2025. 08. 31

# 小惑星(6326)Idamiyoshiの衛星発見と記念座談会

1. (6326)Idamiyoshiの衛星の観測
2. 衛星発見を確かなものにした解析
3. 衛星発見の記念座談会（2025.7.19）

*20240821_(6326) Idamiyoshi*

小惑星 Idamiyoshi の整約図から作られた立体模型（渡部さん作成）

IOTA/EA、JOIN　山村　秀人
認定NPO法人花山星空ネットワーク

2025. 08. 31

# Discovery of a Satellite of Asteroid (6326) Idamiyoshi & the Commemorative Meeting

1. Satellite Observations of (6326) Idamiyoshi
2. Analysis that Confirmed the Satellite Discovery
3. Discussion Celebrating the Satellite Discovery (July 19, 2025)

*20240821_(6326) Idamiyoshi*

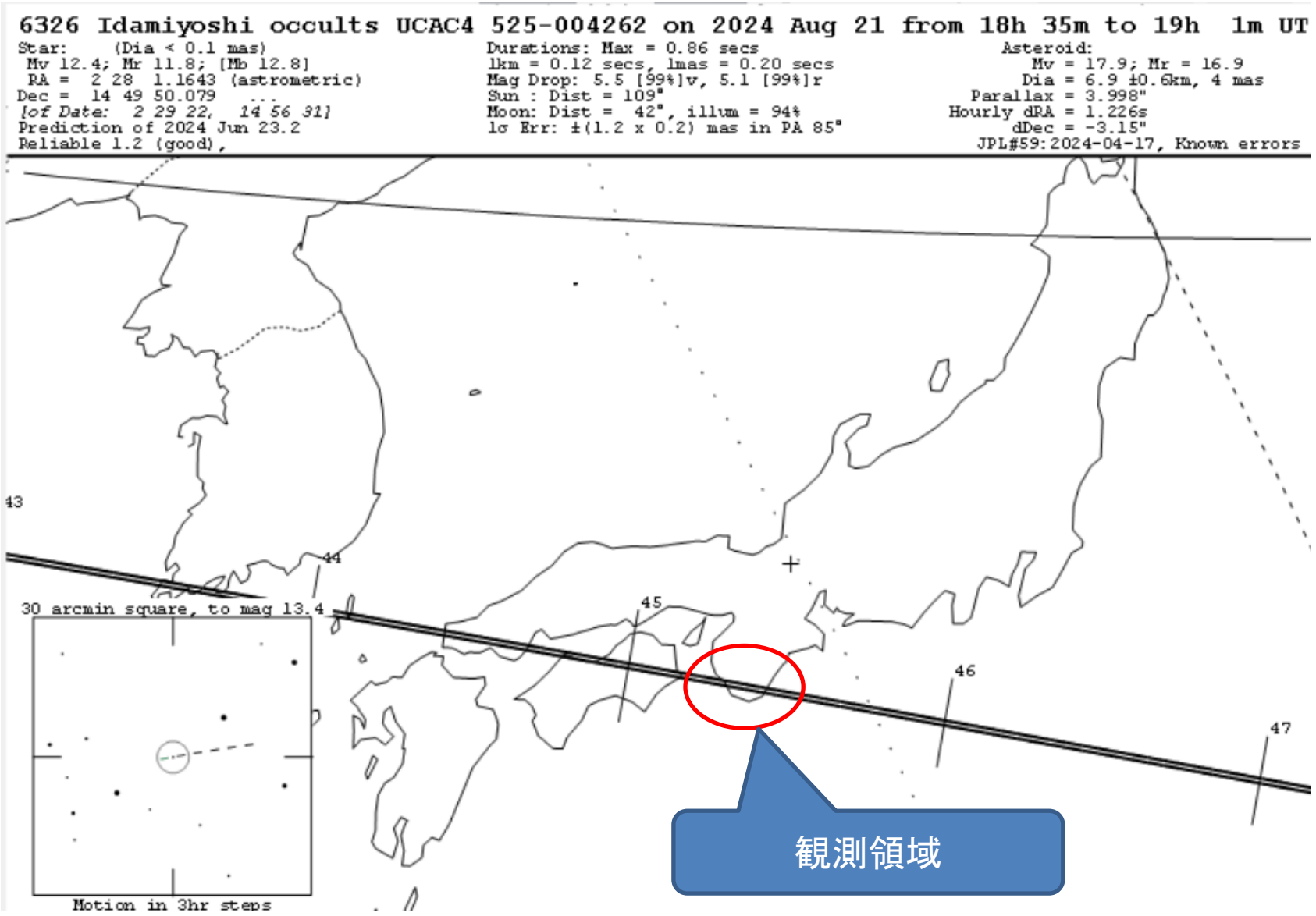
A 3D model of the asteroid Idamiyoshi made from a reduced diagram (created by Watanabe)

IOTA/EA *Hidehito Yamamura*
＜NPO KWASAN ASTRO NETWORK＞

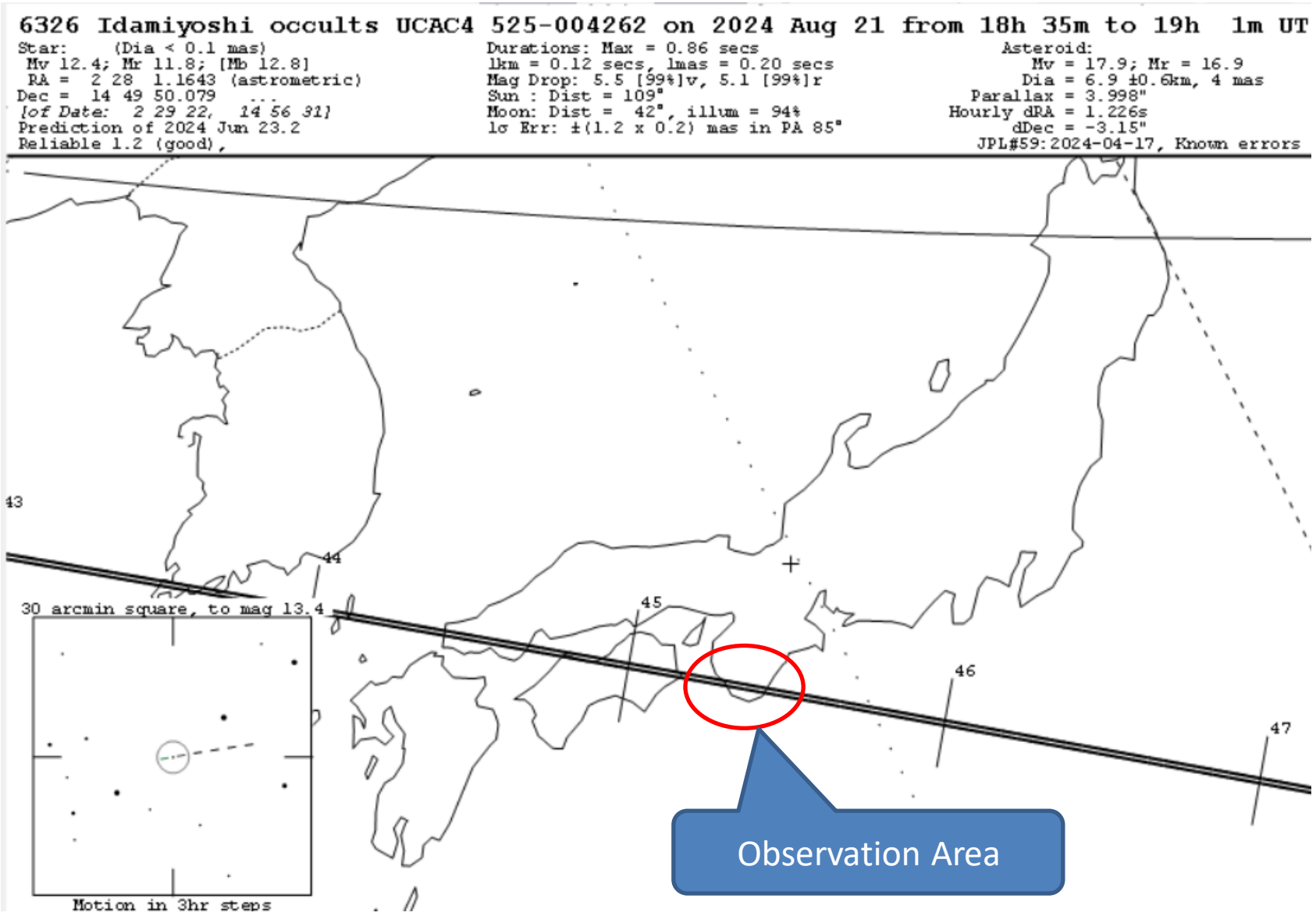
# <Slide 1: Oral explanation>

- This is Yamamura from the NPO Kwasan Astro Network.
- We were able to discover the satellite during observations of the occultation by the asteroid Idamiyoshi on August 21st last year.
- Thanks to Miyashita's detailed analysis, the satellite was confirmed, and a report was made to the IAU's CBAT and a paper was submitted to the Minor Planet Bulletin (MPB).
- In addition, a celebration party was held at the Dynic Astronomical Observatory (Tenkyukan), where the asteroid Idamiyoshi was discovered, with all involved parties gathered for a roundtable discussion.
- I would like to report on the progress of this discovery on behalf of all those involved.

