Al-Khatim Observatory - AKO (M44)

International Asteroid Warning Network (IAWN)

17 September 2024

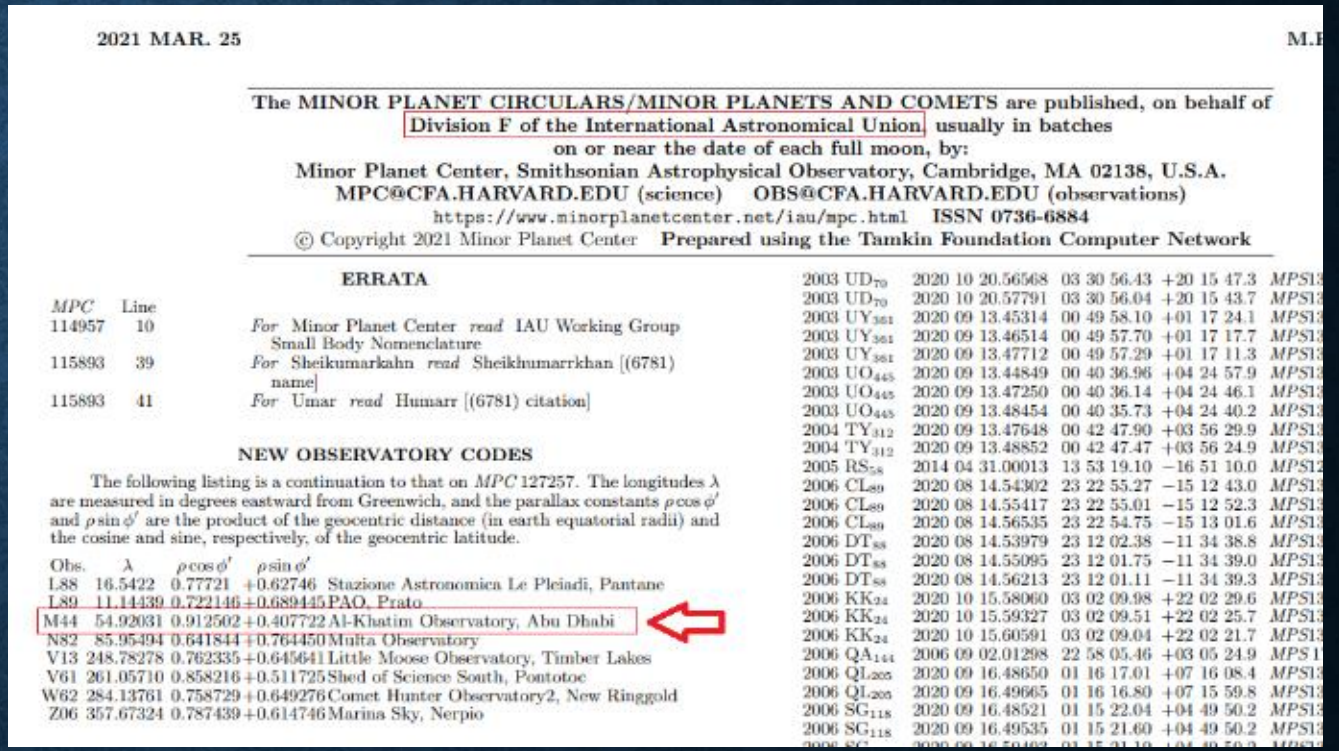
By Mohammad Odeh

International Astronomical Center

Abu Dhabi, UAE

Al-Khatim Observatory - AKO (M44)

- AKO is a robotic observatory, which was built by the International Astronomical Center (IAC) in January 2021, 50Km away from the capital city of Abu Dhabi.
- It is registered with the Minor Planet Center (MPC) of the International Astronomical Union (IAU) and was assigned the code M44.
- AKO is the first robotic observatory in the UAE and the area.



2021 MAR. 25 M.P.

The MINOR PLANET CIRCULARS/MINOR PLANETS AND COMETS are published, on behalf of Division F of the International Astronomical Union, usually in batches on or near the date of each full moon, by:
Minor Planet Center, Smithsonian Astrophysical Observatory, Cambridge, MA 02138, U.S.A.
MPC@CFA.HARVARD.EDU (science) OBS@CFA.HARVARD.EDU (observations)
https://www.minorplanetcenter.net/iau/mpc.html ISSN 0736-6884
 Prepared using the Tamkin Foundation Computer Network

ERRATA

MPC	Line	
114957	10	*For* Minor Planet Center *read* IAU Working Group Small Body Nomenclature
115893	39	*For* Sheikumarkahn *read* Sheikhumarrkhan [(6781) name]
115893	41	*For* Umar *read* Humarr [(6781) citation]

NEW OBSERVATORY CODES

The following listing is a continuation to that on *MPC* 127257. The longitudes λ are measured in degrees eastward from Greenwich, and the parallax constants $\rho\cos\phi'$ and $\rho\sin\phi'$ are the product of the geocentric distance (in earth equatorial radii) and the cosine and sine, respectively, of the geocentric latitude.

Obs.	λ	$\rho\cos\phi'$	$\rho\sin\phi'$	
L88	16.5422	0.77721	+0.62746	Stazione Astronomica Le Pleiadi, Pantane
L89	11.14439	0.722146	+0.689445	PAO, Prato
M44	54.92031	0.912502	+0.407722	Al-Khatim Observatory, Abu Dhabi
N82	85.95494	0.641844	+0.764450	Malta Observatory
V13	248.78278	0.762335	+0.645641	Little Moose Observatory, Timber Lakes
V61	261.05710	0.858216	+0.511725	Shed of Science South, Pontotoc
W62	284.13761	0.758729	+0.649276	Comet Hunter Observatory2, New Ringgold
Z06	357.67324	0.787439	+0.614746	Marina Sky, Nerpio

2003 UD_{70}	2020 10 20.56568	03 30 56.43	+20 15 47.3	*MPS13*
2003 UD_{70}	2020 10 20.57791	03 30 56.04	+20 15 43.7	*MPS13*
2003 UY_{361}	2020 09 13.45314	00 49 58.10	+01 17 24.1	*MPS13*
2003 UY_{361}	2020 09 13.46514	00 49 57.70	+01 17 17.7	*MPS13*
2003 UY_{361}	2020 09 13.47712	00 49 57.29	+01 17 11.3	*MPS13*
2003 UO_{445}	2020 09 13.44849	00 40 36.96	+04 24 57.9	*MPS13*
2003 UO_{445}	2020 09 13.47250	00 40 36.14	+04 24 46.1	*MPS13*
2003 UO_{445}	2020 09 13.48454	00 40 35.73	+04 24 40.2	*MPS13*
2004 TY_{312}	2020 09 13.47648	00 42 47.90	+03 56 29.9	*MPS13*
2004 TY_{312}	2020 09 13.48852	00 42 47.47	+03 56 24.9	*MPS13*
2005 RS_{58}	2014 04 31.00013	13 53 19.10	−16 51 10.0	*MPS12*
2006 CL_{89}	2020 08 14.54302	23 22 55.27	−15 12 43.0	*MPS13*
2006 CL_{89}	2020 08 14.55417	23 22 55.01	−15 12 52.3	*MPS13*
2006 CL_{89}	2020 08 14.56535	23 22 54.75	−15 13 01.6	*MPS13*
2006 DT_{88}	2020 08 14.53979	23 12 02.38	−11 34 38.8	*MPS13*
2006 DT_{88}	2020 08 14.55095	23 12 01.75	−11 34 39.0	*MPS13*
2006 DT_{88}	2020 08 14.56213	23 12 01.11	−11 34 39.3	*MPS13*
2006 KK_{24}	2020 10 15.58060	03 02 09.98	+22 02 29.6	*MPS13*
2006 KK_{24}	2020 10 15.59327	03 02 09.51	+22 02 25.7	*MPS13*
2006 KK_{24}	2020 10 15.60591	03 02 09.04	+22 02 21.7	*MPS13*
2006 QA_{144}	2006 09 02.01298	22 58 05.46	+03 05 24.9	*MPS 1*
2006 QL_{205}	2020 09 16.48650	01 16 17.01	+07 16 08.4	*MPS13*
2006 QL_{205}	2020 09 16.49665	01 16 16.80	+07 15 59.8	*MPS13*
2006 SG_{118}	2020 09 16.48521	01 15 22.04	+04 49 50.2	*MPS13*
2006 SG_{118}	2020 09 16.49535	01 15 21.60	+04 49 50.2	*MPS13*

