ESOP XLIV
Poznań
23–24 August 2025

Scientific Contributions of Suhail Astronomy Association in Laghouat in Observing Stellar Occultation by Asteroids in Algeria

Presented by :

Adnane Saouli

(representative of SAA)

ESOP XLIV

Who We Are ?

Suhail Astronomy Association

Founded in 2012, based in Laghouat, Algeria,

Focused on youth education and scientific contribution.

Active in astronomy outreach, astrophotography, and observational research.




From Visual to Technical




- Started with visual observations
- Gradual acquisition of technical expertise
- Improved accuracy and data quality over time

- Scientific kid caravan:

A fun, traveling science caravan bringing astronomy activities and space-themed games to children around the villages of our state.

Visiting the orphans and disabled children centers

- Other national achievements:
  - 1st Place – Algerian Astronomy Olympiad
  - 1st Place – National Competition in Astronomy & Astrophotography
  - “Ruwad Al-Ataa” Award – Recognizing excellence and contribution in science outreach

National Leadership

- The second prize in the Arab Championship for Artificial Intelligence and Robotics in Qatar
- The positive observation of the asteroid “283 EMMA” occultation led to the discovery of a binary star.
- Observation of asteroid 2013 LU28from : Adrar (south Algeria) – variable scientific precision.
- Participated in the Arab Forum for Talents and Scientific Innovations 2022 winning and honoring prize .

National Leadership

Since 2016,

we have hosted four national forums—three recognized among the top editions

and participated in seven over the past nine years,

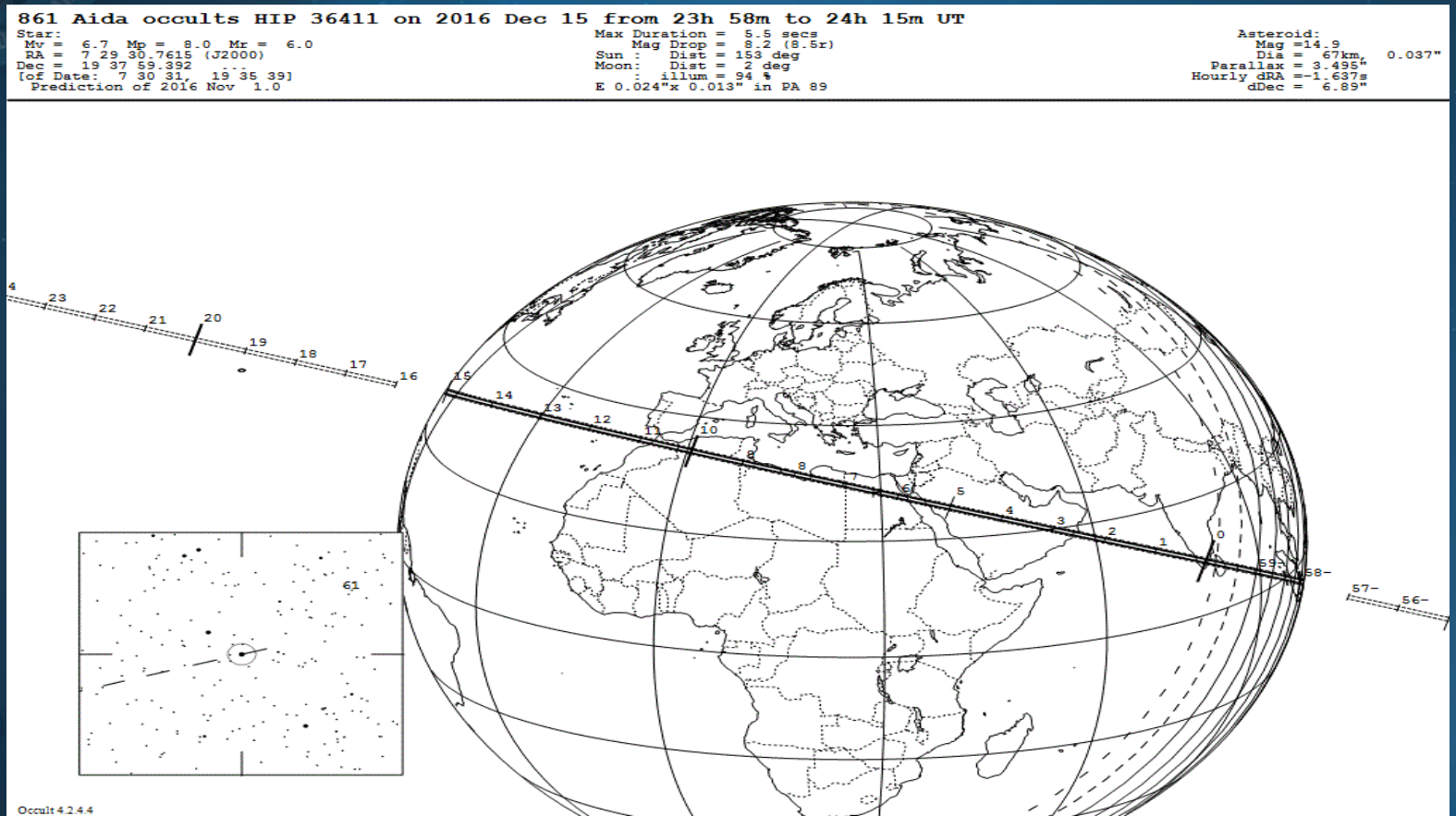
fostering collaboration and advancing asteroid occultation studies.

National Leadership

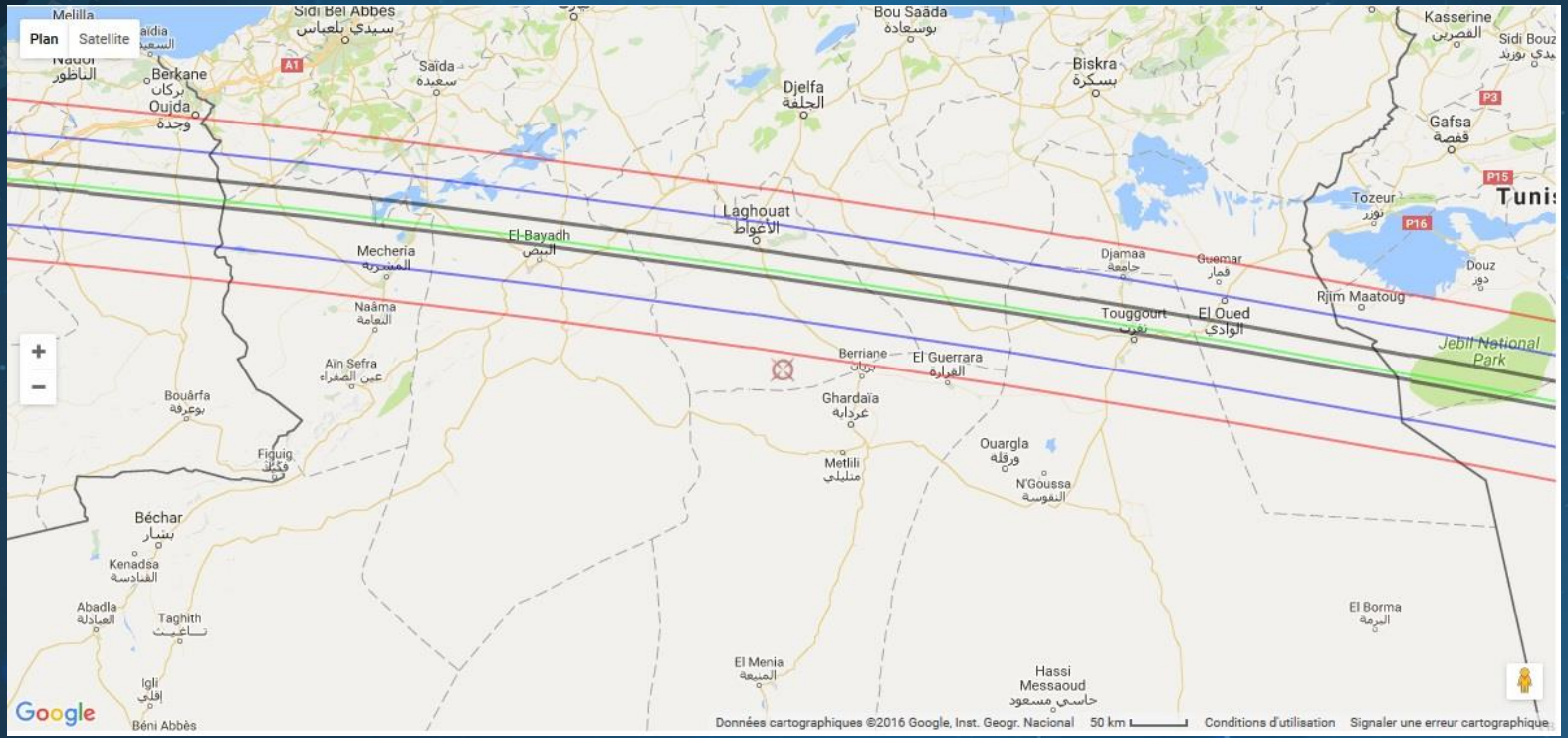
Organized four national gatherings on asteroids occultation mentioning the 8th , 9th and 12th in Laghouat

