

CASE FILE 86 / 237UAP00288

# 237UAP00288

Multiple-witness public UAP report; score 44

NORMAL-OBJECT FAVORED

REPORT NO.	UAP-OM-86-237UAP00288	DISPOSITION	NORMAL-OBJECT FAVORED
PRIMARY CASE	237UAP00288	GENERATED	2026-05-20 18:32 UTC
REPORT TIME	2023-08-16T06:00:00+00:00	OBSERVER	34.56220, -86.75071
SOURCE CASE IDS	237UAP00288		

## Abstract

This case file evaluates a reported UAP sighting against the available orbital-object layer. No compact same-launch group fully identifies the file by itself. The final disposition is assigned under a normal-object favored standard, where ordinary aerospace/orbital explanations are preferred when they reasonably fit the report.

This is a standalone independent analysis prepared from public-source records and public orbital datasets. It is not an official government determination, classification marking, or agency-authored report.

# 1. Executive Summary

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237UAP00288 is assessed as normal-object favored because the available public evidence gives a case-specific ordinary-object candidate: strong ADS-B aircraft candidate N559UW A321 a722b1 at 42.1 km, azimuth 336.5 deg, elevation 14.44 deg, 0.33 min from report. Dense satellite presence alone is not treated as causation in this packet.

## 1.1 Key Findings

- Source score 44 based on: multiple aircraft/facility witnesses, maneuvering/motion anomaly, UAP/UFO language.
- Report time used: 2023-08-16T06:00:00+00:00.
- External object layer used: Starlink.
- Disposition standard: NORMAL-OBJECT requires case-specific causal fit. Satellite density above the horizon is context only and cannot by itself resolve the report.
- Case-specific ordinary-object evidence: strong ADS-B aircraft candidate N559UW A321 a722b1 at 42.1 km, azimuth 336.5 deg, elevation 14.44 deg, 0.33 min from report.
- Non-causal context / rejection screens: substantial orbital-object sky background; context only, not causation; NASA/JPL known-small-body rejection screen present.
- Remaining hard features: multiple witnesses/facilities; hard maneuver language.
- Objects above horizon: 204; at/above 10 deg: 79.
- No compact same-launch/designator group survived the report threshold.
- No explicit Starlink/balloon wording was found in the source excerpt used for ranking.

## 1.2 Bottom Line

**NORMAL-OBJECT FAVORED:** A case-specific ordinary-object candidate exists from source language, orbital geometry, launch-object context, or compact trajectory grouping. Dense ordinary sky traffic alone is not treated as causation.

# 2. Source Control

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The source-control table identifies the public report records reviewed for this case and lists public access links where available. The table is included so this PDF remains interpretable when distributed by itself.

CASE ID	REPORT DATE FIELD	FACILITY / TITLE	TEXT EXTRACT	PUBLIC PDF LINK
237UAP00288	06:00 08/16/2023 Callsign: AAL1397 Origin: MIA	ZME Operator: AAL Operator Type: Commercial	text extract present	<a href="#">237UAP00288.pdf</a>

### 3. Original Report Evidence

PRIMARY EXCERPT USED FOR MATCHING	Aircraft reported an unidentified aerial phenomenon in the vicinity of HSV of what appeared to be two aircraft refueling well above their altitude of FL340. The unknown phenomenon was described as two bright lights 60 miles N of BHM circling at a very high altitude. The lights would stay on for a few minutes and then disappear. Multiple aircraft and facilities are reporting the same description of lights in the general area. NKS2866, Birmingham Tower personnel, and reports from aircraft in Atlanta Center's airspace. AWO notified.
REPORT TIME USED	2023-08-16T06:00:00+00:00
OBSERVER COORDINATE USED	34.56220, -86.75071
OBSERVER SOURCE BASIS	aviation_offset:60 miles N of BHM (public text extract 237UAP00288)

