

# High Precision GNSS Application in Mongolia Mining

--ComNav Technology & OYU Survey

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# Abstract:

In recent years, as global navigation satellite systems, regional systems, and augmentations developed, the stability and reliability of GNSS positioning have been comprehensively improved. And with more commercial companies joining the research of GNSS technology, GNSS end-user products are becoming more cost-efficient. Meanwhile, the great application of GNSS in smart terminals and various professional tools is bringing about a positive impact to people's daily life, economic growth, and industrial development.

Mining, as one of the most important industries throughout the development of human society, plays an important role in economic growth and people's daily life. Combined with the typical cases and projects carried out in Mongolia, this presentation introduces the applications of BDS-based high-precision equipment in mining, especially geological disaster warning and monitoring, mine surveying and mapping, as well as safety monitoring system for vehicles and personnel in mining area. The wide-ranging applications have greatly promoted intensive mining, improved productivity and production safety in mining, making a great contribution to local economic development.

## **PART 01**

# **The Problem in Mining And High Precision GNSS Solutions**

# Mongolia Mining industry

Mining is one of Mongolia's main industries, take more than 70% of Country GDP; it is related to economic development and people's living standards.

Mostly mining is open-pit mines, such as Coal mine, Copper Mines, Iron and so on.

There are two issues face:

- Productivity; well planned and step development.
- Safely work; Geological secondary disaster, vehicle and people safety



# Mine Productivity

The Mining must be well planned

- extend the mining life and create more economic value
- Safely mining; all the ground work of mining will affect the stability of land

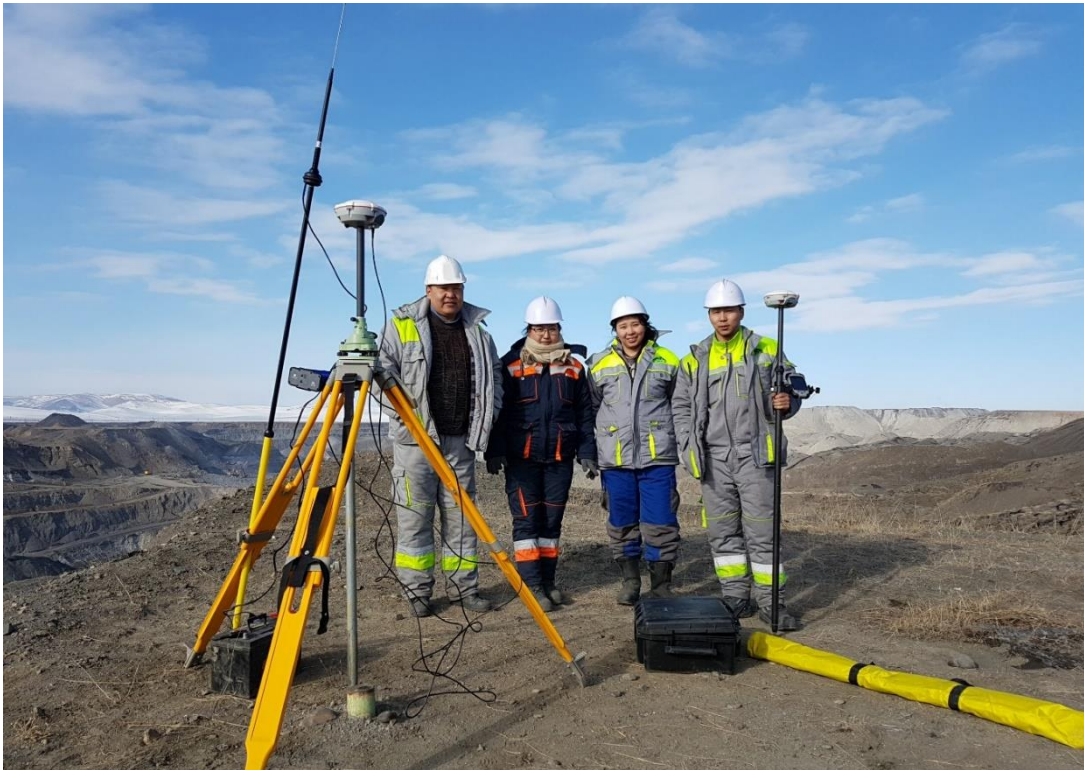
How to planned well? Map the terrain of the mining area, survey and mapping always ontime with mining; there are few request of mining survey

- High accuracy, it is related to Geodic and land deformation monitor, high accuracy is needed
- Fast and always update, the mining side is more tough than normal, so we need to use the modern survey equipment measure the area fast and simple

# Mine Productivity-Terrain mapping

GNSS RTK is the the ideal survey equipment for mining survey

- 1-2 centimeter accuracy ; Especially the Beidou and Galileo improved the position stability a lot!
- Simple operation for the mining side; Set the RTK base station and work distance 8-10km