with the presence of more than 110 astronomer and 54 TELESCOPES.

Key Achievements



Key Achievements



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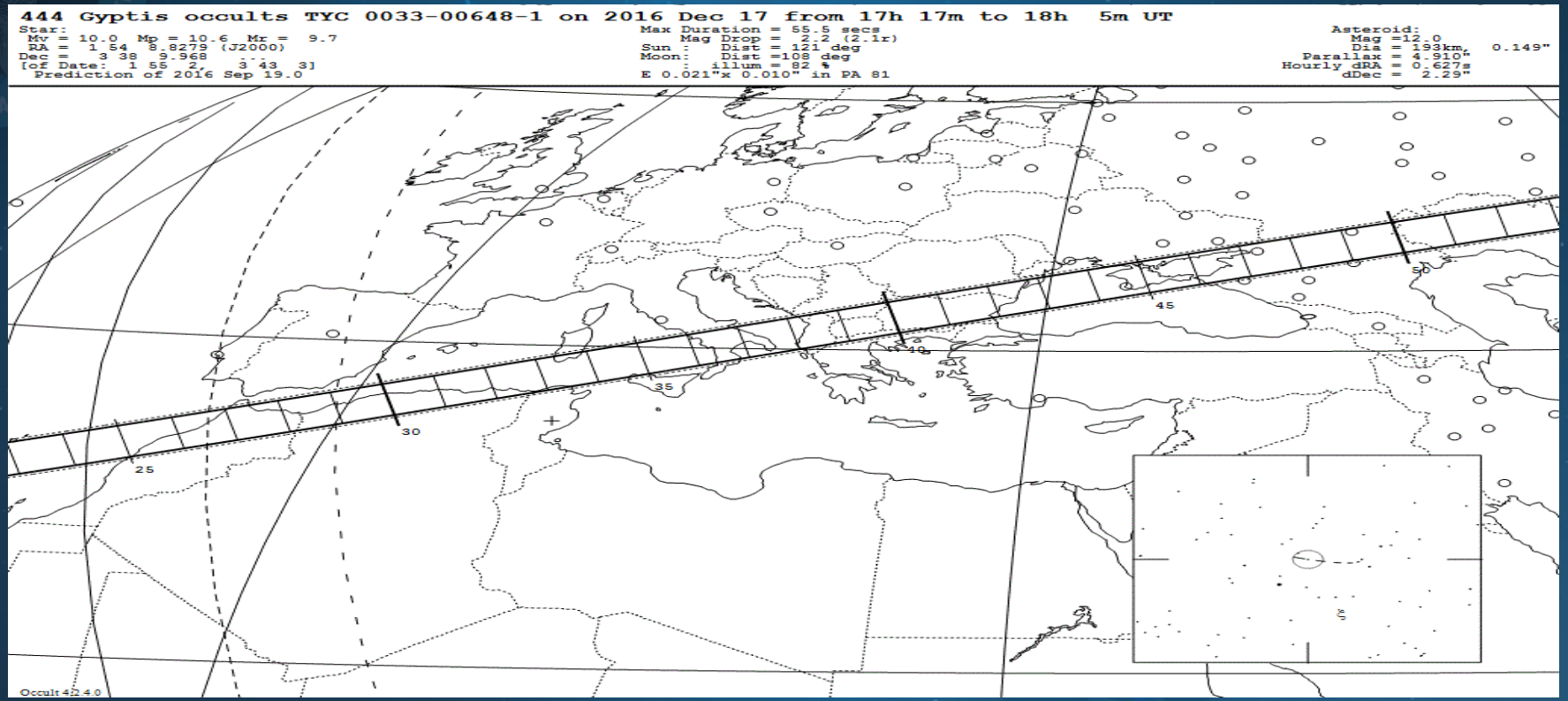
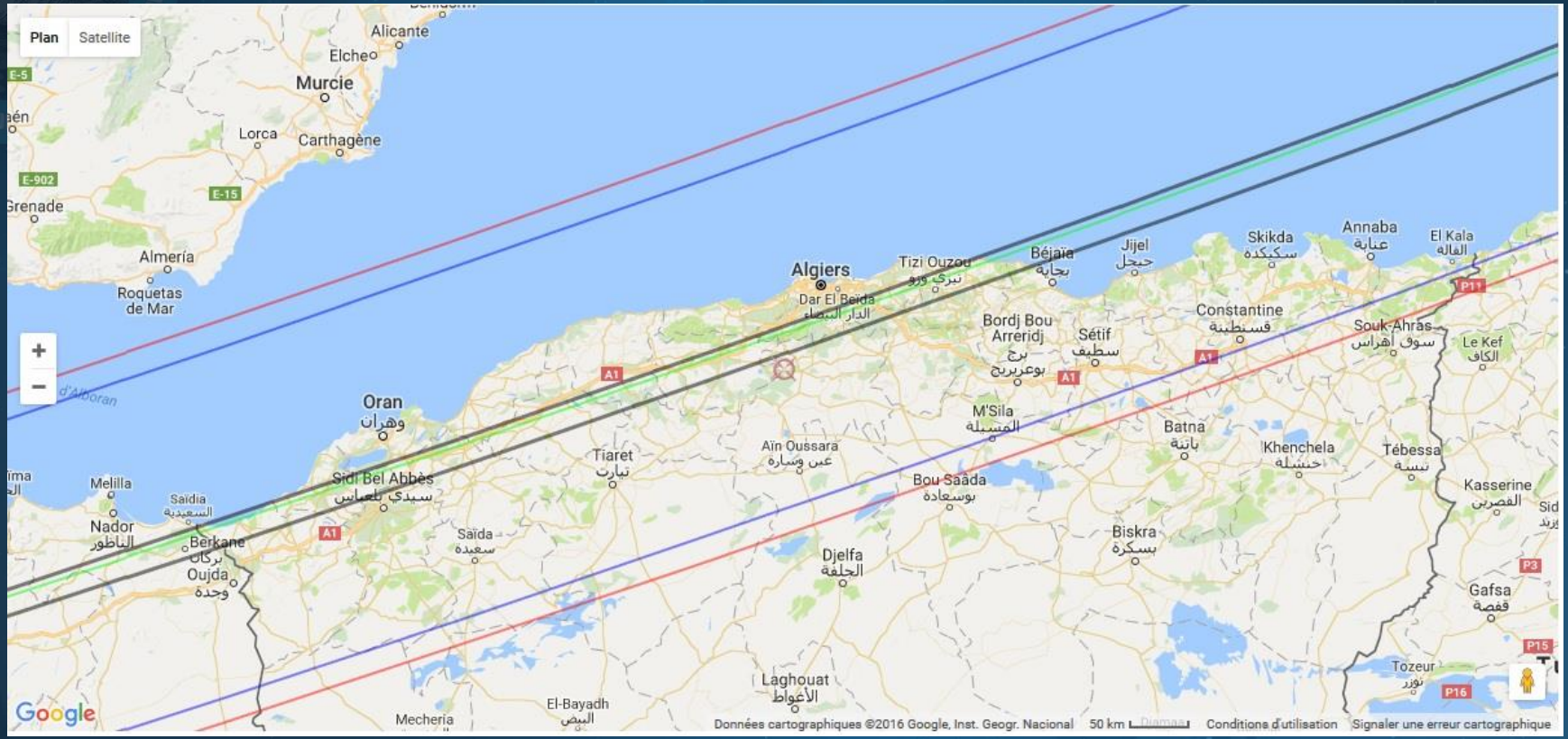
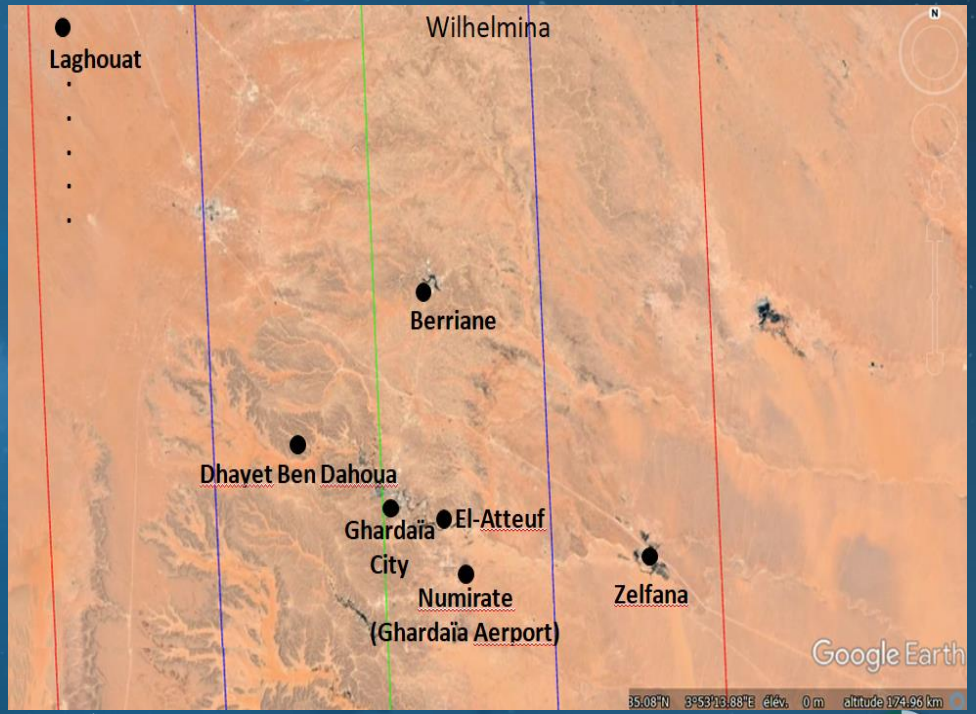


