



Purple Mountain Observatory
Chinese Academy of Sciences

WG1 status report from CNSA

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Routine Observation



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- We continue to track down the rocket upper stages launched by China. During the last year, **267424** tracklets from **213** objects are obtained. (DATE:2023.03.12-2024.03.12)

R/B	number	orbit	tracklets
CZ-2C	32	LEO	11531
CZ-2D	19	LEO	7953
CZ-3	5	HEO	15966
CZ-3A	8	HEO	23088
CZ-3B	25	HEO	85261
CZ-3C	6	HEO	30695
CZ-4	2	LEO	1294
CZ-4B	22	LEO	9097
CZ-4C	43	LEO	22054
CZ-5	3	HEO	5865
CZ-6	3	LEO	1324
CZ-6A	5	LEO	2195

R/B	number	orbit	tracklets
CZ-7A	1	HEO	1919
CZ-11	3	LEO	938
CZ-11H	1	LEO	348
KZ-1A	1	LEO	217
KZ-11	1	LEO	208
YZ-1	16	MEO	18979
YZ-2	1	GEO	6055
CERES-1	1	LEO	2
GRAVITY-1	1	LEO	23
ZHUQUE-2	1	LEO	146
AKM	13	GEO	22266

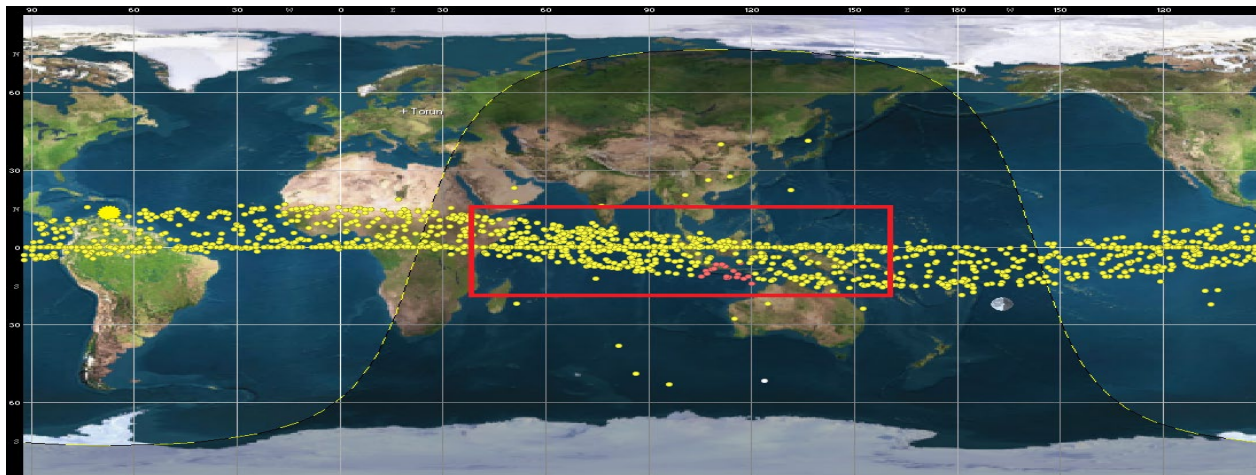


Routine Observation



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- More than **1600** GEO objects and other types of objects are tracked down by 6 telescope arrays across China
- **8211** un-correlated events have been detected, in which **2508** events have been followed, most of them are orbit maintenance maneuvers



GEO	1628
GTO	1311
MEO	431



Cislunar Observation



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- **To extend the awareness range to cislunar space, several test observation of cislunar activities has been carried out**

Spacecraft	Epoch
JUICE	2023/04
EUCLID	2023/07
Chandrayaan 3	2023/07
SLIM	2023/09
Osiris-Rex-SRC	2023/09
Psyche	2023/10
Peregine	2024/01
IM-1	2024/02
DRO A/B	2024/03



Peregine

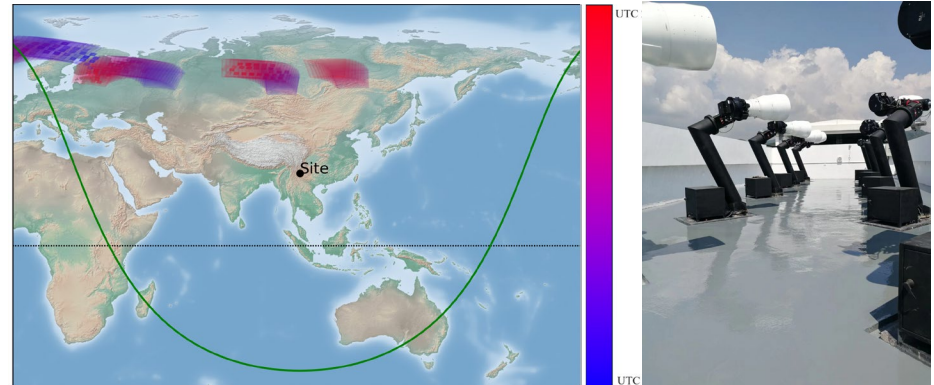


IT34.1

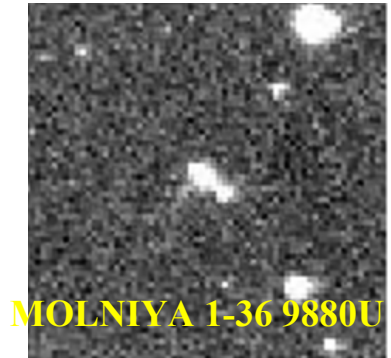
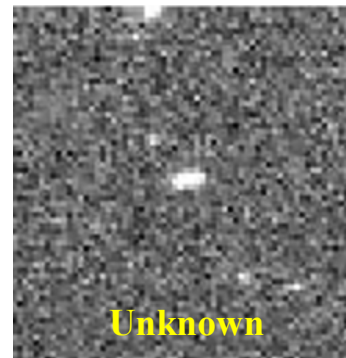