# Mine Productivity-Cut volume

In mining side, lots of construction is related to earthworks-- Calculating Cut in Ming field

Drone mapping:

- Much fast; flying the drone with GNSS PPK, 30 minutes fly can cover 0.3km<sup>2</sup>
- Labor cost; use the traditional survey equipment, measure many points on the mine side, take time and also risk



# Safely work in mine side-Deformation monitor

The mining activity change the surface of land, which may lead geologic hazard, so we need to use built the pre- warning system

- The monitor system must be continuously and timely, only by such way we could forecast the disaster and do something advance
- The monitor system must be automatically, in the mine side is harsh environment, especially in winter time it is not easily to and do the survey work, so automatically is requested



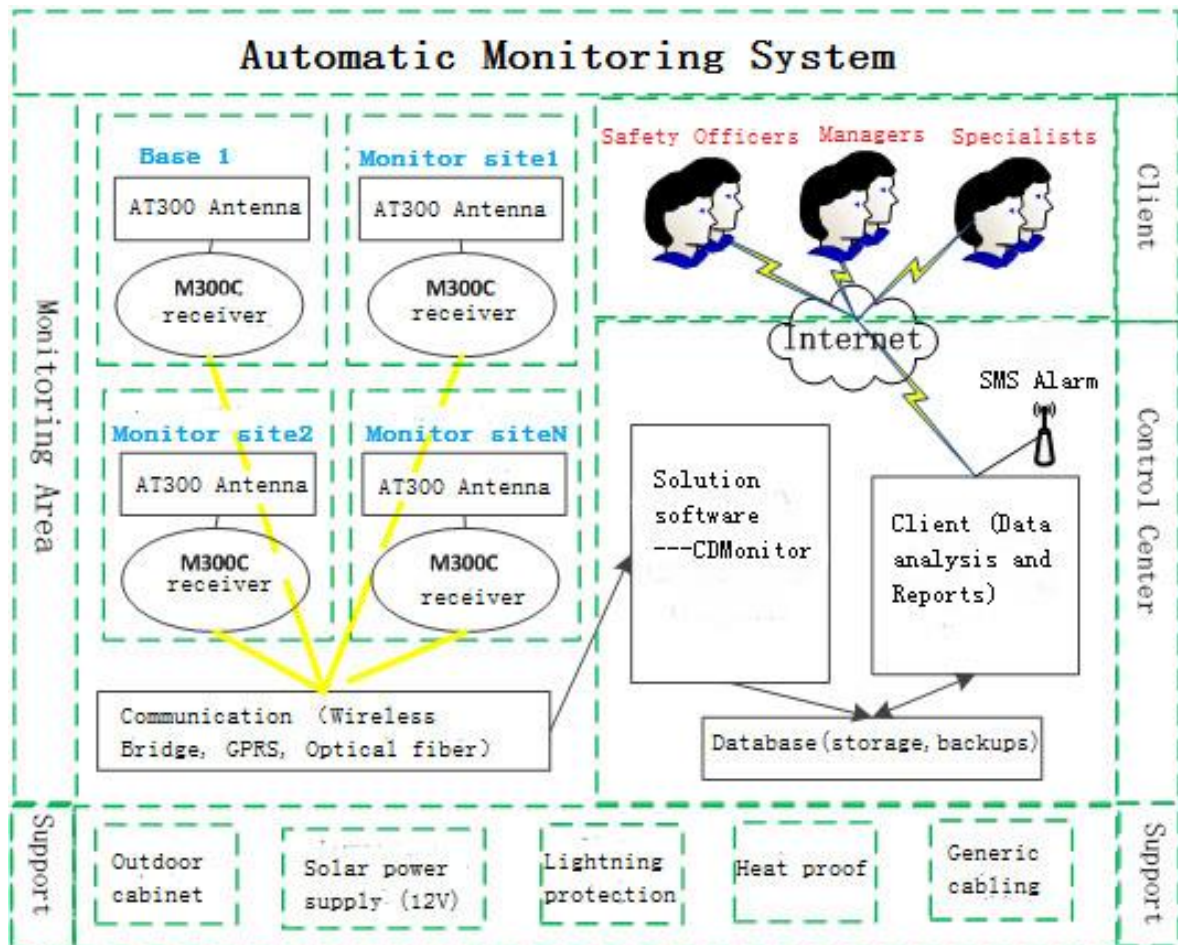
# Safely work— GNSS used in mine side



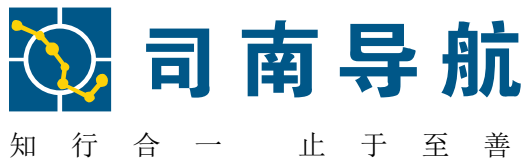
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Why GNSS is used in monitor solution:

- High accuracy, GNSS static process engine can reach 1-2mm accuracy
- GNSS Receiver are work continuingly without stop, it dose not much affect by the harsh weather.
- Automatically forecast by software



# Safely work— People and Fleet Management



Work safety : People and vehicle route must be well design; Mapping the mine side, built the Geofence on Map;

- Install the GNSS on vehicle, the warning system will active when the driver is in the out off the Geofence
- Pocket GNSS hand carry by people to warning people far from the danger place

## 人员安防

实时呈现每位作业人员的信息，包括位置、轨迹、围栏报警、SOS触发等，以最快响应速度保障作业人员的生命安全。

进入系统



## Features

### 特点



位置监控



电子围栏

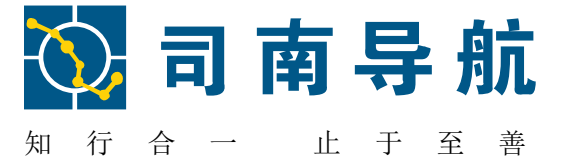


导航救援

## PART 02

# What benefits GNSS Bring to Mongolia Mine Industry

# Beidou GNSS improve the Mine Productivity



Since 2015, ComNav built the cooperation with the locally represent OYU

Beidou GNSS with the low cost and super performance, More than 100 unites Beidou RTK is used in Mine side.

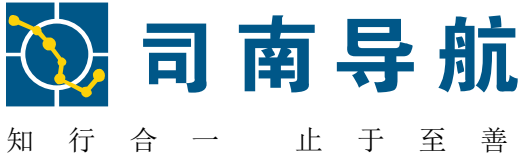


# Geological hazard in mine

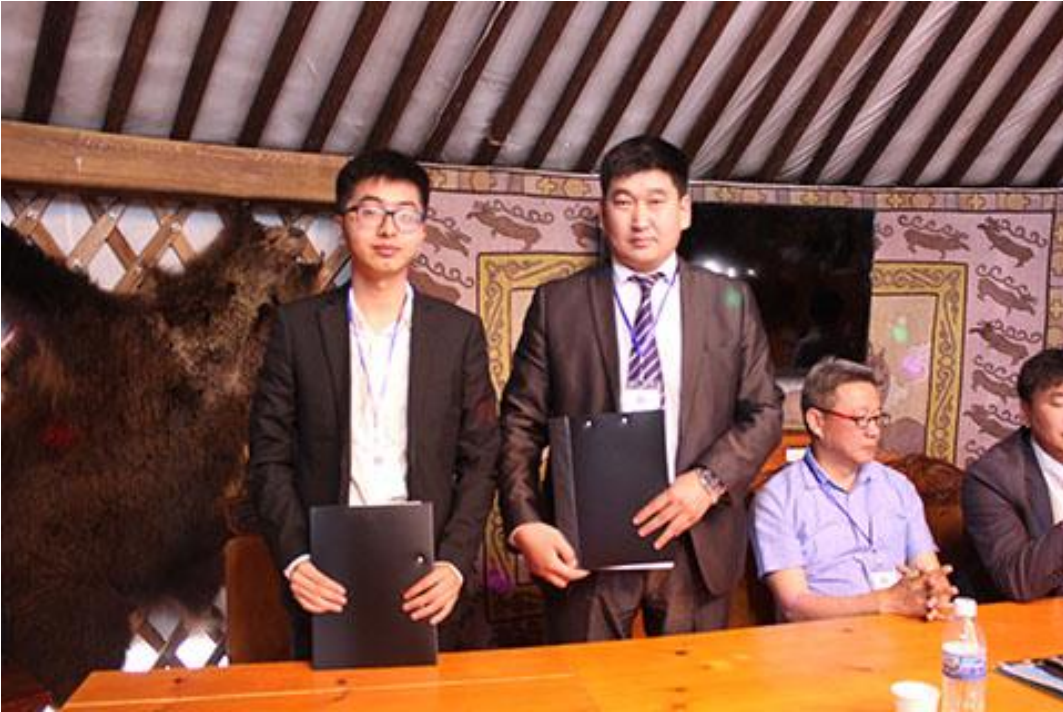
2020 December, In Tarina mine side, because of heavy snow, there is risk of land sliding risk. Oyu Survey engineer take GNSS worked in -30 degree, doing the GNSS static survey



# Academic of Beidou GNSS research



- We visited each other, we together organize the Beidou GNSS application in Mine survey seminar
- Make the proposal of mutual Beidou GNSS research laboratory



# My dream place – Mongolia

Mongolia is so beautiful place, I wish the epidemic gone as soon as possible; I could have the chance to visit all of your guys, we discuss the GNSS Beidou Application more chance in Mongolia





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Thanks All