



GENERAL AUTHORITY FOR LAND  
ADMINISTRATION, GEODESY AND  
CARTOGRAPHY

# GEODETIC NETWORK OF MONGOLIA

SENIOR SPECIALIST responsible for LEVELING AND GRAVITY NETWORKS

Manila, PHILIPPINES

2024.04.22

UNDARMAA Dashbalbar



Government Implementing Agency  
GENERAL AUTHORITY FOR LAND  
ADMINISTRATION, GEODESY AND CARTOGRAPHY



**Country:** MONGOLIA

**Population:** 3.4 million

**Territory:** 1.56 million square kilometers.

**Location:** Mongolia is located in Northern Asia, bordered by Russia in the north and China in the south, east, and west.



GOVERNMENT OF MONGOLIA

CABINET SECRETARIAT OF GOVERNMENT

GENERAL AUTHORITY FOR LAND ADMINISTRATION, GEODESY AND CARTOGRAPHY

DIRECTOR-GENERAL

Department of State  
administration and  
management

Department of Land Research, Analysis and Policy  
Planning

Department of Spatial Data  
Infrastructure

Division of  
Legal

Division of  
Branch  
Archives

Division of  
Finance  
and  
Economy

Division of  
Land  
monitoring

Division of  
Land  
administration

Division of  
Cadastral

Division of  
Land  
Exchange

Division of  
Branch  
supervision  
and  
Inspection

Division of  
Geodesy  
and  
Cartography

Division of  
Information  
and  
technology



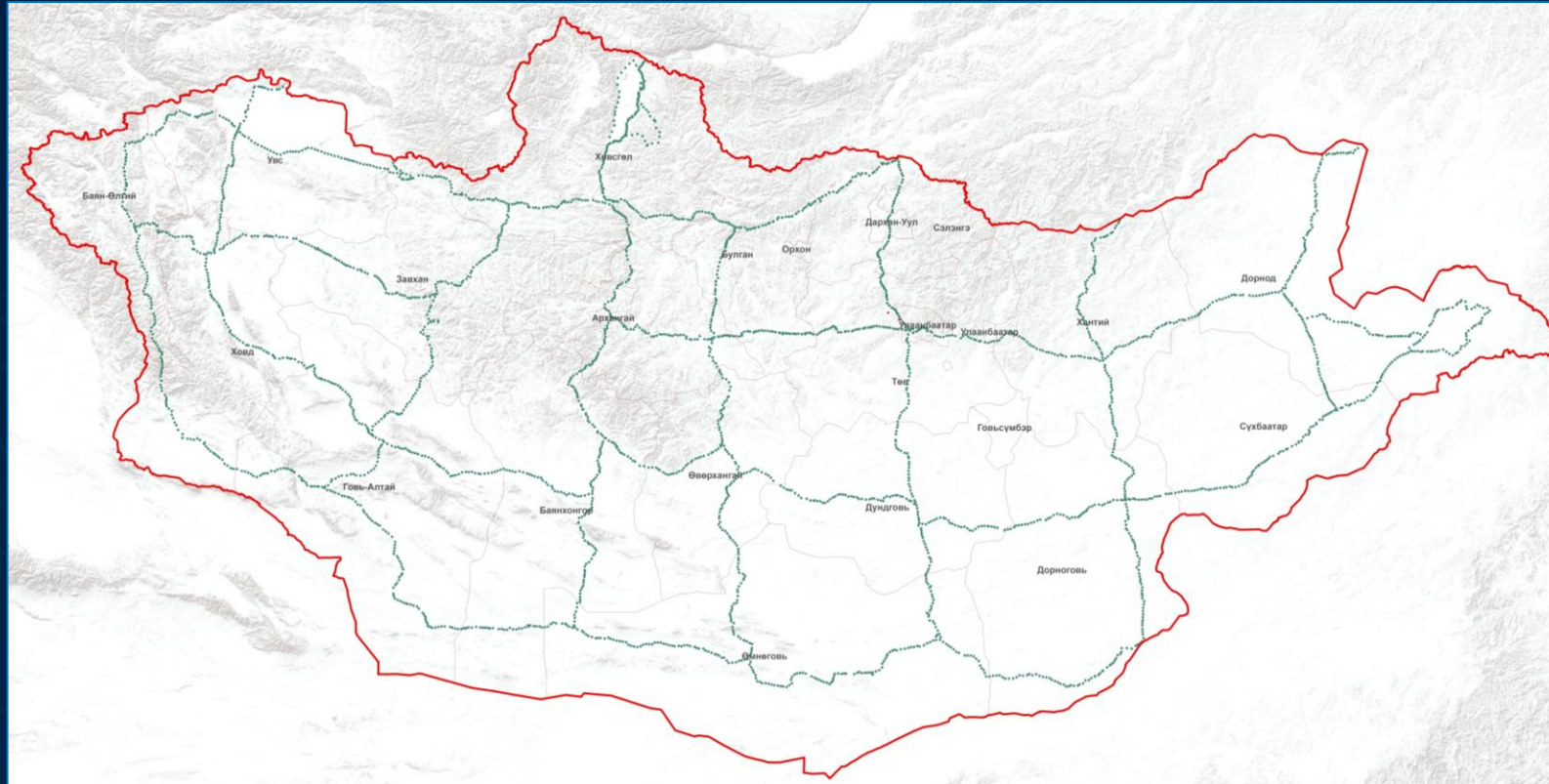
## GEODETIC NETWORK OF MONGOLIA:

- LEVELING NETWORK
  - GRAVITY NETWORK
    - TRIANGULATION NETWORK
      - GNSS NETWORK
        - GNSS CORS
          - DATUM POINT
            - COORDINATE SYSTEM



2<sup>nd</sup> class Leveling network established in 1936-1954:

- 2500 bench marks
- 31 lines
- 14 polygons
- 9302 km length.