# 20240821 (6326)Idamiyoshi Observed



# 20240821 (6326)Idamiyoshi Observed

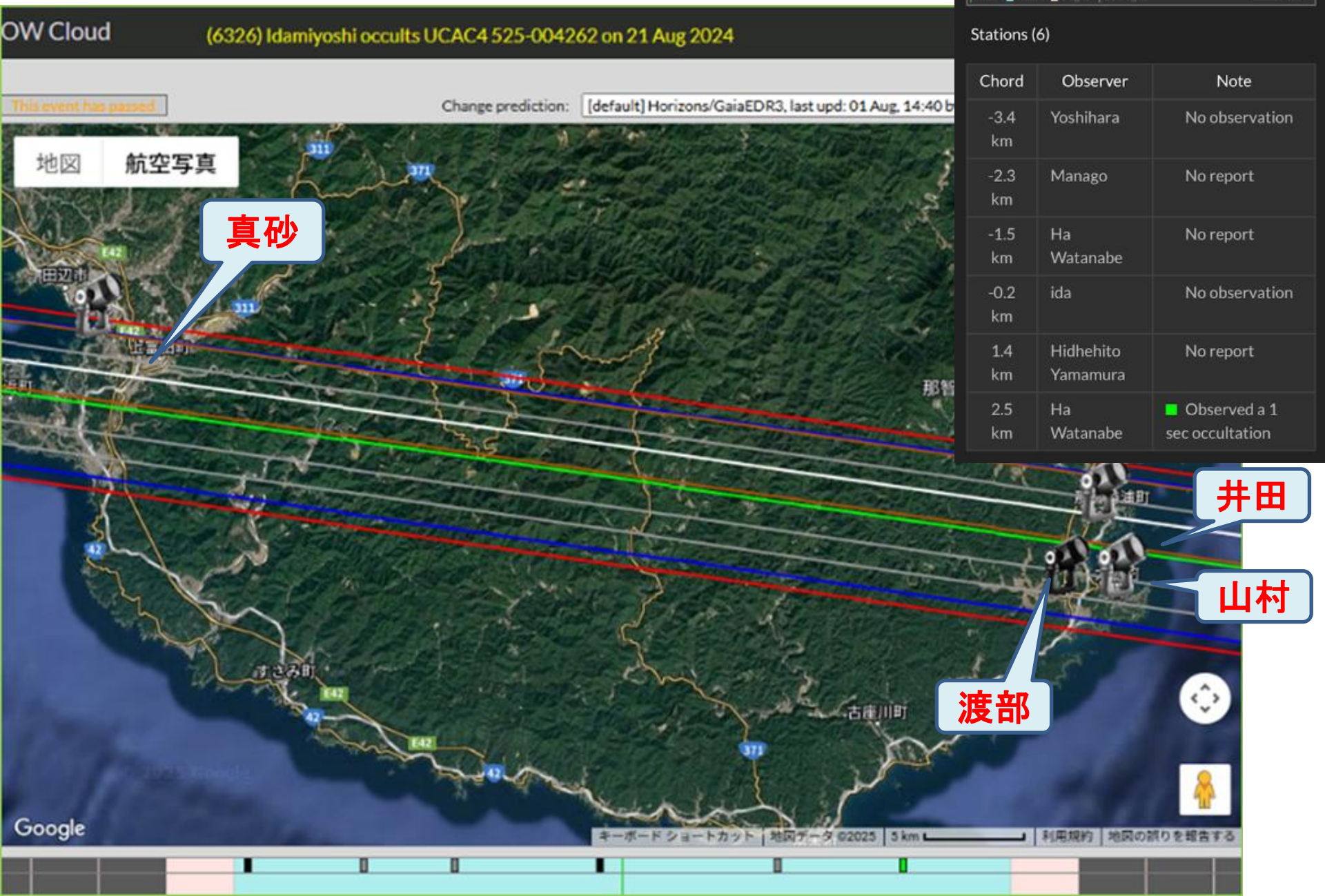


# <Slide 2: Oral explanation>

- When I used Oculus4 to calculate the occultation forecast for August 2024, I found the asteroid "Idamiyoshi" among the results.
- I had a feeling that this name must have been named after Mr. Ida, so even though the occultation belt passes beyond the Kii Peninsula,I included it in my observation plan.
- The target star was bright at magnitude 12.4, and the dimming lasted a maximum of 0.86 seconds. The dimming magnitude was 5.5, and although the duration was short, it was a relatively easy phenomenon to observe.

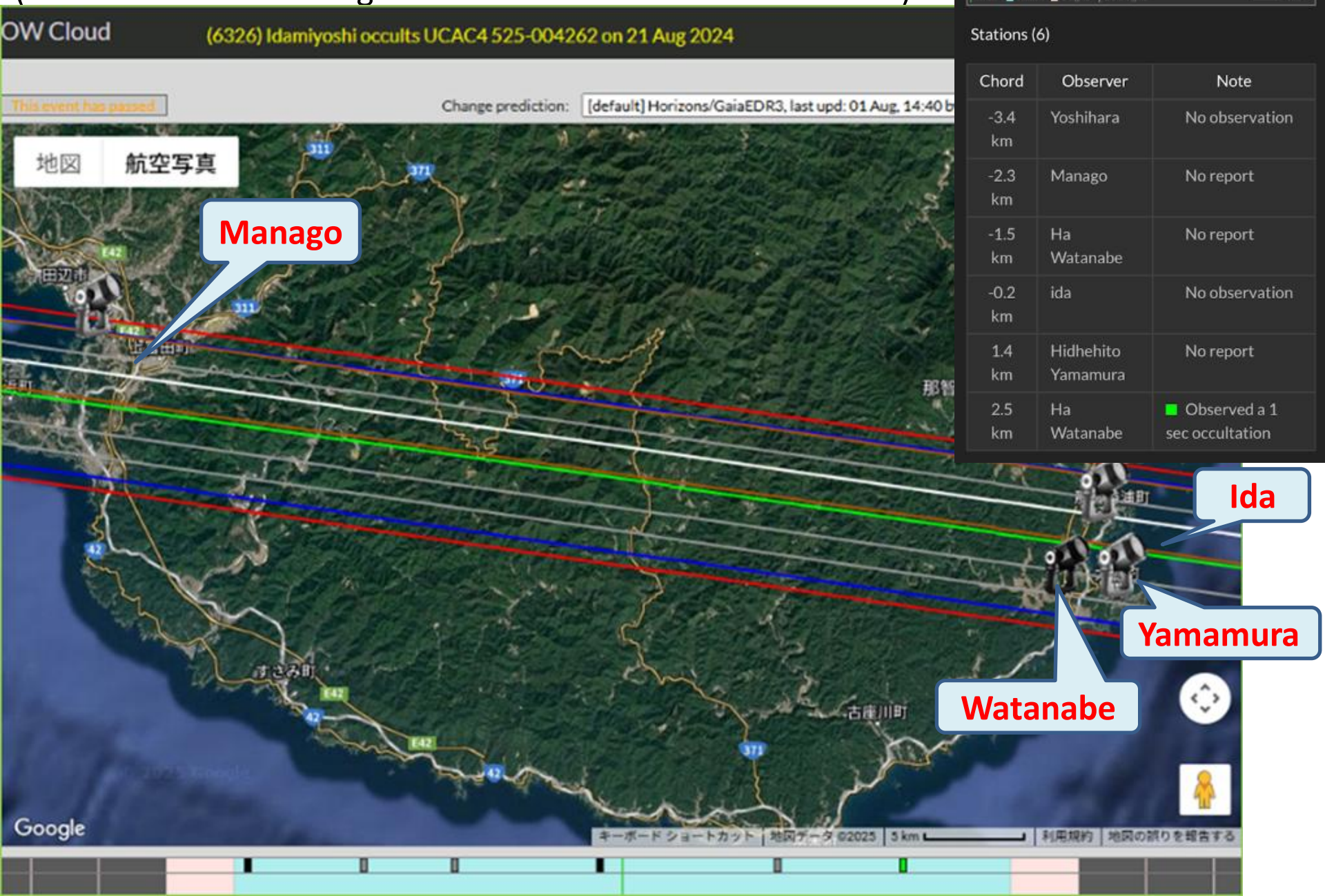
# 掩蔽帯と観測Site

（Occult watcher Cloud に登録された観測者とライン）



# Occultation Zones and Observation Sites

(Observers and lines registered in the Occult watcher Cloud)




Shadow crossing the Earth for **25:27 min** from **18:35:12 UT** to **19:00:40 UT**

Stations (6)

| Chord | Observer | Note |
|---|---|---|
| -3.4 km | Yoshihara | No observation |
| -2.3 km | Manago | No report |
| -1.5 km | Ha Watanabe | No report |
| -0.2 km | ida | No observation |
| 1.4 km | Hidhehito Yamamura | No report |
| 2.5 km | Ha Watanabe | Observed a 1 sec occultation |

# <Slide 3: Oral explanation>

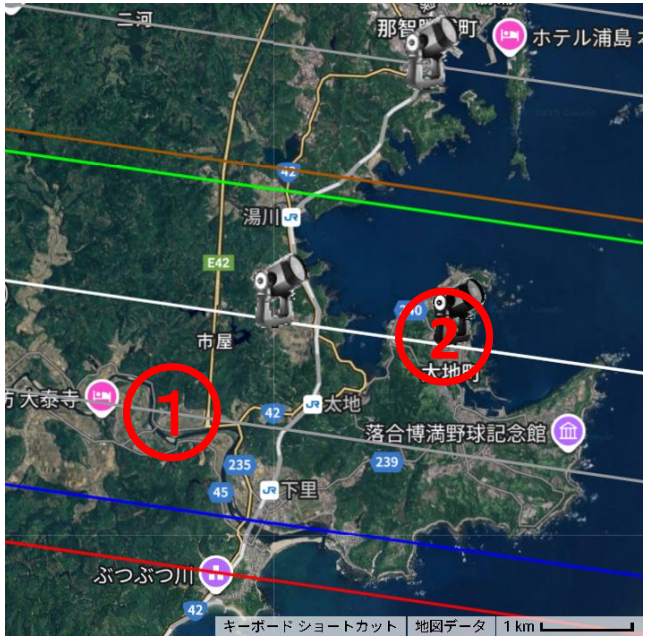
- When I looked up the detailed occultation belt on OccultWatcherCloud, I found that it ran from Katsuura in Wakayama Prefecture to Shirahama.
- Ida-san had already registered an observation site in Katsuura, which is close to the center line of the occultation belt,
- so I chose to set up my observation site about 1.5km south of there, in Taiji, the town known for whales, where I had previously observed whales.
- Watanabe-san also set up his observation site about 1km further south.
- Masago-san's observation site is at his home.When I used

