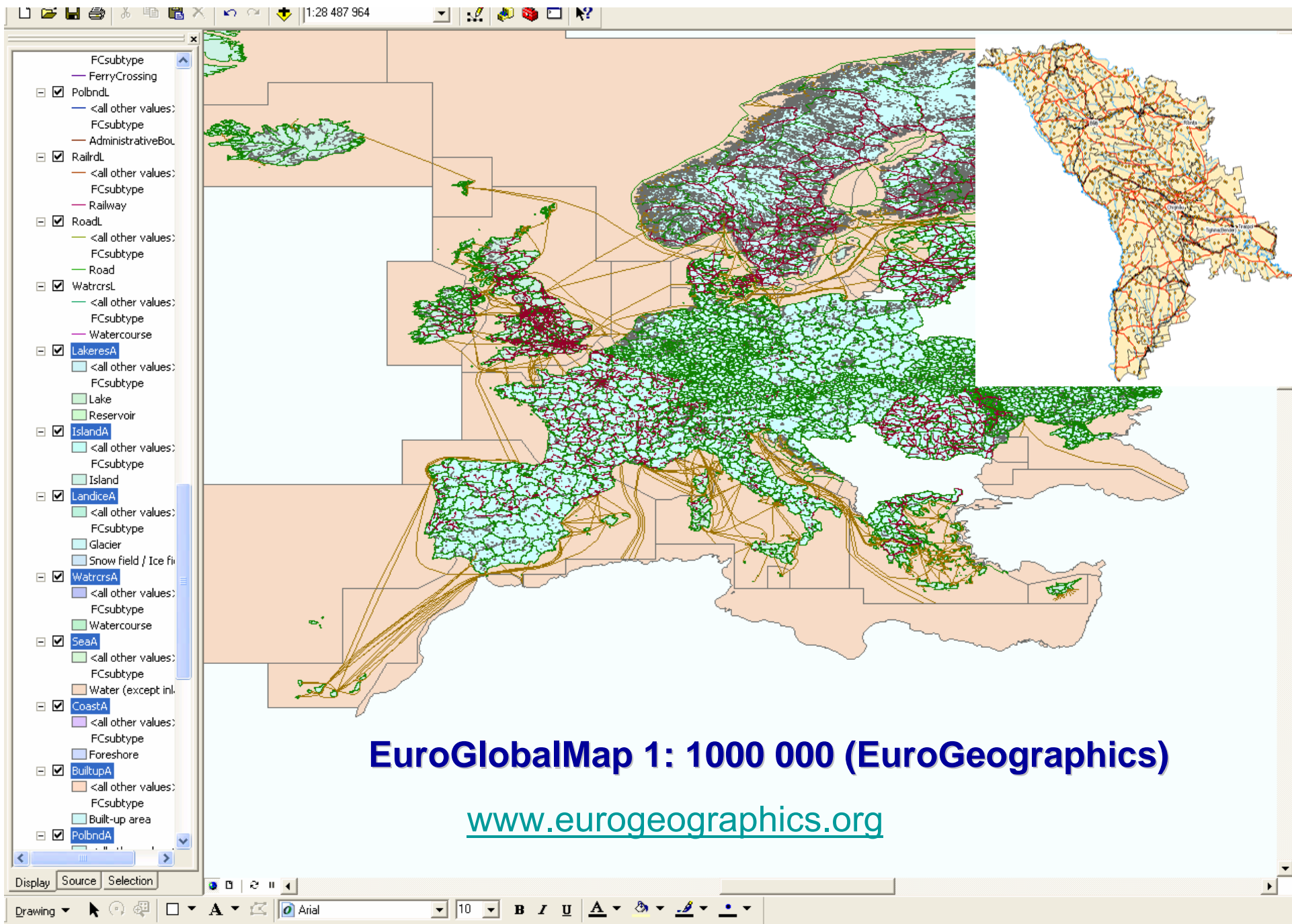
[www.eurogeographics.org](http://www.eurogeographics.org)

2007: Moldova through ARFC participate in INSPIRE Project as LMO (Legally Mandated Organization),

[www.ec-gis.org/inspire](http://www.ec-gis.org/inspire).

