Forming a new East Asia occultation group

International Occultation Timing Association / East Asia (IOTA/EA)

It will be officially formed after the inaugural meeting to be held on August 27, 2023.

Fumi Yoshida

@2023 IOTA Meeting on July 15-16, 2023

IOTA/EA

IOTA/EA is a joint organization of professional astronomers (**P**) and amateur astronomers (**A**).

Chairpersons

Tsutomu Hayamizu (早水勉) **A**
Saga Hoshizora Astronomy Center

Fumi Yoshida (吉田二美) **P**
UOEH/PERC

Secretary

Hayato Watanabe (渡部勇人) **A**
JOIN

Officers

Hiroshi Akitaya (秋田谷洋) **P**
PERC

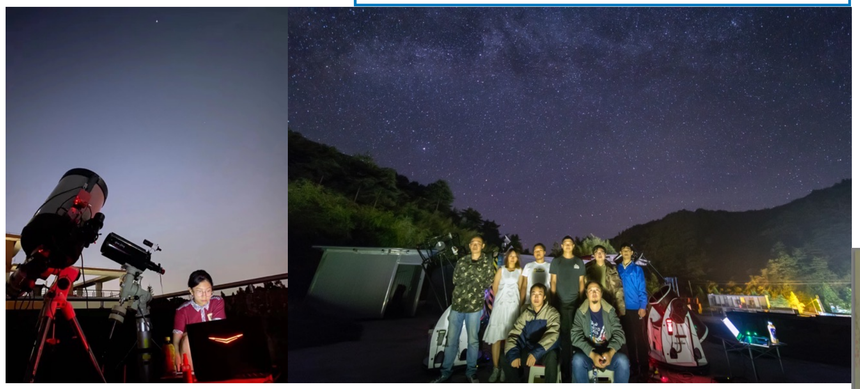
Mitsuru Soma (相馬充) **P**
NAOJ

Hirotomo Noda (野田寛大) **P**
NAOJ

Toshihiro Horaguchi (洞口俊博) **P**
National Museum of Nature and Science

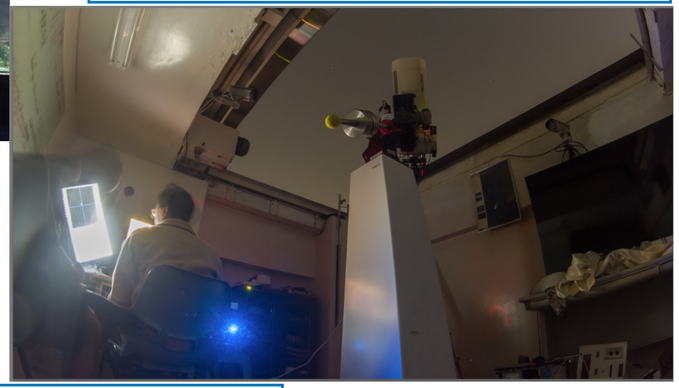
Kazuhisa Miyashita (宮下和久) **A**
JOIN

Ye Yuan (袁烨) ***China***
Purple Mountain Observatory, CAS



Observing group leaders with experience in occultation observations have been asked to serve as directors for their regions.

Chilong Lin (林 志隆) ***Taiwan***
National Museum of Natural Science



Regional Directors

Wai-Chun Yue（余 惠俊）***Hong Kong***
Occultation Timing Section,
Hong Kong Astronomical Society

Members of IOTA/EA will be registered officially after the inaugural meeting

Background on the organization of IOTA/EA

We need you!

(professional astronomers) (amateur astronomers)

2019 August 21 (UT)

This was the first time that a joint Pro-Am observing team was organized.
Although no data could be collected due to poor weather conditions, the unity of the Pro-Am team at this time became a strong motivation for the formation of IOTA/EA.

- The DESTINY+ science team called for a Phaethon observing campaign. Radar, photometric, and spectroscopic observations were made during Phaethon's close approach to Earth in December 2017, revealing Phaethon's physical properties.
- However, due to Phaethon's peculiar orbital configuration, it was not possible to observe Phaethon at zero solar phase angle. This makes it difficult to estimate the exact absolute magnitude. As a result, a large error was involved in the estimated diameter of Phaethon.
- Therefore, we decided to estimate the size/shape of Phaethon using a different method, namely occultation observations.