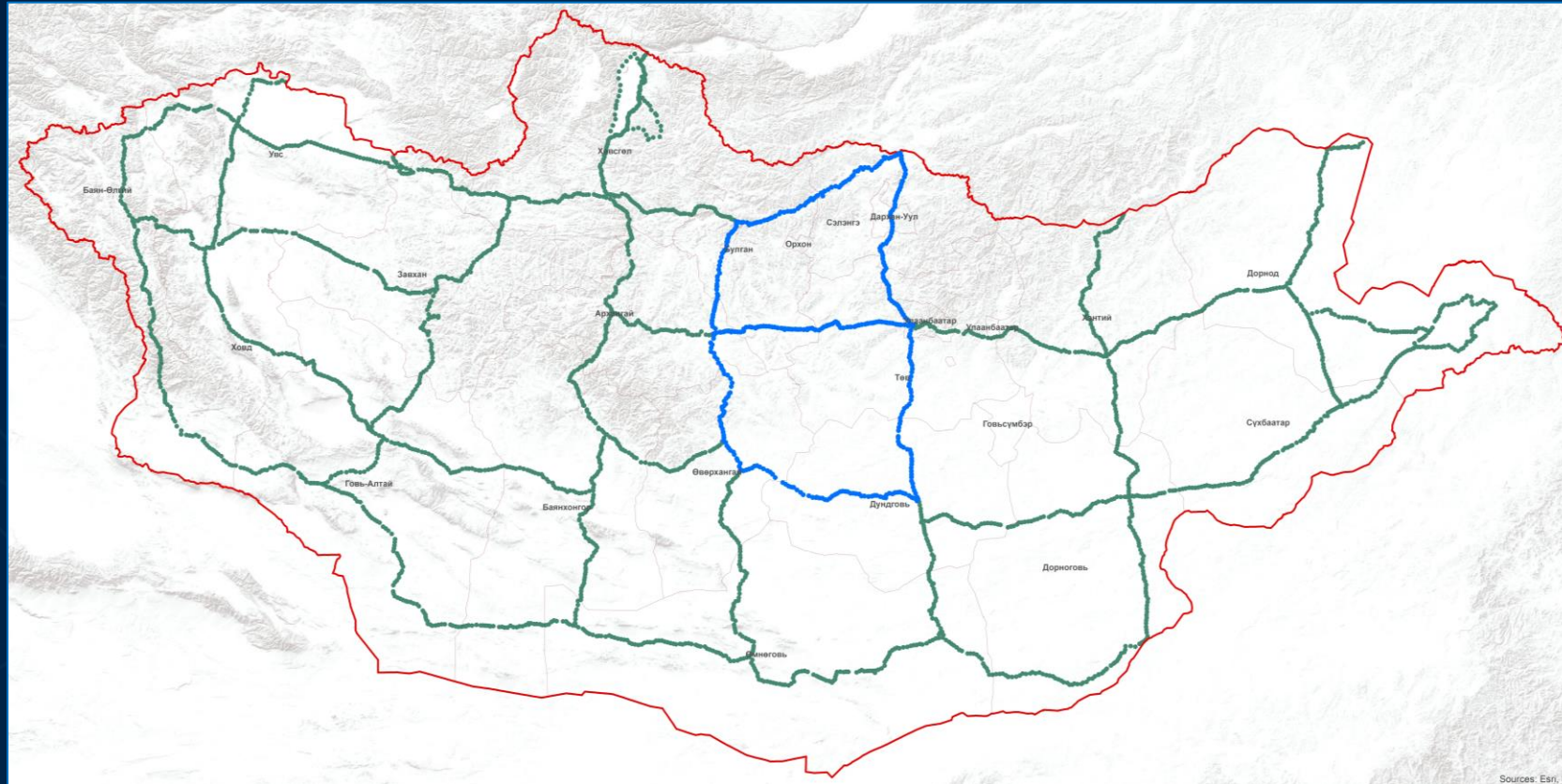


- Mongolian Government activity plan in 2020-2024: Re-measurement of 2<sup>nd</sup> class leveling network
- 14000 km: 43 lines, about 2500 benchmarks.

# ESTABLISHMENT OF 1<sup>ST</sup> CLASS LEVELING NETWORK

1<sup>st</sup> class Leveling network establishment in 2014-2021:

- 520 benchmarks
- 2 polygons,
- 7 lines
- 4300 km



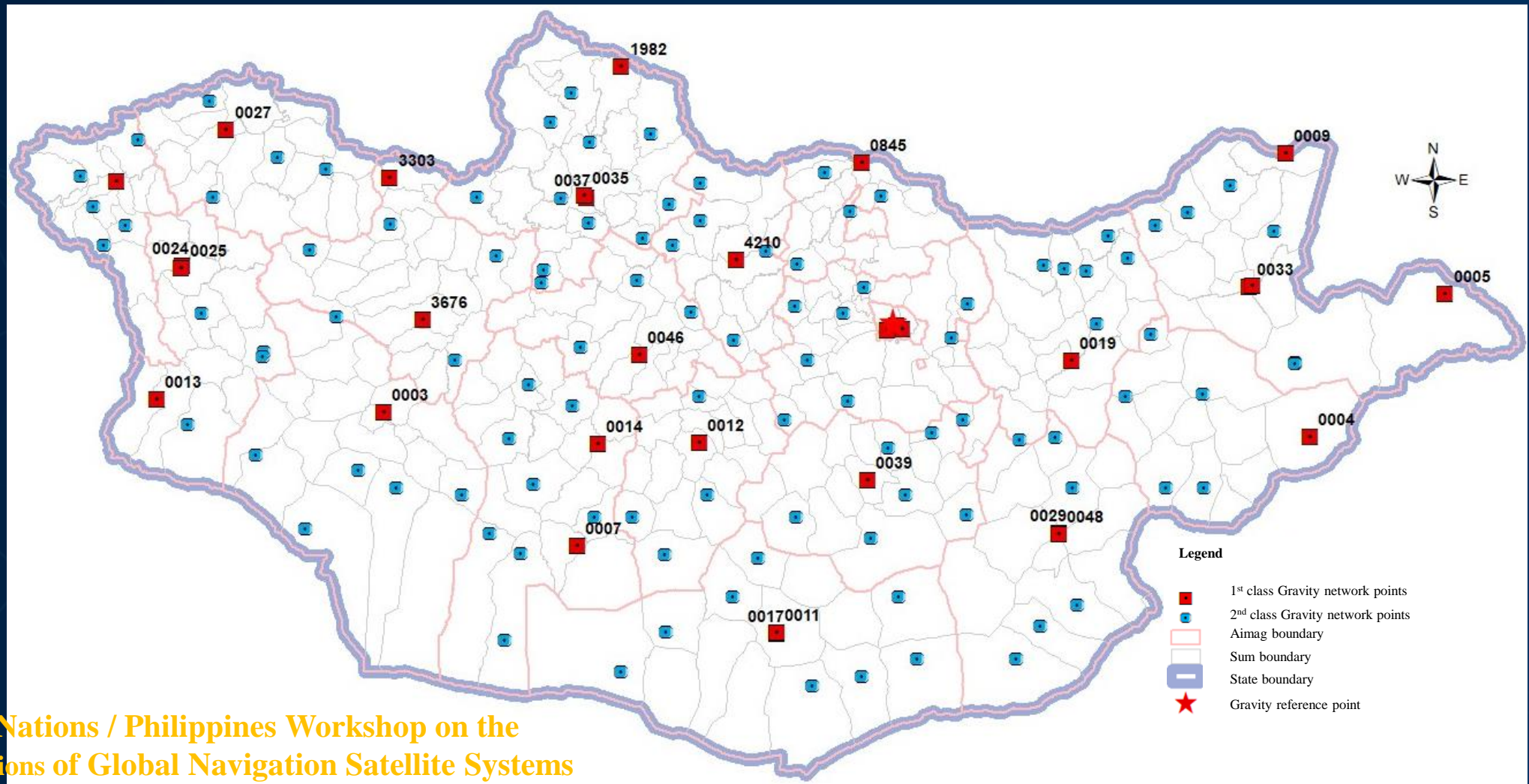
- Levelling measurement
- GNSS measurement
- Gravity measurement
- Adjustment