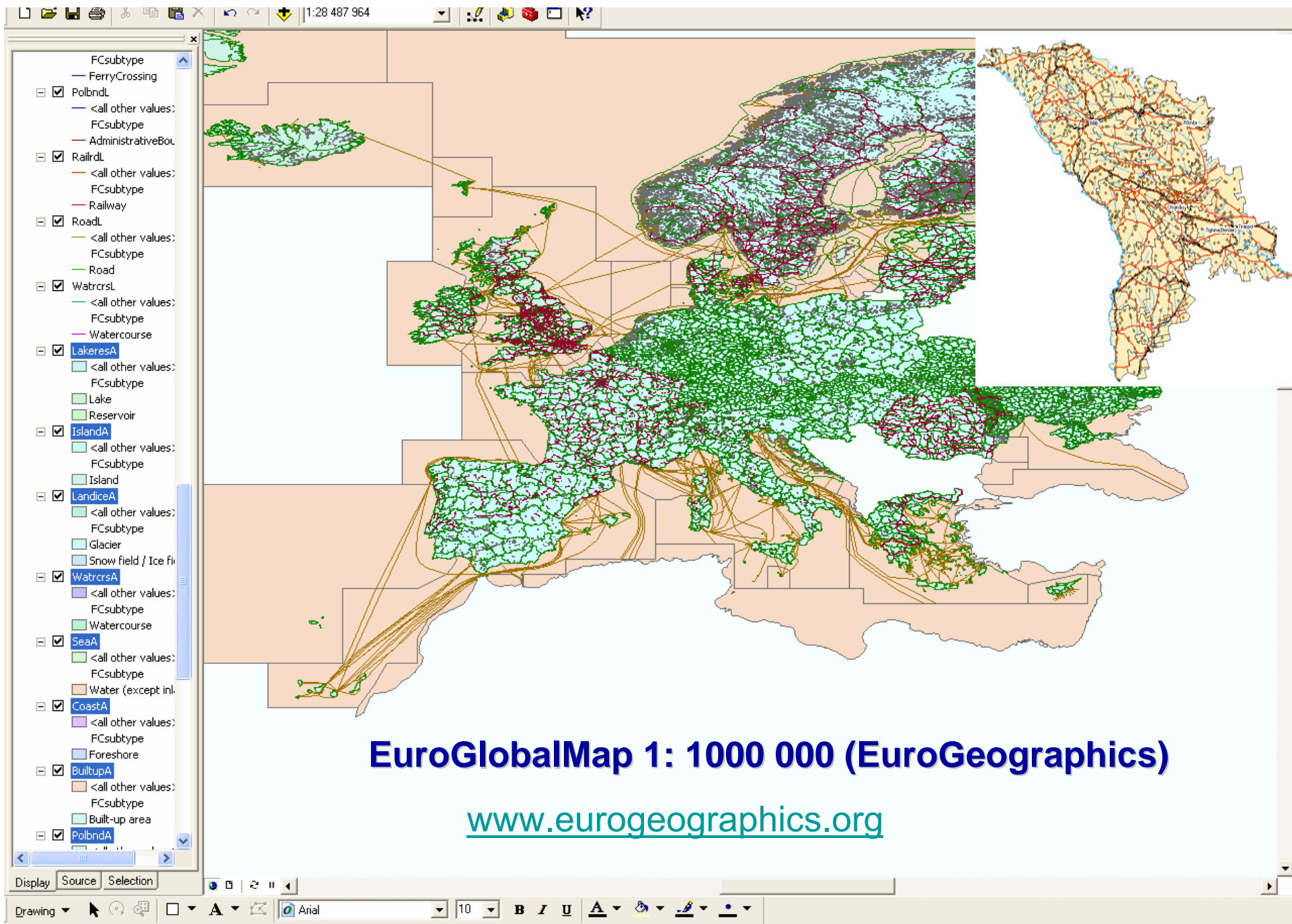
2008: Moldova –new EUPOS member <http://www.eupos.org>