Occultation observation

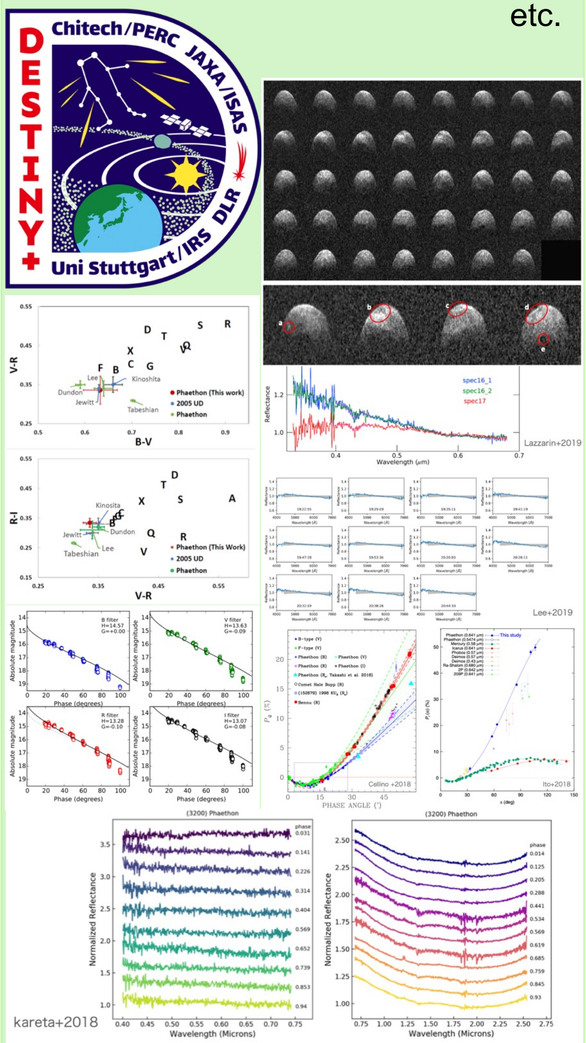
- A large number of observers are needed.
- Call for professional group of occultation observers

➡ A joint professional/amateur team was formed.

- The IOTA has contributed greatly to the prediction of Phaethon's occultations.
- We are very grateful to IOTA for their help.

Observation campaign in 2017

Radar, photometry, spectroscopy, etc.

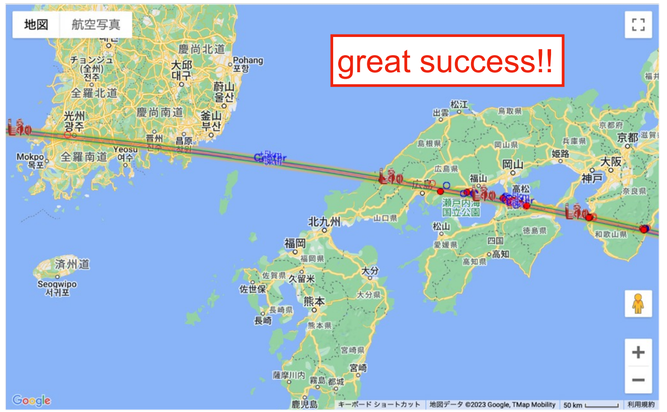


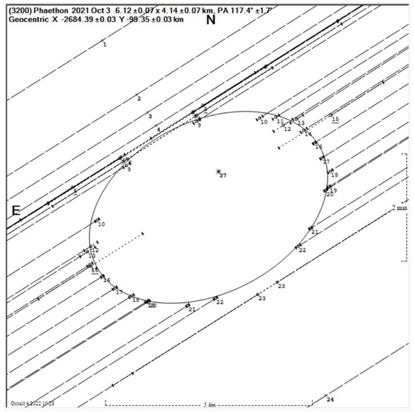
We have been looking for the next observation opportunity. During two years (2017-2019), many observers have prepared the equipments (GPS module, CMOS camera, etc). Then, challenged the observation on 3 October 2021 (UT)

Occultation observation on October 3, 2021

Observers : 72

Hiroshi Akitaya, Akira Asai, Yasunori Fujiwara, Takao Fujiwara, Tateki Goto, Miyu Haraguchi, George L. Hashimoto, Akitoshi Hatanaka, Tsutomu Hayamizu, Hironori Hayashi, Tomoya Hitotsuda, Toshihiro Horaguchi, Toshihiro Horikawa, Miyoshi Ida, Kazuyoshi Imamura, Kai Ishida, Masateru Ishiguro, Ken Isobe, Tadashi Ito, Sunho Jin, Noboru Kaizuka, Wonseok Kang, Hisashi Kasebe, Toshihiko Katayama, Yohei Kawasaki, Ryosuke Kawasaki, Taewoo Kim, Kihyeon Kim, Masayuki Kita, Katsuhiko Kitazaki, Naoko Kitazaki, Hiroya Kurisu, Norihiro Manago, Makoto Mathushima, Chika Matsumi, Masafumi Matsumura, Hiroshi Matsushita, Shuji Matsuura, Ayami Mihari, Toshihiro Nagata, Masaru Naka, Takahiro Nakamura, Tatsuya Nakaoka, Reiko Nishihama, Yukio Nishiyama, Hirotomo Noda, Sadao Nukui, Masahiko Oba, Masaaki Ogawa, Osamu Ohshima, Takaya Okamoto, Yujiro Omori, Minoru Owada, Kazuyuki Saito, Jinguk Seo, Hiroki Shirakawa, Tomoshi Sugino, Kazuhiko Takagaki, Yuki Tani, Mitsunori Tsumura, Yukikazu Ueda, Yoshihiro Ueyama, Seitaro Urakawa, Hiroyuki Watanabe, Hayato Watanabe, Masanari Watanabe, Masa-Yuki Yamamoto, Hidehito Yamamura, Kouhei Yamashita, Misato Yamashita, Fumi Yoshida, Hideki Yoshihara





