



Overview of Lishan SLR Station of National Time Service Center(NTSC)

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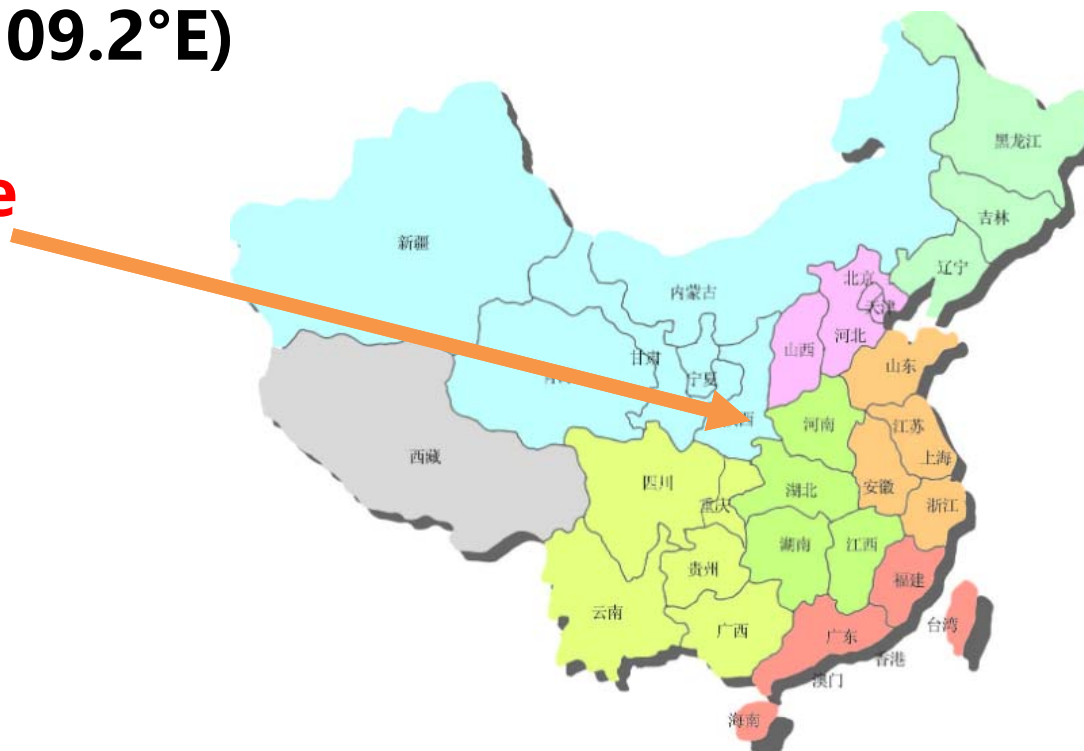
02 **Observation**

1.Introduction

➤ Lishan Satellite Laser Ranging Station

Location : lintong, Xi'an, Shaanxi Province
(34.5°N 109.2°E)

**In the middle
of China**



1.Introduction

➤ Lishan Satellite Laser Ranging Station

Altitude : ~1000m

**In the top of the Lishan Mountain
available minimum elevation:10°**

SLR Station



1.Introduction

➤ Lishan Satellite Laser Ranging Station

Key Equipments

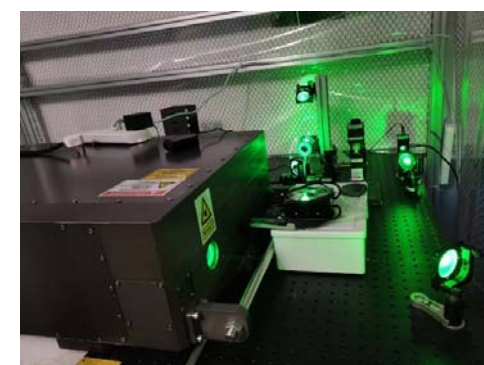
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1.Introduction