# EuroGlobalMap 1: 1000 000 (EuroGeographics)

[www.eurogeographics.org](http://www.eurogeographics.org)



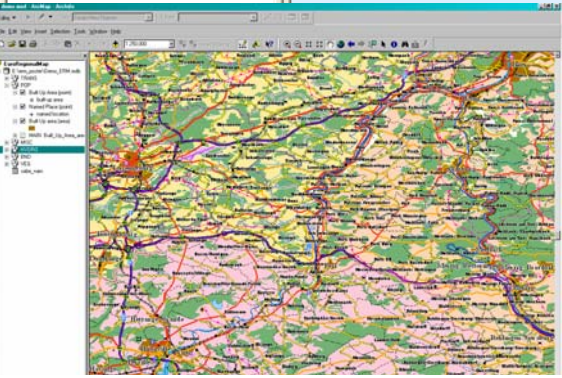
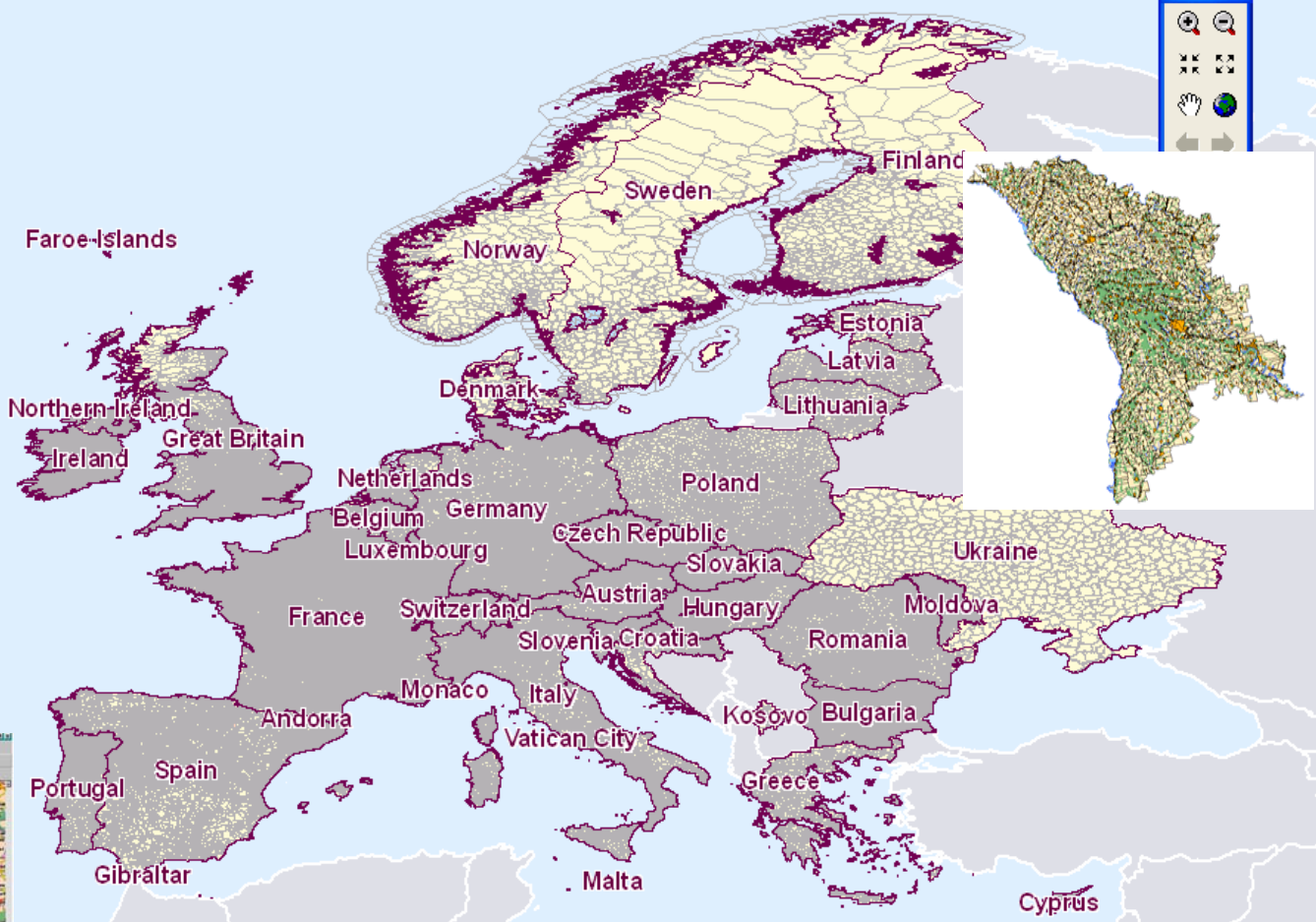
# EuroGlobalMap 1: 1000 000 (EuroGeographics)