Obs. Sites : 36
Positive detection: 18
Negative detection:7
Fail (Insturument trable, weather etc):11

Occultation : 2021.10.03 16h58m UT
Star : UCAC4 646-021974(=GSC 2894-00131) 12.0 mag
RA 04h 50m 35.205s, DEC +39° 05' 11.25" (J2000)
Mag drop : ~6.5 mag
Duration : Max = 0.64 sec

- The Phaethon's cross section at the time of the stellar occultation on October 3 (UT) would be fitted approximately by an ellipse with a major diameter of 6.12 ± 0.07 km and a minor diameter of 4.14 ± 0.07 km.
- This is the first successful ultra-precise measurement of stellar occultation by an asteroid 5-6 km in diameter using a CMOS camera and a GPS module. The large number of observation points and the high-precision time keeping method enabled us to obtain a high-resolution outline of Phaethon. The measurement error of each observation point is about 80-140m.

Figures are from Occultation Observation Manual, which we are now making.

Observation tools

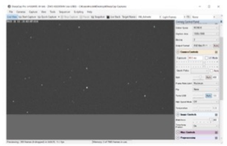
(1) GPS module & GPS clock : Recording the exact timing of occultation

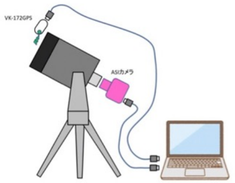
(2) CMOS camera

Since this CMOS camera has a GPS function, people using this CMOS camera do not need to use the GPS module.

(3) SharpCap for image capture

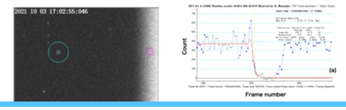
https://www.sharpcap.co.uk





(4) Limovie for analisys

http://astro-limovie. info/occultation_observation/limovie_en.html

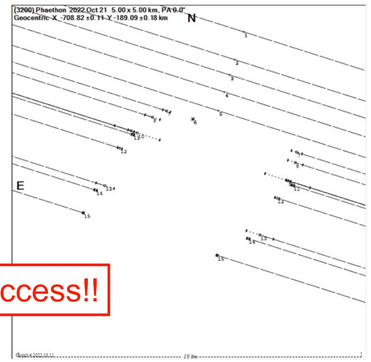


- Capture a series of images including 1 PPS LED emission produced by the GPS module, which has only an atomic clock level error relative to UTC.
- Corrected the time recorded by the computer by Limovie.

Occultation observation on October 21, 2022

Observers : 39

Hiroshi Akitaya, Tomohiro Asada, Yu Fujise, Mai Hamagaki, George L. Hashimoto, Tsutomu Hayamizu, Hironori Hayashi, Arika Higuchi, Toshihiro Horaguchi, Kai Ishida, Masayuki Ishida, Ken Isobe, Hisashi Kasebe, Hodaka Komori, Ryo N. Matsuoka, Shuji Matsuura, Hiroyuki Mita, Kazuhisa Miyashita, Yohei Moteki, Sakura Namikawa, Hirotomo Noda, Chinami Okochi, Ryo Osawa, Motoki Ouchi, Tomohiko Sekiguchi, Maho Shiratori, Tsutomu Soejima, Seiko Takagi, Yudai Takahara, Koji Takimoto, Yuto Tome, Hiroyuki Tuda, Yukikazu Ueda, Ryujiro Washio, Kazuo Watanabe, Hidehito Yamamura, Mikoto Yasue, Fumi Yoshida, Hidetoshi Yoshida



Obs. Sites : 19
Positive detection: 9
Negative detection:5
Fail (Instruments trouble, weather etc.):5

Occultation : 2022.10.21 14h32m UT
Star : TYC 2844-0735-1(=UCAC4 675-013356) 10.8 mag
RA 02h 32m 08.786s, DEC +44° 56' 40.06" (J2000)
Mag drop: ~6.7 mag
Duration : Max = 0.22 sec

We learned how to conduct an observing campaign

Date	Object	Mission
Oct. 6, 2022	Triton	
Oct. 21, 2022	Phaethon	(DESTINY+)
Oct.-Nov. 2022	Didymos	(DART)
Jan.-Mar. 2023	2001CC21	(Hayabusa2#)

Now, Japanese observers can handle observations of occultation events with the durations as short as 0.1 sec, with brightness of the occulted star <11-12mag.