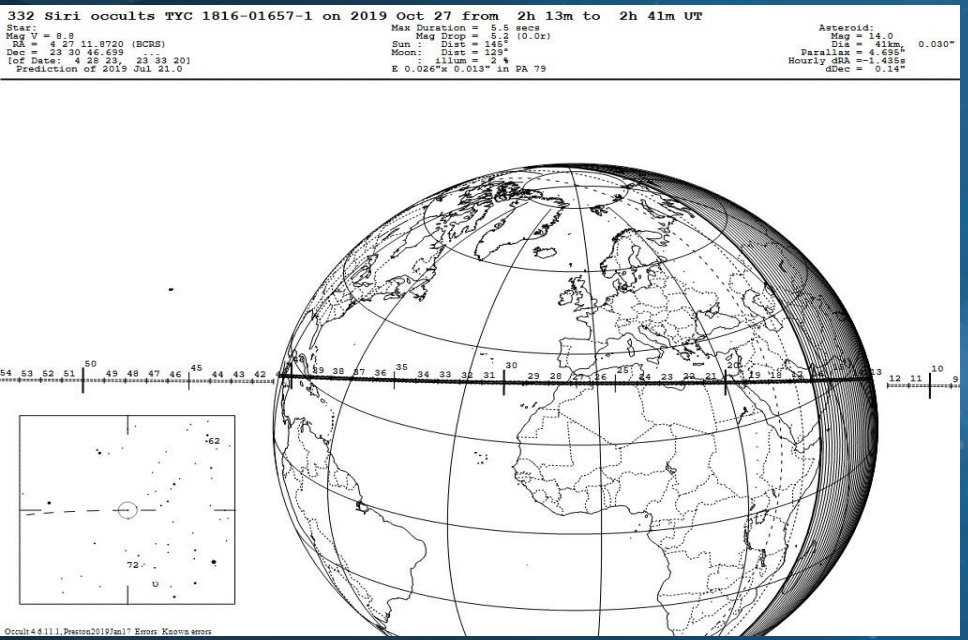
Key Achievements



7 observation sites of Laghouat and Ghardaïa departments for the observation of the stellar occultation by the asteroid 392 Wilhelmina



The 8th national gathering for asteroids occultation in laghouat organized by suhail astronomy association 332 SIRI 27October 2027