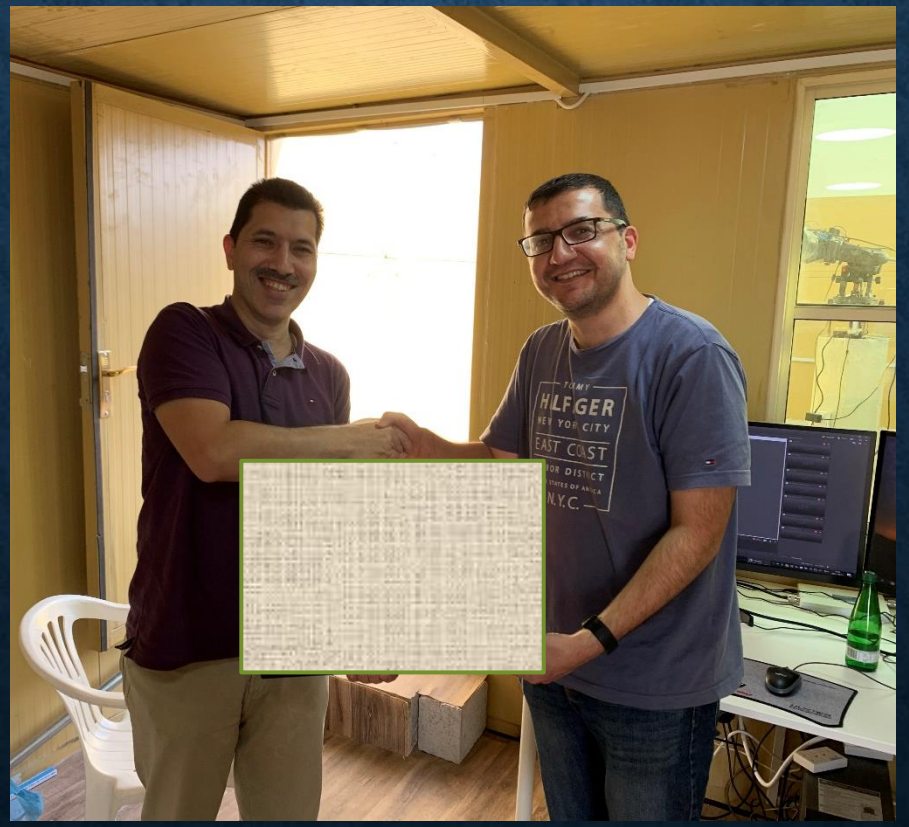
AKO Location

Osama Ghannam

Anas Mohammad

Khalfan Al-Noiamy

Observatory Team



Sameh Ashi and

Mohammad Odeh

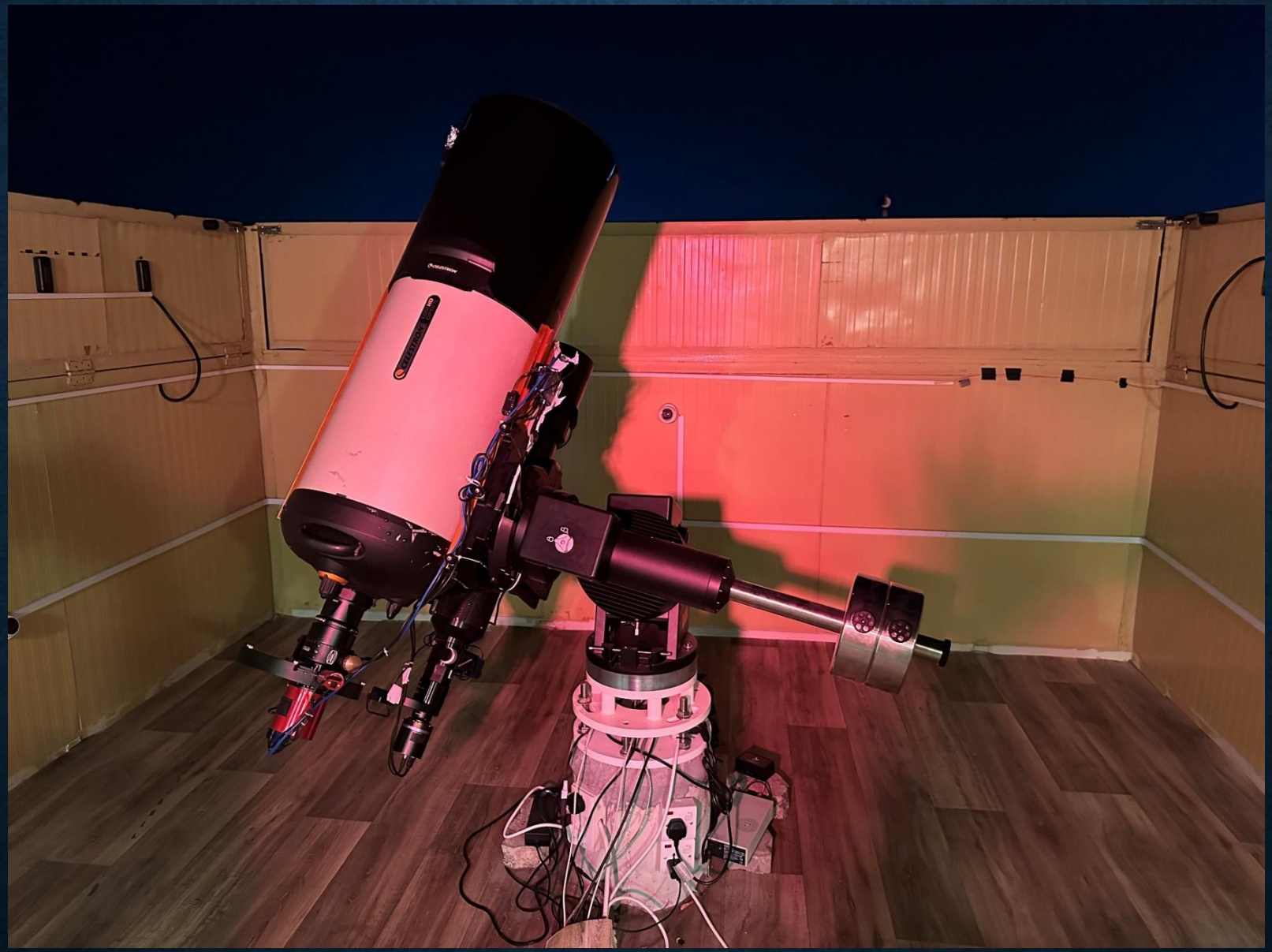
Our Objectives

- Building a remote-operated observatory to allow for quick response in case of urgent observations.
- Constructing a robotic observatory to allow for efficient utilization of time to conduct multiple observations in the same night, and without the need for human intervention.
- Establishing an efficient observatory in our area, that shares its results and observations with others.