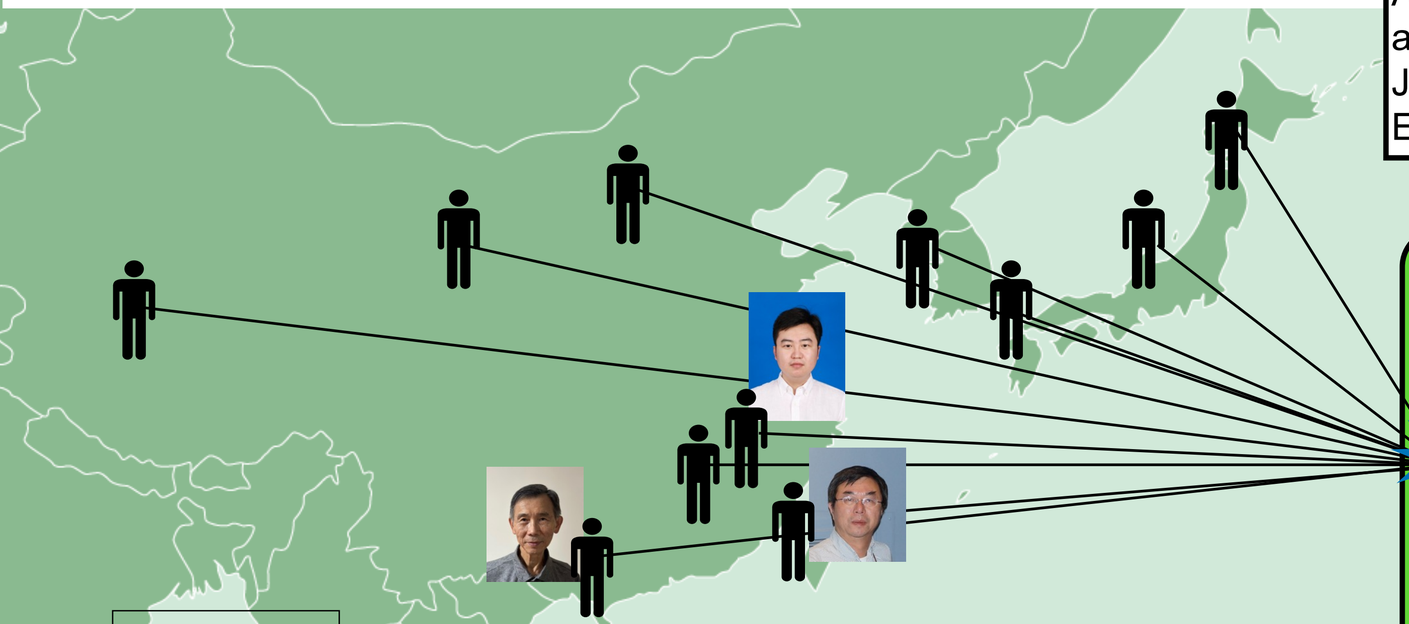
Since 1995

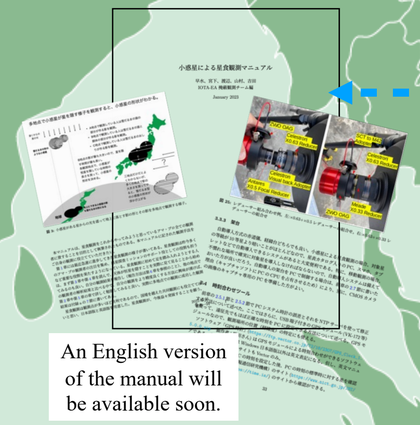
Structure of IOTA/EA

Japan Occultation Information Network (JOIN)

Occultation Observing Professionals

Accumulation of research on the performance of observation/data analysis and improvement of observation/analysis techniques by Japanese amateur astronomers.
Extensive discussion on Occultation Observation.





An English version of the manual will be available soon.