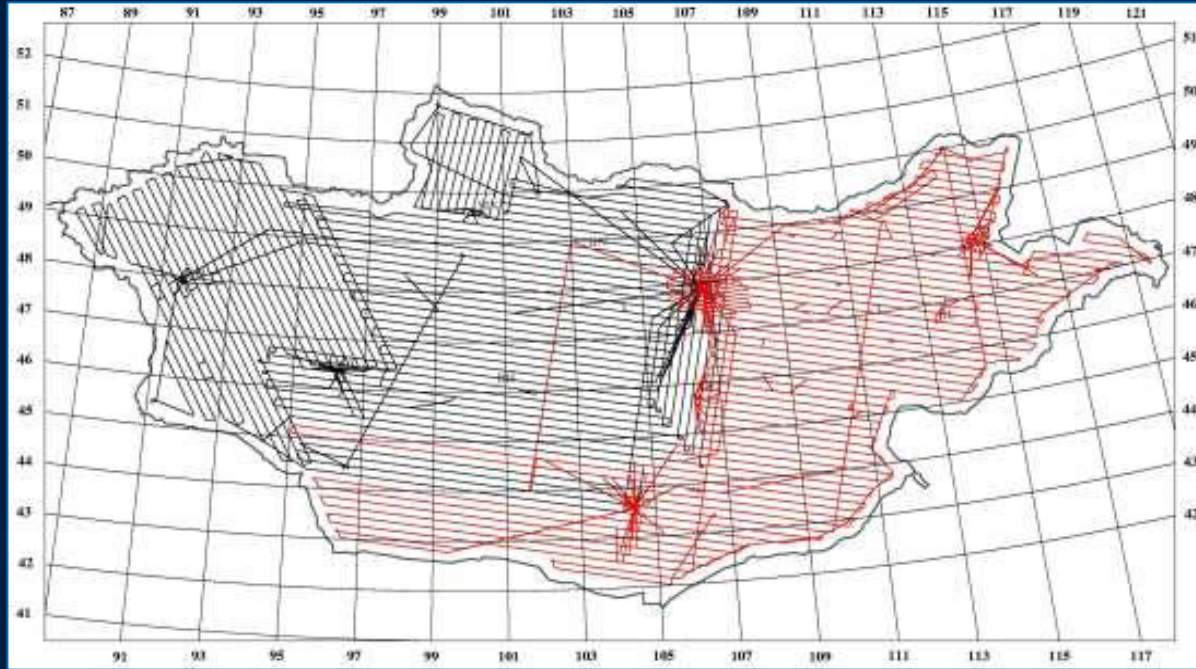
2022-2023:

- 2 polygons adjustment

1<sup>st</sup> class Gravity network established in 1983-1985: **31 points**

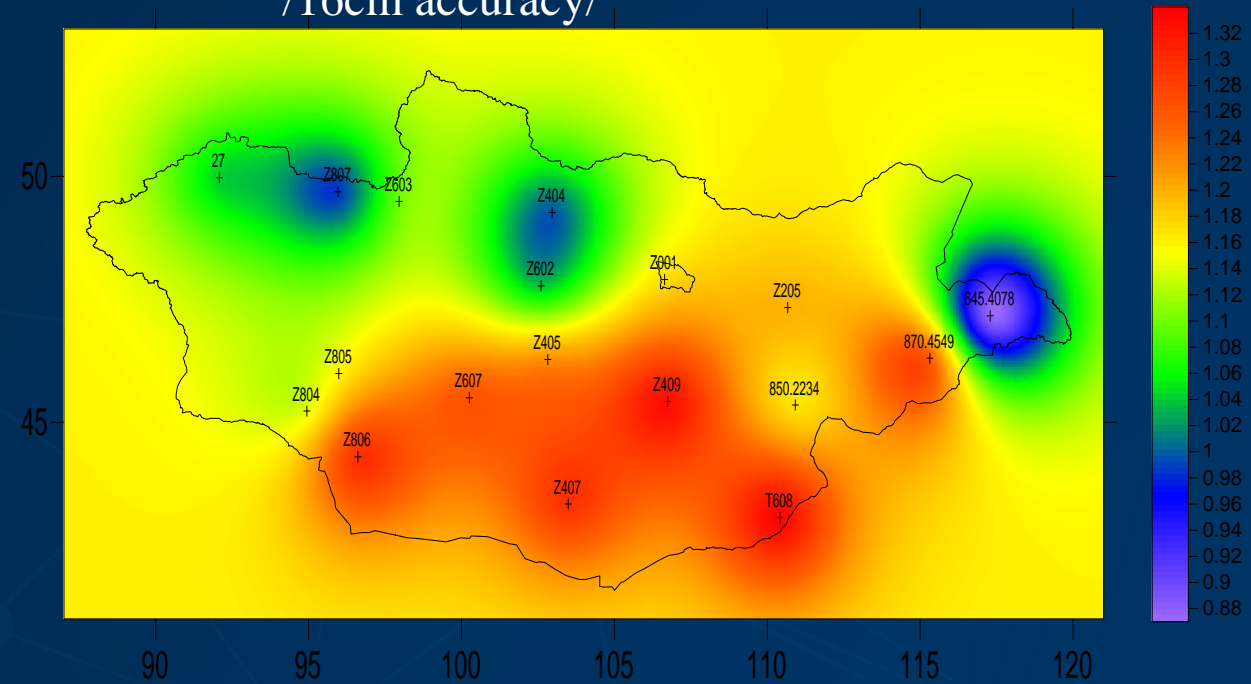
2<sup>nd</sup> class Gravity network established in 1985-1989: **103 points**