Our Current Telescope

- Aplanatic Schmidt-Cassegrain telescope.
- D = 36cm (14”), F = 2737mm (using 0.7X focal reducer), F/ = 7.7
- FOV: 29.5’ X 19.7’.
- Image Scale: 0.28”/pixel.
- Seeing: 1.25” to 1.8”.

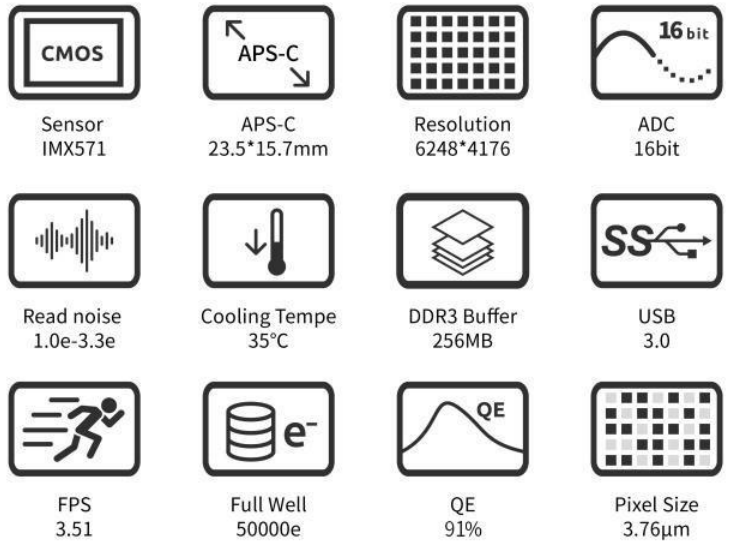
Our Current Mount



10 Micron GM3000 HPS

Camera and Filters

- ASI2600MM Pro, Cooled CMOS mono camera
- Starlight Xpress Maxi Filter Wheel with 11-Position 36mm Round Filters.
- Johnson Cousins Photometric Filters (V, B,I).
- Color filters (LRGB).
- HSO Filters.

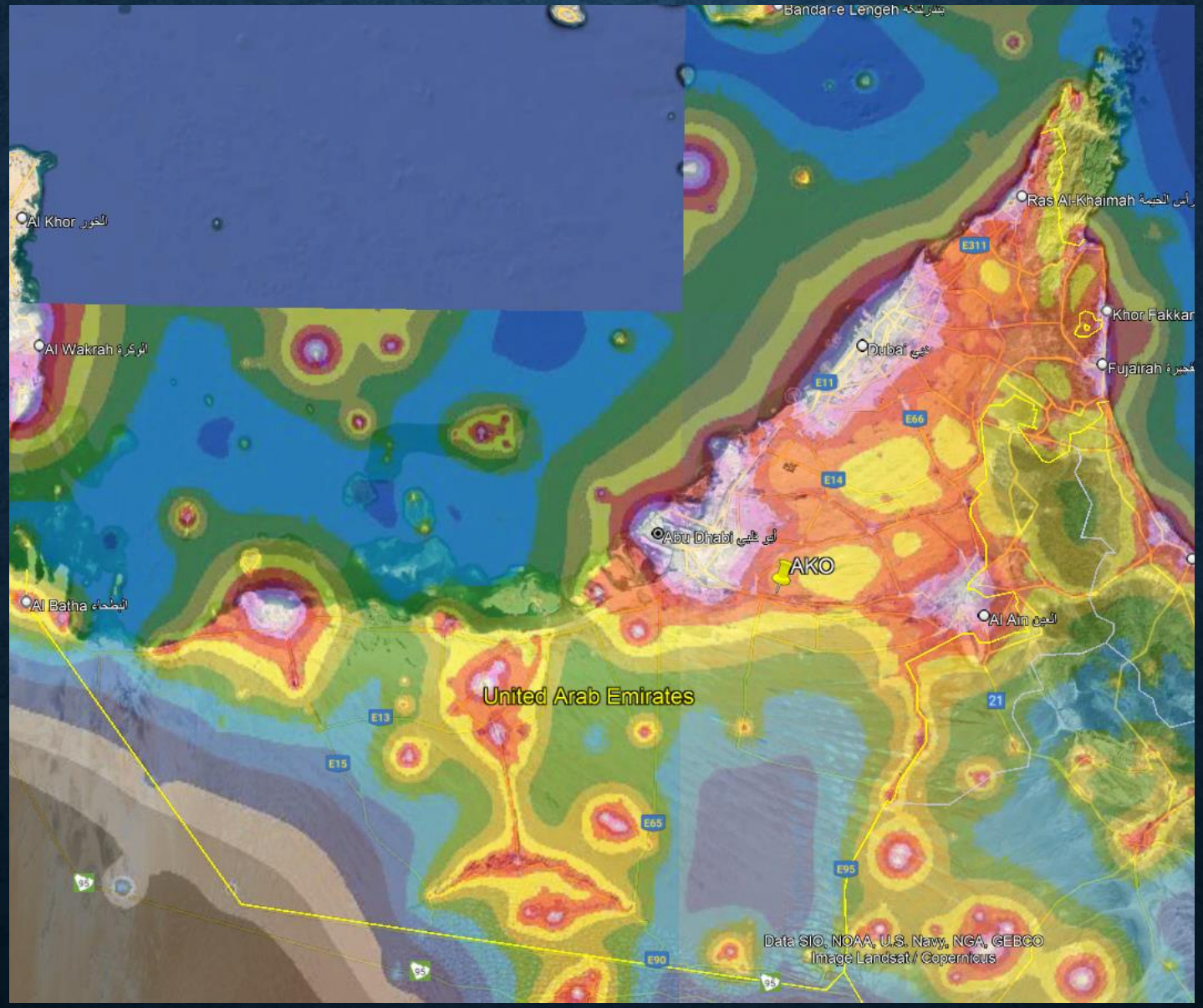


Current Observatory

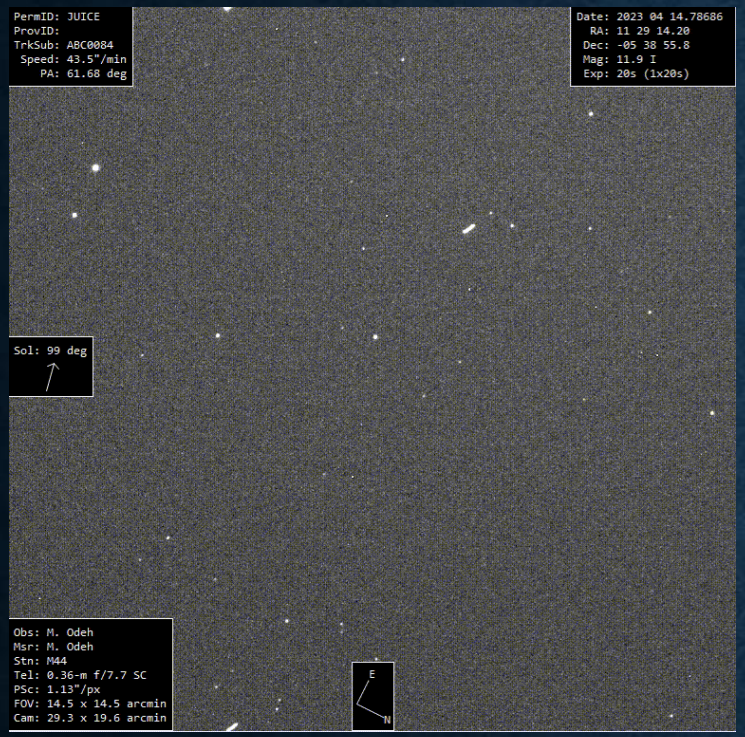
Our Limiting Magnitude

- Unfiltered 30-second exposure times: 18.5.
- Unfiltered 3 minutes: 19.5.
- Stacking several 3-minute: 20.5