IOTA/EA

- Provide occultation prediction for East Asia region
- Collect observational results and report to IOTA/IAU
- Archive observation data sets
- Launch observing campaign
- Running workshops on occultation observations

- Distribute observation manuals
- Share observing methods and analysis software
- Disseminate IOTA/EA activities through the websites

Providing information to local observers

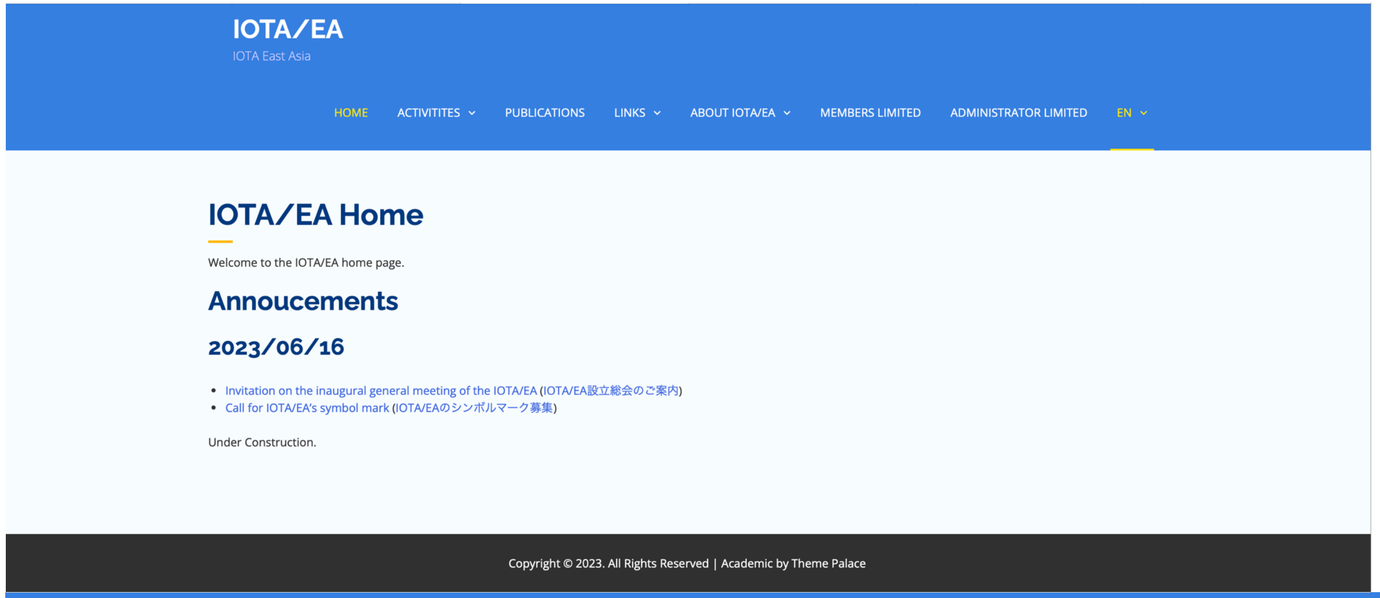
As there is no common language in the Asian region, information must be provided by each director in the local language.

Directors of each country/region

Act as a liaison between IOTA/EA and the observers in each region where the director resides.
(1) Communicate information sent by IOTA/EA in **English** to observers in each region in a language they can understand.
(2) Communicate reports and questions from observers in each region to the IOTA/EA.

It would be great if we could extend this observation network to our friends in the Southeast/Central Asia regions in the near future!

IOTA/EA Website https://www.perc.it-chiba.ac.jp/iota-ea/wp/



Multilingual support.

To reduce the barrier between languages, an automatic translation function is provided.
As this is an automatic translation, there may be cases where the meaning is difficult to convey, but it is better than nothing.

Each page is still under construction.
We hope to have the site completed just before the inaugural meeting.

Please visit the site after the meeting.

Prediction list for East Asia Observers

IOTA/EA
IOTA East Asia

ASTEROIDAL OCCULTATION PREDICTION 2024 EN

Home / Asteroidal Occultation Prediction 2024

Asteroidal Occultation Prediction 2024

The predictions on this page are courtesy of Steve Preston (IOTA, USA) and Edwin Goffin (IOTA, Belgium). We also thank Mitsuru Soma(National Astronomical Observatory of Japan) contributed to the publication of this article.

Past predictions, Japan (link to HAL site)

Results of Asteroidal occultation, East Asia (link to HAL site)

Asteroidal occultation Prediction at Japan（2024)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

January

Show 7 entries Search:

Date(UT)	Star	mag	RA(h m s)	Dec(° ' ")	Asteroid	mag	dia (km)	duration (sec)	dmag	Links	Region	Note
01/04 12h49m	UCAC4 490-005400	14.4	03 44 52.569	+07 51 01.12	2013XL40	23.55	125.9	8.1	9.2	Goffin		TNO
01/05 12h08m	TYC 1310-00691-1	11.87	05 41 02.294	+21 10 49.83	(4)Vesta	6.7	523.2	45.5	0.0	Goffin		Major, Small dmag
01/07 11h11m	TYC 0088-00424-1	11.80	04 50 12.784	+02 39 59.40	(173)Ino	11.58	159.0	19.1	0.7	Goffin		Small dmag
01/07 11h53m	TYC 0590-01033-1	9.13	23 59 47.836	+04 44 55.84	(465)Alekto	16.20	76.6	3.5	7.1	Goffin		Very fine
01/09 14h40m	UCAC4 666-045936	11.40	06 19 37.342	+43 07 54.49	(6090)Aulis	16.44	55.0	3.2	5.1	Goffin		Trojan
01/09 20h14m	HIP 33738	9.03	07 00 33.424	+42 58 03.85	(804)Hispania	12.40	140.6	9.8	3.4	Goffin		Very fine

The IOTA/EA staff selects and lists the observable occultation event in East Asia from a number of predictions.