### 4. Methodology

- Spacetime extraction.** The report time and observer coordinate were extracted from the public text report and normalized to UTC. Aviation fixes/radials were resolved during earlier preprocessing where applicable.
- External object dataset.** The object layer used historical Space-Track/TLE-derived Starlink element rows. The analytic mode for this case is historical Starlink element propagation and same-launch/designator sky grouping.
- Propagation.** Orbital elements were propagated to the report minute and observer location. For launch-object checks, samples around the report minute were retained. For Starlink group checks, objects above the horizon were clustered by sky position and filtered for same-launch groupings.
- Comparison.** The output was compared against the report's count of lights, direction cue, motion language, altitude/radar language, and whether the file itself already suggested a satellite explanation.
- Causation standard.** Mere object presence above the horizon is treated as background context only. A normal-object disposition requires a case-specific causal fit, such as a named launch object, a compact same-launch trajectory group, or source language that directly supports that object class.
- Disposition assignment.** *Identified* means a specific normal object fits the report spacetime and the hard reported features do not materially conflict. *Normal-object favored* means a case-specific ordinary aerospace/orbital candidate exists, but it is not a full named identification. *Insufficient* means the file is too thin to carry high anomaly value. *High-value unresolved* is used when radar, video, rapid maneuver, or multi-witness features remain after reasonable normal-object checks.

## 5. External Object Evidence

### 5.1 Search Volume and Density

This table is a screening layer only. Objects above the horizon show background opportunity; they do not establish causation unless a specific object or compact trajectory group matches the reported behavior.

STARLINK CATALOG IDS CONSIDERED	4597	HISTORICAL ELEMENT ROWS	4391
ABOVE HORIZON AT REPORT MINUTE	204	AT/ABOVE 10 DEG	79
LARGEST SAME-SKY CLUSTER	45		

No compact same-launch/designator group survived the report threshold. In this condition, satellite density remains context only and cannot by itself resolve a report with hard features.

### 5.2 Same-Launch / Same-Designator Candidate Groups

#	LAUNCH DATE	COUNT	AZIMUTH SPAN	ELEVATION SPAN	MOTION LABELS	MEMBERS
No same-launch group identified.						

### 5.3 Primary Group Members

OBJECT	NORAD	LAUNCH	AZ	EL	RANGE KM	APPARENT MOTION	ELEMENT AGE H
No members available.							

### 5.4 Bright-Sky Context: Top Starlink Objects by Elevation

OBJECT	AZ	EL	RANGE KM	APPARENT MOTION	LAUNCH DATE
STARLINK-5566	131.01	77.87	572.74	westward, setting	2023-03-29
STARLINK-3857	350.37	60.44	615.48	eastward, setting	2022-05-06
STARLINK-3363	69.46	57.18	634.49	eastward, setting	2022-01-19
STARLINK-5302	332.71	55.08	671.88	eastward, setting	2023-05-14
STARLINK-4576	214.32	53.95	655.89	westward, setting	2022-08-19
STARLINK-6096	22.0	47.25	740.37	eastward, setting	2023-03-29
STARLINK-3253	343.69	43.13	760.67	eastward, rising	2022-01-19
STARLINK-2081	139.69	39.28	820.15	westward, setting	2021-01-20
STARLINK-1131	203.2	39.14	821.43	westward, setting	2020-01-29
STARLINK-5189	7.62	35.92	864.31	eastward, setting	2022-10-20
STARLINK-4784	134.87	35.82	863.03	eastward, setting	2022-09-19
STARLINK-3373	167.82	34.31	889.75	westward, setting	2022-01-19

### 5.5 Largest Sky Clusters

#	COUNT	AZIMUTH SPAN	ELEVATION SPAN	MOTION LABELS
1	45	4.58-357.76 deg	10.19-35.92 deg	eastward, rising, eastward, setting, westward, rising, westward, setting
2	6	70.87-81.87 deg	12.96-27.97 deg	eastward, setting, westward, setting
3	6	226.98-253.27 deg	10.21-21.56 deg	eastward, rising, westward, rising, westward, setting

#	COUNT	AZIMUTH SPAN	ELEVATION SPAN	MOTION LABELS
4	5	188.63-212.63 deg	11.05-24.35 deg	westward, rising, westward, setting
5	3	332.71-350.37 deg	43.13-60.44 deg	eastward, rising, eastward, setting

### 5.6 Space-Track SATCAT Enrichment

Space-Track SATCAT metadata was pulled as a cached subset for NORAD catalog IDs appearing in this packet's evidence tables. This section adds owner/type/status context to the propagated object candidates.

