GNSS Application based on citizen science in Mongolia

OCHIRKHUYAG Lkhamjav

ochirkhuyag@geomedeelel.mn

22 - 26 April 2024, Manila, Philippines.
FACTS

- 1,564,000 sq.km
- ~3,500,000 people (2023)
- Language: Mongolian
- Main religions: Buddhist (53%), Shamanist (3%), Muslims (3%), Christian (2%)
- GDP 5,045.50 USD (2022)
- HDI 0.737 (2023)
- Parliament democracy
- Government: 16 Ministries, 36 Agencies

Source: www.nso.mn
• 1965: Space technology and application is started under INTERCOSMOS program

• 1970: First Telecommunications satellite data receiving station “ORBIT”

• 1970: World meteorological satellite data receiving ground station is established /NRSC/

• 1981: J. Gurragchaa, the first cosmonaut of Mongolia the 2nd Asian in the space.

• 2017: Mazaalai /CubeSAT/, the first satellite in the space

Source: NRSC
Introduction

- Photogrammetry, Remote Sensing (RS)
- Geographic Information Systems (GIS)
- Global Navigation Satellite Systems (GNSS)
- Expert group

Members and Stakeholders

Technical Committees

Internal Audits

Execution

- CEO
- CIO

Board of Members

- 3 members
- 9 members

MEMBERS /ACTIVE/

- 34
- 38
- 3
- 33

Total: 108
Introduction

**VISION**

To be the leading advocate and facilitator of geospatial technology adoption worldwide, fostering collaboration among governments, industries, academia, and civil society to drive sustainable development, innovation, and societal well-being.

**MISSION**

To promote the widespread adoption and responsible use of geospatial technology worldwide through advocacy, education, and collaboration. We aim to empower individuals, organizations, and governments to leverage geospatial data and tools for sustainable development, environmental stewardship, and societal well-being.
Geo-workshop

- Remote sensing: SENTINEL data processing
- GIS: ArcGIS Pro
- GNSS: GAMIT/GLOBK training
In collaboration with Institute of Astronomy and Geophysics of the Mongolian Academy of Sciences, "Geo-Forum: Applications of the GNSS" was successfully organized on April 17, 2019.
International Activities

• More than 100 people participated from over 20 countries;

• All GNSS Providers and other observers;

UNITED NATIONS/MONGOLIA WORKSHOP ON THE APPLICATIONS OF GLOBAL NAVIGATION SATELLITE SYSTEMS

ULAANBAATAR, MONGOLIA, 25 - 29 OCTOBER 2021

ORGANIZED JOINTLY BY
The United Nations Office for Outer Space Affairs and The Mongolian Geospatial Association

SUPPORTED BY

CO-SPONSORED BY
Mongolia Government, member of APSCO, is granted to our association for the local institution of APSCO-iGMA project implementation (2018-2023).

APSCO International GNSS Monitoring and Assessment” (IGMA) project in Mongolia is implemented with our members, New Mongol Institution of Technology and Chandmani Survey, LLC, Since 2018.
• GNSS Training Course and GNSS for Policy and Decision-Makers Course since 2018 – current
• GNSS Summer School – Japan
• International Training Workshop on BeiDou Technologies and its Applications in the Belt and Road Countries and Regions, China
• UNOOSA IGS activities
  • Reference Frames in Practice, May 2018, Turkey
  • The International Space Weather Initiative School on Space Weather and Global Navigation Satellite Systems 2018, Baku, Azerbaijan;
  • Workshop on The Application of GNSS
In Mongolia, the utilization of GNSS technology has gained momentum across multiple domains, including but not limited to:

- **Infrastructure Development**: GNSS plays a crucial role in land surveying, construction, and infrastructure development projects across Mongolia, facilitating accurate positioning and mapping in remote and rugged terrains (Altangerel et al., 2019).