Telescope

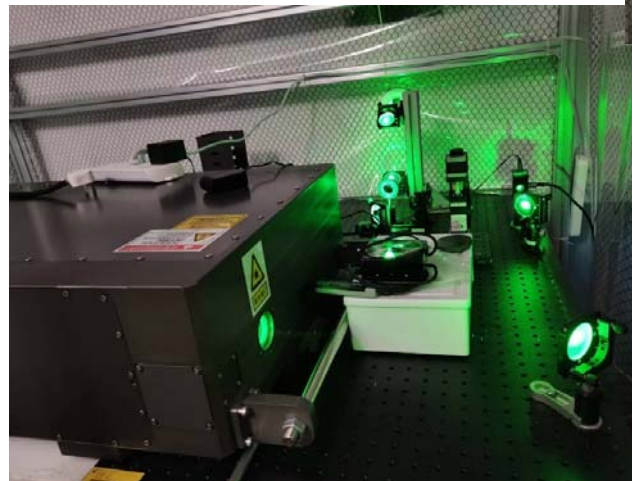
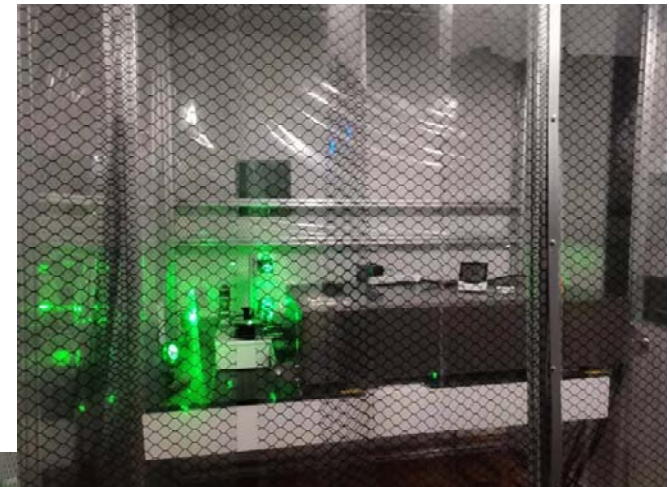
- Receive Aperture: **1.05m**
- Transmit Aperture: **0.2m**
- Tracking speed:
 - Azimuth angular speed: **3"/s~4°/s**
 - Elevation angular speed: **3"/s~2°/s**
- Pointing Accuracy: **≤ 3 "**(after pointing model)
- Tracking Accuracy: **≤ 1 "**



1.Introduction

Laser

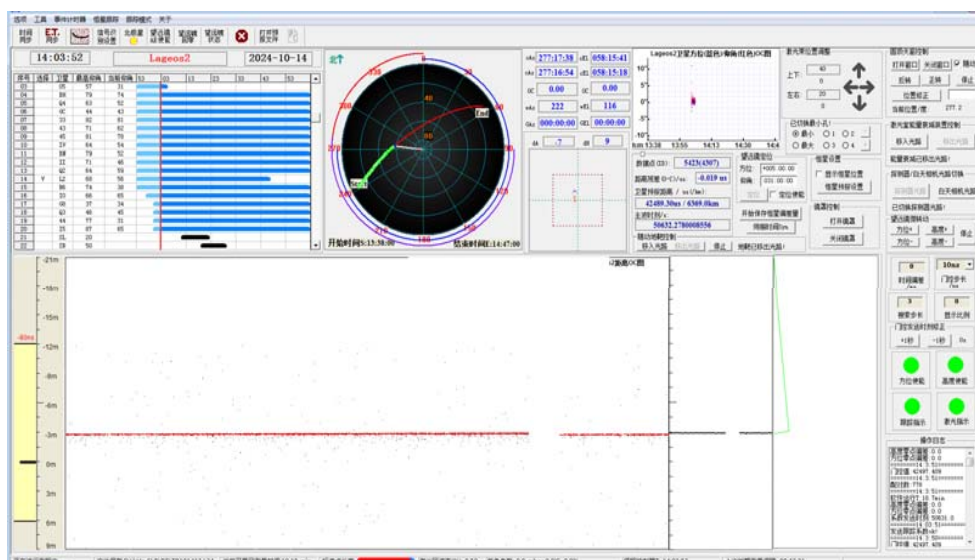
- Wavelength: **532nm**
- Repeat Frequency: **0.1kHz~1kHz**
- Single Pulse Energy: **0.5mJ~15mJ**
- Pulse Width: **$\leq 25\text{ps}$**



1.Introduction

Detector

- **SPAD** Detector, add the spike filter, diaphragm;
- To detect the weak return signal of a few or single photon from satellites.