PACKET SATCAT SUBSET ROWS	5370	FETCHED	2026-05-19T01:19:50+00:00
THIS CASE NORAD IDS CHECKED	30	SATCAT ROWS MATCHED	30
TOP OWNERS	US: 30		
OBJECT TYPES	PAYLOAD: 30		

### 5.7 Space-Track Metadata for Top Propagated Objects

NORAD	OBJECT NAME	TYPE	OWNER	LAUNCH DATE	DECAY DATE
56133	STARLINK-5566	PAYLOAD	US	2023-03-29	n/a
52494	STARLINK-3857	PAYLOAD	US	2022-05-06	n/a
51135	STARLINK-3363	PAYLOAD	US	2022-01-19	n/a
56556	STARLINK-5302	PAYLOAD	US	2023-05-14	n/a
53566	STARLINK-4576	PAYLOAD	US	2022-08-19	n/a
56103	STARLINK-6096	PAYLOAD	US	2023-03-29	n/a
51136	STARLINK-3253	PAYLOAD	US	2022-01-19	n/a
47366	STARLINK-2081	PAYLOAD	US	2021-01-20	n/a
45047	STARLINK-1131	PAYLOAD	US	2020-01-29	n/a
54052	STARLINK-5189	PAYLOAD	US	2022-10-20	n/a
53839	STARLINK-4784	PAYLOAD	US	2022-09-19	n/a
51122	STARLINK-3373	PAYLOAD	US	2022-01-19	2024-07-04

### 5.6 NASA/JPL Near-Earth Object Screen

This secondary object screen checks NASA/JPL close-approach objects near the report date and propagates their observer geometry through Horizons at the report coordinate. It is a known-object rejection layer, not a generic astronomy backdrop.

NASA/JPL CAD WINDOW	event date +/- 1 day, dist-max 0.2 au	COORDINATE USED	34.56, -86.75
CLOSE-APPROACH OBJECTS	16	ABOVE HORIZON	11
BRIGHT-ISH ABOVE HORIZON	0 using apparent magnitude <= 10 screen		

### 5.7 NASA/JPL Objects Above Horizon

OBJECT	CLOSE APPROACH UTC	DIST AU	H	AZ	EL	APP MAG
2023 QH5	2023-Aug-15 18:05	0.0378396842051172	24.55	240.69	49.06	19.09
2010 PK9	2023-Aug-16 11:36	0.147072701659612	21.81	202.83	70.21	19.14
2023 PH1	2023-Aug-16 21:57	0.0134076266864546	27.68	207.26	23.68	19.61
2023 PX	2023-Aug-15 23:30	0.033259322093466	25.91	207.22	16.84	19.95
2023 QC1	2023-Aug-15 00:24	0.0802665965328313	25.22	184.90	41.82	20.14

OBJECT	CLOSE APPROACH UTC	DIST AU	H	AZ	EL	APP MAG
2023 QL2	2023-Aug-15 09:17	0.0593953536369405	24.91	182.55	11.85	20.16
2017 BZ5	2023-Aug-16 20:01	0.127749610247471	22.27	46.96	57.25	20.30
2023 PG	2023-Aug-16 08:52	0.0646262494499499	24.49	254.00	71.02	20.32
2023 QN1	2023-Aug-15 19:53	0.0776351100690678	24.27	164.10	79.38	20.34
2023 QQ2	2023-Aug-16 17:49	0.0771828080989217	25.11	250.71	52.74	21.35

### 5.8 NASA/JPL Bright-Candidate Result

OBJECT	AZ	EL	APP MAG
No above-horizon close-approach object met the apparent magnitude $\leq 10$ screen.			