Result from EURASTER

2019/10/27 | 332 | Siri | TYC 1816-01657-1
asteroid measurement: at least 41 km

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P+ | prediction           | 02:25:15 | 02:25:15 |       |     |    | E  03 00 00   | N 33 15 41   |    0 | WS |;
O+ | K. Maamri et al      |          |          | M150  | VIS | DZ | E  03 00 10.8 | N 33 29 38.0 |  875 | WS |
 5.57 | 02:25:20.12 | 1    | 02:25:25.69 | 1    | NTP   | 0.40 | 0.40 | A |
Observation with H. Benmahiedine.|;
O+ | A. Ghadi et al       |          |          | M130  | VIS | DZ | E  03 00 18.0 | N 33 29 37.0 |  897 | WS |
 5.61 | 02:25:19.77 | 1    | 02:25:25.38 | 1    | NTP   | 0.40 | 0.40 | A |
Observation A. Bouchareb.|;
O+ | O. Bouazara et al    |          |          | M130  | VIS | DZ | E  03 02 36.0 | N 33 26 46.7 |  848 | WS |
 4.58 | 02:25:20.95 | 1    | 02:25:25.53 | 1    | NTP   | 0.40 | 0.40 | A |
Observation with H. Rayane.|;
O+ | Djounai Baba Aissa   | 02:22:06 | 02:27:16 | M203  | VID | DZ | E  03 08 33.8 | N 33 18 54.1 |  795 | WS |
 5.28 | 02:25:17.42 | 0.04 | 02:25:22.70 | 0.04 | GPS++ |      |      |   |;
O+ | R. Aider et al       |          |          | M114  | VIS | DZ | E  03 08 35.4 | N 33 18 55.3 |  795 | WS |
 5.09 | 02:25:17.47 | 1    | 02:25:22.56 | 1    | NTP   | 0.40 | 0.40 | A |
Observation with S. Belhanachi/Y. Hocine.|;
O- | N Bouhoume Ali et al | 02:24:01 | 02:26:03 | M114  | VIS | DZ | E  03 20 28.0 | N 33 09 27.0 |  743 | WS |
Observation with B. Benaoumeur.|;
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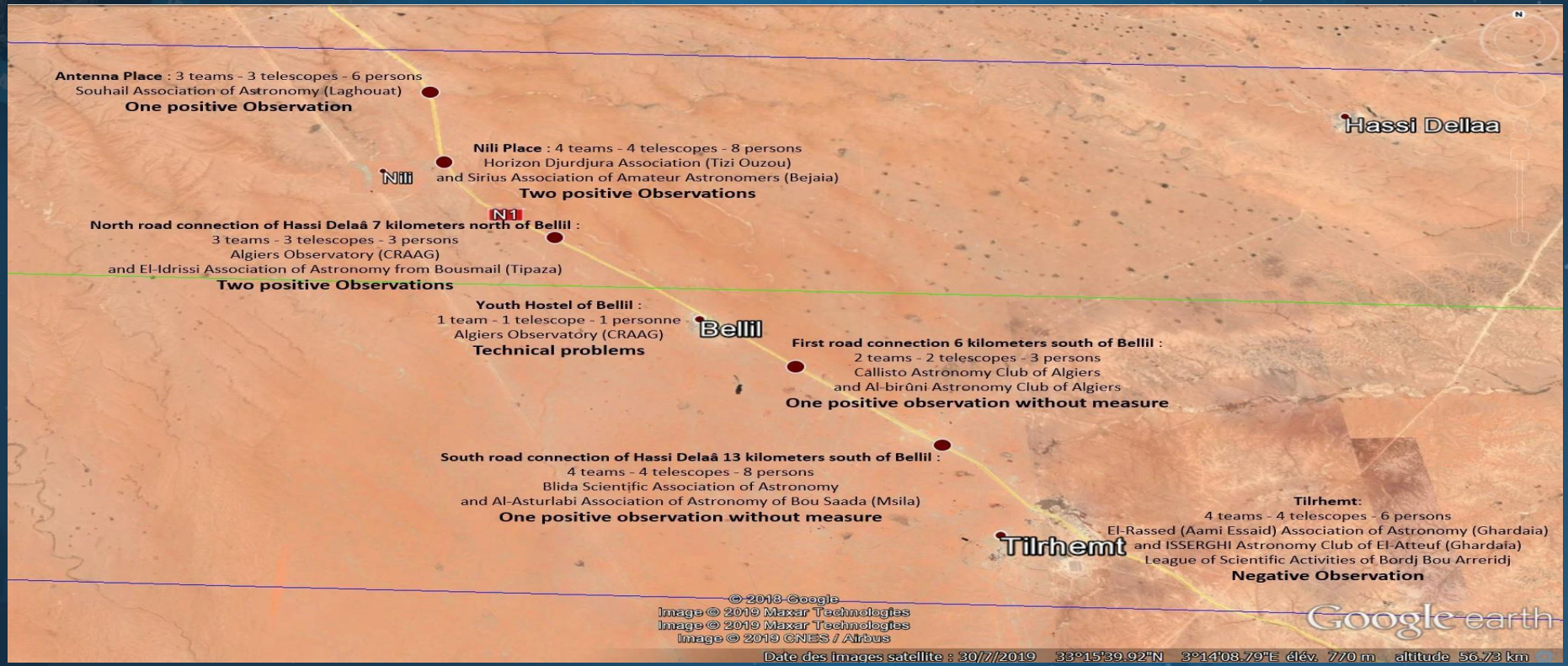
Key Achievements



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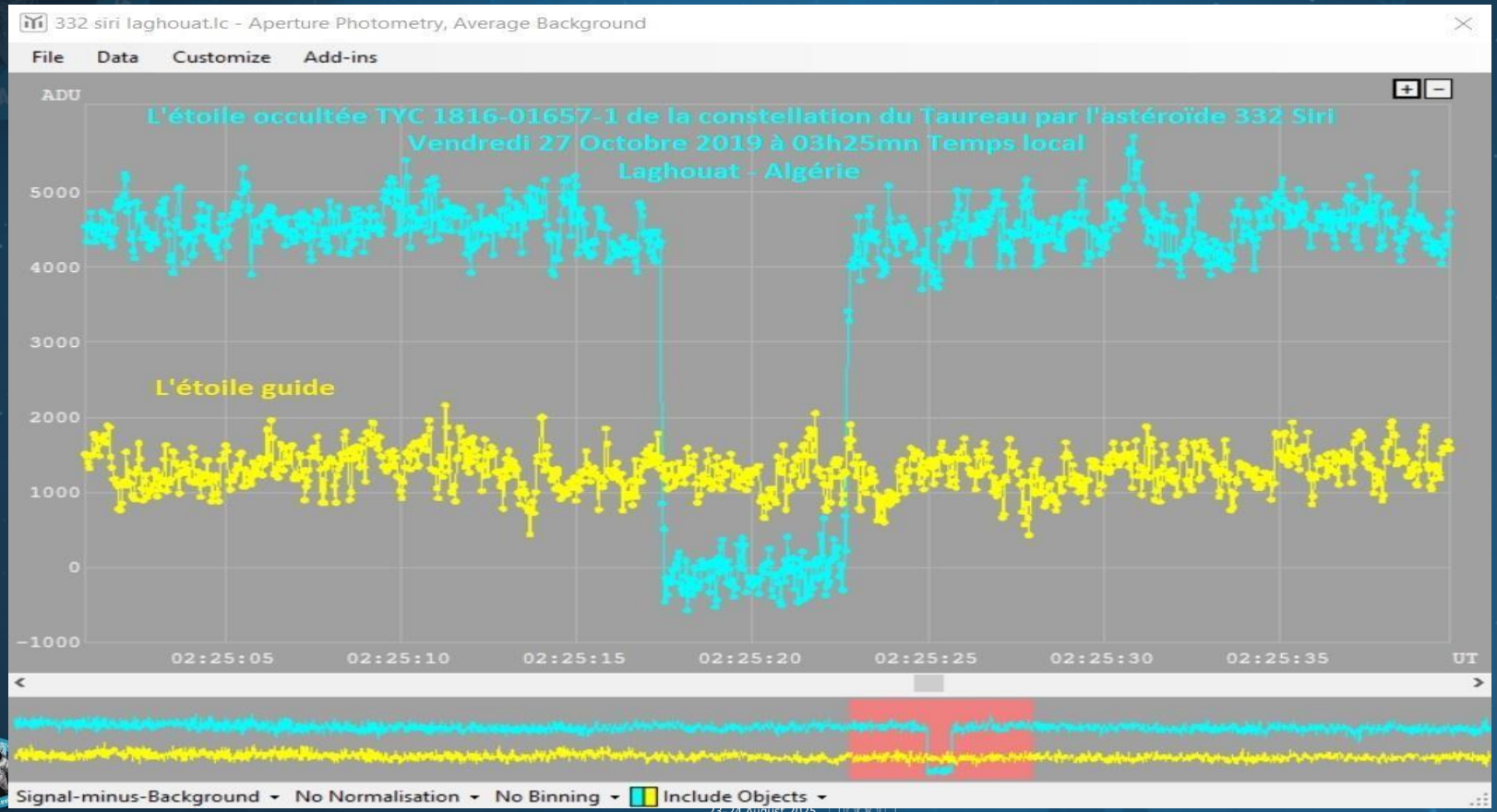