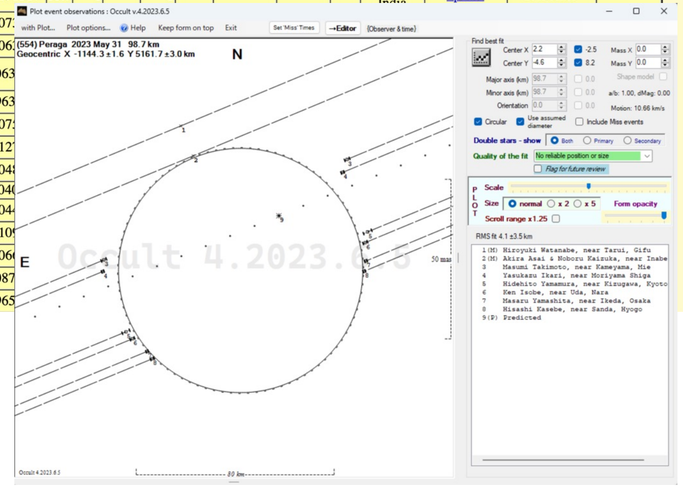
Observation results are also available.

Results of Asteroidal occultation

The Summary of East Asia Results

*1 : The Observations from 2021 are published in OBS.XML format available OCCULT4 as "Obs"field. Download by right click.

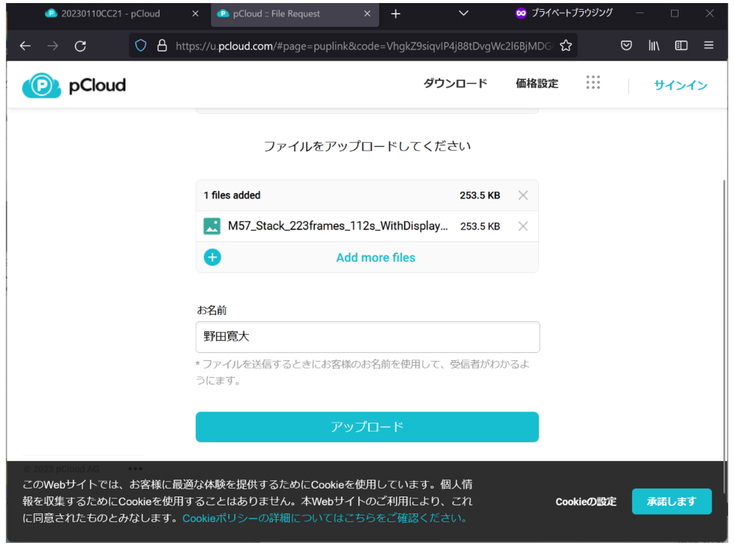
No.	Date(UT)	Asteroid	Star	mag	Successful observations							Obs (*1)	Reduction	update	light curve
					Total	Visual	Video	Photo/ CCD	Hi-speed CCD, CMOS	unknown	other				
878	2023/6/20	417 Suevia	UCAC4 387-111810	13.0	1				1			update	update	2023 Jul.03	
877	2023/6/20	393 Lampetia	UCAC4 476-090238	12.3	1				1			update	update	2023 Jul.03	
876	2023/6/19	657 Gunlod	UCAC4 295-169520	14.1	3				3			update	update	2023 Jul.03	
875	2023/6/17	417 Suevia	UCAC4 387-113474	14.8	1				1			update	update	2023 Jul.03	
874	2023/6/5	676 Melitta	UCAC4 416-096963	14.2	2				2			update	update	2023 Jul.03	
873	2023/5/31	53 Kalypso	UCAC4 527-050263	13.8	7				7			update	update	2023 Jun.09	
872	2023/5/31	554 Peraga	UCAC4 350-071972	13.3	6				6			update	update	2023 Jun.08	
871	2023/5/31	305 Gordonia	UCAC4 359-090719	14.2	1				1			update	update	2023 Jun.08	
870	2023/5/26	67 Asia	TYC 5603-00158-1	9.9	1				1			update	update	2023 Jun.08	
869	2023/5/21	1952 Hesburgh	UCAC4 363-077264	13.7	1				1			update	update	2023 Jun.08	
868	2023/5/17	4642 Murchie	UCAC4 359-072995	13.2	1				1			update	update	2023 May.22	
867	2023/5/17	206 Hersilia	UCAC4 361-098317	10.7	1		1					update	update	2023 Jul.03	
866	2023/5/16	26722 2001 HK7	UCAC4 367-07												
865	2023/5/15	892 Seeligeria	UCAC4 474-06												
864	2023/5/14	336 Lacadiera	TYC 6152-0063												
863	2023/5/11	4829 Sergestus	TYC 581-00963												
862	2023/5/11	423 Diotima	UCAC4 361-07												
861	2023/5/11	52 Europa	UCAC4 369-12												
860	2023/5/10	1023 Thomana	UCAC4 504-04												
859	2023/5/3	1116 Catriona	UCAC4 611-04												
858	2023/5/3	191 Kolga	UCAC4 533-04												
857	2023/4/28	15066 1999 AX7	UCAC4 279-10												
856	2023/4/28	1520 Imatra	UCAC4 348-06												
855	2023/4/22	14394 1990 SP15	TYC 4960-0087												
854	2023/4/20	22 Kalliope	TYC 883-00965												