- NASA/JPL CAD listed 16 near-Earth close approaches in the event-date  $\pm 1$  day window within 0.2 au.
- Horizons placed 11 of those objects above the local horizon at the report coordinate/time.
- None of the above-horizon close-approach objects were remotely bright enough for naked-eye explanation using the  $\text{mag} \leq 10$  screen.

### 5.9 NASA/NOAA/ADS-B Expansion Layer

NASA POWER/Horizons/DONKI batch context had not yet been written for this case at packet build time.

### 5.11 Free Source Availability and Remaining Work

LAYER	STATUS	CASE-SPECIFIC NOTE
ADSB.LOL HISTORICAL RELEASE LISTING	screened/present	planes-readsb-staging-0 1684.2 MiB; planes-readsb-prod-1 1684.2 MiB; planes-readsb-prod-0 1681.3 MiB
ADSB TRACKS DOWNLOADED	not yet exhausted	Requires targeted extraction from large daily history archives before claiming aircraft exhaustion.
NOAA GOES IMAGERY	not yet exhausted	Needed for cloud/lightning visual context.
NOAA GOES ABI/GLM MANIFEST	screened/present	Public S3 object availability for the report hour.
NOAA NEXRAD WEATHER RADAR	not yet exhausted	Weather radar only; not ATC radar.
NOAA IGRA RADIOSONDE	screened/present	Needed for balloon drift plausibility.
ASOS/METAR WEATHER OBSERVATIONS	screened/present	Nearest station surface observations around report time.

- ADSB.lol historical: extract aircraft traces from adsblol/globe\_history\_2023 for 2023-08-16, then filter  $\pm 60$  min and 250 nmi around 34.5622,-86.7507.
- NASA POWER/Horizons/DONKI: batch context for 237UAP00288 at 2023-08-16T06:00:00+00:00.
- NOAA GOES: pull nearest ABI/GLM products for the UTC hour and render cloud/lightning map.
- NOAA NEXRAD: select nearest radar stations and render Level-II/III weather radar sweep around event time.
- NOAA IGRA: find nearest radiosonde station launches bracketing the event and model wind drift for balloon-like descriptions.
- Space-Track gp\_history/decay: fetch exact historical element rows and decay/reentry status for top candidate NORAD IDs.

### 5.12 Weather, Imagery, and Balloon Query Plan

This plan identifies the concrete free sources needed for the next case-specific weather and balloon checks. These are not treated as completed exclusions until the data are downloaded and plotted.

GOES SATELLITE	GOES16
GOES ABI PREFIX	<a href="https://noaa-goes16.s3.amazonaws.com/ABI-L2-CMIPF/2023/228/06/">https://noaa-goes16.s3.amazonaws.com/ABI-L2-CMIPF/2023/228/06/</a>
GOES GLM LIGHTNING PREFIX	<a href="https://noaa-goes16.s3.amazonaws.com/GLM-L2-LCFA/2023/228/06/">https://noaa-goes16.s3.amazonaws.com/GLM-L2-LCFA/2023/228/06/</a>

### 5.13 Nearest Weather-Airport Candidates

STATION	NAME	DISTANCE KM	COORDINATE
KHSV	Huntsville International Airport	8.50	34.64, -86.77
KHUA	Redstone Army Air Field	14.30	34.68, -86.68
KMSL	Northwest Alabama Regional Airport	81.50	34.75, -87.61
KBHM	Birmingham-Shuttlesworth International Airport	111.10	33.56, -86.75
KANB	Anniston Regional Airport	136.00	33.59, -85.86

- KHSV: [IEM ASOS/METAR daily CSV query](#)
- KHUA: [IEM ASOS/METAR daily CSV query](#)
- KMSL: [IEM ASOS/METAR daily CSV query](#)

### 5.14 Nearest Radiosonde Stations

STATION	NAME	DISTANCE KM	COORDINATE
USM00072230	BIRMINGHAM; AL	153.80	33.18, -86.78
USM00072327	NASHVILLE/METROPOLITAN; TN.	186.70	36.23, -86.55
USM00072215	PEACHTREE CITY; GA.	242.00	33.36, -84.57
USM00072235	JACKSON/ALLEN C. THOMPSON FIEL	397.00	32.32, -90.08
USM00072221	VALPARAISO/EGLIN AFB; FL.	454.10	30.48, -86.52

### 5.15 ASOS/METAR Surface Weather Observations

surface visibility ranged 10-10 statute miles; no precipitation was reported in the retained observations; no low broken/overcast cloud ceiling was evident in the retained station observations. Surface ASOS/METAR observations describe airport-level weather and visibility; they do not by themselves prove conditions at the sighting altitude or line of sight.