1.Introduction

Timer

- Timer Frequency: **0.1kHz~1kHz**
- Timer Accuracy: **$\leq 10\text{ps}$**



1.Introduction

Tracking Dome

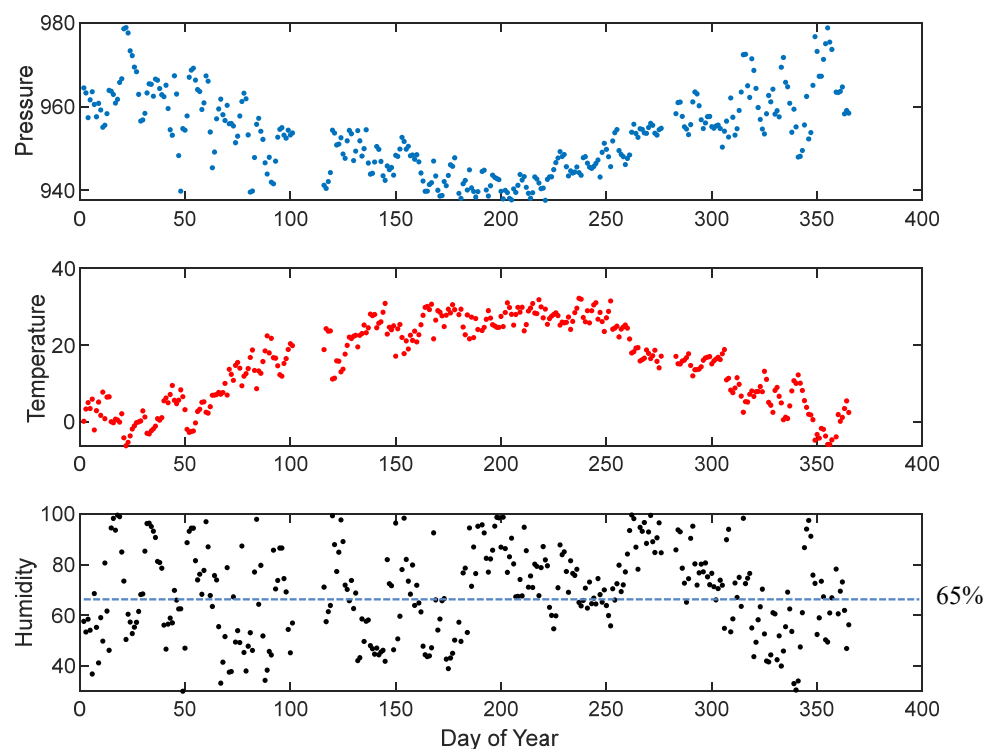
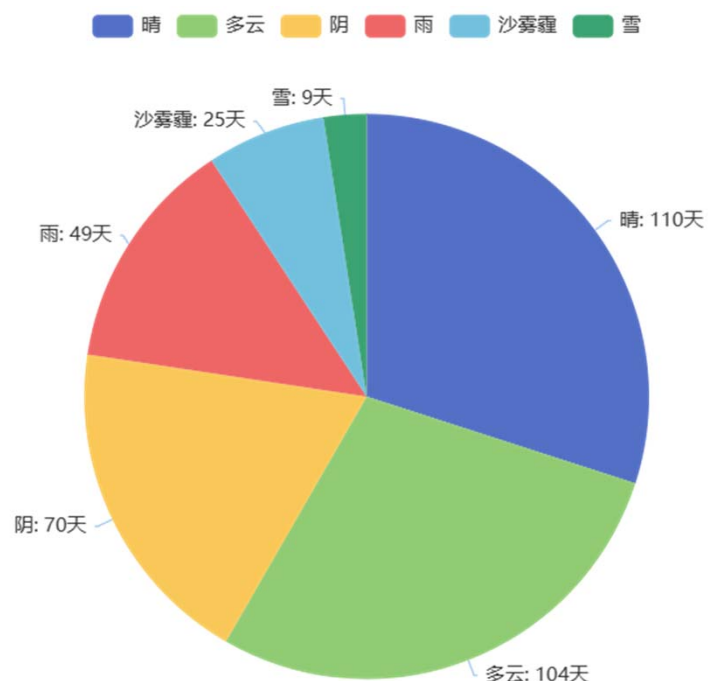
- The Dome can **rotate with the telescope** and make the telescope **always point the window** of the dome.
- Maximum Rotational Speed: **5°/s**