- **Agriculture and Natural Resource Management**: GNSS-based precision agriculture techniques have been explored to optimize resource utilization, monitor soil conditions, and enhance crop productivity in Mongolia's agricultural landscapes (Tsend-Ayush et al., 2018). Furthermore, GNSS-enabled tracking systems have been deployed for livestock management, enabling herders to monitor animal movements and grazing patterns more effectively (Lunden et al., 2020).

- **Environmental Monitoring and Disaster Management**: GNSS technology provides valuable data for environmental monitoring and disaster management efforts in Mongolia, including monitoring of land cover changes, glacier movements, and seismic activities (Tsend-Ayush et al., 2020). Real-time GNSS data also contributes to early warning systems for natural disasters such as earthquakes and floods (Davaasuren et al., 2017).
GNSS Applications

Private services /CORS station/

- MonMAP LLC /Septentrio/
- Engineering Geodesy LLC /Kolida/
- Geomasters LLC /Trimble/
- 5d World LLC /CHCNav/ + Mongolian University of Science and Technology (MUST)

Academic Level

- Institute of Astronomy and Geophysics, Mongolian Academy of Sciences – Monitoring for Seismics and Geodynamics
- School of Mining and Geology, MUST - CORS
- New Mongolia Institute of Technology (NMIT) – a part of iGMA
GNSS Applications

Tools and Apps

- GPS tools – Monitoring of Vehicles /Logistics and Transportations/
- Mining activities and monitoring /coal mining etc/
- Civil Society and everday life
  - UB cab /taxi services using GPS tracking system/
  - Jet/Tapatrip – bicycle/scooter renting services
- Conservation and Environmental Monitoring
  - Spatial Mapping and Reporting Tool (SMART) – GNSS based application for environmental law enforcement activities of Mongolian SPA’s department
  - Trelings – Forest monitoring applications
• In Mongolia, citizen science initiatives have been gaining traction in recent years, particularly in areas such as biodiversity monitoring, climate change research, and community-based conservation efforts (Batbold et al., 2019).

• However, the integration of citizen science with GNSS applications remains relatively unexplored in the Mongolian context, presenting an opportunity to leverage the collective efforts of local communities for enhancing spatial data collection and monitoring.
Public Activities

Survey 123 of ArcGIS, Qtools, NextGIS

- Organize workshops and trainings for universities and institutions
- Conduct training and seminars for NGOs in Mongolia, local NGOs

- Organize training courses for Mapillary
- Organize training courses for ICT Group

- Mapathon for mapping and updating OSM using GNSS applications such as Mapillary and iMap, local community mapping application developed by ICT Group
- Ulaanbaatar – 2 times, Spring 2020 and November 2021
- Erdenet city, Orkhon province – November 2022
- Darkhan city, Darkhan-Uul province – Fall, 2024 /October or November/
Public Activities

#GISday2022
ГАЗРЫН ЗУРАГТ СУУРИЛСАН
ӨГӨГДЛІЙН ДУРСЛӨЛИЙН УЗЭСГЭЛӨН
1. Investing in comprehensive training and support for citizen scientists to enhance data collection skills and ensure data quality.

2. Developing standardized protocols and guidelines for citizen science data collection, management, and sharing.

3. Strengthening partnerships between government agencies, research institutions, and local communities to facilitate knowledge exchange and co-management of natural resources.

4. Leveraging emerging technologies such as crowdsourcing platforms, UAVs, and AI algorithms to enhance data collection efficiency and accuracy.

5. Promoting interdisciplinary collaboration and participatory approaches to address complex socio-environmental challenges and achieve sustainable development goals.
Challenges

➢ Human resources
➢ Technology
➢ Financial issues

STRATEGY

WIN-WIN

i. Government institutions and NGOs – A memorandum of understanding (MoU)

ii. Citizens, companies – membership

iii. International organizations – MoU

RECOMMENDATIONS???
Thank You

ADDRESS:
P.O.Box - 24, Post Office-38, Ulaanbaatar 15141, Mongolia
www.facebook.com/MonGeoSpatialAssoc
Geomedeelel
info@geomedeelel.mn
Question and Answer...