[www.eurogeographics.org](http://www.eurogeographics.org)

- EBM\_v20
  - USE\_Regions
    - USE\_1
    - USE\_2
    - USE\_3
    - USE\_4
    - USE\_5
    - USE\_6
  - NUTS\_Regions
    - NUTS\_1
    - NUTS\_2
    - NUTS\_3
  - EuroBoundaryMap
    - EBM\_P
    - EBM\_L
    - EBM\_A
      - TAA
        - Main area
        - Branch area
        - Special area
      - Coastal water
      - Inland water
  - Background

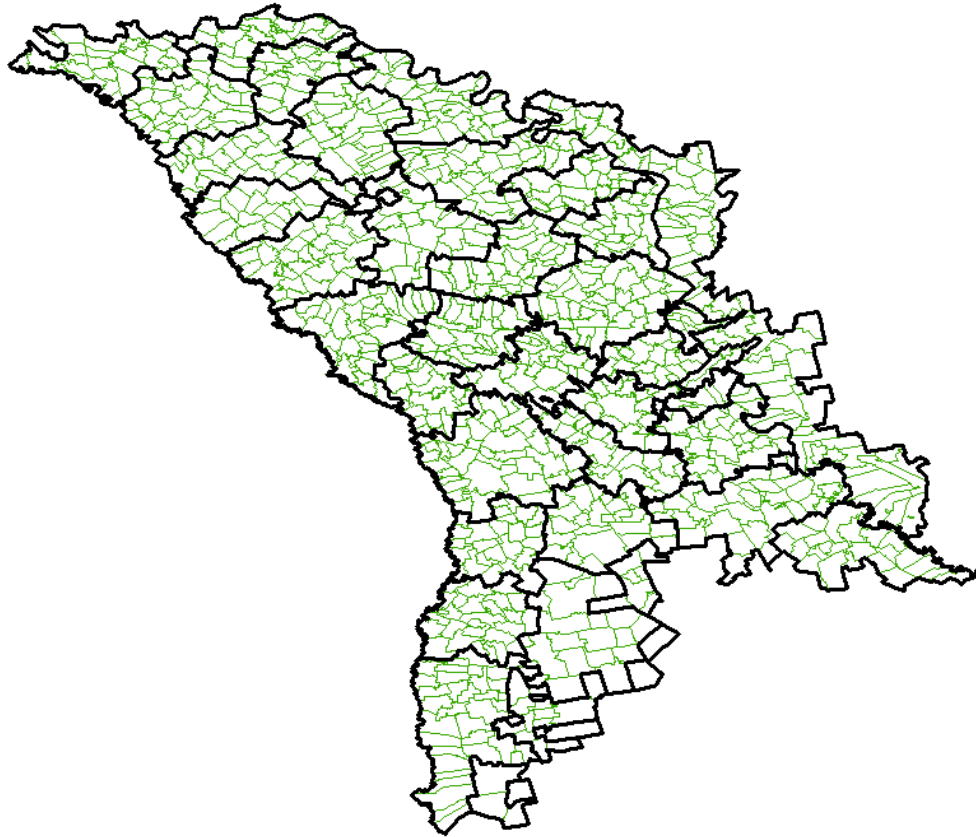
# EuroRegionalMap 1:250 000 (EuroGeographics)