STATION	DISTANCE KM	NEAREST OBS UTC	VIS SM	SKY	WIND DEG/KT	METAR
KHSV	8.50	2023-08-16T05:53:00 +00:00	10.00	CLR, M, M, M	10.00 / 6.00	KHSV 160553Z AUTO 01006KT 10SM CLR 21/18 A3001 RMK AO2 SLP155 T02060183 10250 20206 402890206 58007
KHUA	14.30	2023-08-16T05:55:00 +00:00	10.00	CLR, M, M, M	40.00 / 8.00	KHUA 160555Z AUTO 04008KT 10SM CLR 20/19 A3000 RMK AO2 SLP154 T02040189 10252 20201 57007
KMSL	81.50	2023-08-16T05:53:00 +00:00	10.00	CLR, M, M, M	350.00 / 4.00	KMSL 160553Z AUTO 35004KT 10SM CLR 21/18 A3003 RMK AO2 SLP161 T02110178 10261 20206 402890206 58006

### 5.16 NOAA IGRA Radiosonde Wind Profile

Nearest sounding implies mean 0-12 km wind drift toward 251.0 deg at 13.3 m/s; a passive balloon could drift about 95.8 km in two hours under this crude layer-average model. Radiosonde winds are sparse station soundings; balloon drift remains approximate without launch time, ascent rate, object altitude, and exact line-of-sight bearing.

STATION	NAME	DISTANCE KM	SOUNDING UTC	MEAN DRIFT BEARING	MEAN SPEED M/S	2H DRIFT KM	MAX WIND
USM00072230	BIRMINGHAM; AL	153.80	2023-08-16T00:00 :00+00:00	251.00	13.30	95.80	35.00 at 174.00 m

### 5.17 NOAA GOES ABI/GLM Public File Manifest

GOES public S3 objects are listed for the report hour where available. This is an availability manifest, not yet a rendered satellite image.

<b>SATELLITE</b>	GOES16	<b>BUCKET</b>	noaa-goes16
<b>ABI SAMPLE FILES</b>	12	<b>GLM SAMPLE FILES</b>	12

#### ABI sample objects:

- [ABI-L2-CMIPF/2023/228/06/OR\\_ABI-L2-CMIPF-M6C01\\_G16\\_s20232280600208\\_e20232280609516\\_c20232280609584.nc](#)
- [ABI-L2-CMIPF/2023/228/06/OR\\_ABI-L2-CMIPF-M6C01\\_G16\\_s20232280610208\\_e20232280619516\\_c20232280619582.nc](#)
- [ABI-L2-CMIPF/2023/228/06/OR\\_ABI-L2-CMIPF-M6C01\\_G16\\_s20232280620208\\_e20232280629516\\_c20232280629588.nc](#)
- [ABI-L2-CMIPF/2023/228/06/OR\\_ABI-L2-CMIPF-M6C01\\_G16\\_s20232280630208\\_e20232280639516\\_c20232280639579.nc](#)

#### GLM lightning sample objects:

- [GLM-L2-LCFA/2023/228/06/OR\\_GLM-L2-LCFA\\_G16\\_s20232280600000\\_e20232280600200\\_c20232280600218.nc](#)
- [GLM-L2-LCFA/2023/228/06/OR\\_GLM-L2-LCFA\\_G16\\_s20232280600200\\_e20232280600400\\_c20232280600422.nc](#)
- [GLM-L2-LCFA/2023/228/06/OR\\_GLM-L2-LCFA\\_G16\\_s20232280600400\\_e20232280601000\\_c20232280601018.nc](#)
- [GLM-L2-LCFA/2023/228/06/OR\\_GLM-L2-LCFA\\_G16\\_s20232280601000\\_e20232280601200\\_c20232280601219.nc](#)

### 5.18 ADSB.lol Historical Aircraft Track Extraction

This layer uses the downloaded ADSB.lol daily history archive to test actual aircraft tracks near the report coordinate and minute. It is not treated as a primary-radar substitute; it is a transponder/receiver-derived aircraft screen.