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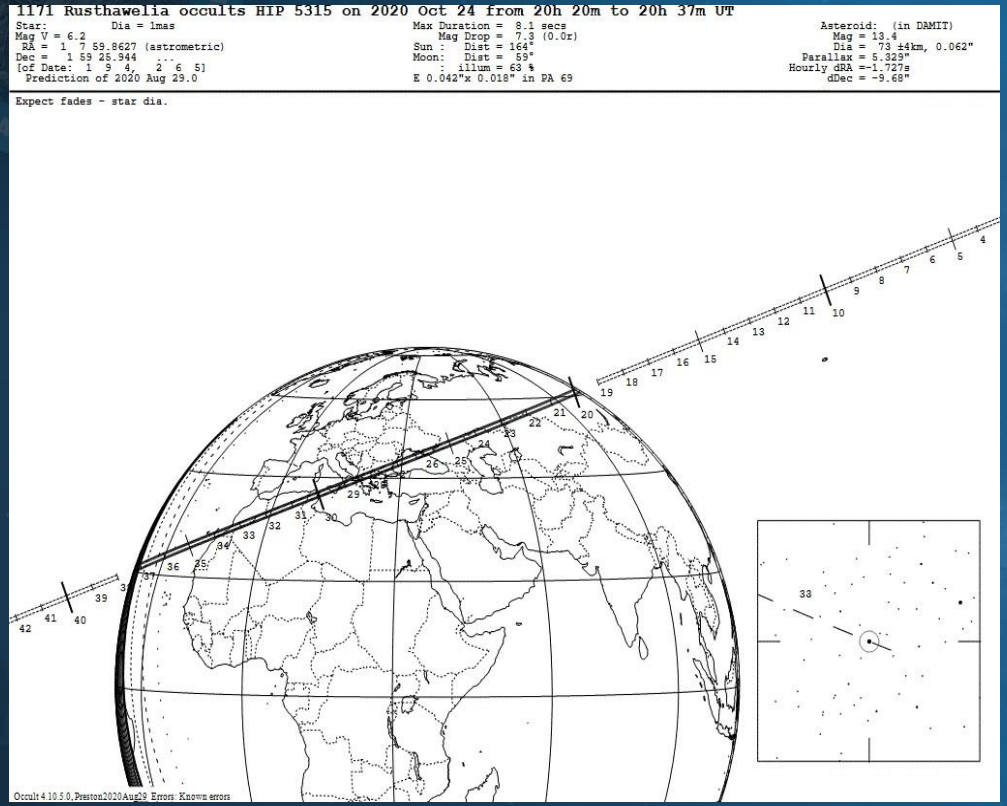
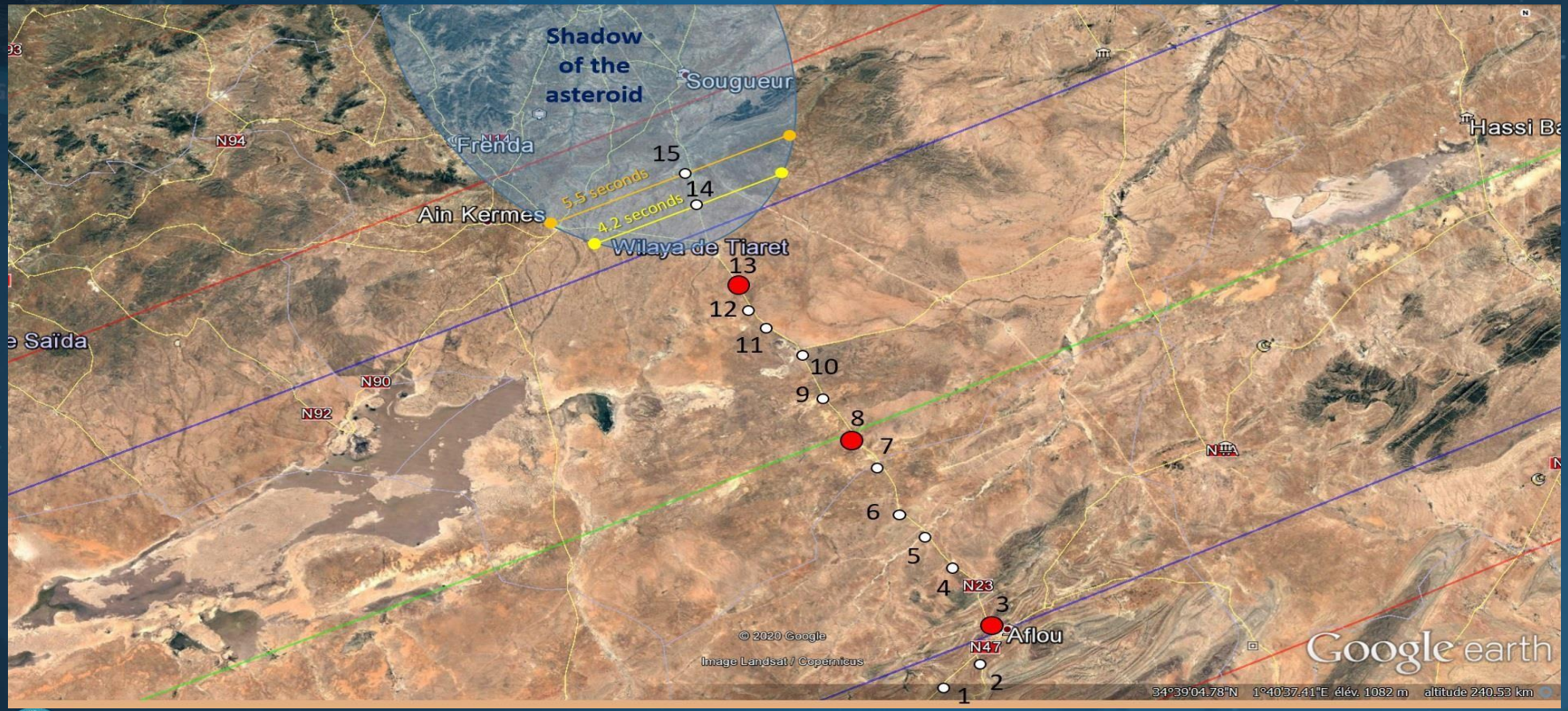