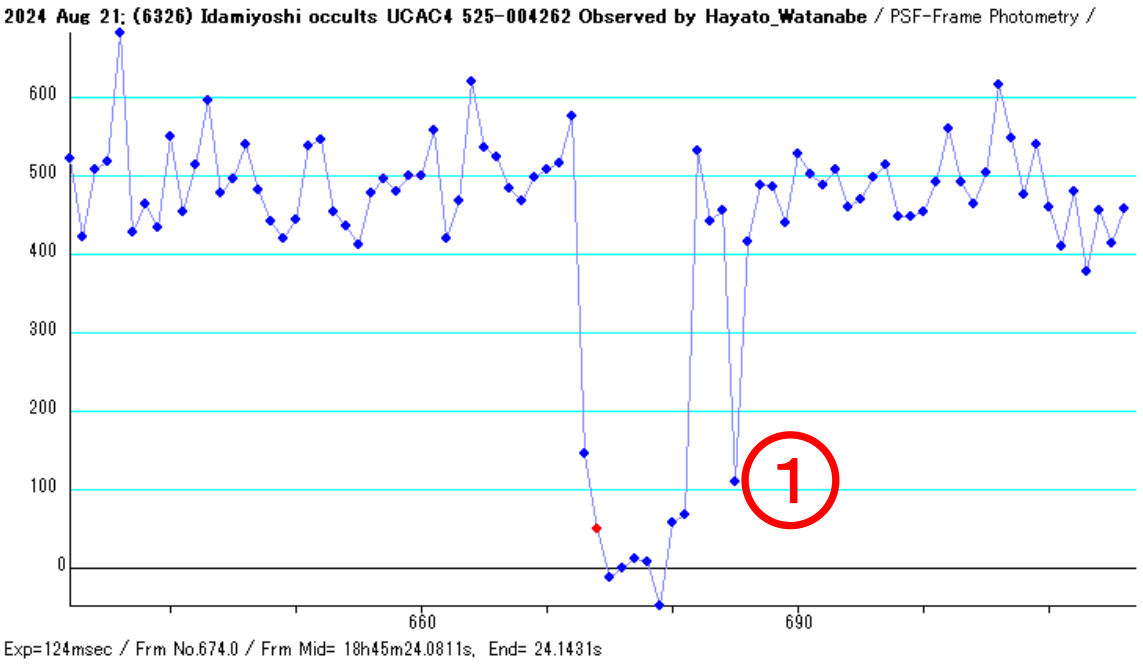
# 2回目の減光

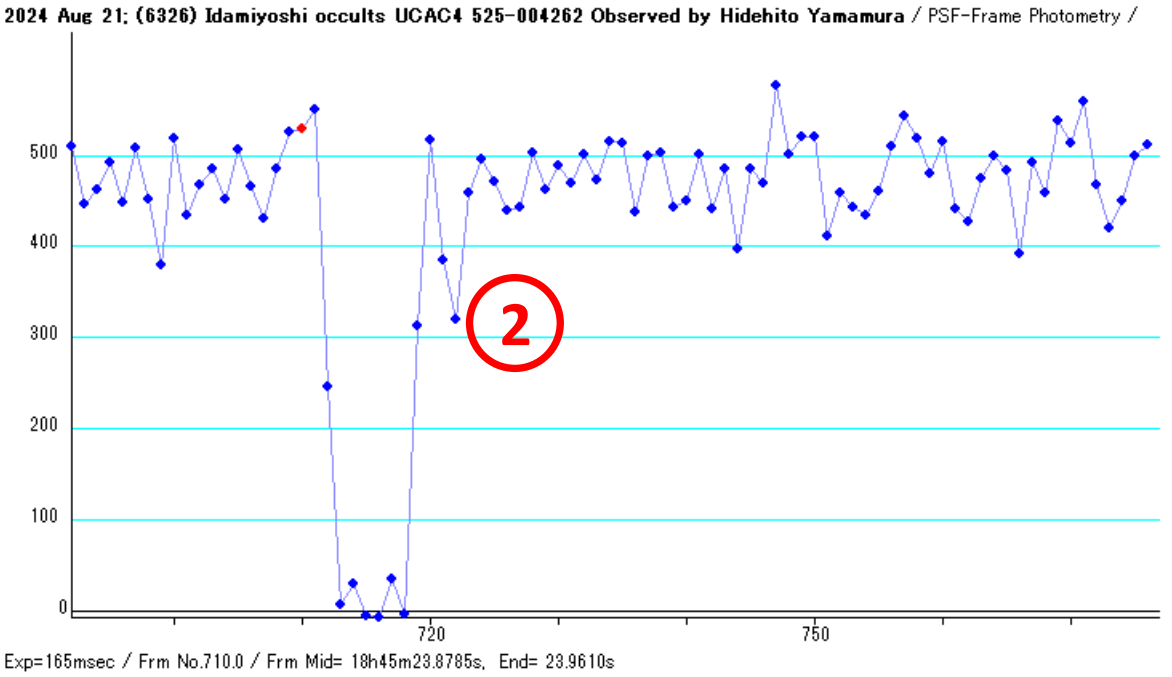
① 18h45m25.378s±0.021s
by Watanae
74%(1.47mag)減光

② 18h45m25.753s±0.087s
by Yamamura
34%(0.45mag)減光

この観測により、Idamiyoshi に小さな衛星がある可能性が得られた。



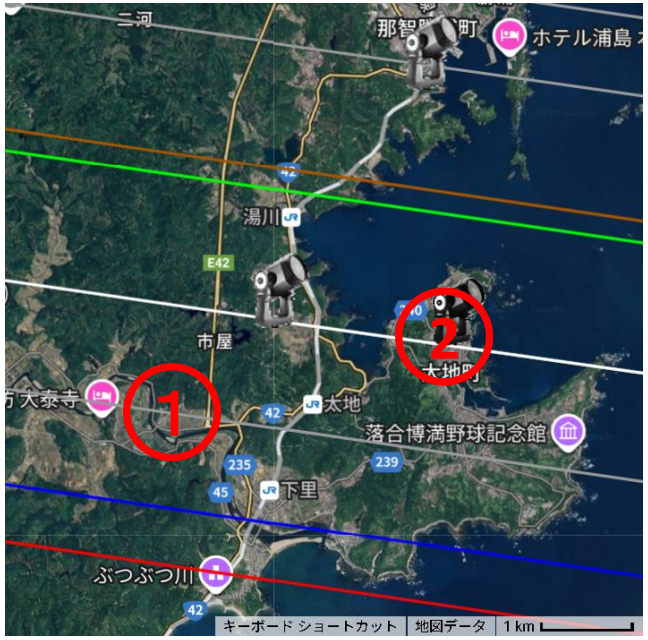



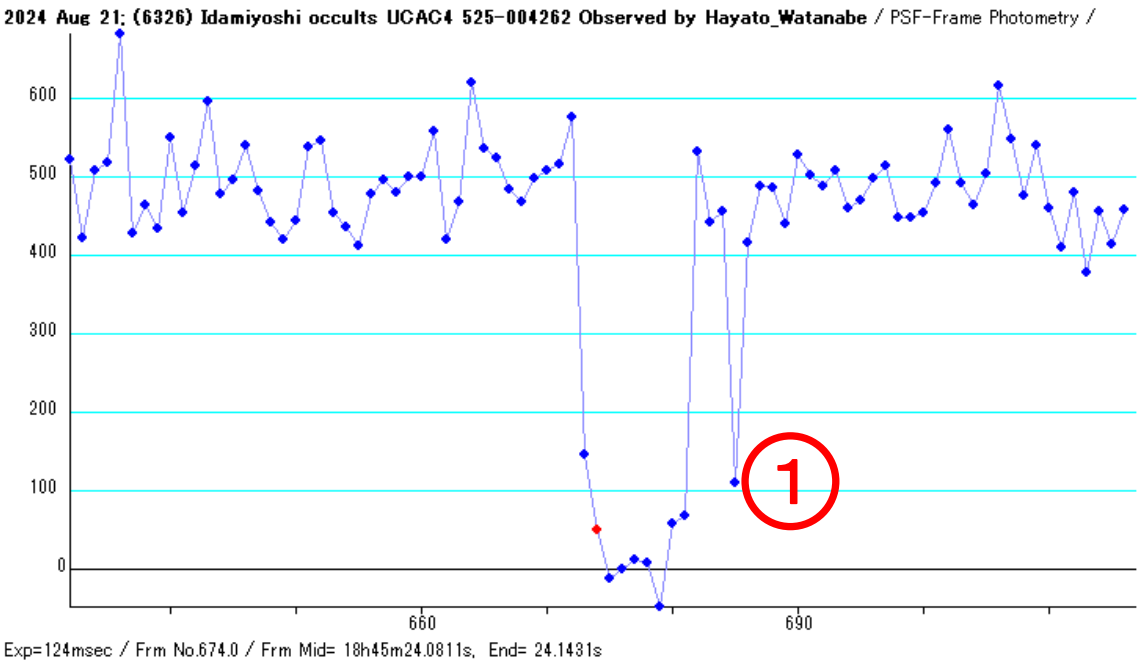
# Second dimming

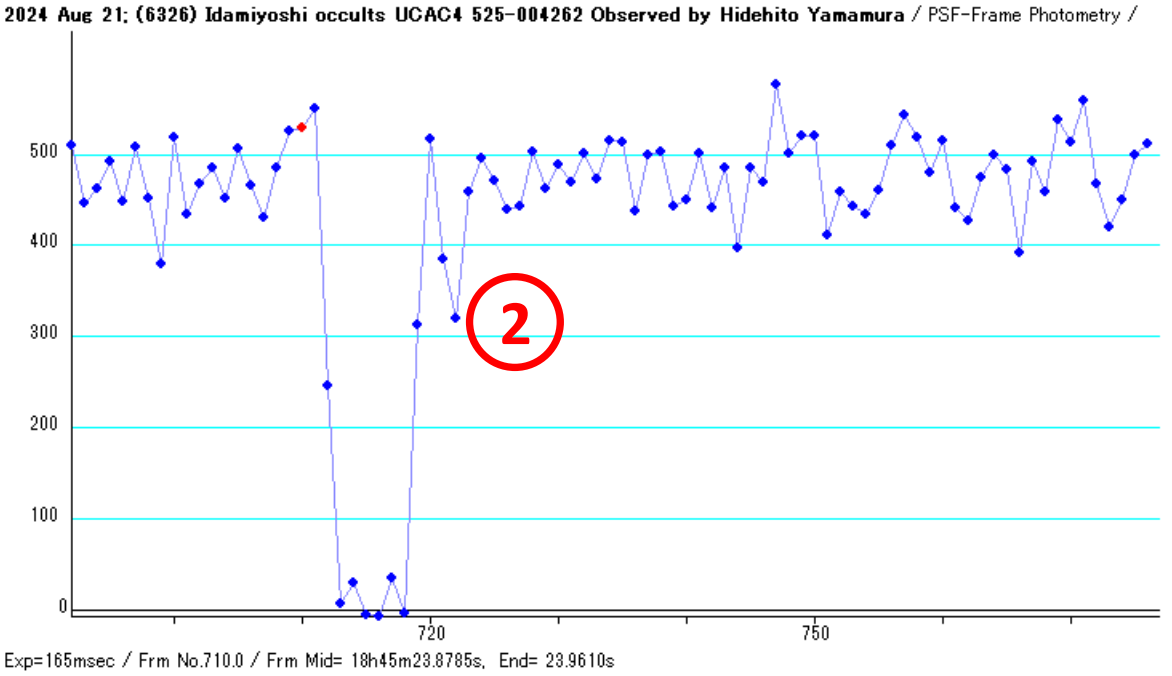
① 18h45m25.378s±0.021s
by Watanae
74%(1.47mag) dimming

② 18h45m25.753s±0.087s
by Yamamura
34%(0.45mag)dimming

This observation suggests the possibility that Idamiyoshi may have a small satellite.