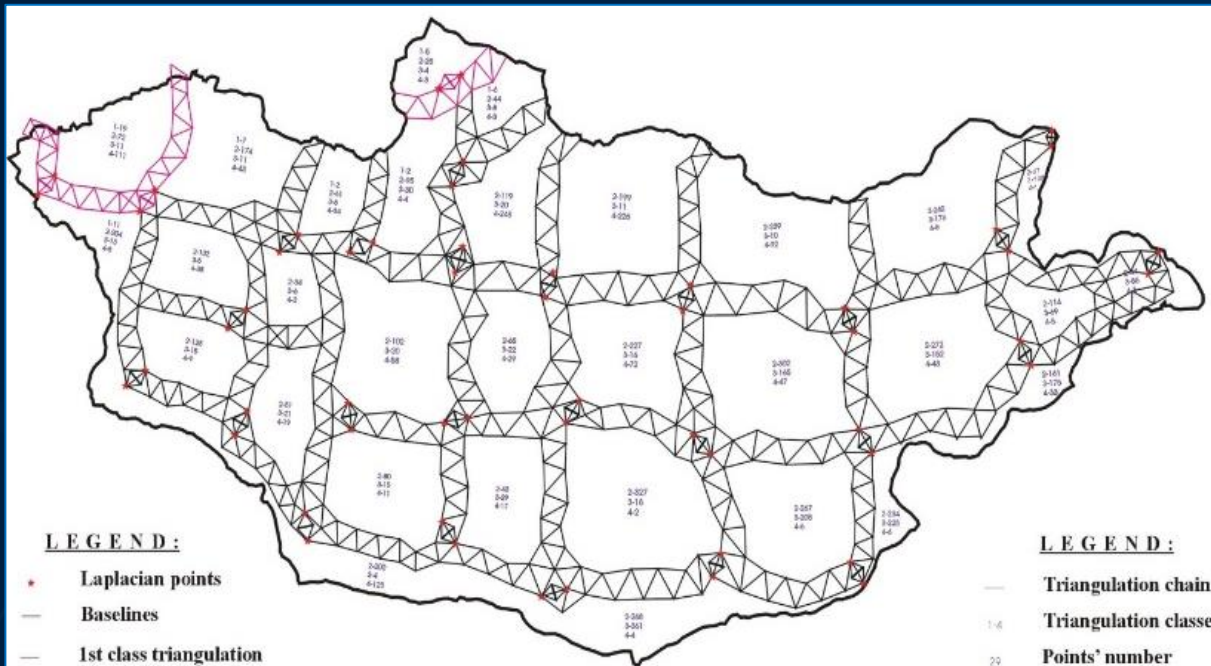
Airborne gravity measurement in 2004-2005.

Mongolian geoid height model  
/16cm accuracy/

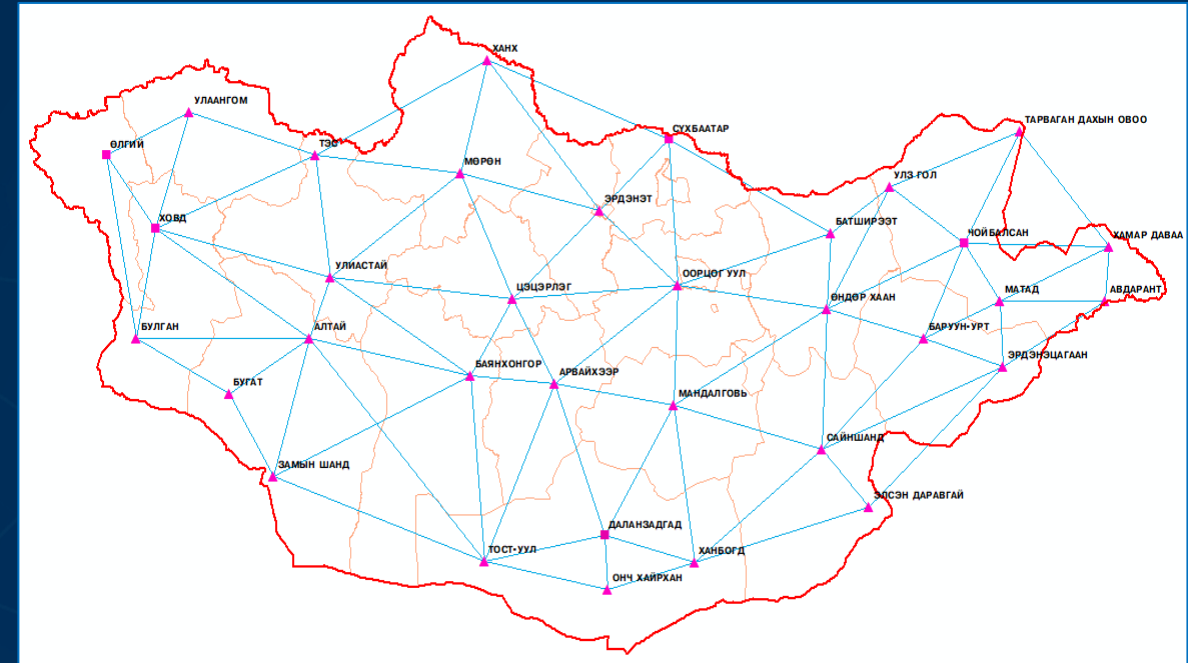




Triangulation network established in 1940-s:

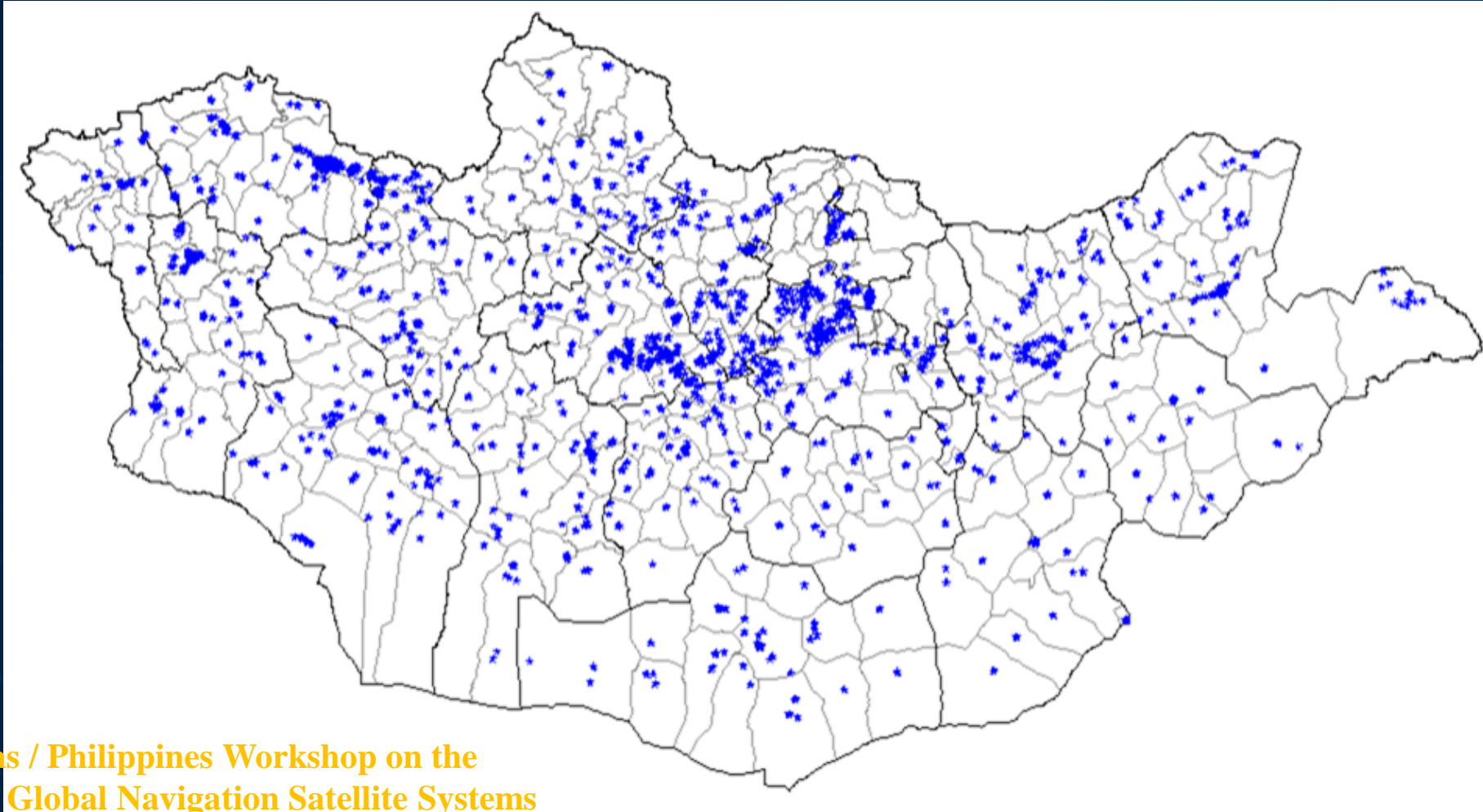


GPS primary network established in 1997-1998  
/MONREF97/: **34 points**  
Adjusted by BERNESE software





- GPS primary network densification:
  - 3760 points in 2013: adjusted in ITRF2008
  - For 1:1000 scale topographic and cadastral mapping in Ulaanbaatar city, 21 aimag and 330 soum centers.