<b>ARCHIVE WINDOW</b>	2023-08-16T05:00:00+00:00 to 2023-08-16T07:00:00+00:00	<b>RADIUS</b>	250.00 nmi
<b>TRACE FILES SCANNED</b>	55125	<b>TRACKS RETAINED</b>	199
<b>SUPPORT STATUS</b>	aircraft strong candidate present	<b>BEST-CANDIDATE NOTE</b>	ordinary-object favored if the report's count, color, direction, and motion can be reconciled with the candidate track(s).
<b>STRONG CANDIDATES</b>	3	<b>PLAUSIBLE CANDIDATES</b>	16
<b>REPORTING-AIRCRAFT TRACKS EXCLUDED</b>	0	<b>WEAK CANDIDATES</b>	25

### 5.19 Top ADS-B Candidate Tracks

AIRCRAFT	STATUS	SCORE	MIN DIST KM	NEAREST DT MIN	ALT FT	AZ	EL
N559UW A321 a722b1	strong aircraft candidate	81.72	40.30	0.33	36000	336.50	14.44
N414CY C208 a4e345	strong aircraft candidate	68.67	14.80	5.14	3900	111.00	4.41
N959NK A20N ad574c	strong aircraft candidate	56.99	70.80	1.09	31975	176.40	6.65
N541FL FA20 a6dc2b	plausible aircraft candidate	48.90	95.50	0.15	35975	77.00	5.32
N677ST PC12 a8f75b	plausible aircraft candidate	47.21	115.70	2.21	1600	179.70	-0.28
N511DN A359 a6657e	plausible aircraft candidate	42.69	160.90	0.13	30925	32.20	2.18





## 7. Analytic Comparison

CRITERION	REPORT EVIDENCE	ANALYTIC TREATMENT
TIME CONSTRAINT	2023-08-16T06:00:00+00:00	Directly used in propagation; this is a hard filter, not descriptive context.
LOCATION CONSTRAINT	34.56220, -86.75071	Directly used as observer point for azimuth/elevation/range computation.
COUNT / PATTERN	two-object/light language present	No compact same-launch count match; retained for unresolved report features.
MOTION LANGUAGE	circling, disappear	Apparent motion labels in the object table provide a plausible but not definitive comparison.
RADAR / OFFICIAL CHECK	not specified	No ATC radar return can be consistent with distant orbital objects or visual aircraft-light hypotheses, but it does not prove the match.
ANALYTIC DISPOSITION	normal-object	237UAP00288 is assessed as normal-object favored because the available public evidence gives a case-specific ordinary-object candidate: strong ADS-B aircraft candidate N559UW A321 a722b1 at 42.1 km, azimuth 336.5 deg, elevation 14.44 deg, 0.33 min from report. Dense satellite presence alone is not treated as causation in this packet.

## 8. Caveats, Limitations, and Collection Gaps

- No raw cockpit video, ATC replay, radar plot, or witness interview transcript was reviewed unless explicitly stated in the public source text.
- Aviation-derived coordinates can represent a nearby fix/radial or report point, not necessarily the actual line-of-sight intercept point.
- Starlink visibility depends on illumination, observer altitude, atmospheric conditions, and apparent brightness; this analysis tests geometry, not photometry. No brightness model is used unless explicitly stated elsewhere in the case file.
- TLE propagation is appropriate for screening and reconstruction but is not a substitute for authoritative operational ephemerides.
- When many satellites are above the horizon, generic presence is weak evidence and is not treated as causation. The report emphasizes named launch-object checks or compact same-launch trajectory groups.
- Normal-object favored is not the same as a perfect named-object identification; it requires a case-specific ordinary-object candidate stronger than simple object density.