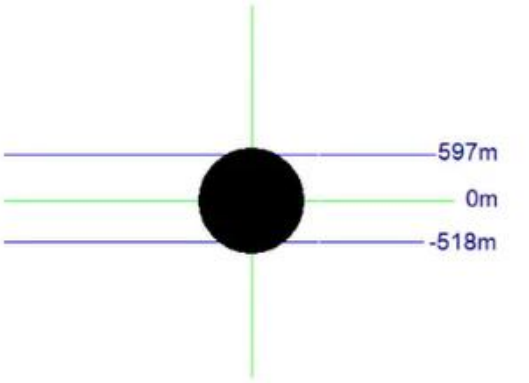



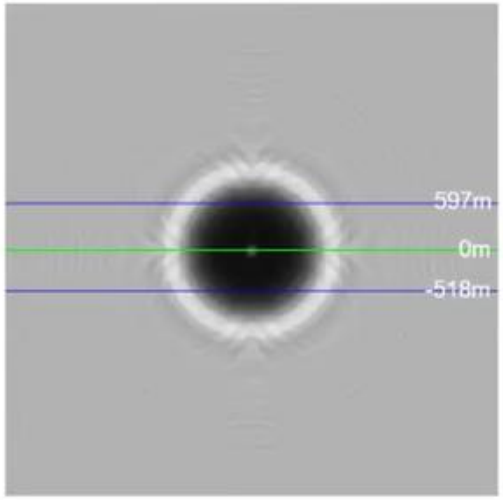
## <Slide 4: Oral explanation>

- On the day of observation, the weather was unstable, with a low-pressure system caused by a typhoon passing nearby.
- The clouds gradually disappeared, and although there was a thin layer of cloud at the time of observation, the target star was bright enough to be observed.
- After observation, when I looked at the LightCurve, I saw that after the initial dimming and recovery, it had dimmed again by about 1/3, for just one frame.
- I was curious about this, but then Watanabe sent me a LightCurve on Line, which indeed recorded a second, short dimming,and I was convinced that it was the real thing.
- Watanabe and I exchanged messages asking, "Could it be a satellite?"
- Analysis using limovie showed that the second dimming occurred almost simultaneously, so I asked Miyashita for a detailed analysis of the possibility that it was a satellite.

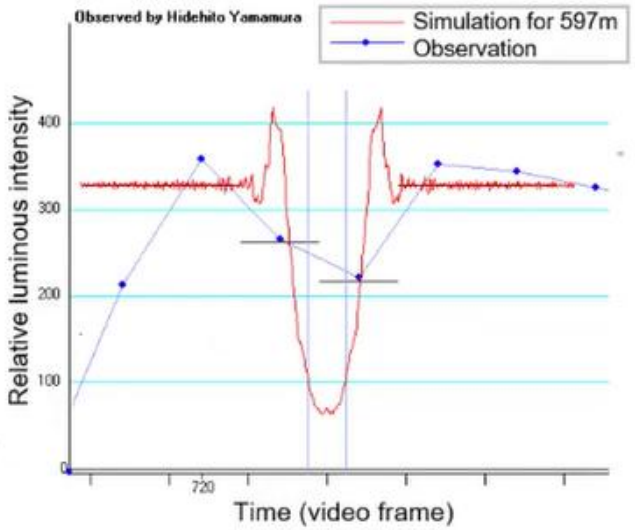
# 衛星かどうかの詳細な解析（宮下さんによる）
## 2番目の減光についての、フレネル回折シミュレーションによる解析結果

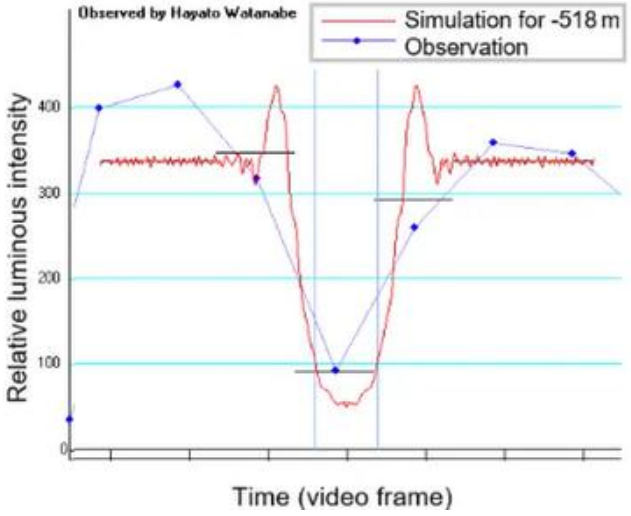


Silhouette model (Circle; diameter=1352m)



Shadow of model (diffraction simulation)



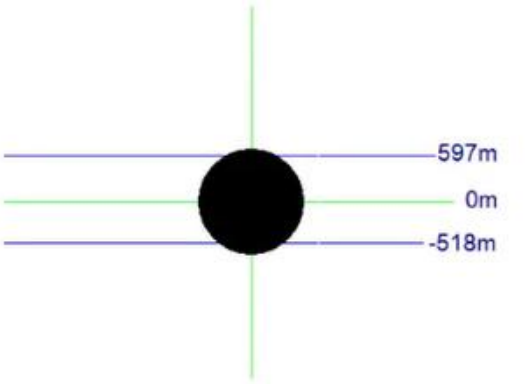




宮下はフレネル回折のシミュレーションモデルを作成しそれとの比較から、両観測者の2番目の減光の深さが、1.3kmの天体のフレネル回折モデルと一致することを見出した。

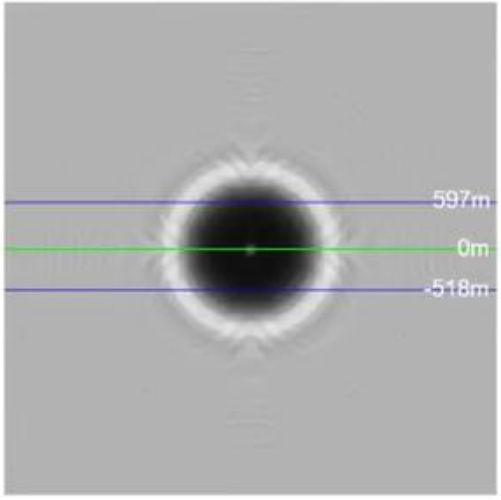
# Detailed analysis of whether it is a satellite

(by Mr. Miyashita)

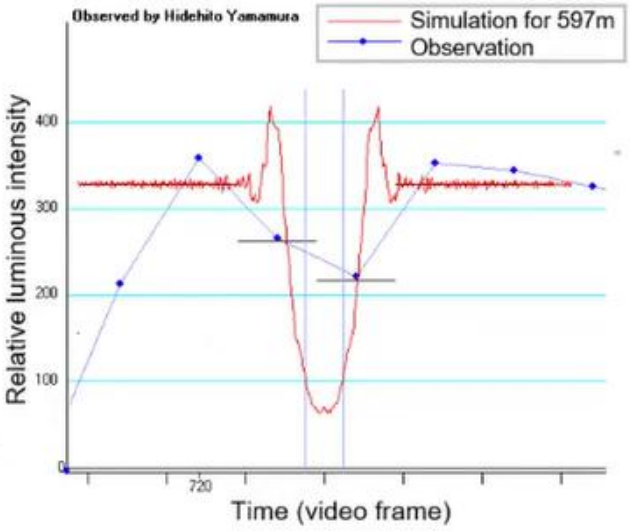
Analysis results of the second dimming using Fresnel diffraction simulation

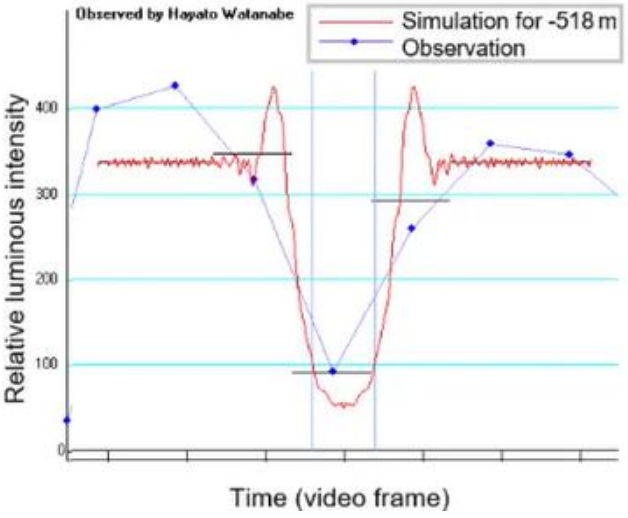



Silhouette model (Circle; diameter=1352m)