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- Follow the recommendation of IT34.1, observation was carried out from Mar.18 to Mar.24, got 5 nights' data
- 22 known Molniya type objects from 2024-03-18
- Data reduction is ongoing



13070U	62.67	0.69	2.01	MOLNIYA-1-53
17078U	63.89	0.7	2.01	MOLNIYA-1-69
17328U	63.35	0.74	2.01	MOLNIYA-3-31
22949U	64.84	0.7	2.03	MOLNIYA-1-87
23420U	64.41	0.59	3.34	MOLNIYA-1-88
07780U	63.45	0.67	2.01	MOLNIYA-1-29
09880U	63.61	0.68	2.01	MOLNIYA-1-36



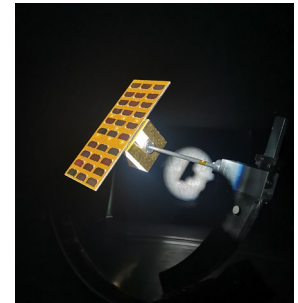
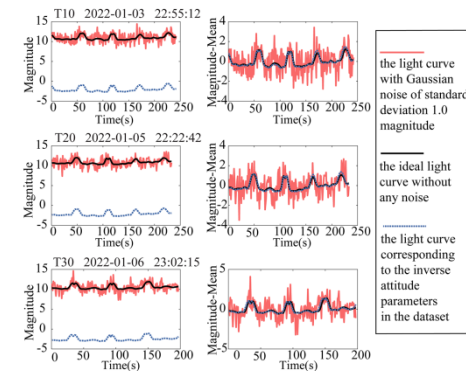
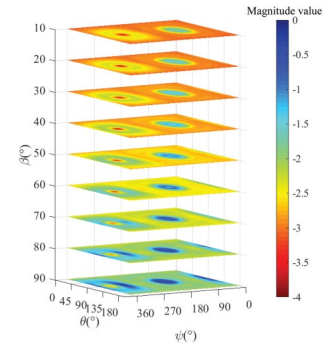
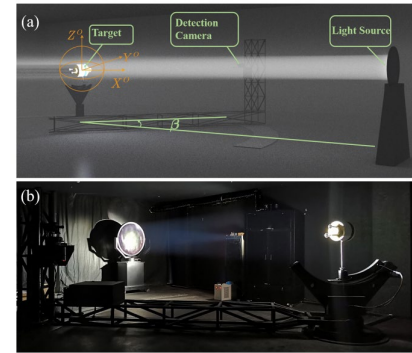


Photometry Simulation



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- Research of photometric consistency calibration of space debris based on numerical simulation and laboratory simulation
- Construct the photometric dataset of CZ-4C upper stage model
- Attitude inversion from light curves based on photometric dataset
 - The relationship of attitude angles in the laboratory and space
 - Analysis of attitude angle variation rules
- Extrapolate this research methodology to satellite model with complex surface structure



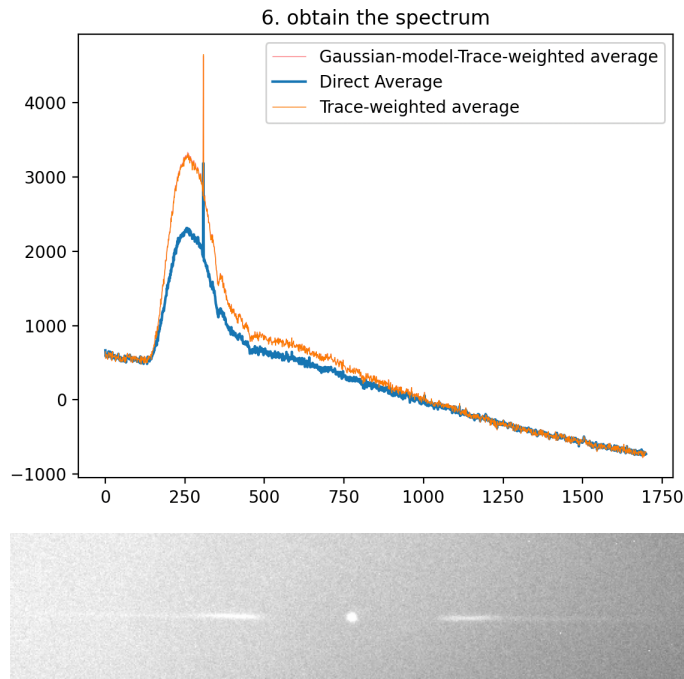


800mm Space Debris Telescope



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- 800mm f/7 telescope for high precision and multi-purpose optical measurements of space debris has put into field test of slitless spectrometry





Future Works



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- **Keep on the routine observation**
- **Keep using meter class telescopes and optical arrays for debris survey on higher orbits, including IT34.1**
- **Integrate more photometry and spectrometry data to build database of debris optical characteristics**
- **Test new telescope and participate future AIs**



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➤ **Thank you for your attention!**