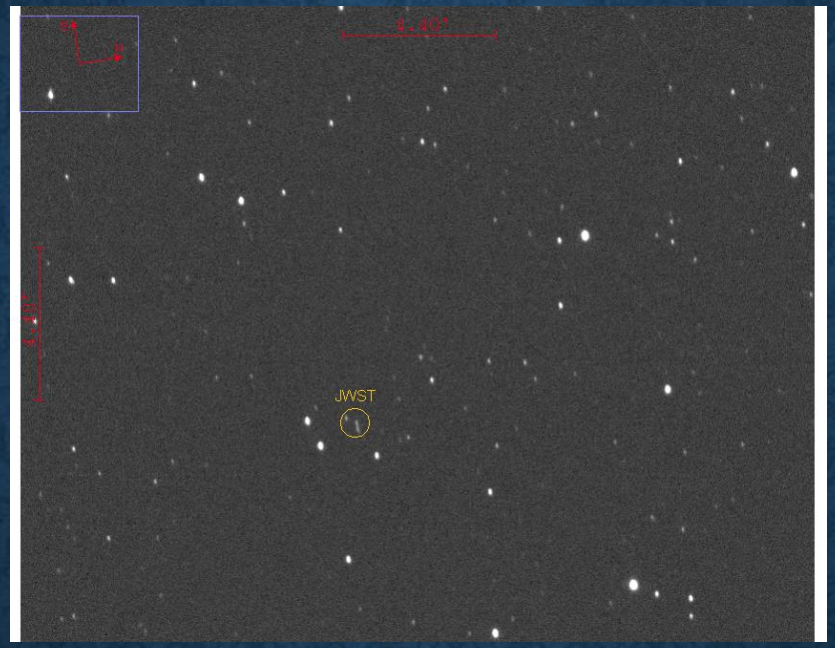
Light Pollution (Bortle 6)



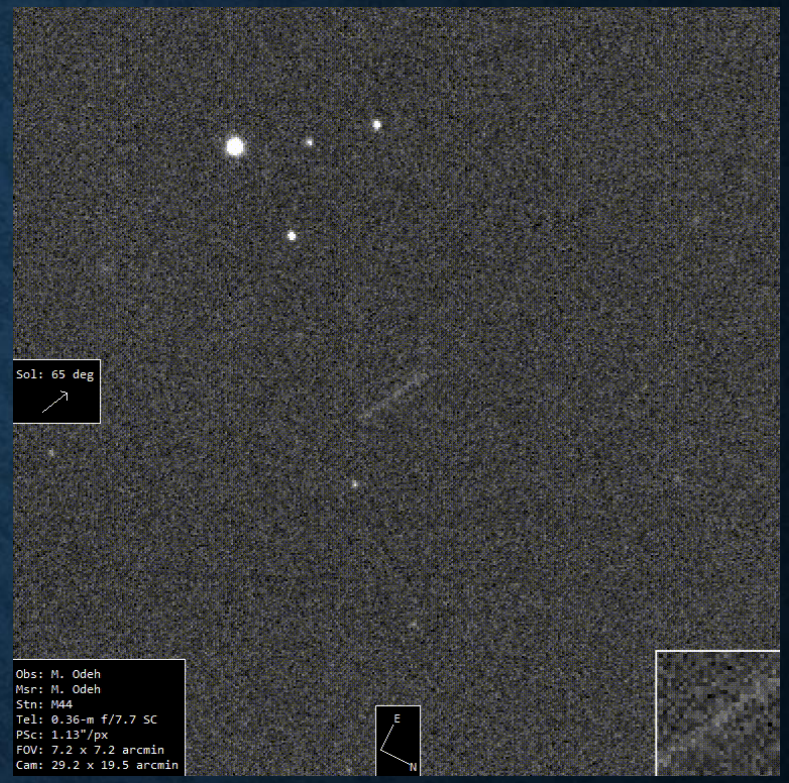
AKO Observations: Spacecrafts



The explorer "JUICE," launched by ESA on April 14, 2023, heading towards the planet Jupiter. AKO was the third observatory in the world to capture images of the explorer and conduct observations for it.



In Jan 2022, JWST was captured during its journey from Earth to its final orbit about 1.5 million Km. Photometric observations for the telescope was done by AKO, which was shared to interested researchers.

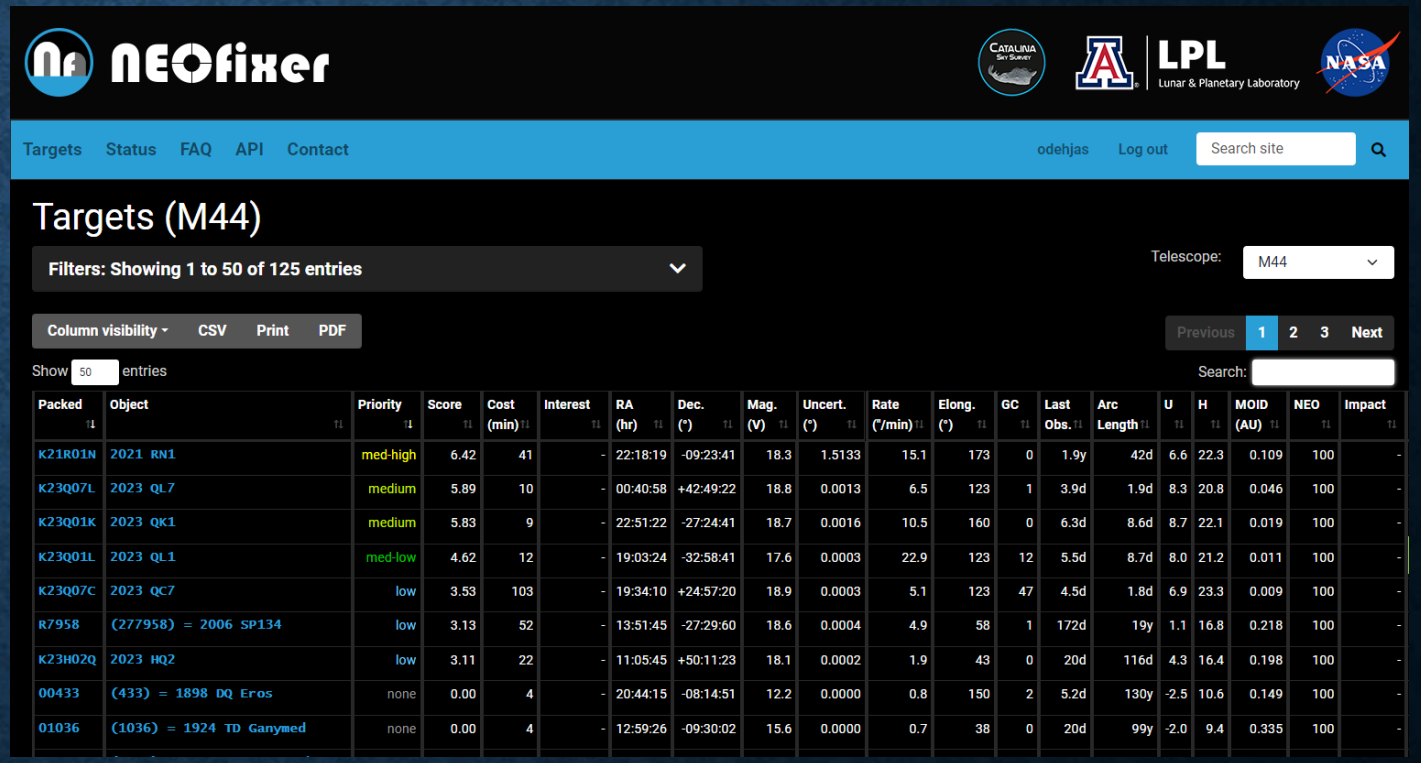


The space capsule "Orion," part of the NASA's Artemis mission to the Moon, was imaged on December 7, 2022. It was located about 380,000 Km from Earth.