Shadow of model (diffraction simulation)



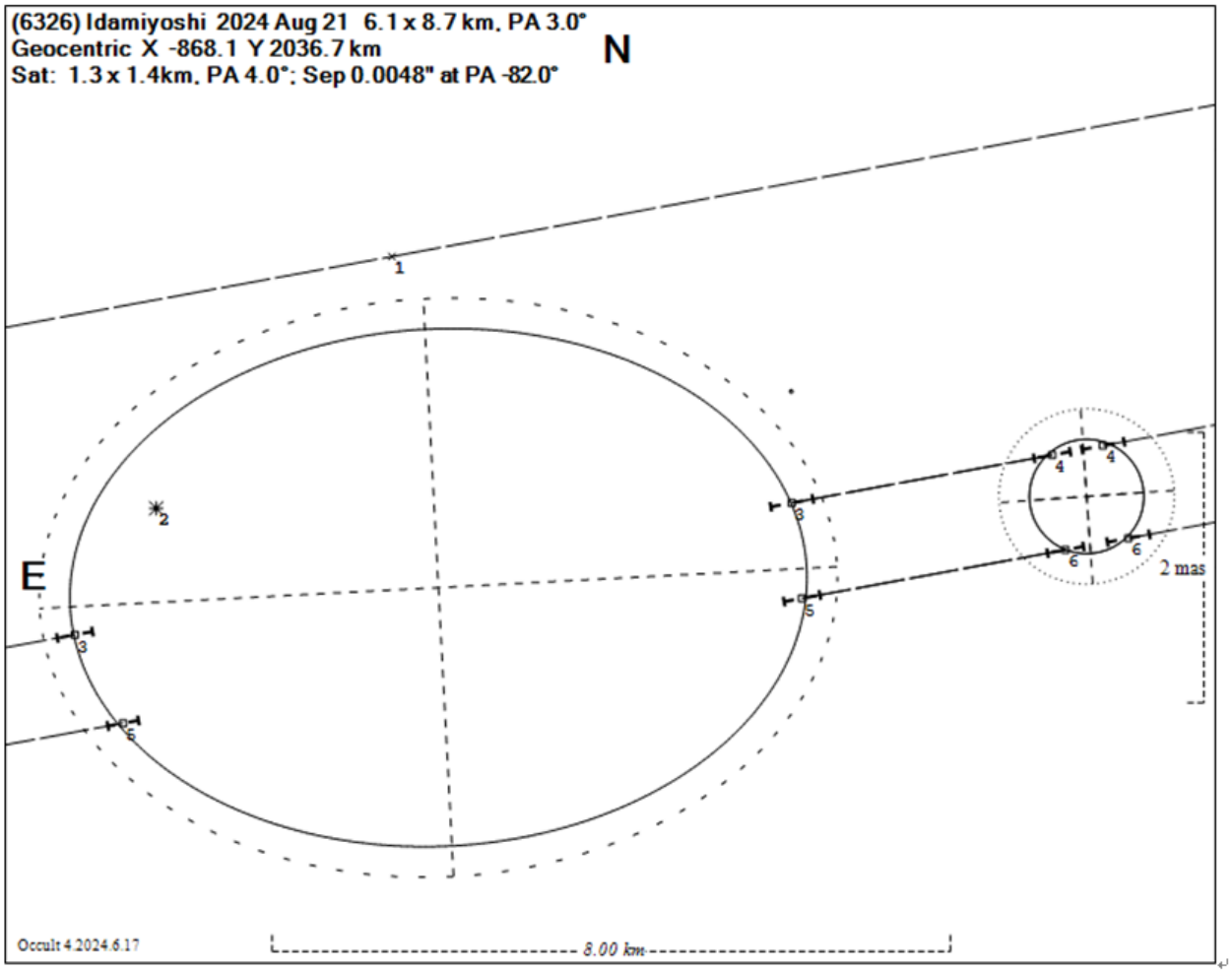




Analysis results of the second dimming using Fresnel diffraction simulation.

# <Slide 5: Oral explanation>

- OnThese are the results of Miyashita's Fresnel diffraction simulation analysis.
- The light intensity change along the shadow observation line (red curve) from the diffraction simulation is roughly consistent with the average value per fram exposure time.
- The observed light intensity of the LightCurve is also nearly consistent.
- ・The second extinction depth for both observers was found to be consistent with the Fresnel diffraction model for a 1.3 km object.

# 直径1.3kmの衛星を仮定すると光量変化を矛盾なく説明できる（宮下さんによる）




本体の直径は、真砂さんの通過観測を併せて整約した結果、長軸は8.8km、短軸は7.0km以下であり、平均直径は7.8km以下である。衛星までの距離は7.7kmでP.A.は277°であった。

Fig. 5 Sky plane plot added estimated shape and size of small object.

# Assuming a satellite with a diameter of 1.3 km, the change in light intensity can be explained without contradiction (according to Miyashita)

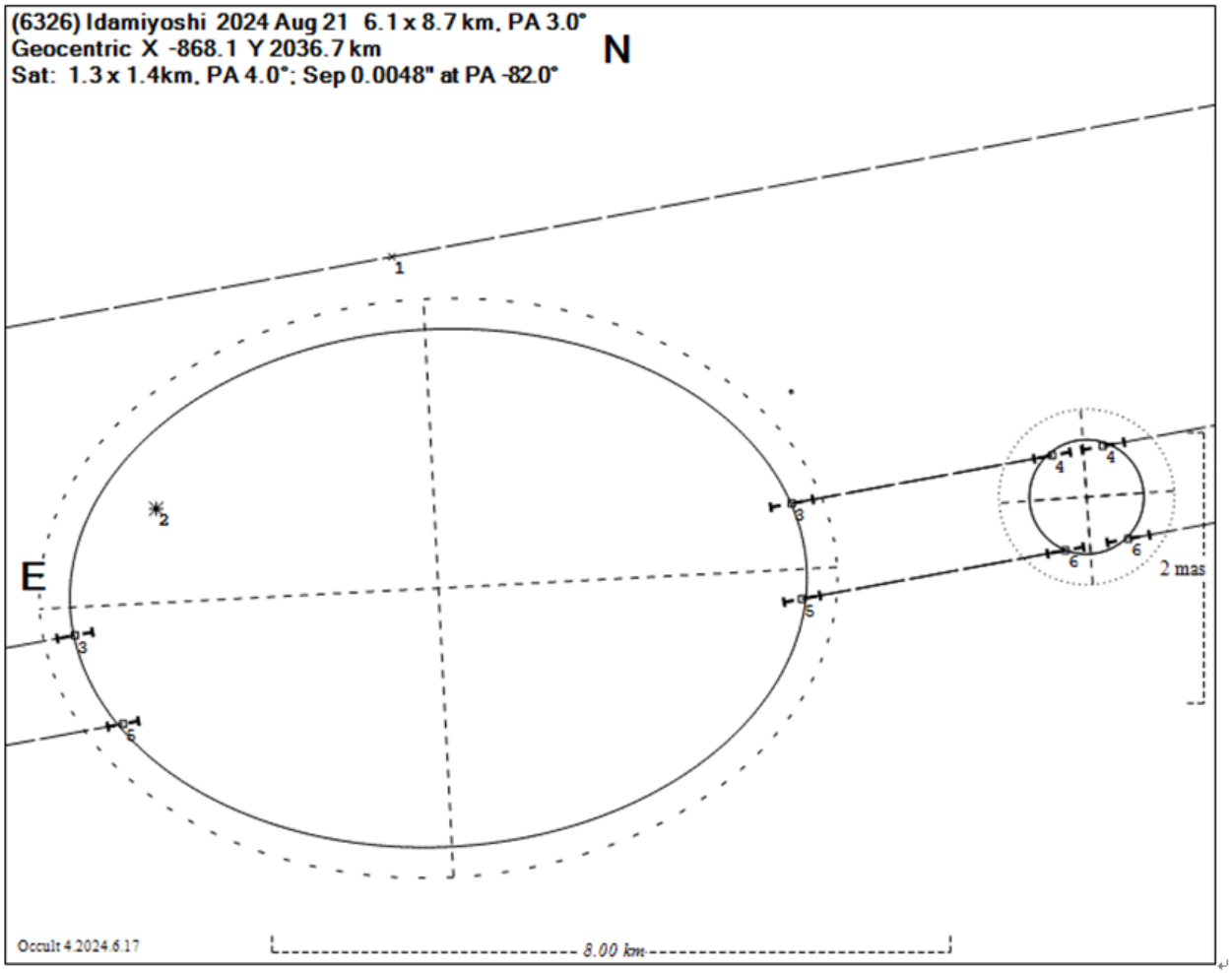



Fig. 5 Sky plane plot added estimated shape and size of small object.

Based on the data from Masago's flyby observations, the diameter of the main body is estimated to be 8.8 km on the major axis and less than 7.0 km on the minor axis, with a mean diameter of less than 7.8 km. The distance to the satellite is 7.7 km, and the P.A. is 277° .

# <Slide 6: Oral explanation>

- After collating data from Masago's flyby observations, the diameter of the main body was determined to be 8.8 km on the major axis and less than 7.0 km on the minor axis, for a mean diameter of less than 7.8 km.

- The distance to the satellite was 7.7 km, and the position angle P.A. was 277°.