2.Observation

The weather for observation

Lishan SLR Station: A new station for observation



The Weather and PTH in Xi'an(2023.10~2024.10)



2.Observation

Observed Satellite

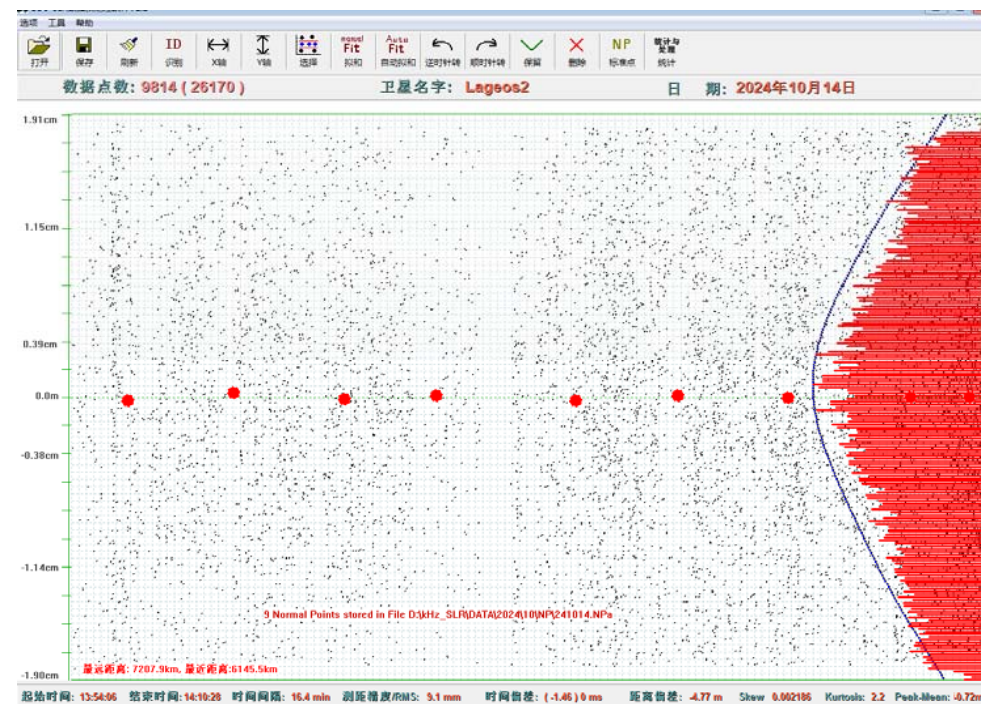
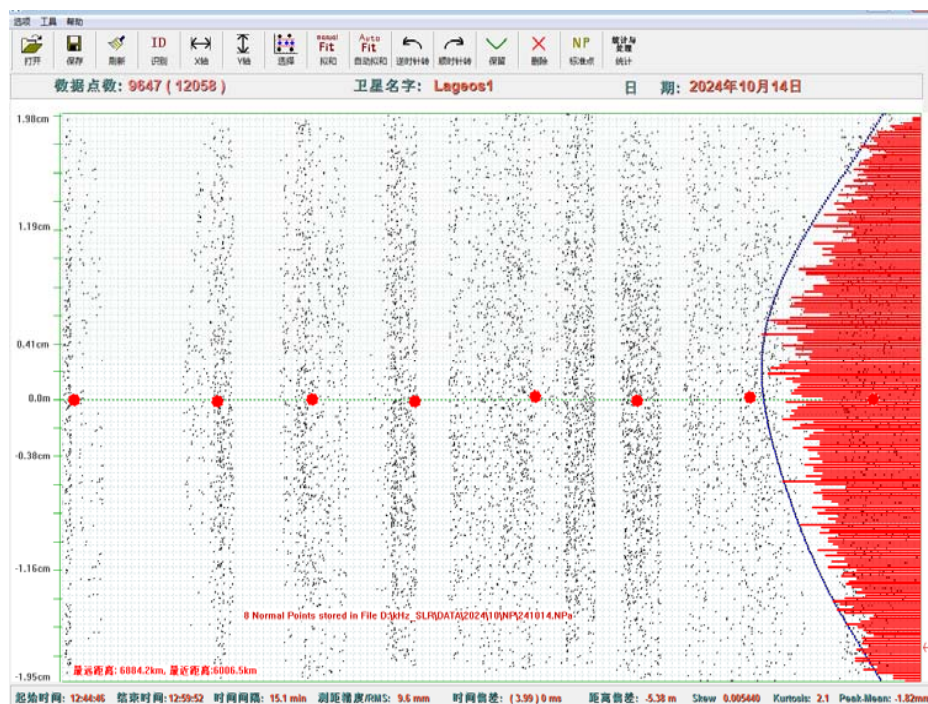
from Sep. to now ,it has observed about **80, 300 circles** satellites.