Planetary Defense

- AKO received a letter from Catalina Sky Survey to participate in planetary defense observations by using NEOfixer.

- This site was developed so observers can optimize their observing lists, so they use their telescope time in the most useful manner. The priorities are automatically updated as new observations arrive and are posted by the Minor Planet Center.



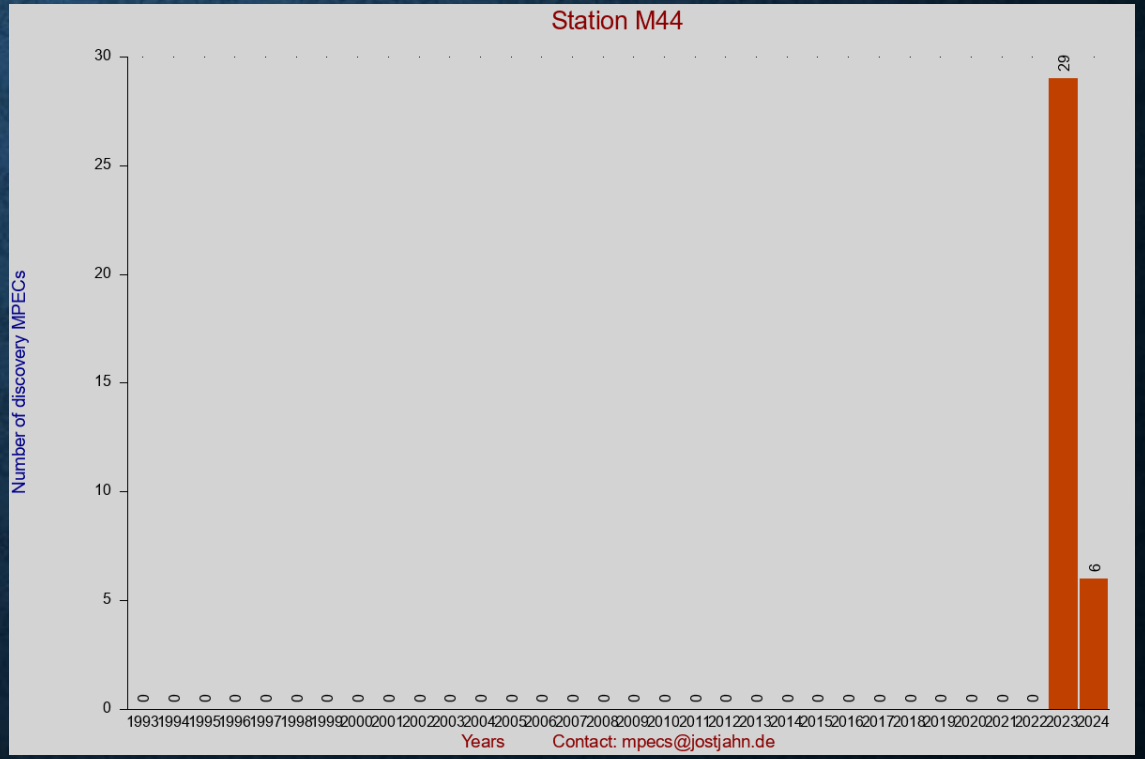
Packed	Object	Priority	Score	Cost (min)	Interest	RA (hr)	Dec. (°)	Mag. (V)	Uncert. (°)	Rate (°/min)	Elong. (°)	GC	Last Obs.	Arc Length	U	H	MOID (AU)	NEO	Impact
K21R01N	2021 RN1	med-high	6.42	41	-	22:18:19	-09:23:41	18.3	1.5133	15.1	173	0	1.9y	42d	6.6	22.3	0.109	100	-
K23Q07L	2023 QL7	medium	5.89	10	-	00:40:58	+42:49:22	18.8	0.0013	6.5	123	1	3.9d	1.9d	8.3	20.8	0.046	100	-
K23Q01K	2023 QK1	medium	5.83	9	-	22:51:22	-27:24:41	18.7	0.0016	10.5	160	0	6.3d	8.6d	8.7	22.1	0.019	100	-
K23Q01L	2023 QL1	med-low	4.62	12	-	19:03:24	-32:58:41	17.6	0.0003	22.9	123	12	5.5d	8.7d	8.0	21.2	0.011	100	-
K23Q07C	2023 QC7	low	3.53	103	-	19:34:10	+24:57:20	18.9	0.0003	5.1	123	47	4.5d	1.8d	6.9	23.3	0.009	100	-
R7958	(277958) = 2006 SP134	low	3.13	52	-	13:51:45	-27:29:60	18.6	0.0004	4.9	58	1	172d	19y	1.1	16.8	0.218	100	-
K23H02Q	2023 HQ2	low	3.11	22	-	11:05:45	+50:11:23	18.1	0.0002	1.9	43	0	20d	116d	4.3	16.4	0.198	100	-
00433	(433) = 1898 DQ Eros	none	0.00	4	-	20:44:15	-08:14:51	12.2	0.0000	0.8	150	2	5.2d	130y	-2.5	10.6	0.149	100	-
01036	(1036) = 1924 TD Ganymed	none	0.00	4	-	12:59:26	-09:30:02	15.6	0.0000	0.7	38	0	20d	99y	-2.0	9.4	0.335	100	-

Planetary Defense

- Using this tool, our work became easier to follow new asteroids, and we participated in confirming the discovery of 35 new asteroids in 2023 and 2024.