Data Archive

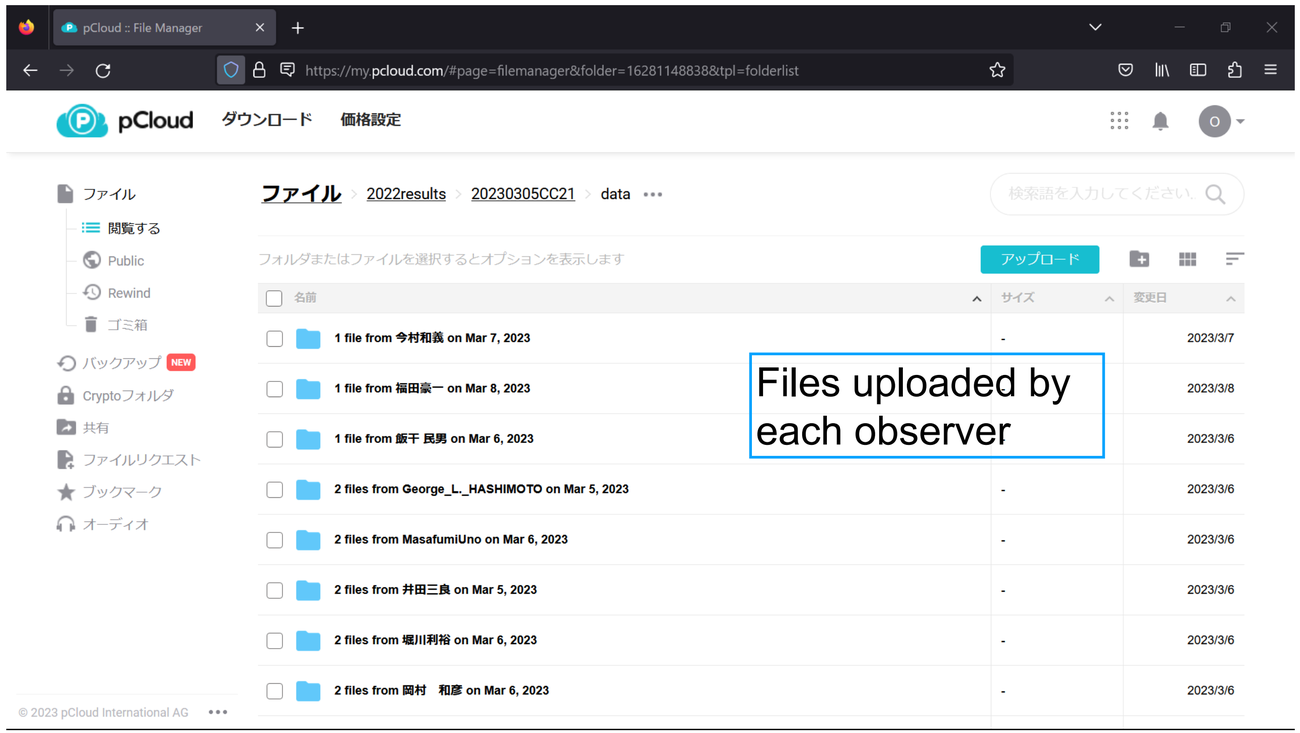
We will collect avi files and camera setting information from each observer.
The data set will be stored separately for each occultation event.