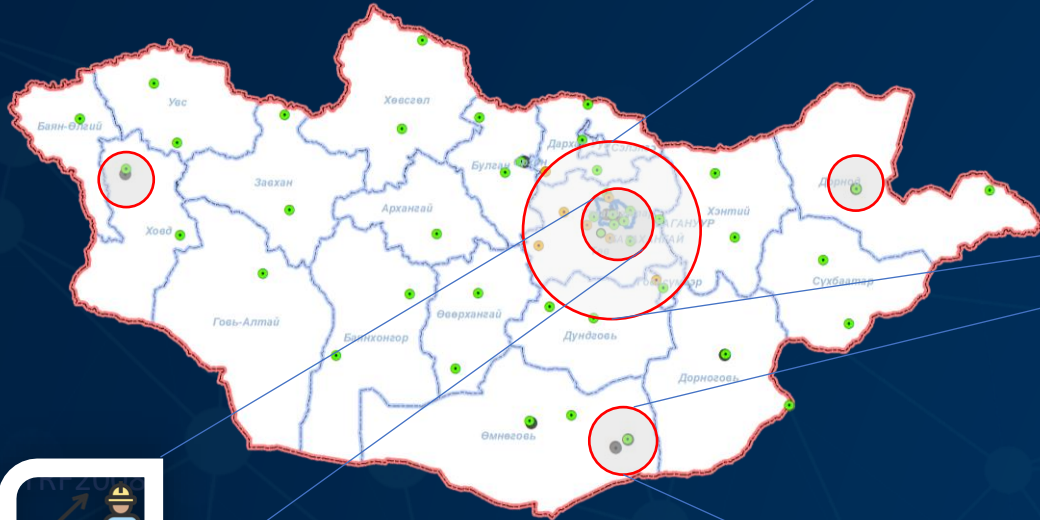


# GNSS CORS NETWORK



## PUBLIC AND PRIVATE GNSS-CORS

- PUBLIC CORS - 43
- RESEARCH (Academy of Science ) CORS-12
- PRIVATE CORS - 10

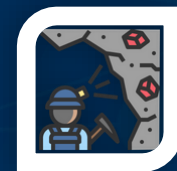
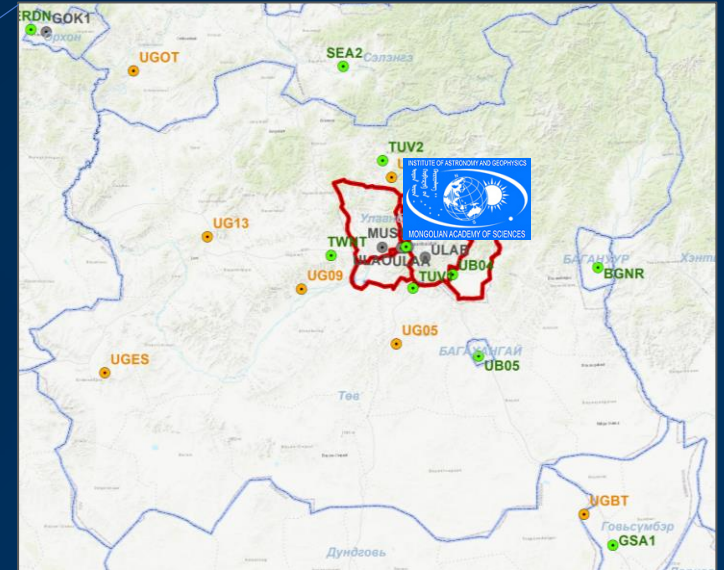


RTK for Topographic survey

ITRF2014



Geodynamic



Mining survey





## DAILY USAGE OF THE CORS-GNSS in MONGOLIA

The screenshot shows the SNIP software interface with the following data:

MountPt	ova2	dua1_mgl	ova1	bgnr_mgl	buu2_mgl	ub01	oma1_mgl	tuv2_mgl	oma2
UpTime	2 Days 10:52 Up(1/33)	2 Days 10:47 Up(1/47)	2 Days 06:24 Up(10/35)	1 Day 22:46 Up(2/6)	1 Day 16:26 Up(1/38)	1 Day 14:14 Up(1/3)	22:02:10 Up(5/51)	1 Day 09:30 Up(1/38)	1 Day 08:16 Up(2/44)
Input	69.627 MB	62.193 MB	62.431 MB	48.207 MB	41.041 MB	42.913 MB	36.067 MB	35.115 MB	34.538 MB
Output	0 Bytes	595.67 KB	5.654 MB	2.392 MB					
Clients	0 / 0 [R]	0 / 172 [R]	0 / 146 [R]	0 / 1,043 [R]					

**Reserved MountPts (34/40)**

- ub05 [H] (44th/405)
- uva1\_mgl [H] (29th/295)
- ova2\_mgl [H] (49th/673)
- zav1 [H] (42nd/458)
- zav2 [H] (53rd/612)
- doa2 [H] (293)
- hea2 [H] (0)

**Connected Users**

User Name	IP:Port	Base	Lat-Long	City	Duration
1 rover	202.179.25.216:35478	MGL_network	Lat:47.9004, Long:107.0283	Ulaanbaatar, MNG	31 Days 21:31
2 rover	66.181.160.208:11694	MGL_network	Lat:47.9222, Long:106.9181	Ulaanbaatar, MNG	27 Days 06:00

The map shows numerous CORS stations across Mongolia, with a green arrow pointing to a station and the text "Radius-35km".



GEODETIC FUNDAMENTAL NETWORK



LAND DISPUTE

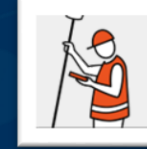
USER

70-100



TOPOGRAPHIC MAPPING

RTK CORRECTION



CADASTRAL MAPPING



RTK DRONE

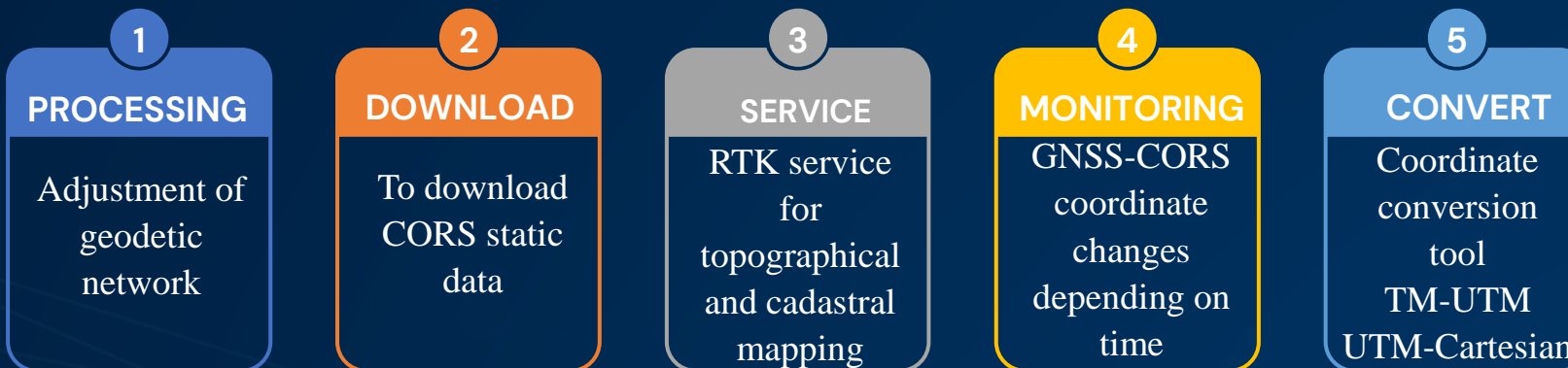
DURATION

3-8 hour





## ONLINE POSITIONING PROCESSING SERVICES



<https://monpos.gazar.gov.mn>

CORS: TUV2

Installed: 2012 001 00 00 00 - 2050 001 00 00 00  
 Receiver: TRIMBLE NETR9  
 Antenna: TRM59900.00 SCIS  
 Орчны зургууд:

ЗУРАГ ЗАСГАХ

RINEX өгөгдөл татах:

tuv22860.23d.Z

TATAХ

CORS-ын байрлалын мониторинг (Статик өгөгдөл, RTK засварын талаар эндээс):

CORS: bho1

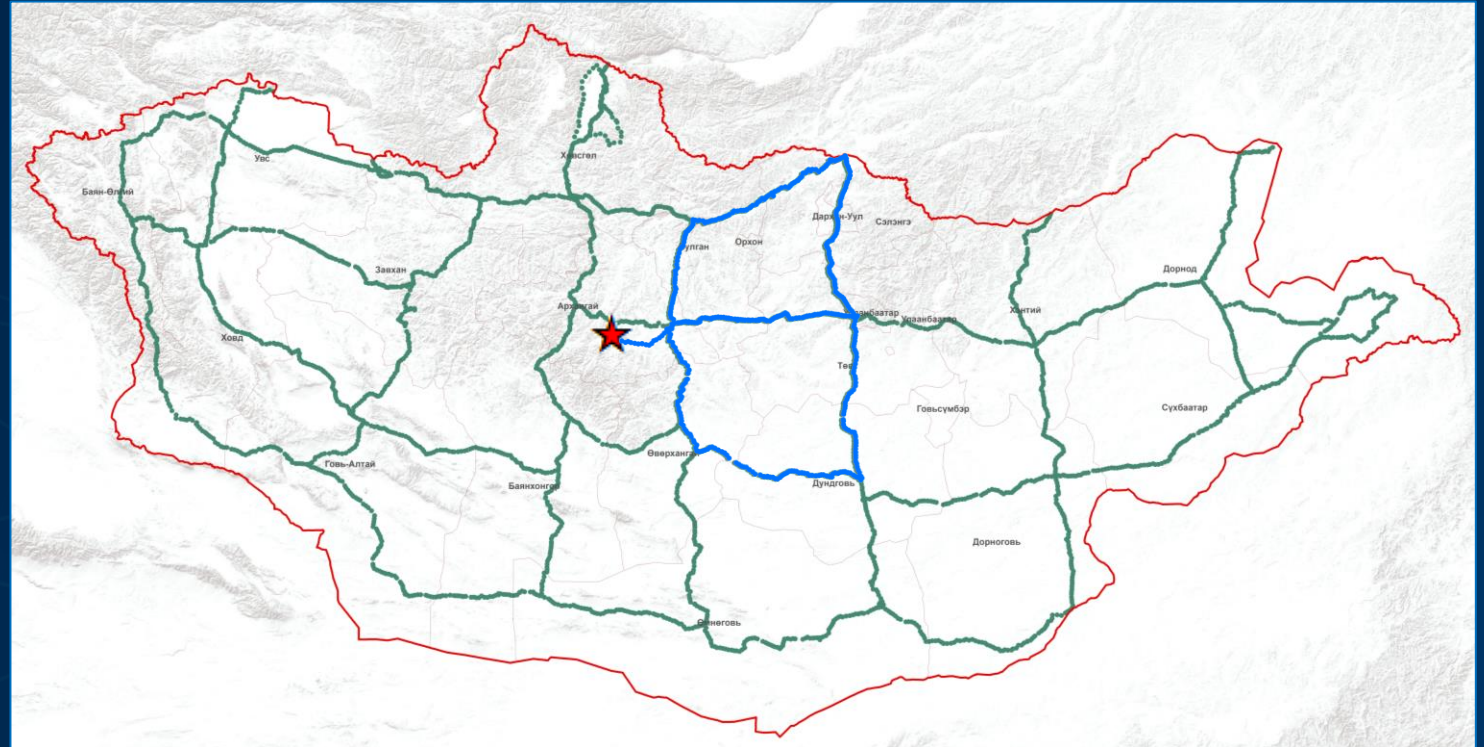
Он: 2020



## DATUM POINT



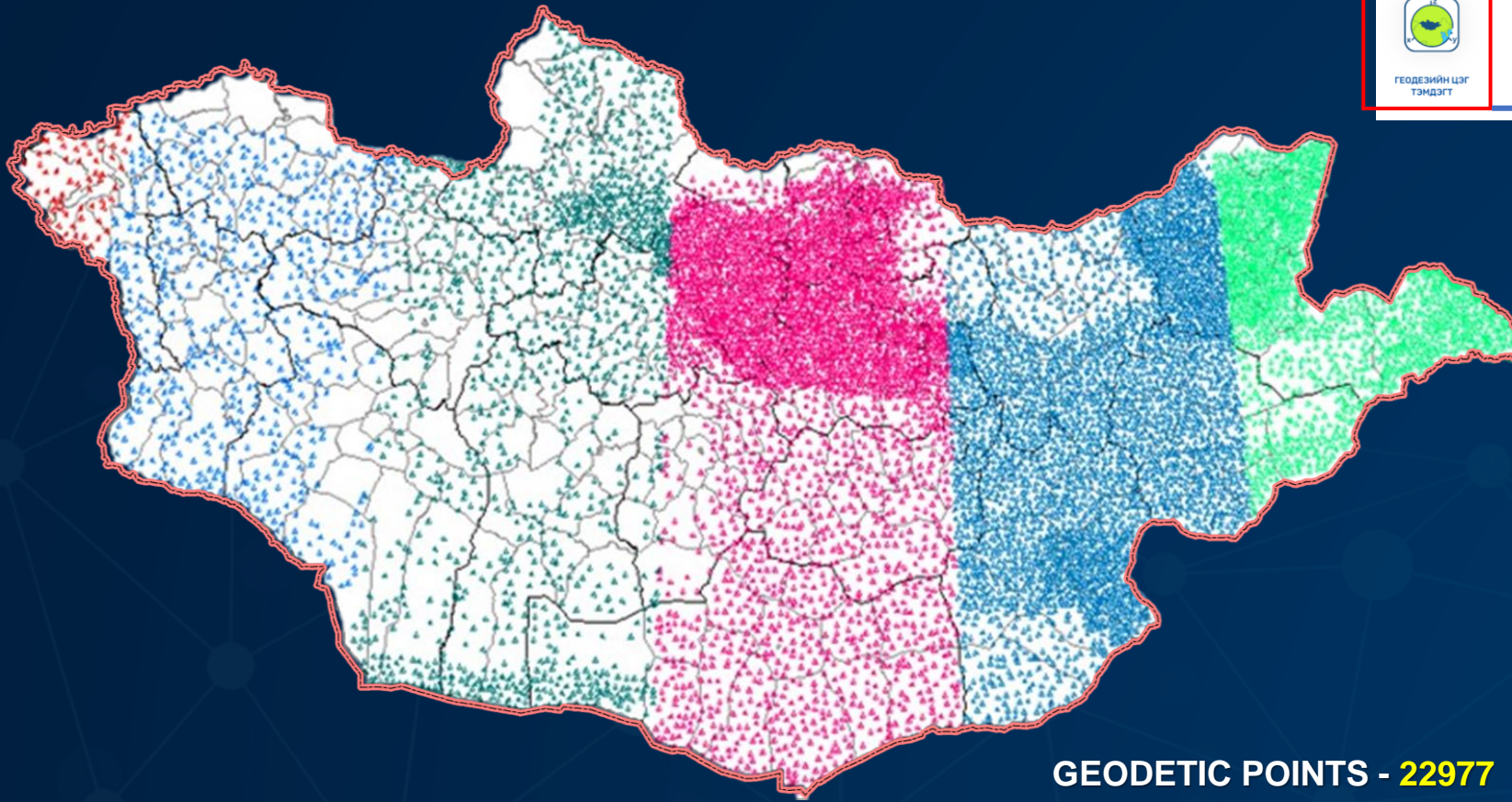
- Datum points of Mongolia was established in Tsetserleg city of Arkhangai aimag in 2019.
- Datum point was connected to 1<sup>st</sup> class leveling network in 2022-2023.





# GEODETIC POINT

<https://nsdi.gov.mn/>



★ Оронзайн суурь өгөгдлийн сан

- ГЕОДЕЗИЙН ЦЭГ ТЭМДЭГТ
- БАЙР ЗҮЙН ЗУРАГ
- ХИЛ ЗААГ
- ХАЯГ
- БАРИЛГА, СУУРИН ГАЗАР
- ӨНДӨРЖИЛТ, ГҮН

1 - 6

**ГЕОДЕЗИЙН ЦЭГ ТЭМДЭГТ**

ТАЛБАР	МЕТАДАТА