M.P.E.C. statistics for M44

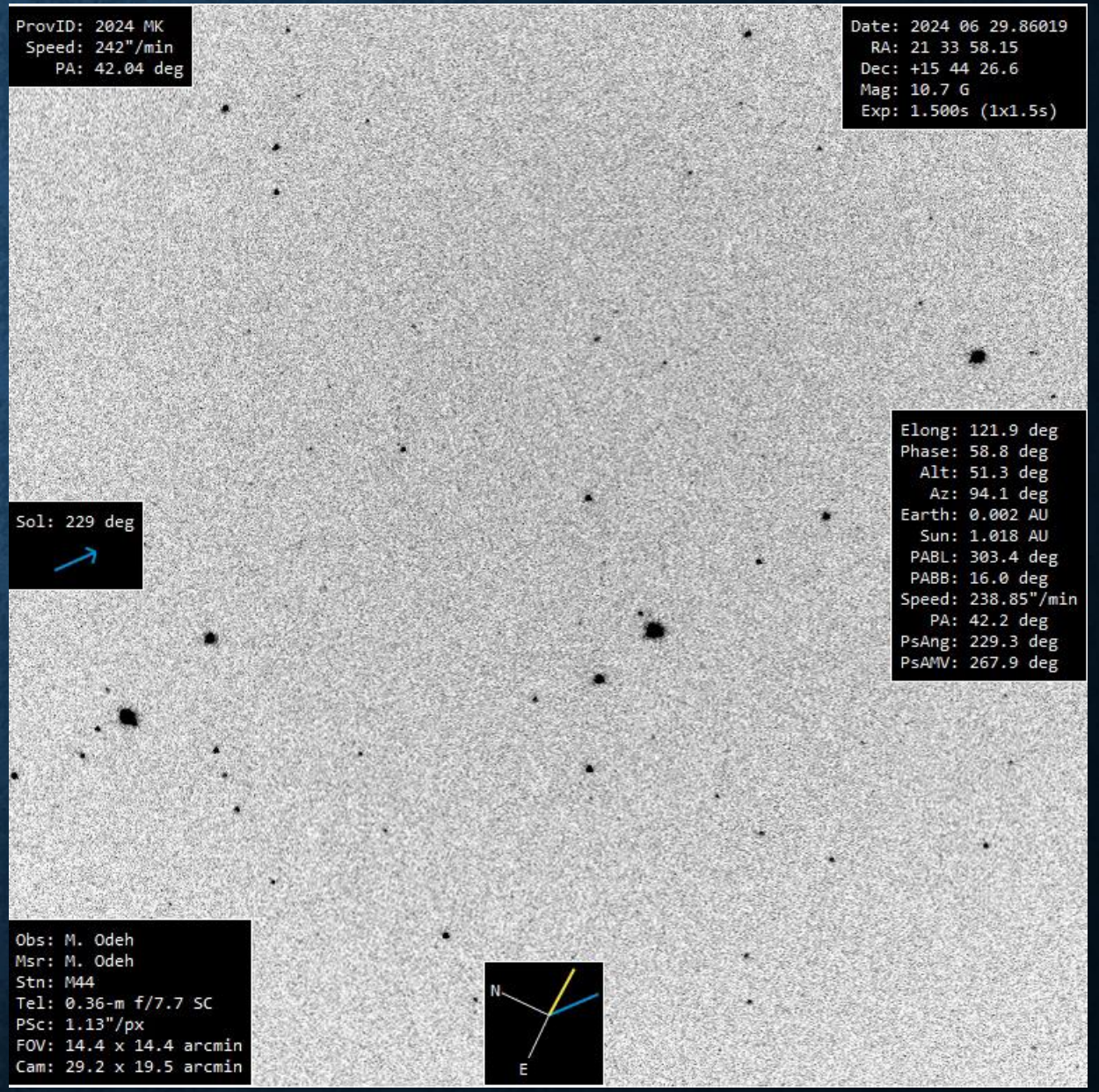
All MPECs
Made with MPECSGET (Version of 2023 Jan 11) at 08-11-2024 18:30:28
Name: Al-Khatim Observatory, Abu Dhabi
Code: M44
Longitude: 54.920310°
Cos: 0.912502
Sin: 0.407722
Earth center distance 6363.932454 km;
Latitude (geocentric) 24.075935°
Latitude (geographic) 24.219598°
Data file (text)
Number of MPECs with discoveries (*): 35
Number of MPECs without discoveries: 58



NEO Observations

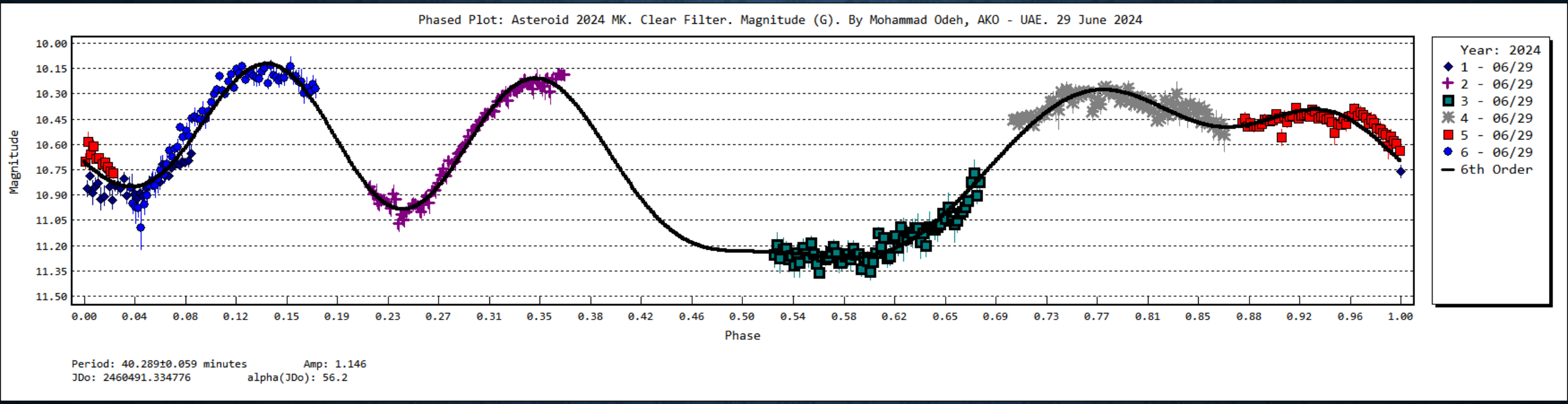
- We do some astrometric and photometric observations for some important events.

- This video is for the asteroid (2024 MK) when it passed by Earth on 29 June 2024.