# Appendix A. Public Report Text Extracts

237UAP00288

SKYWATCH INCIDENT REPORT

PRIMARY CODE: UNIDENTIFIED AERIAL PHENOMENON  
Date: 06:00 08/16/2023  
Status: Closed  
POD: DEN  
Reporting Facility: ZME

Callsign: AAL1397  
Aircraft: B738  
Tail Number:  
Operator: AAL

Origin: MIA  
Destination: MCI  
New Destination:  
Operator Type: Commercial  
Paged: YES

REMARKS

Aircraft reported an unidentified aerial phenomenon in the vicinity of HSV of what appeared to be two aircraft refueling well above their altitude of FL340. The unknown phenomenon was described as two bright lights 60 miles N of BHM circling at a very high altitude. The lights would stay on for a few minutes and then disappear. Multiple aircraft and facilities are reporting the same description of lights in the general area. NKS2866, Birmingham Tower personnel, and reports from aircraft in Atlanta Center's airspace. AWO notified.

## Appendix B. Computational Evidence Digest

This appendix preserves the principal computed values used in the assessment, shortened to the fields most relevant to audit and review.

```
{
  "report_time_utc": "2023-08-16T06:00:00+00:00",
  "source_excerpt": "Aircraft reported an unidentified aerial phenomenon in the vicinity of HSV of what appeared to be two
aircraft refueling well above their altitude of FL340. The unknown phenomenon was described as two bright lights 60 miles N of
BHM circling at a very high altitude. The lights would stay on for a few minutes and then disappear. Multiple aircraft and
facilities are reporting the same description of lights in the general area. NKS2866, Birmingham Tower personnel, and reports
from aircraft in Atlanta Center's airspace. AWO notified.",
  "historical_starlink_element_rows": 4391,
  "observer": {
    "lat": 34.562203108891815,
    "lon": -86.750712000000002,
    "source": "aviation_offset:60 miles N of BHM (public text extract 237UAP00288)"
  },
  "case_id": "237UAP00288",
  "starlink_above_horizon_at_report_time": 204,
  "starlink_catalog_ids_considered": 4597,
  "largest_same-sky_cluster_count": 45,
  "starlink_at_or_above_10_deg": 79,
  "top_starlinks": [
    {
      "azimuth_deg": 131.01,
      "azimuth_plus_2m_deg": 121.12,
      "azimuth_plus_5m_deg": 120.69,
      "element_age_hours": 14.91,
      "element_epoch": "2023-08-15T15:05:07.523520+00:00",
      "elevation_deg": 77.87,
      "elevation_plus_2m_deg": 26.56,
      "elevation_plus_5m_deg": 4.75,
      "epoch_altitude_km": 565.37,
      "ground_track_bearing_deg": 120.39,
      "ground_track_label": "ESE",
      "launch_date": "2023-03-29",
      "name": "STARLINK-5566",
      "norad_id": "56133",
      "range_km": 572.74,
      "sky_motion_label": "westward, setting",
      "subpoint_lat": 33.9044,
      "subpoint_lon": -85.8477
    },
    {
      "azimuth_deg": 350.37,
      "azimuth_plus_2m_deg": 33.4,
      "azimuth_plus_5m_deg": 41.54,
      "element_age_hours": 8.16,
      "element_epoch": "2023-08-15T21:50:13.238880+00:00",
      "elevation_deg": 60.44,
      "elevation_plus_2m_deg": 23.28,
      "elevation_plus_5m_deg": 3.53,
      "epoch_altitude_km": 546.06,
      "ground_track_bearing_deg": 46.58,
      "ground_track_label": "NE",
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## Appendix C. Source Exhaustion Checklist

This checklist records which source layers were actually applied to this individual report. It separates checked evidence from unexhausted collection gaps so the disposition is auditable when the PDF is read alone.

SOURCE LAYER	STATUS	CASE-SPECIFIC NOTE
NARA PUBLIC UAP/FAA REPORT	reviewed	Source IDs: 237UAP00288
TIME AND OBSERVER COORDINATE	extracted	2023-08-16T06:00:00+00:00 at 34.56220, -86.75071
ORBITAL OBJECT PROPAGATION	screened	Starlink