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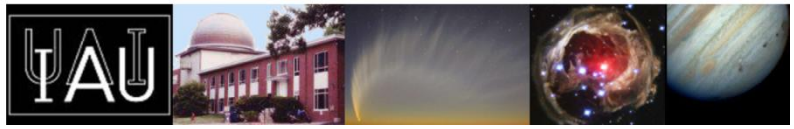


- CBET 5514 : 20250228 : COMET P/2025 D4 (ATLAS)
- CBET 5513 : 20250226 : COMET P/2025 D3 (PANSTARRS)
- CBET 5512 : 20250226 : (6326) IDAMIYOSHI
- CBET 5511 : 20250225 : (3927) FELICIAPLATT
- CBET 5510 : 20250224 : COMET P/2025 D2 (PANSTARRS)

Electronic Telegram No. 5512

Central Bureau for Astronomical Telegrams
Mailing address: Hoffman Lab 209; Harvard University;
20 Oxford St.; Cambridge, MA 02138; U.S.A.
e-mail: cbatiau@eps.harvard.edu (alternate cbat@iau.org)
URL http://www.cbat.eps.harvard.edu/index.html
Prepared using the Tamkin Foundation Computer Network

(6326) IDAMIYOSHI
K. Miyashita (Azumino, Nagano, Japan) reports that H. Watanabe (Nachikatsuura, Wakayama, Japan), H. Yamamura (Taiji, Wakayama, Japan), and N. Manago (Kamitonda, Wakayama, Japan) have discovered the apparent binary nature of the minor planet (6326) from the occultation of the star UCAC4 525-004262 (magnitude 12.4) on 2024 Aug. 21.782 UT. The minor planet was 5.5 magnitudes fainter than the star. Watanabe recorded a full-light-drop occultation of duration 1.07 s, followed 0.39 s later by a 74-percent light drop lasting 0.10 s. Both light drops were greater than 2.4 magnitudes, to below the brightness of a 14.8-mag comparison star. The depth of these light drops excludes the possibility of this being a double star with different components occulted at Watanabe's location. Yamamura recorded a full-light-drop occultation of duration 1.13 s, followed 0.27 s later by a 33-percent light drop lasting 0.13 s. The location corresponding to this light drop was fully consistent with the location of the second light drop of Watanabe, indicating that it was caused by the same body having a diameter of 1.3 km. Miyashita modeled the effect of Fresnel diffraction and found that the depths of the second light drop for both observers were consistent with Fresnel diffraction of a 1.3-km body. The diameter of the main body is constrained by a "miss" observation in Manago's data, with a major axis of 8.8 km and a minor axis no greater than 7.0 km, giving a mean diameter no greater than 7.8 km. The distance to the satellite was 7.7 km in p.a. 277 degrees. The chords are displayed in a diagram at http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig1.png (provided by Miyashita). D. Herald (Murrumbateman, Australia), who aided in the analyses of these data, provides an additional chord diagram, posted at URL http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig2.png, and two light-curve plots for Yamamura's and Watanabe's observations posted at URL http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig3.png; explanation of the figures follows that provided on CBET 5511.

NOTE: These 'Central Bureau Electronic Telegrams' are sometimes superseded by text appearing later in the printed IAU Circulars.

宮下さんにより、
IAU(国際天文学連合)の
CBAT(中央天文電報局)に報告していただいた。
その衛星発見の報告が
CBET(電子回報)5512番として、世界に にアナウンスされました。

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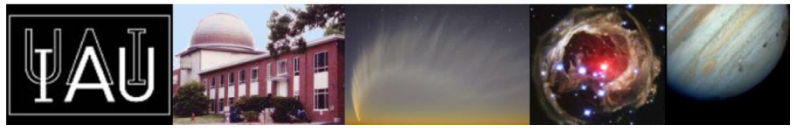


- CBET 5514 : 20250228 : COMET P/2025 D4 (ATLAS)
- CBET 5513 : 20250226 : COMET P/2025 D3 (PANSTARRS)
- CBET 5512 : 20250226 : (6326) IDAMIYOSHI
- CBET 5511 : 20250225 : (3927) FELICIAPLATT
- CBET 5510 : 20250224 : COMET P/2025 D2 (PANSTARRS)

Electronic Telegram No. 5512

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URL http://www.cbat.eps.harvard.edu/index.html
Prepared using the Tamkin Foundation Computer Network

(6326) IDAMIYOSHI
K. Miyashita (Azumino, Nagano, Japan) reports that H. Watanabe (Nachikatsuura, Wakayama, Japan), H. Yamamura (Taiji, Wakayama, Japan), and N. Manago (Kamitonda, Wakayama, Japan) have discovered the apparent binary nature of the minor planet (6326) from the occultation of the star UCAC4 525-004262 (magnitude 12.4) on 2024 Aug. 21.782 UT. The minor planet was 5.5 magnitudes fainter than the star. Watanabe recorded a full-light-drop occultation of duration 1.07 s, followed 0.39 s later by a 74-percent light drop lasting 0.10 s. Both light drops were greater than 2.4 magnitudes, to below the brightness of a 14.8-mag comparison star. The depth of these light drops excludes the possibility of this being a double star with different components occulted at Watanabe's location. Yamamura recorded a full-light-drop occultation of duration 1.13 s, followed 0.27 s later by a 33-percent light drop lasting 0.13 s. The location corresponding to this light drop was fully consistent with the location of the second light drop of Watanabe, indicating that it was caused by the same body having a diameter of 1.3 km. Miyashita modeled the effect of Fresnel diffraction and found that the depths of the second light drop for both observers were consistent with Fresnel diffraction of a 1.3-km body. The diameter of the main body is constrained by a "miss" observation in Manago's data, with a major axis of 8.8 km and a minor axis no greater than 7.0 km, giving a mean diameter no greater than 7.8 km. The distance to the satellite was 7.7 km in p.a. 277 degrees. The chords are displayed in a diagram at http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig1.png (provided by Miyashita). D. Herald (Murrumbateman, Australia), who aided in the analyses of these data, provides an additional chord diagram, posted at URL http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig2.png, and two light-curve plots for Yamamura's and Watanabe's observations posted at URL http://www.cbat.eps.harvard.edu/iau/cbet/005500/CBET5512_Fig3.png; explanation of the figures follows that provided on CBET 5511.

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Miyashita-san reported the discovery to the Central Astronomical Telegraph Office (CBAT) of the International Astronomical Union (IAU).
The satellite discovery report was announced to the world as CBET (Electronic Circular) No. 5512.

# <Slide 7: Oral explanation>

- After collating data from Masago's flyby observations, the diameter of the main body was determined to be 8.8 km on the major axis and less than 7.0 km on the minor axis, for a mean diameter of less than 7.8 km.

- The distance to the satellite was 7.7 km, and the position angle P.A. was 277°.

THE MINOR PLANET BULLETIN

BULLETIN OF THE MINOR PLANETS SECTION OF THE ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

VOLUME 52, NUMBER 3, A.D. 2025 JULY-SEPTEMBER 191.

https://mpbulletin.org/issues/MPB_52-3.pdf



**A NEW SATELLITE OF ASTEROID (6326) IDAMIYOSHI DISCOVERED FROM OCCULTATION OBSERVATION**

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(Received: 2025 March 12)

A highly probable satellite phenomenon was observed during the occultation of the star UCAC4 525-004262 by the asteroid (6326) Idamiyoshi on August 21, 2024 at 18.75 hr (UT).

宮下さんにより詳しく論文にされて、Minor Planet Bulletin（MPB）に投稿され、掲載されました。

＜アピールポイント＞

- 近年、掩蔽観測による衛星発見が急増していていますが、MPBに論文として掲載されるのは数少なく、4番目です。
- 回折シミュレーションの妥当性が検証されました。
- 衛星の位置を精密に求めることが出来ました。

等、画期的な観測成果となりました。

THE MINOR PLANET BULLETIN

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VOLUME 52, NUMBER 3, A.D. 2025 JULY-SEPTEMBER 191.

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**A NEW SATELLITE OF ASTEROID (6326) IDAMIYOSHI DISCOVERED FROM OCCULTATION OBSERVATION**

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(Received: 2025 March 12)

A highly probable satellite phenomenon was observed during the occultation of the star UCAC4 525-004262 by the asteroid (6326) Idamiyoshi on August 21, 2024 at 18.75 hr (UT).

Miyashita wrote a detailed paper about the discovery, which was submitted to and published in Minor Planet Bulletin (MPB). <Appealing points> - In recent years, there has been a rapid increase in the discovery of satellites through occultation observations, but only a few have been published as papers in MPB, making this the fourth. - The validity of the diffraction simulation was verified. - The satellite's position could be determined precisely. These were groundbreaking observational results.

# <Slide 8: Oral explanation>

- Miyashita reported these results to the IAU's (International Astronomical Union) Central Astronomical Telegraph Office (CBAT).

- The satellite discovery report was announced to the world as CBET (Electronic Circular) No. 5512.

# 小惑星（6326）Idamiyosiの関係者が、発見された天究館に集まった　（2025年7月19日）

ダイニックアストロパーク天究館と60cm反射望遠鏡ﾄﾞｰﾑ

(6326) 1991 FJ1< Idamiyoshi>を発見したダイニック天究館館長の杉江　淳さん

日本で最初に小惑星による掩蔽観測で減光を観測したことを記念して 小惑星(6326)にその名をつけられた、井田三良さん

フルネル回折シミュレーションによる解析をして、CABTへの投稿とMPBへの論文の執筆、投稿をしていただいた、宮下和久さん

衛星による減光を捉えた渡部勇人さん。 この座談会を企画、成功させた

渡部さんと共に、衛星による減光を捉えた山村秀人さん

和歌山県上富田町の自宅観測所で観測。
減光なしながら、小惑星の形状決定に貢献した真砂礼宏さん

# Those involved with the asteroid (6326) Idamiyosi gathered at Tenkyukan, where it was discovered (July 19, 2025)

Jun Sugie-san：
Director of the Dynic Astronomical Observatory (Tenkyukan) , who discovered the asteroid (6326) 1991 FJ1 <idamiyoshi>

Ida Miyoshi-san:
The asteroid (6326) was named after him to commemorate the first asteroid occultation observation in Japan.

Kazuhisa Miyashita-san：
He analyzed the data using Fresnel diffraction simulations and submitted the paper to CABT and MPB.

Dynic Astronomical Observatory (Tenkyukan) and the 60cm Reflector Telescope Dome

Watanabe Hayato, who captured the dimming of Idamiyoshi's light from the satellite, and who planned and made this roundtable discussion a success.

Hidehito Yamamura, who captured the dimming of the star using a satellite, worked with Watanabe.

Norihiro Masago observed the asteroid from his home observatory in Kamitonda, Wakayama Prefecture.
Despite no dimming, he contributed to determining its shape.