1171 Rusthawelia 2024 oct 24

Key Achievements

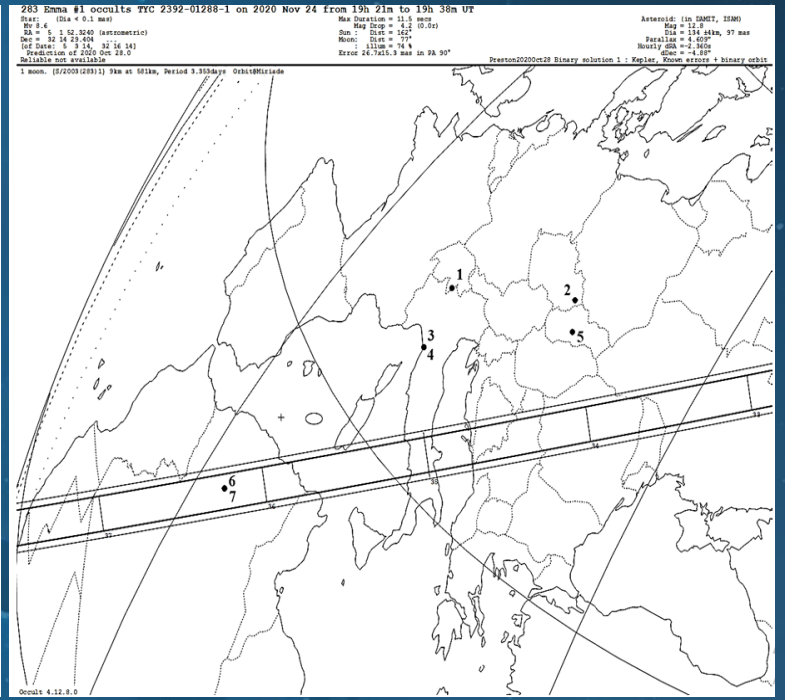


The discovery of a binary star by asteriod ‘’EMMA”

TYC 2392-01288-1, Discovery of Stellar Duplicity During Asteroidal Occultation by (283) Emma

Eric Frappa (European IOTA coordinator)[1], Petr Zeleny[2,3,8], Pietro Baruffetti[4,9], Abdelhak Bendjeddou[5], Michele Bigi[4,9], Omar Bouazara[5], Abderrahman Gacem[5], Hadj Mahmoud Khenifer[5], Lakhdar Mokhtari[5], Peter Nosal[6], Hicham Rayane[5], Tarek El Mokhtar Selimi[5], Stefano Sposetti[7], and Djounai Baba Aissa[10]

1. Euraster, Faycelles, France
2. Observatory Valasske Mezirici, Czechia
3. Occultation & Astrometry Section of Czech Astronomical Society
4. Gruppo Astrofili Massesi, Massa, Italy
5. Association Suhail d’Astronomie, Laghouat, Algeria
6. Viglas, Slovakia
7. Gnosca, Switzerland
8. International Occultation Timing Association (IOTA-ES)
9. European Asteroidal Occultation Network (EAON)
10. Centre de Recherche en Astronomie, Astrophysique et Géophysique (CRAAG), Alger, Algeria



The discovery of q binary star by asteriod ‘’EMMA”

#	Observers	Location	Aperture	Method	Exp. time	Result
1	S. Sposetti (CH)	E 09 01 26.5 N 46 13 53.2	280 mm	WAT-902H2 U VTI + GPS 1PPS	0.04 s	Negative
2	P. Zeleny (CZ)	E 17 58 24.5 N 49 27 47.9	254 mm	QHY-174M GPS	0.02 s	Positive 10.36 s
3	M. Bigi (IT)	E 10 08 19.0 N 44 01 33.9	200 mm	WAT-910BD VTI + GPS 1PPS	0.02 s	Positive 10.41 s
4	P. Baruffetti (IT)	E 10 07 56.7 N 44 01 17.0	300 mm	WAT-910HX VTI + GPS 1PPS	0.04 s	Uncertain positive 9.73 s
5	P. Nosal (SK)	E 19 17 49.3 N 48 33 24.8	250 mm	ZWO ASI120MM NTP	0.05 s	Negative
6	O. Bouazara, H. Rayane, A. Bendjeddou (DZ)	E 02 37 05.8 N 33 57 29.7	120 mm	Visual Audio recording NTP	-	Positive 7.0 s
7	A. Gacem, M. Khenifer, T. Selimi (DZ)	E 02 37 05.5 N 33 57 29.2	120 mm	Visual Audio recording NTP	-	Positive 7.0 s

Table 1. Summary of the observations received. The complete data set with occultation times is available at Euraster website and in the Occult database.

Key Achievements

Name	RA+Dec	Mags	PA	Sep	Date	N	Note
xxxxxxx	050153+3214	8.9 10.7	105.0	0.7000	2020.901	1	Soln 1
xxxxxxx	050153+3214	8.9 10.7	109.6	0.7530	2020.901	1	Soln 2

Table 2. Two possible solutions for the double star.

Abstract: An occultation of TYC 2392-01288-1 by the minor planet (283) Emma on November 24, 2020 showed this star to be a previously unknown double star. The occultation of the main component alone was observed by one visual double station in Algeria. The occultation of the secondary component alone was observed by three stations in Czechia and Italy. Two negative observations were also reported from Slovakia and Switzerland. From a Gaia G magnitude of 8.73 for the target star, an estimated V magnitude of 12.8 for the asteroid, and a 0.18 mag drop measured for the occultation of the secondary component, we conclude that the approximate G (or V) magnitudes of the two components are 8.9 and 10.7. Two solutions for the separation and position angle of the components are derived from a fit of the chords on the 3D model DAMIT #1859 of the asteroid. The separation of the two components in solution 1 is found to be 0.7000 ± 0.0038 arcseconds at a position angle of 105.0 ± 0.2 degrees. The separation of the two components in solution 2 is found to be 0.7530 ± 0.0026 arcseconds at a position angle of 109.6 ± 0.2 degrees.

Circumstances

On November 24, 2020 an occultation of TYC 2392-01288-1 by (283) Emma and its moon S2003-283-1 was first predicted by Steve Preston (using Occult software) to pass across Russia, Europe and North Africa. Figure 1 shows the predicted path of the main body's shadow, and Figure 2 shows the predicted path of its moon's shadow, about 450 km to the northwest.

The predicted magnitude drop was 4.1 (V) with a predicted max duration of 11.5 s for Emma and 0.9 s for its moon.