Orbital Altitude	Satellite Name	Precision
LEO	Stella、Ajisai、Lares、Jason-3、Beacon-C、Cryosat-2、Sentinel-6A、Hy-2C、Hy-2D、Larets、Saral、Starlette、	AJ:1~2cm Others<1cm
MEO	Lageos-1、Lageos-2、Etalon-1、Etalon-2、	L1,L2<1cm E1,E2:2~4cm
	BDS: M2、M3、M5、M6、M9、M11、M12、M13、M14、M15、M18、M20、M21、M22、M24、Compass-M3、 GLONASS: 105、106、116、127、128、129、131、132、133、134、137、138、139、140、141、142、143、146、 GALILEO: 101、102、103、104、201、203、204、205、206、210、211、212、214、215、216、217、218、219、222、223、224、227、	1~3cm
GEO	COMPASS:I3、I5、I6B、G8; QZSS: QZS2、QZS3、QZS4、QZS1r	2~3cm

2.Observation

Observed Satellite

Lageos1、Lageos2

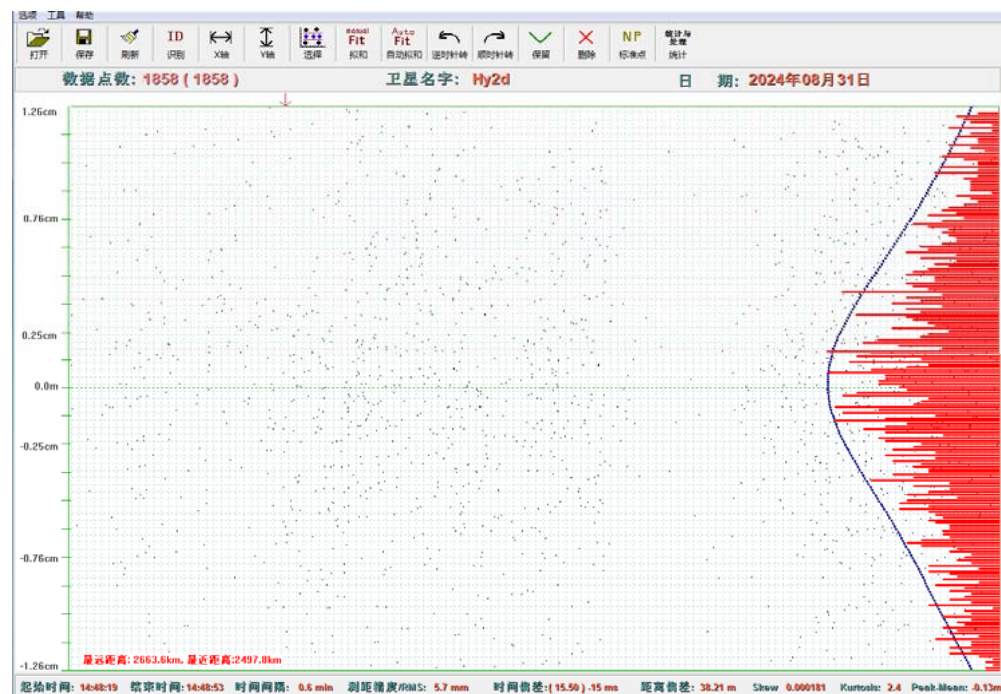
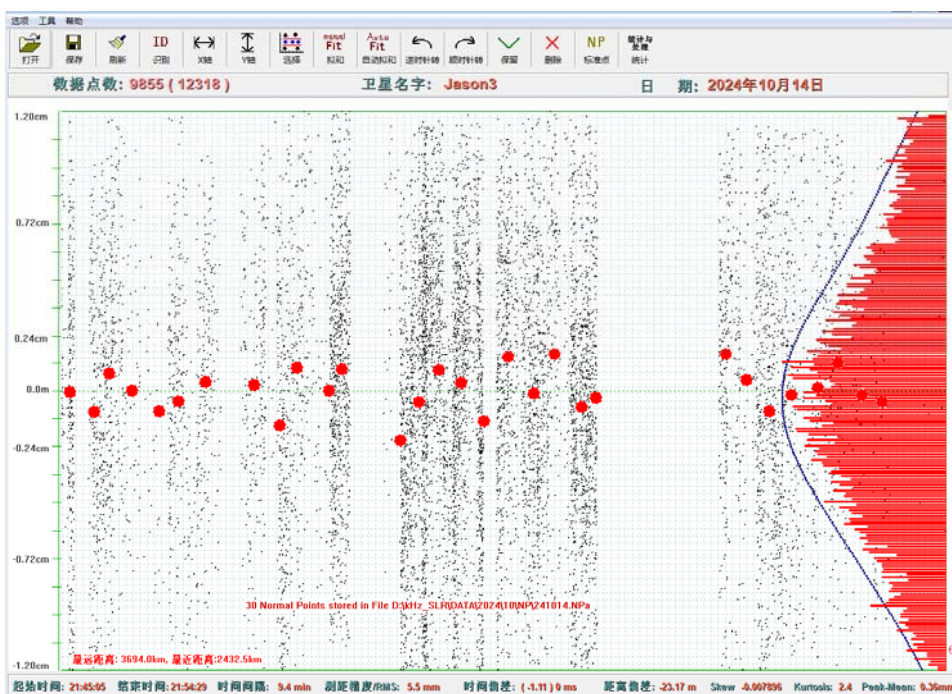