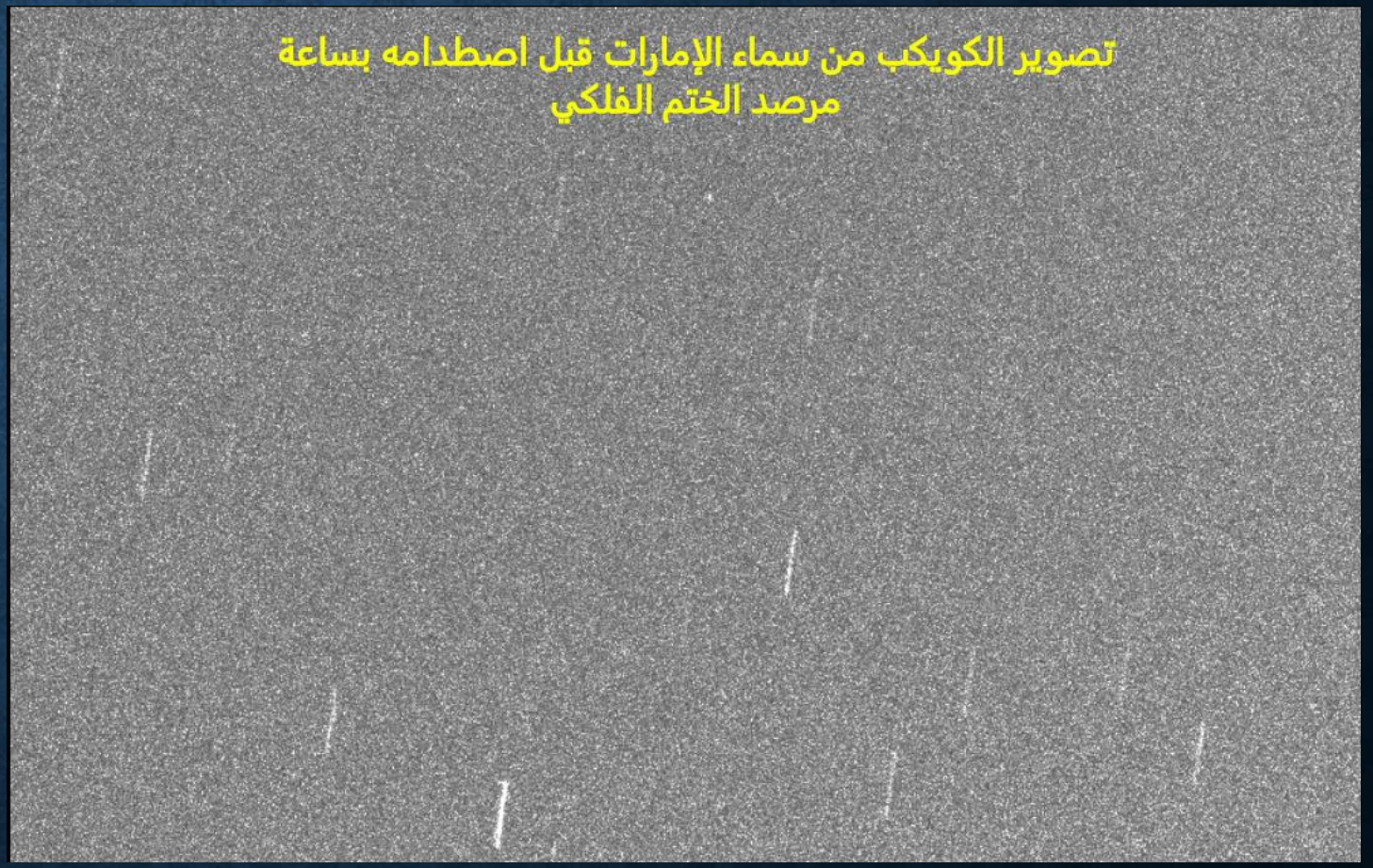
NEO Light Curve

- Below is the light curve for (2024 MK) asteroid during its pass by.



2024 RW1

- The 1.6-meter asteroid 2024 RW1 was discovered on 04 September 2024 at 06 UT.
- It was found it will impact Earth on the same day at 16:40 UT.
- AKO observed the asteroid just one hour before the impact and did photometric and astrometric observations.
- Also, we did live broadcast for the event on our social media channels.



NEO Public Outreach

- AKO pays close attention to the topic of NEOs and regularly writes articles in the media about how to mitigate the dangers, especially when a notable asteroid passes by Earth.

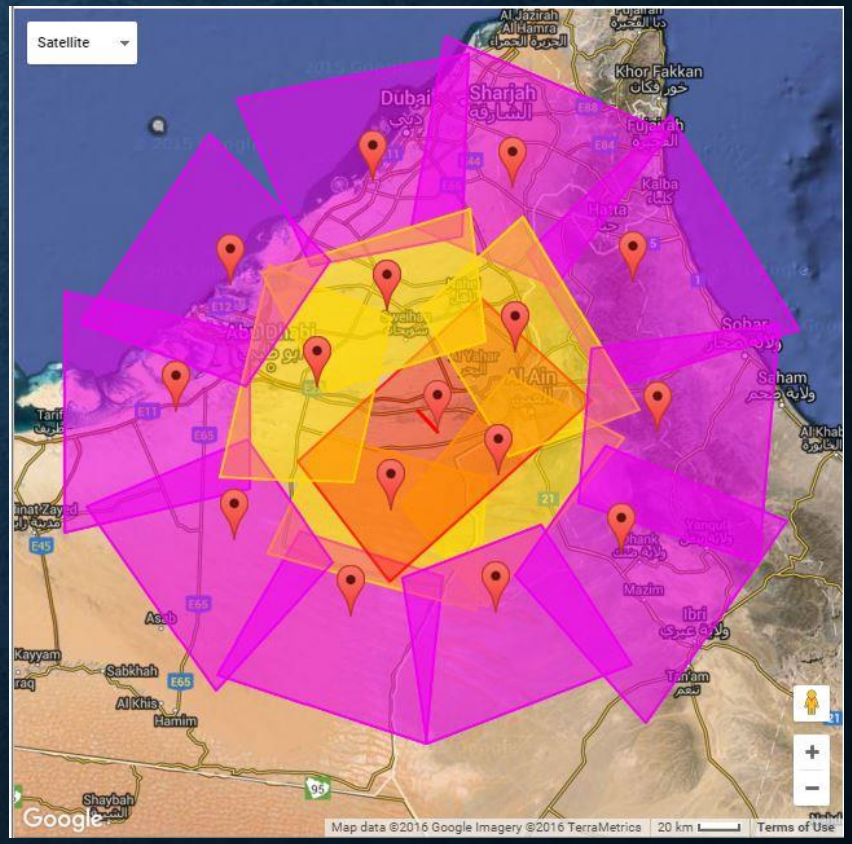
UAE Astronomical Cameras Network (UACN)

- The UAE Astronomical Cameras Network (UACN) is a collaborative initiative between the IAC and the SETI Institute in USA, under the support of NASA.
- UACN comprises a series of advanced video cameras positioned across various locations in Abu Dhabi.
- These cameras automatically record video footage upon detecting a meteor.
- The detected meteor could be part of a meteor shower, a meteorite fall, or even the reentry of satellite debris.

UAE Astronomical Cameras Network (UACN)

- The network consists of three stations, named UACN1, UACN2, and UACN3, which have been operational and contributing valuable data since 2016.

- Each station is equipped with 16 specialized cameras covering the sky above 30 degrees altitude.