# <Slide 9: Oral explanation>

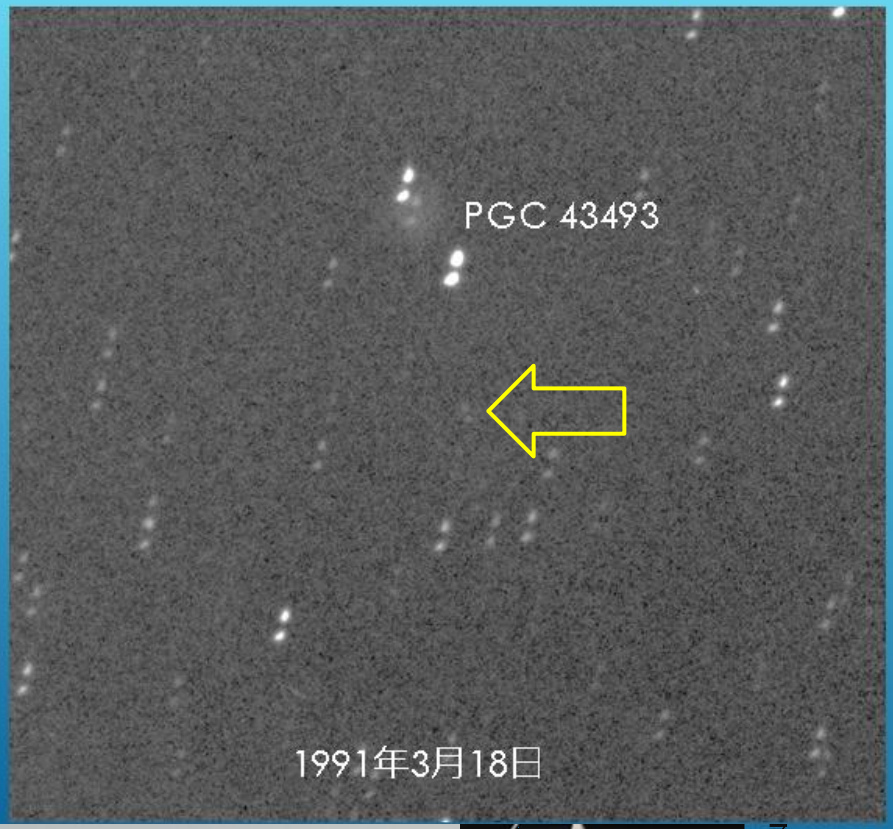
On July 19th of this year,

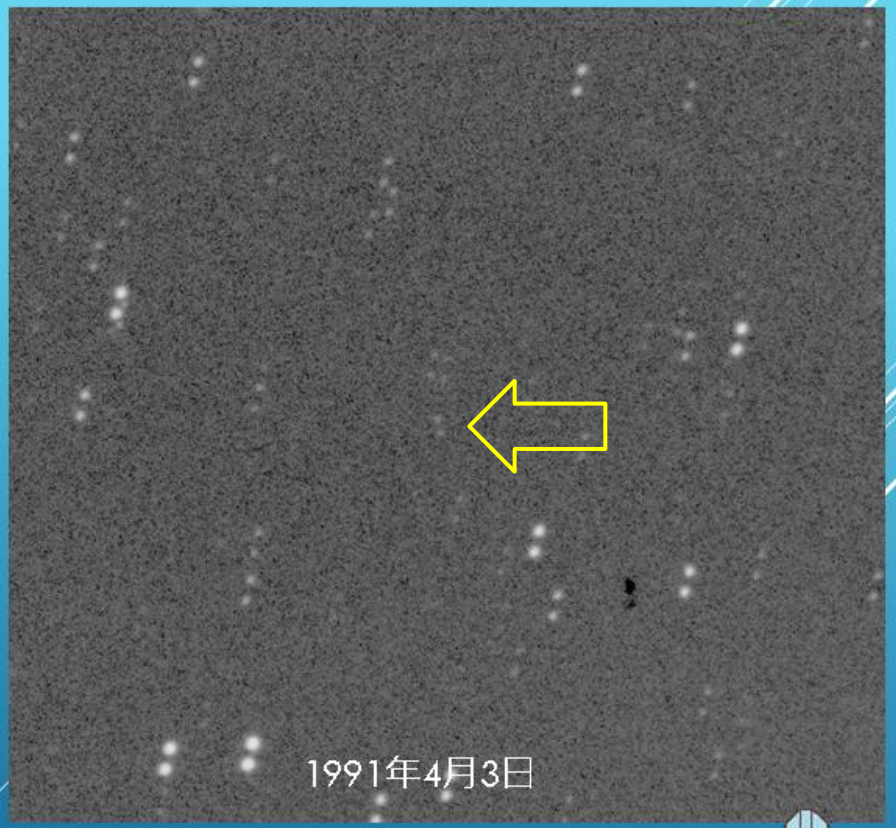
- Sugie-san, the discoverer
- Ida-san, the person who named the asteroid (6326)
- Miyashita-san, who analyzed, wrote, and submitted the paper
- Watanabe-san, who conducted the observations that discovered the satellite
- Yamamura myself
- Masago-san

- The six of them gathered at the Dynic Astronomical Observatory(Tenkyukan) , where the asteroid was discovered,

  and held a roundtable discussion, which was also streamed on Zoom.

# 小惑星Idamiyoshi発見観測画像



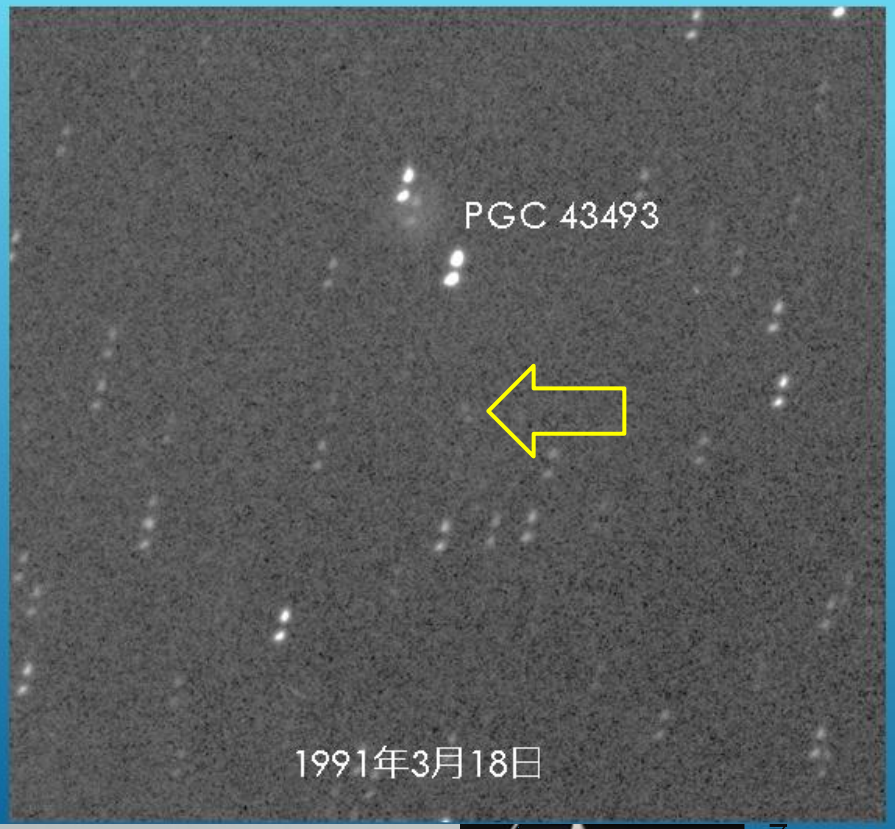



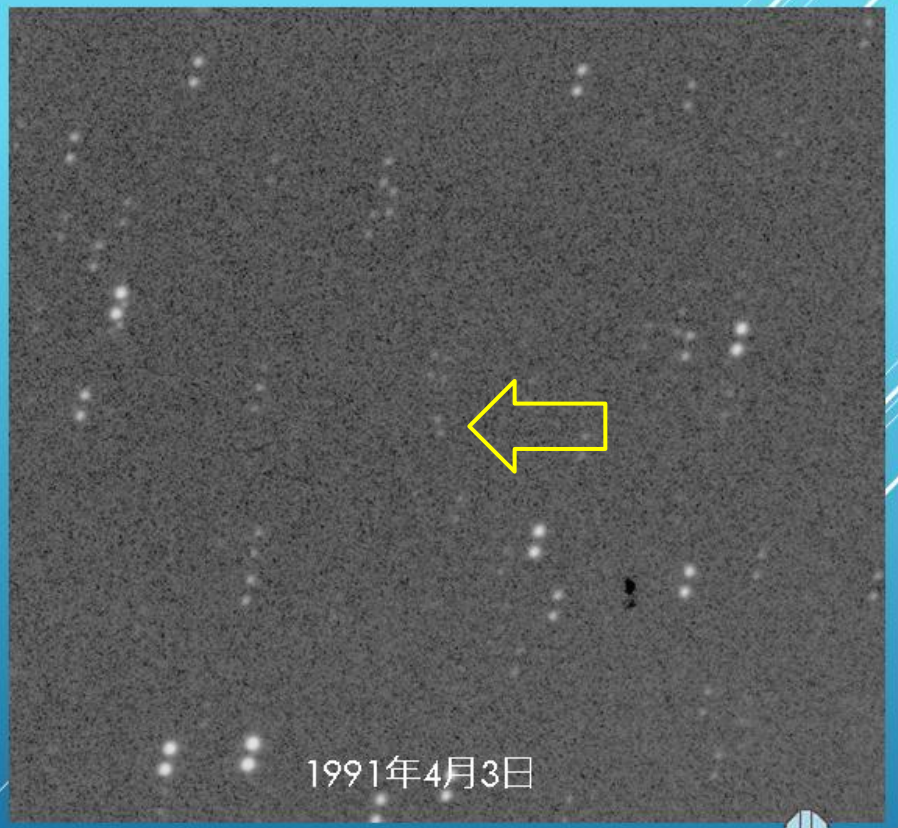

ダイニックアストロパーク天究館


1991年に(6326) 1991 FJ1< Idamiyoshi>を
発見したダイニック天究館現館長の
杉江　淳さんと使われた25cm（F3.4）シュミット望遠鏡

・1988 ～2000年の間に121個の小惑星を発見した。

# Image of the discovery of the asteroid Idamiyoshi





ダイニックアストロパーク天宮館

The 25cm (F3.4) Schmidt telescope used by Jun Sugie, current director of the Dynic Astronomical Observatory, who discovered (6326) 1991 FJ1 (Idamiyoshi) in 1991.