Observations

Seven reports from six different stations were received for this event (summarized in Table 1). Three stations in Europe, one in Czechia and two in Italy, originally waiting for a possible short occultation by the asteroid's moon, recorded actually a ~10 s event with a very low 0.1-0.2 magnitude drop, suggesting that the target star is double and that the asteroid has occulted a faint companion from these locations (Figures 3, 4 and 5). Fortunately, the occultation of the main star was also observed by a team of observers in Algeria, divided in two groups to make a visual double station, who reported a 7 s occultation allowing the measurement of the double star. Two additional stations from

TYC 2392-01288-1, Discovery of Stellar Duplicity During Asteroidal Occultation by (283) Emma

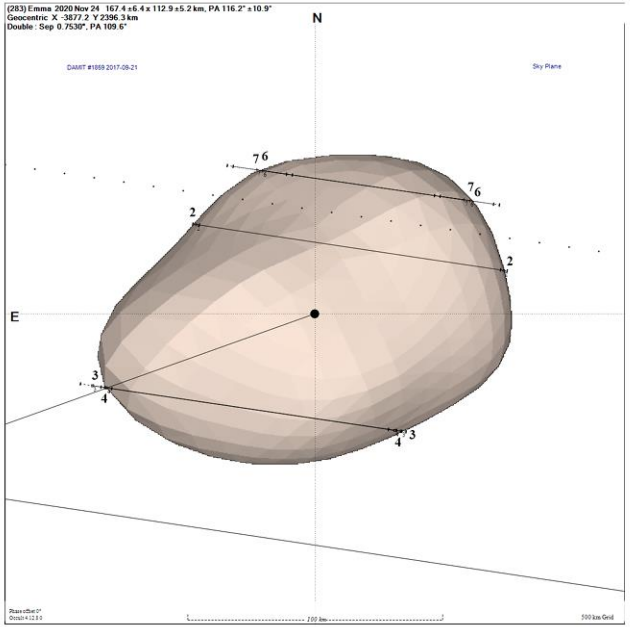


Figure 7. Fit on the 3D model DAMIT #1859 leading to solution 2. The station numbers are those visible in Table 1.

Key Achievements

- Observation of the occultation of the star TYC 1812-02302-1 in the constellation Taurus by the asteroid 2212 Hephaistos.

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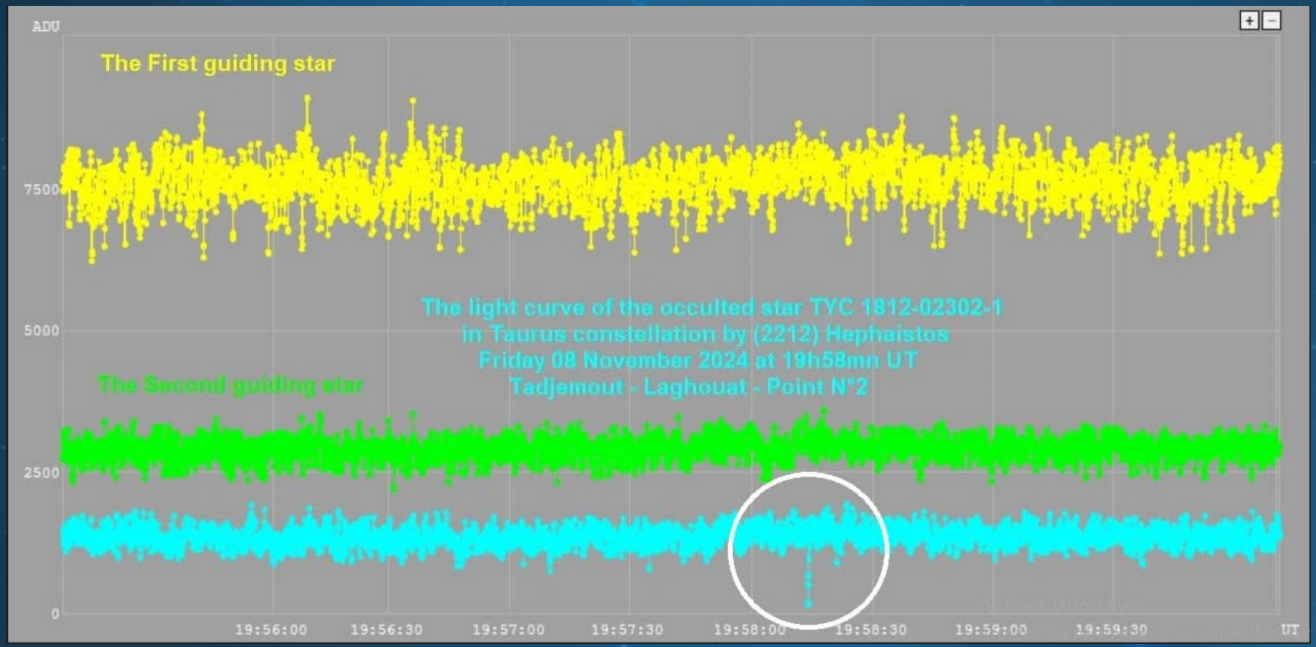
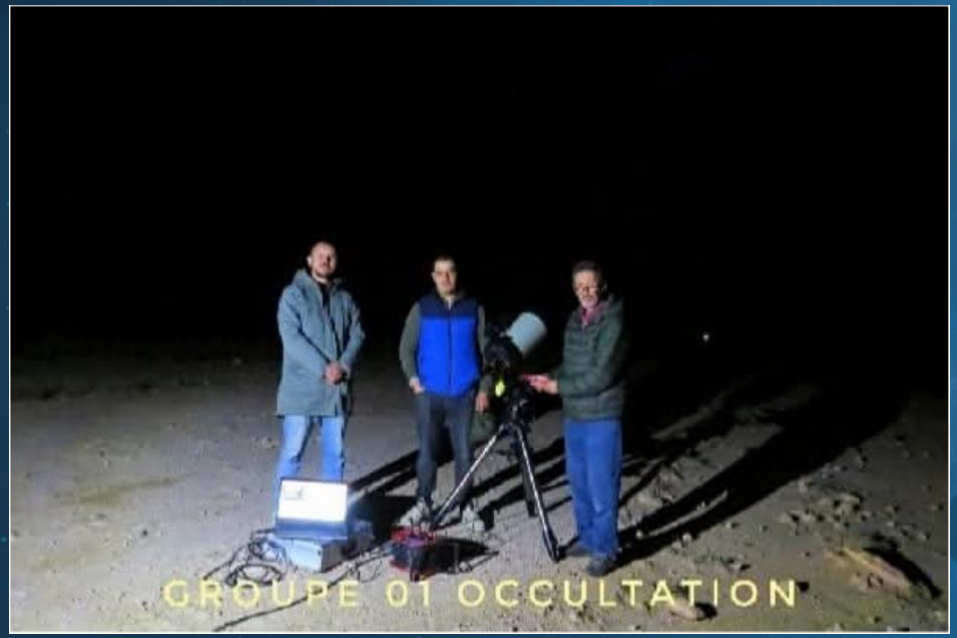


Key Achievements

- Observation of the occultation of the star TYC 1812-02302-1 in the constellation Taurus by the asteroid 2212 Hephaistos.



- Observation of the occultation of the star HIP 102217 by the asteroid (16) Psyche.

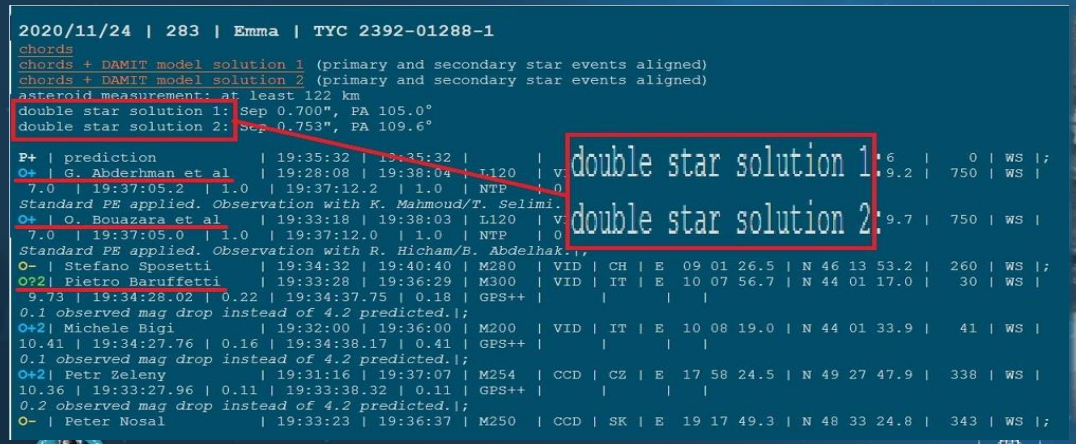
- Observation of the occultation of the star HIP 102217 by the asteroid (16) Psyche.