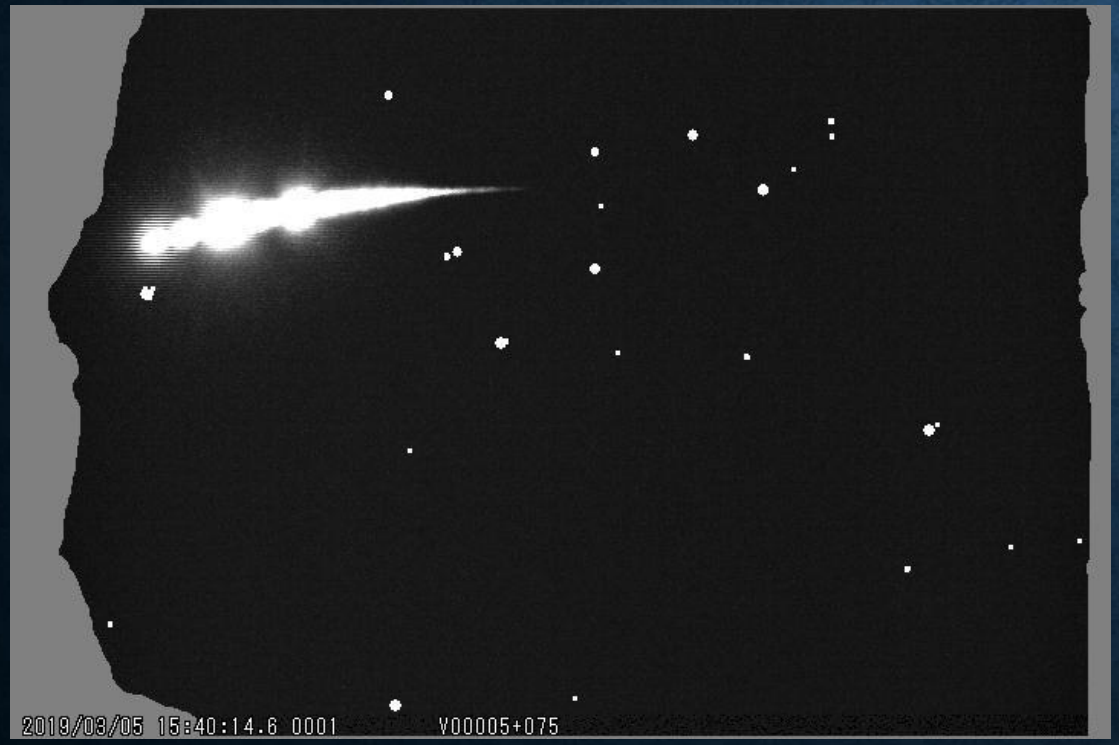
UACN: Observing Satellite Re-entries

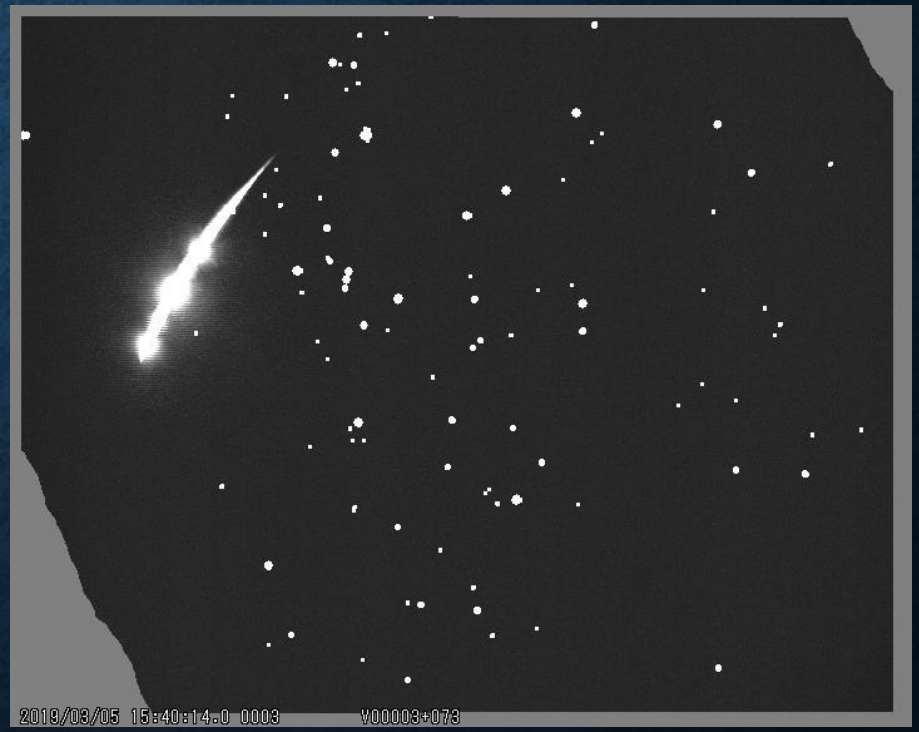
- The UACN has also successfully detected several satellite reentries, including the notable reentry of the PROGRESS MS-07 SL-4 R/B on 16 October 2017 at 19:30 (UT+4). This event was witnessed across the UAE, Oman, Qatar, Bahrain, Kuwait, and the eastern regions of Saudi Arabia. The satellite in question was the second stage of a Russian Soyuz-2.1a rocket. UACN1 and UACN3 captured this reentry at 19:29:34.

UACN: Meteorite Recovery

- The UACN's data is crucial in determining the location of falling meteorites when a fireball is captured by more than one station.

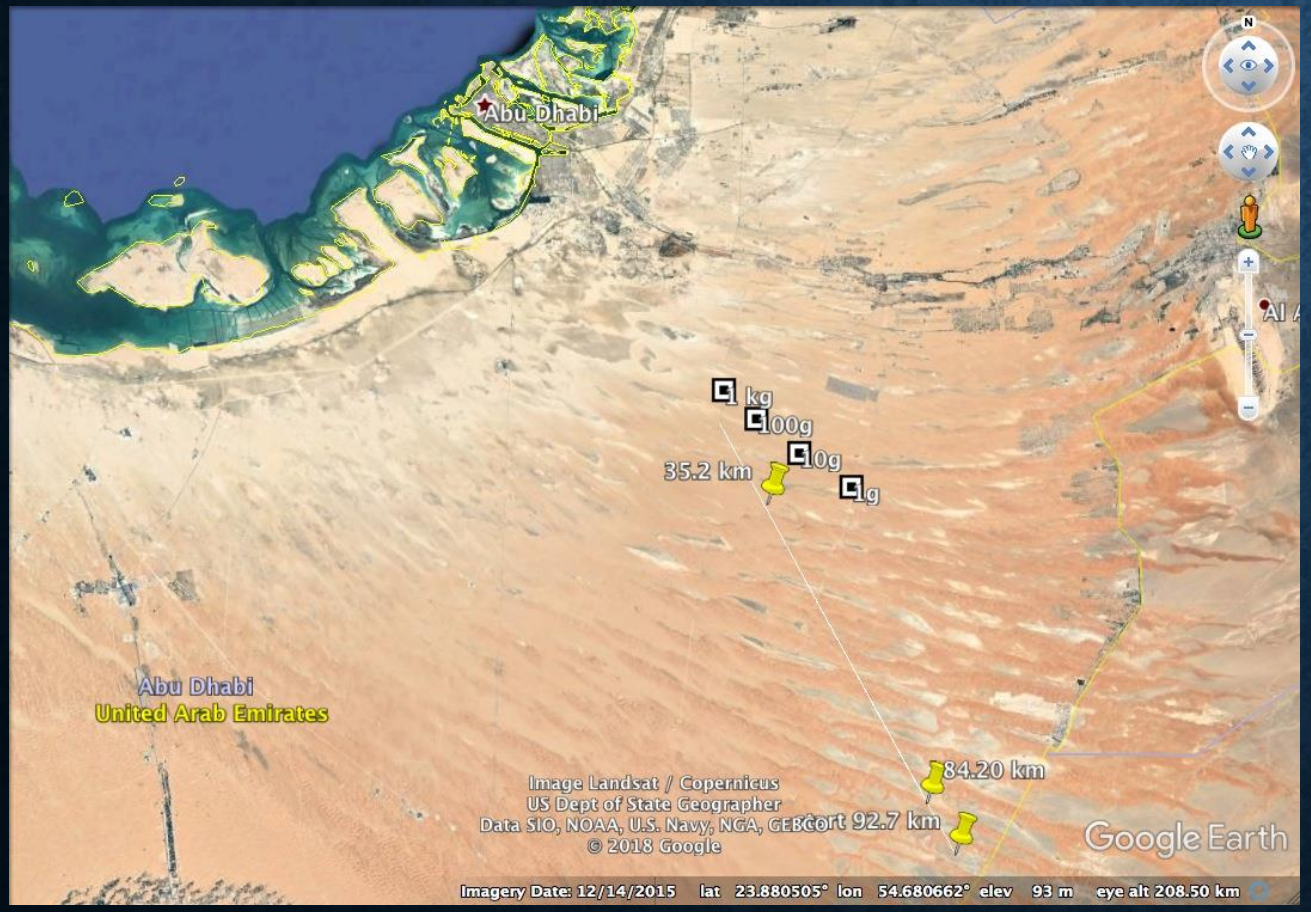
- On 05 March 2019, a bright fireball was detected at 19:40:11 local time, and it was recorded by cameras at both UACN1 and UACN3. Calculations based on these recordings indicated that a possible meteorite might have reached the ground near the Arabian Nights Village Resort.





UACN: Observing Satellite Re-entries

- In response, the International Astronomical Center (IAC) organized a team to search the area on 12 March 2019. During this search, the team discovered a magnetic stony-iron fragment. Subsequent analysis in specialized labs both within and outside the UAE confirmed that the fragment was indeed an old meteorite.



UACN: Meteorite Recovery

Thank you!