Precision < 1cm

2.Observation

Observed Satellite

LEO

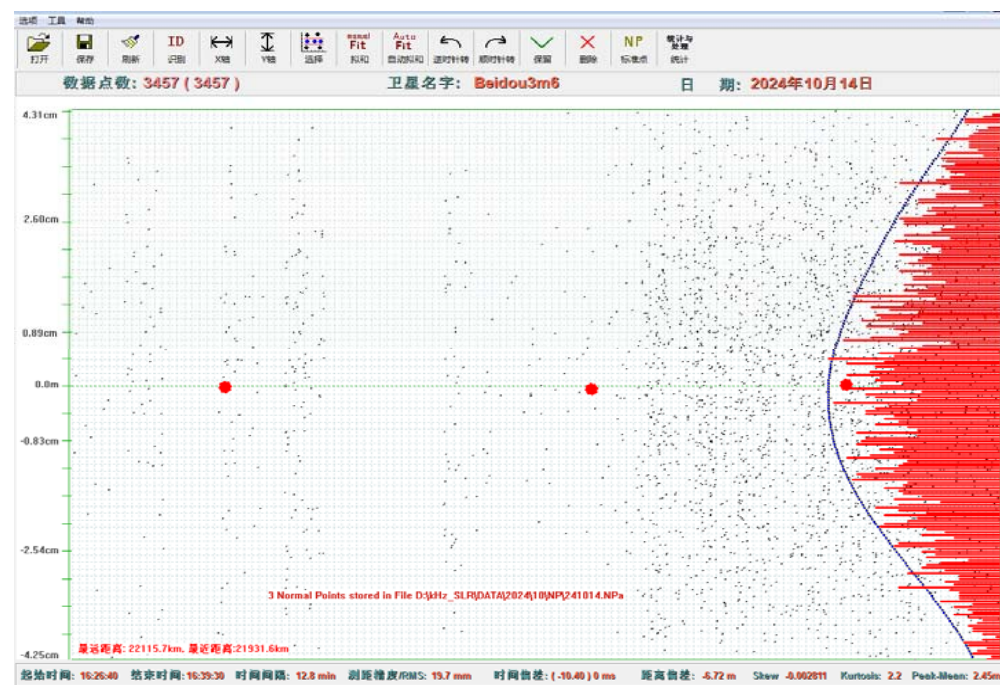
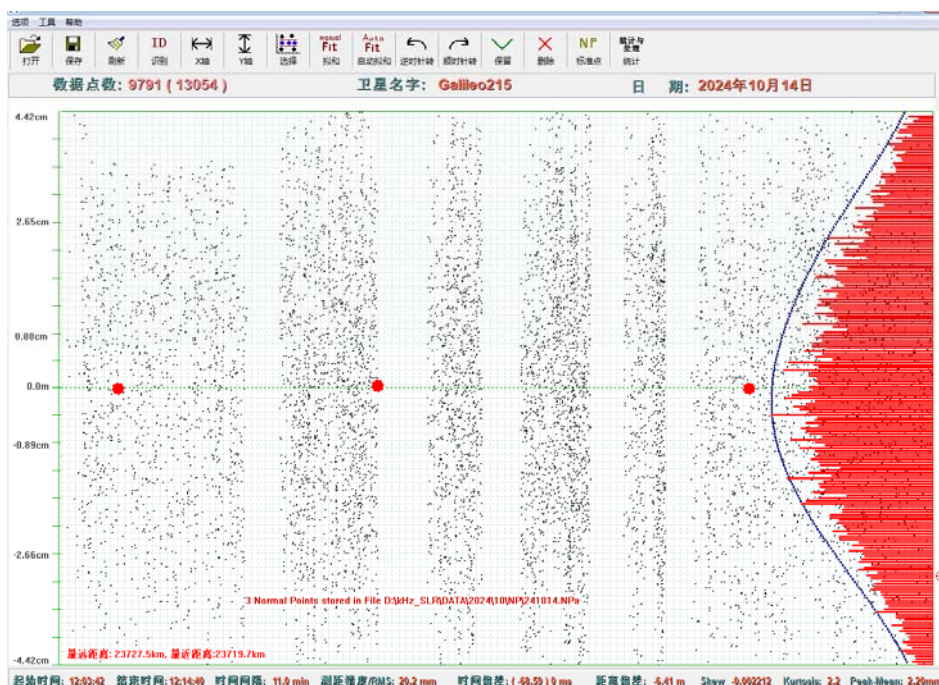