Key Achievements

- Part of IOTA, Euraster observer network

- Inspired by Professor Baba Aissa Jounaï – pioneer of participatory astronomy in Algeria

- Working to train new observers across the country



2020/11/24 | 283 | Emma | TYC 2392-01288-1
chords
chords + DAMIT model solution 1 (primary and secondary star events aligned)
chords + DAMIT model solution 2 (primary and secondary star events aligned)
asteroid measurement: at least 122 km
double star solution 1: Sep 0.700", PA 105.0°
double star solution 2: Sep 0.753", PA 109.6°

P+ | prediction | 19:35:32 | 19:35:32 | | | | | 6 | 0 | WS |;
O+ | G. Abderhman et al | 19:28:08 | 19:38:04 | L120 | V | | | 9.2 | 750 | WS |
7.0 | 19:37:05.2 | 1.0 | 19:37:12.2 | 1.0 | NTP | 0
Standard PE applied. Observation with K. Mahmoud/T. Selimi.
O+ | O. Bouazara et al | 19:33:18 | 19:38:03 | L120 | V | | | 9.7 | 750 | WS |
7.0 | 19:37:05.0 | 1.0 | 19:37:12.0 | 1.0 | NTP | 0
Standard PE applied. Observation with R. Hicham/B. Abdelhak.;
O- | Stefano Sposetti | 19:34:32 | 19:40:40 | M280 | VID | CH | E 09 01 26.5 | N 46 13 53.2 | 260 | WS |;
O?2| Pietro Baruffetti | 19:33:28 | 19:36:29 | M300 | VID | IT | E 10 07 56.7 | N 44 01 17.0 | 30 | WS |
9.73 | 19:34:28.02 | 0.22 | 19:34:37.75 | 0.18 | GPS++ | | | |
0.1 observed mag drop instead of 4.2 predicted.|;
O+2| Michele Bigi | 19:32:00 | 19:36:00 | M200 | VID | IT | E 10 08 19.0 | N 44 01 33.9 | 41 | WS |
10.41 | 19:34:27.76 | 0.16 | 19:34:38.17 | 0.41 | GPS++ | | | |
0.1 observed mag drop instead of 4.2 predicted.|;
O+2| Petr Zeleny | 19:31:16 | 19:37:07 | M254 | CCD | CZ | E 17 58 24.5 | N 49 27 47.9 | 338 | WS |
10.36 | 19:33:27.96 | 0.11 | 19:33:38.32 | 0.11 | GPS++ | | | |
0.2 observed mag drop instead of 4.2 predicted.|;
O- | Peter Nosal | 19:33:23 | 19:36:37 | M250 | CCD | SK | E 19 17 49.3 | N 48 33 24.8 | 343 | WS |;

double star solution 1:
double star solution 2:

Successful Observation of TNO 2013 LU28' Stellar Occultation in the far Southern of Algeria on February 18, 2025.

The celestial body 2013 LU28 is a Trans-Neptunian Object classified as a Centaur due to its elliptical, highly eccentric, and retrograde orbit. Its trajectory is similar to the orbits of periodic comets such as Halley's Comet but lacks a coma or tail characteristic of comets.

It was discovered on June 8, 2013, by astronomers from the Mount Lemmon Survey at the Mount Lemmon Observatory in Arizona, USA.

Following its identification, astronomers have known very little about it, except that it has an inclination of 125° and an eccentricity of 0.953, making it a truly fascinating object.

It was therefore a great challenge. Observing this occultation was crucial. Indeed, since 2016,

researcher BABA AISSA Djounai from the Center for Research in Astronomy,

Astrophysics and Geophysics (ex Algiers Observatory) has been the driving force behind the initiative of participative astronomy

applied to the observation of stellar occultations by small celestial bodies.

In line with this topic, the CRAAG delegated and assigned BABA AISSA

to lead a scientific expedition to the remote southern region of Algeria, Commissioned with this mission,

he was deployed on the field in collaboration with three members of Suhail Astronomical Association of Laghouat

and a member of Bejaia Youth Scientific and Technical Activities League.

Key Achievements

The total Solar Eclipse – April 8, 2024 – Dallas, Texas, United States

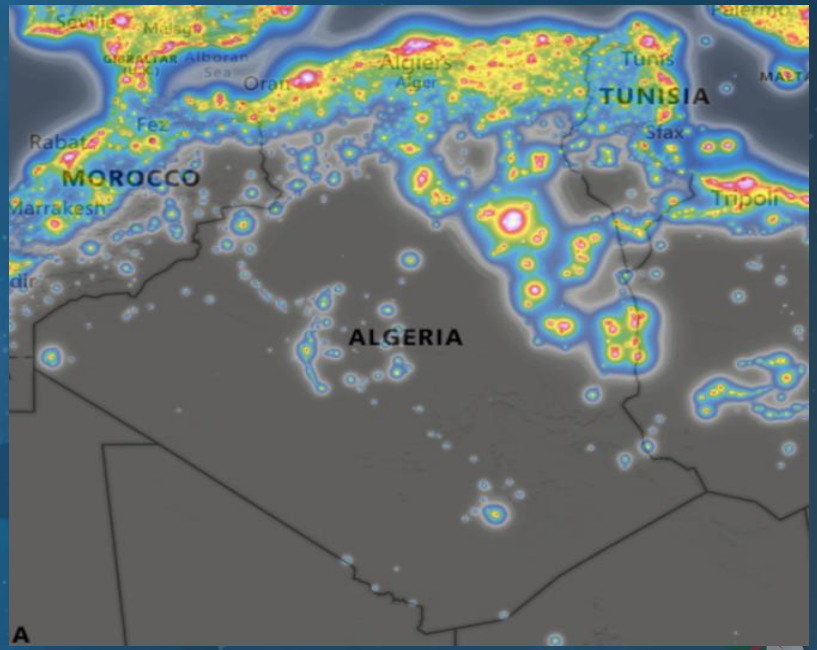
Why Algeria Matters

In occultations .?

- Geographic location bridges Europe and Africa in observation networks

- Clear desert skies, especially in southern Algeria

- Our observations complement international datasets



Map highlighting Algeria’s strategic position


ASSOCIATION SUHAIL D'ASTRONOMIE LAGHOUAT
جمعية سهيل لعلم الفلك و علوم الفضاء بالأغواط
Jupiter
Saturn
Earth
Mars

Looking Ahead

– Expand collaboration with North African and European teams.

– Involve more youth and amateurs in scientific observations.

– publishing in international scientific bulletins.

– We are equipped with telescopes of various sizes and motorized mounts,

ready to support scientific work.

– developing our own cameras to help overcome the shortage

of imaging equipment.

– eager to take part in capturing major astronomical events.

Suhail Astronomy Association

“ The Algerian Sky in Your Hands.”

Thank you

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