засаг захиргааны нэгжийн үндсэн ангилал:	завхан
цэгийн дугаар :	гцт-3658

ХУДАЛДАЖ АВАХ

САГСАНД НЭМЭХ

GEODETIC POINTS - 22977





## INVALID:

Mongolian Government Decree Number 25 from 2009 says to use WGS84 coordinate system, the Baltic sea level height system and UTM projection for surveying and mapping.

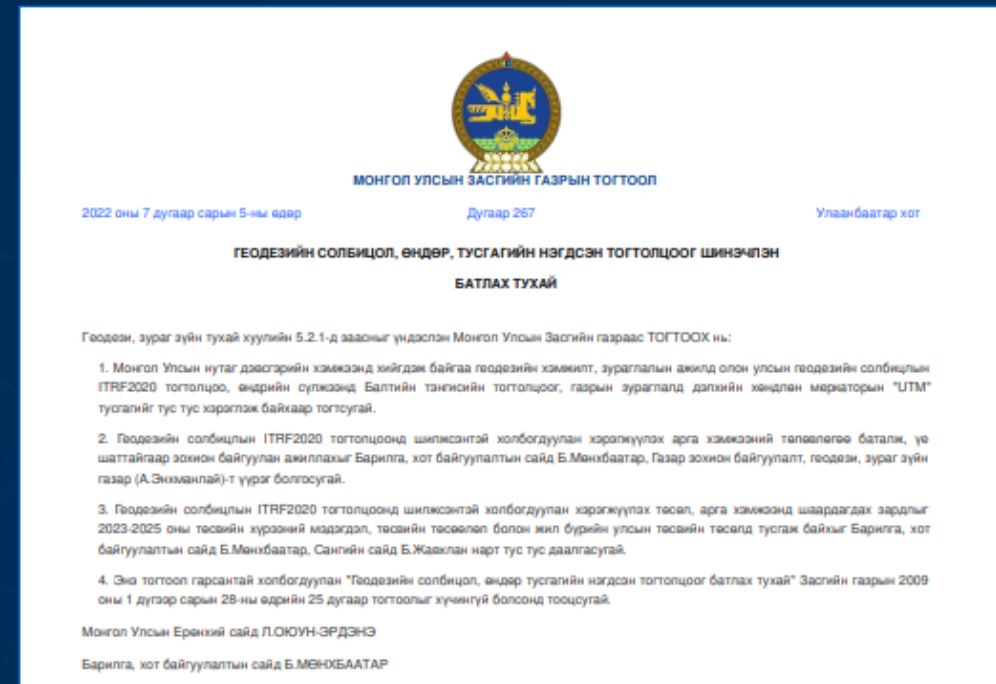


## COORDINATE SYSTEM

### GOVERNMENT RESOLUTION (No 267) in 2022

To approve updating Geodetic coordinate system, height system and projection

- ITRF2020 coordinate system
- Baltic Sea level height system
- UTM map projection







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**THANK YOU FOR  
YOUR ATTENTION**