[www.eurogeographics.org](http://www.eurogeographics.org)



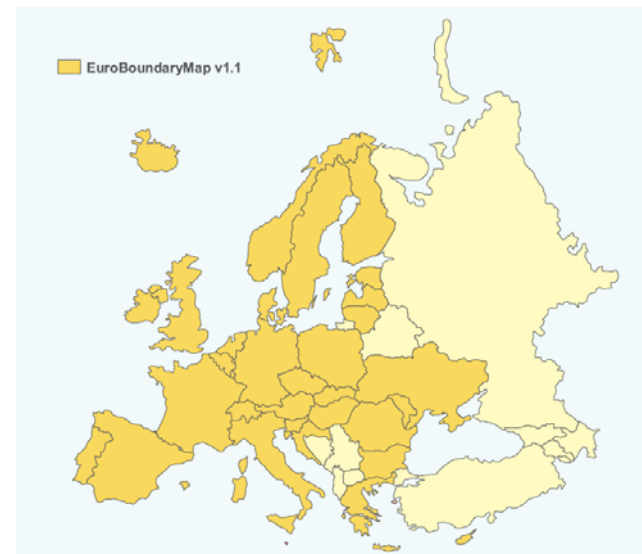
• Format ESRI, ARC/INFO.

# Euro Boundary Map 1:1000 000 (EuroGeographics)



- *The digital map 1:1000 000 of administrative and territorial division of the Republic of Moldova*

[www.eurogeographics.org](http://www.eurogeographics.org)





# From Geodetic Datums to Positioning Infrastructure



In 2007 the Agency, in collaboration with Bundesamt für Kartographie und Geodäsie (BKG) , EUREF and EuroGeographics, has installed and jointly operate the first GNSS permanent station IGEO in Chisinau. This reference station is integrated into the EUREF Permanent Network (EPN) and the International GNSS Service array (IGN).

More information:

<ftp://ftp.epncb.oma.be/pub/station/new>

<http://www.epncb.oma.be/trackingnetwork>

The GPS daily and hourly data of IGEO are available at the BKG and OLG regional data centers, SUT analysis centre and S.I. INGEOCAD data server:

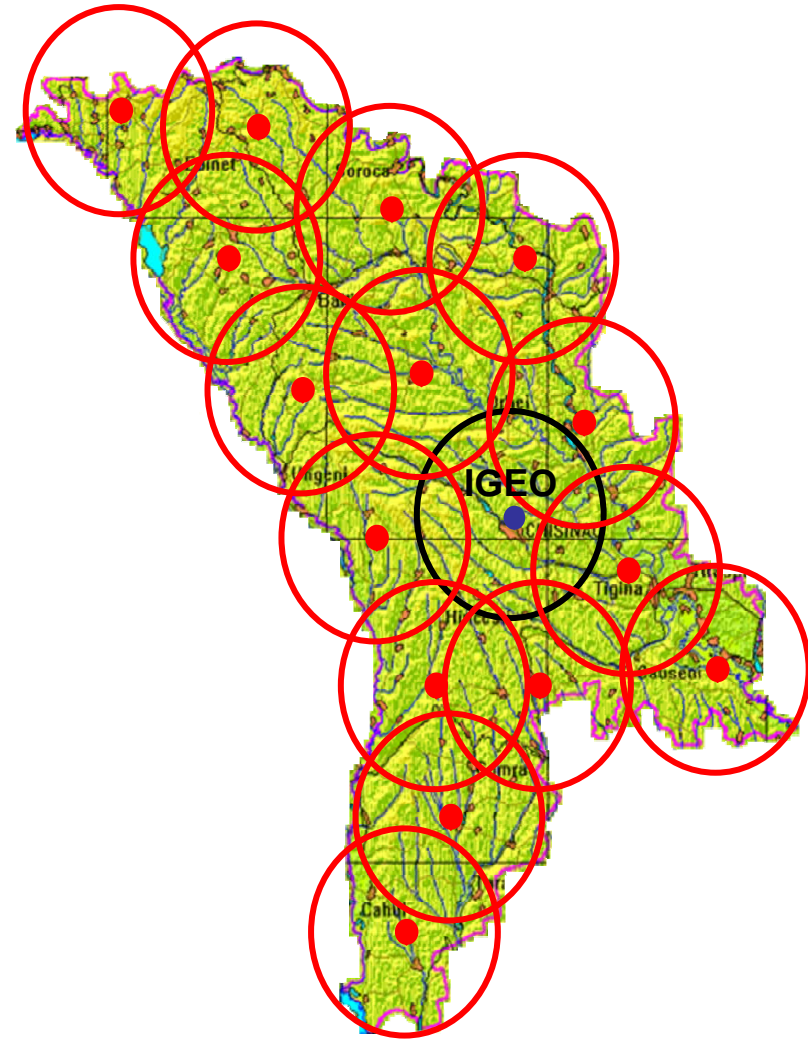
<ftp://ftp.ingeocad.md>

# From Geodetic Datums to Positioning Infrastructure

- The development of GNSS MOLDPOS network is one of the components of the Land Reform in Moldova. Activities on establishment of SNSS MOLDPOS are still going on.
- Positioning Infrastructure of the Republic of Moldova represent a modality of modernising the National Geodetic Network from the traditional function of supporting surveying and mapping processes, to enabling the monitoring of global process such as those associated with climate change and extending to real time precise positioning services employed in industries such as agriculture through precision farming and Land Administration.
- The achievement of MOLDPOS based on *EUPOS* standards will allow to reach the objectives in area of cadastre and geodesy as well as to ensure quality services for other activity fields.
- The national system of MOLDPOS services provision will be integrated in the European *EUPOS* system with compatible standards. This will ensure the interconnection with similar European systems, allowing a uniform positioning even in case of determinations for borders with neighbouring countries.

# From Geodetic Datums to Positioning Infrastructure

- The concepts of Geodetic Datums to Positioning Infrastructures and their relevance to the parallel evolution of the concept of Land Administration.
- The concept of a Positioning Infrastructure is based on Global Navigation Satellite Systems such as GPS and extends to the ground infrastructure used to improve the accuracy and reliability of GNSS positioning for users.
- After the single reference station approach, the next logical step is to develop a network MoldPOS, what include 15 permanent stations across the area of interest at a maximum spacing of 30 km.



# Positioning Infrastructure in sustainable land administration

- Land Administration is part of the Infrastructure that supports good land management.
- The roles of a modern Positioning Infrastructure can be grouped into three main categories:
  - a) Continuation of the traditional role of a Geodetic Datum in support of surveying and mapping activities;
  - b) Realization of the value of a stable geodetic reference frame for measurements;
  - c) Extension to the concept of a true infrastructure in industrial and mass market use of positioning technology.
- Next step for Moldova is create modern satellite system based surveying technologies (GPS), which are now replacing traditional field surveying throughout the World: GPS has radically simplified field surveying and has rapidly become the most cost-effective and time saving method for surveying of parcel boundaries and other field activities.
- To benefit from GPS in surveying and mapping, Moldova has to invest in a terrestrial network of reference stations and a system for controlling the satellite signals, which will also link Moldova to the European GPS control system.

# Conclusion

- Real time communications being a requirement of a modern Positioning Infrastructure enables the possibility of real time processes in Land Administration.
- Positioning Infrastructure can contribute to the United Nations goals such as reducing rural hunger and poverty, responding to climate change and improving environmental sustainability.
- Positioning Infrastructure can be factored into long term decision making on land use, administration, planning and tenure security.
- Positioning Infrastructure allows much more effective monitoring of and response to the impacts of those decisions in the future.

***Thank you for your attention***

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