・Between 1988 and 2000, he discovered 121 asteroids.

# <Slide 10: Oral explanation>

Jun Sugie-san, the discoverer of the asteroid Idamiyoshi and current director of the Dynic Astronomical Observatory, spoke about the time of its discovery.He talked about the time of the discovery.

He has discovered 121 asteroids using a 60cm reflecting telescope and a 25cm Schmidt telescope,

and this is an image of the 21st asteroid, (6326) 1991 FJ1, discovered at the time of its discovery.

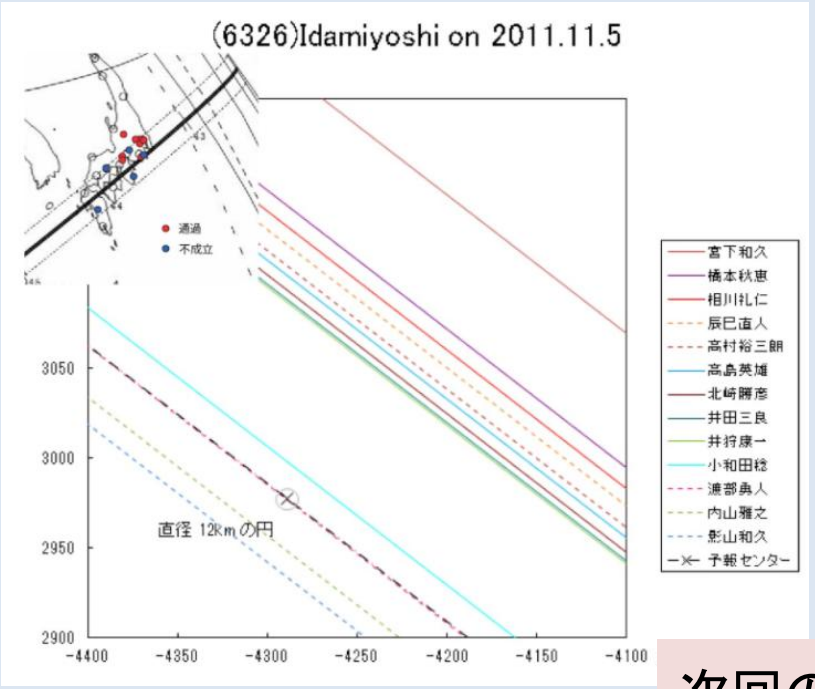
発見者の杉江さんからMPCに命名申請され、Idamiyoshiの命名が公表された （MPC20010109_130）

**(6326) Idamiyoshi = 1991 FJ$_1$**

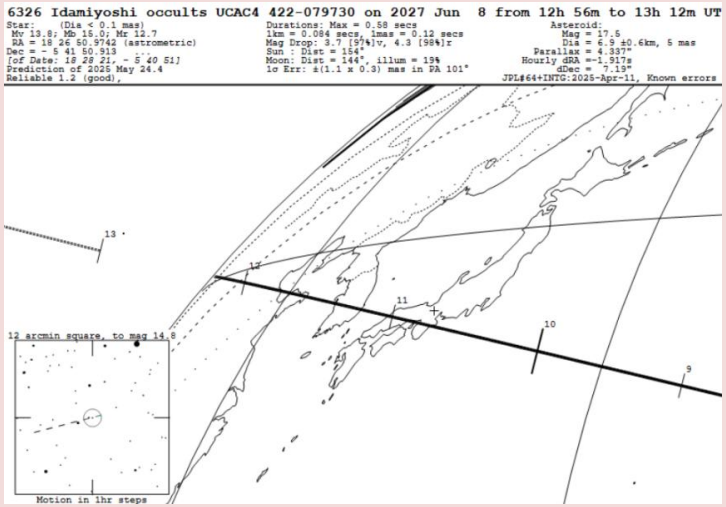
Discovered 1991 Mar. 18 by A. Sugie at Dynic Astronomical Observatory.

Miyoshi Ida (b. 1953) is a schoolteacher and active observer of occultations. He made the first observation from Japan of an occultation by a minor planet, that of a star by (106) Dione on 1983 Feb. 26.

小惑星Idamiyoshiの立体模型を前に説明する、ご本人の井田三良さん


2011.11.5に(6326)Idamiyoshiによる掩蔽があり、JOINのメンバー13人により観測されたが、減光なしだった。



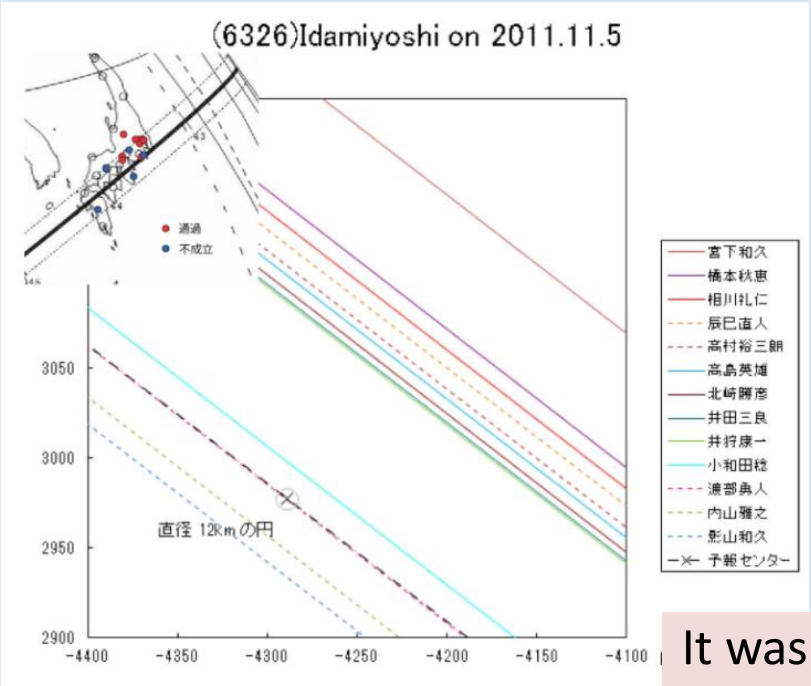

次回の掩蔽が2027.1.8に観測可能なことが報告された。

The discoverer, Mr. Sugie, applied for the name to the MPC, and the name Idamiyoshi was announced.
（MPC20010109_130）

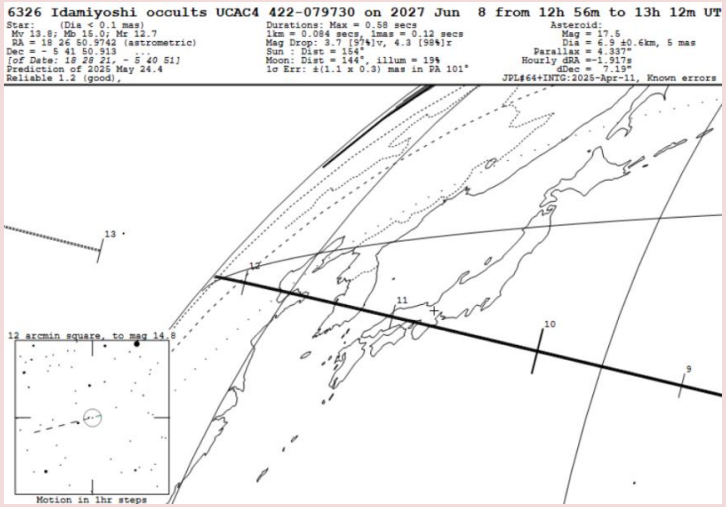
**(6326) Idamiyoshi = 1991 $FJ_1$**

Discovered 1991 Mar. 18 by A. Sugie at Dynic Astronomical Observatory. Miyoshi Ida (b. 1953) is a schoolteacher and active observer of occultations. He made the first observation from Japan of an occultation by a minor planet, that of a star by (106) Dione on 1983 Feb. 26.

Mr. Ida Miyoshi in front of a 3D model of the asteroid Idamiyoshi.


On November 5, 2011, there was an occultation by (6326) Idamiyoshi, which was observed by 13 JOIN members, but there was no dimming.




It was reported that the next occultation will be observable on January 8, 2027.

# <Slide 11: Oral explanation>

- Ida Miyoshi-san, whose name is attached to the asteroid, reported on the results of joint observations by 13 members of JOIN, which were conducted by the asteroid Idamiyoshi on November 5, 2011.

- He also mentioned that the next opportunity to observe the occultation will be on Jan.8,2027., and that the occultation belt will follow a course similar to this one.

# 2025年7月19日
# 小惑星Idamiyoshiの衛星発見を祝う会兼座談会

# July 19 2025

## Discovery of a Satellite of Asteroid (6326) Idamiyoshi & the Commemorative Meeting

# <Slide 12: Oral explanation>

- Participants in the "Celebration and Discussion Celebrating the Discovery of Asteroid Idamiyoshi's Satellite"
- Participants on screen are participating via Zoom.

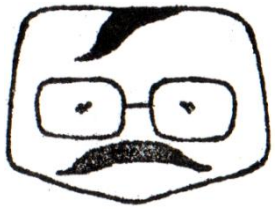
# まとめ

- 小惑星Idamiyosiの衛星を発見できた。
- 掩蔽観測でフルネル回折シミュレーションによる解析の妥当性が確認された。
- 小惑星Idamiyosi発見の地で、ゆかりの者が集いその成果を確認した。

このスライドをIOTA/EAで公開する場合は、各ページの口頭説明の要旨のスライドを追加して公開します。

ご静聴ありがとうございました

山村　秀人



# In conclusion

- A satellite of asteroid Idamiyosi has been discovered.
- Occultation observations confirmed the validity of analysis using Fresnel diffraction simulations.
- Those associated with the discovery of asteroid Idamiyosi gathered at the site to confirm the results.

If I were to publish these slides on IOTA/EA, I would publish additional slides summarizing the verbal explanations on each page.

Thank you for your attention.

*Hidehito Yamamura*