Data upload site

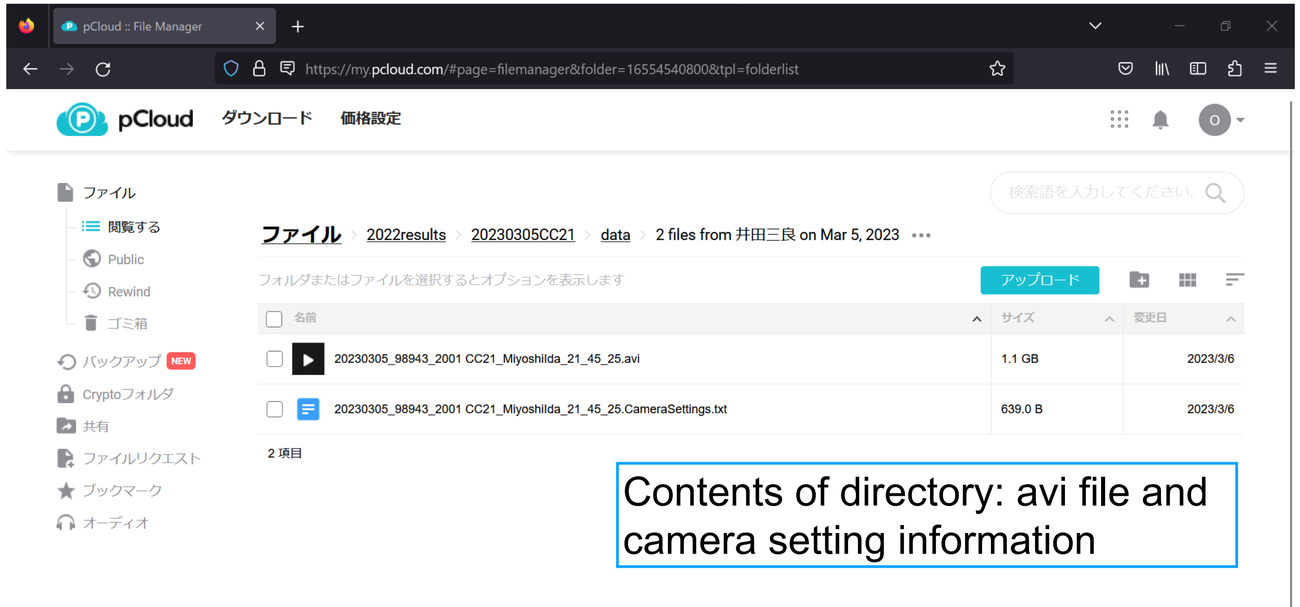


Currently, 12TB of disk space is reserved for data archiving. When the space runs out, hard drives are purchased with IOTA/EA membership fees (about $10).

Occultation event by 2001CC21 on March 5, 2023



Files uploaded by each observer



Contents of directory: avi file and camera setting information

Symbol Mark Public Call and Observation Plan for FY2023

Call For IOTA/EA's Symbol Mark

Japanese/日本語

As announced in a separate email, IOTA/EA (a group for occultation observations in East Asia) is being formed.

Accordingly, we call for a symbol mark of the IOTA/EA from public. Could you spare some time to consider symbol mark candidates as an expression of your support for IOTA/EA activities?

Please submit your logo via e-mail to the address : iota-ea_core@googlegroups.com

(the file size should be smaller than 2 Mbytes. Those whose symbol marks are selected will be asked to send a high resolution file later, so please be prepared to do so.)

Please be sure to include your name and email address with the symbol mark file.

The deadline for entries is 15 August, 2023.

The result will be announced at the inaugural general meeting of the IOTA/EA on 27 August, 2023 and will also be on the IOTA/EA website.

＊＊＊＊ Copyright of the symbol mark＊＊＊＊

The copyright belongs to the author, but it is freely available for commercial and non-commercial use. However, it may not be altered or used in any way. (CC-ND)

We look forward to receiving your contributions.

Founding members of the IOTA/EA (in alphabetical order)

- Hiroshi Akitaya
- Tsutomu Hayamizu
- Toshihiro Horaguchi
- Kazuhisa Miyashita
- Hirotomo Noda
- Mitsuru Soma
- Hayato Watanabe
- Fumi Yoshida

We have issued a broad call for the symbol mark of IOTA/EA. We have already received several applications. After a review process, the symbol mark will be officially unveiled at the inaugural meeting on August 27, 2023.

Inaugural meeting of IOTA/EA will be held on August 27, 2023, on zoom.
Once IOTA/EA is established, we would like to contribute to the occultation observations in the East Asia region in close cooperation with IOTA.

We are preparing an observing plans for FY2023. The main event are the occultation observations of **2005UD** and **Phaethon**, which is the flyby target/ candidate of the DESTINY+ mission.
We plan to make observations in search of **rings and satellites** because the rings and satellites have been discovered in outer objects such as TNO and the Trojan group in recent years.