Precision ~5mm

2.Observation

Observed Satellite

MEO

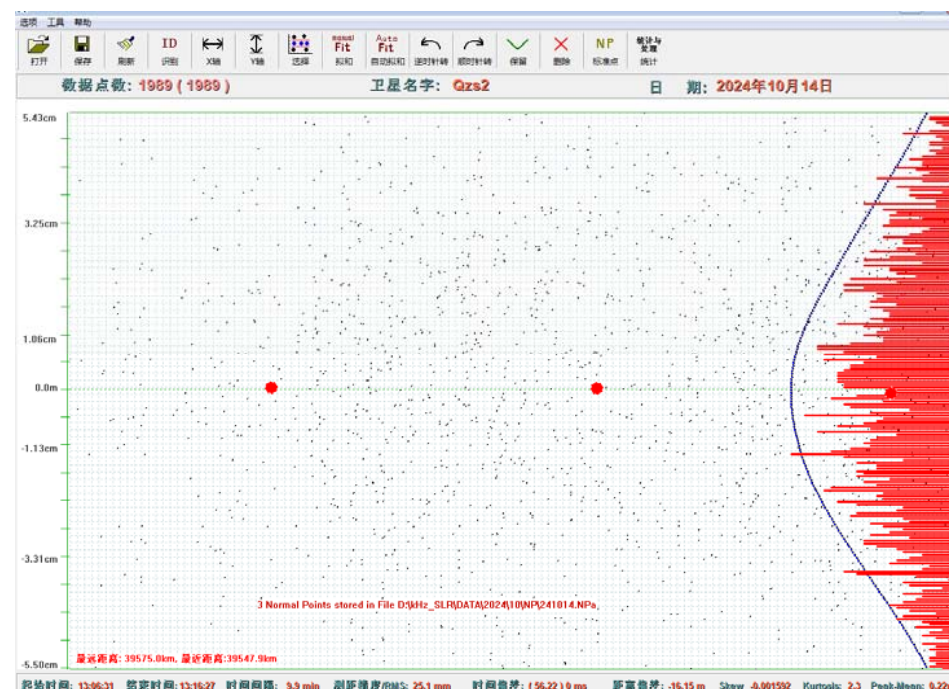
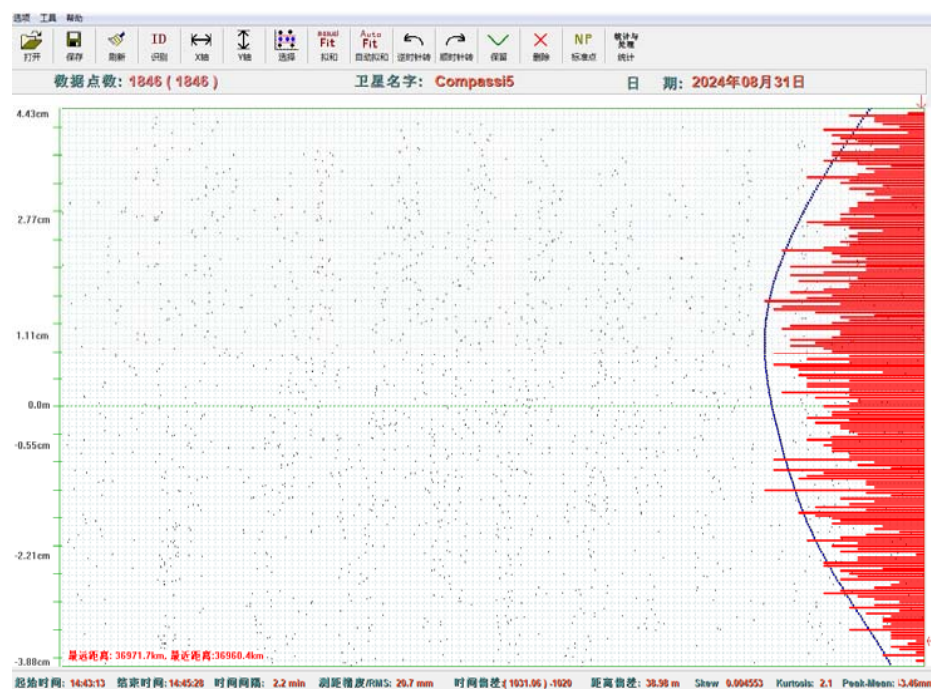


Precision ~2cm

2.Observation

Observed Satellite

GEO



Precision ~2-3cm

3.Summary

Lishan SLR Station in Observation

- **Observable days: about 100~150 days**
- **Available Working Time: day and night**
- **Measurable Range: 1000km~40000km**
- **Observable Elevation: $\geq 10^\circ$**
- **Precision: 1~3cm**



3.Summary

Lishan SLR Station in Observation

- **Conducting Routine Observation for more observational data;**
- **Join the ILRS and take part in joint observation, we are preparing the application form now, and will submit shortly.**

3.Summary

Future Plans –in data processing

- ERP Determination;
- Satellite Orbit Determination and Precision
Evaluation;
- Laser Time Transfer

3.Summary



Xi'an SLR Station and Beijing SLR Station with 40cm Telescope, and these two stations has successfully observed the Chinese Space Station.



Xi'an SLR Station



Chinese Space Station



Beijing SLR Station

Welcome to visit and guide to Lishan SLR station !

Thanks for your attention!