SPACE-TRACK SATCAT METADATA	screened	30 NORAD IDs checked; 30 matched in local SATCAT subset
LAUNCH-OBJECT/SUPGP LAYER	not applicable	not a launch-object case
NASA/JPL KNOWN SMALL-BODY LAYER	screened	CAD/Horizons secondary screen included when this case had NEO-relevant timing/ geometry
NASA POWER/HORIZONS/DONKI CONTEXT	not exhausted	Hourly weather, sky geometry, and space-weather context where local JSON is present
AIRCRAFT/ADS-B LAYER	screened	55125 trace files scanned; 199 tracks retained; aircraft strong candidate present
NOAA GOES IMAGERY LAYER	not exhausted	Cloud/lightning imagery layer for the report hour
NOAA GOES ABI/GLM MANIFEST	screened	Public S3 object listing for the report hour
NOAA/NEXRAD WEATHER RADAR LAYER	not exhausted	Weather radar only; not ATC/primary radar
NOAA IGRA RADIOSONDE LAYER	screened	Balloon drift plausibility layer
ASOS/METAR SURFACE WEATHER	screened	Nearest station visibility, cloud, wind, precipitation, and METAR observations
WEATHER/BALLOON SOURCE PLAN	planned	Nearest weather-airport, GOES, and radiosonde queries are listed where local plan JSON is present
FINAL ANALYTIC DISPOSITION	normal-object favored	Presence-only satellite density is context only; a stronger case-specific fit is required for normal-object disposition



## References and Source Links

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2. National Archives and Records Administration. *Record Group 615: Unidentified Anomalous Phenomena Records Collection*. <https://www.archives.gov/research/topics/uaps/rg-615>
3. National Archives and Records Administration. *Bulk Downloads for Records Related to Unidentified Anomalous Phenomena (UAPs)*. <https://www.archives.gov/research/catalog/catalog-bulk-downloads/uap-bulk-download>
4. National Archives Catalog. *Records from the Federal Aviation Administration Relating to Unidentified Anomalous Phenomena, National Archives Identifier 493468575*. <https://catalog.archives.gov/id/493468575>
5. National Archives direct digital object. *237UAP00288.pdf, FAA UAP report record copied from RG 615 bulk digital objects*. <https://s3.dualstack.us-east-1.amazonaws.com/NARAprdstorage/lz/electronic-records/rg-615/493468575/237UAP00288.pdf>
6. Hugging Face dataset. *oxzoid/space-track-tle-history: historical TLE archive used for Starlink screening*. <https://huggingface.co/datasets/oxzoid/space-track-tle-history>
7. Space-Track.org. *Public source for the underlying U.S. Space Surveillance Network TLE distribution referenced by the historical TLE archive*. <https://www.space-track.org/>
8. Space-Track.org. *API documentation for SATCAT and catalog metadata classes used for local enrichment*. <https://www.space-track.org/documentation#/api>
9. NASA/JPL Solar System Dynamics. *Close-Approach Data API documentation for known small-body encounter screening*. <https://ssd-api.jpl.nasa.gov/doc/cad.html>
10. NASA/JPL Solar System Dynamics. *Horizons API documentation for observer geometry and apparent magnitude queries*. <https://ssd-api.jpl.nasa.gov/doc/horizons.html>
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12. ADSB.lol. *Historical open-data release documentation*. <https://www.adsb.lol/docs/open-data/historical/>
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14. OpenSky Network. *Historical data via Trino documentation*. <https://openskynetwork.github.io/opensky-api/trino.html>
15. NASA GIBS. *Global Imagery Browse Services API documentation*. <https://nasa-gibs.github.io/gibs-api-docs/>
16. NASA Earthdata. *Common Metadata Repository search API documentation*. <https://cmr.earthdata.nasa.gov/search/site/docs/search/api.html>
17. NOAA / AWS Open Data. *GOES public dataset registry*. <https://registry.opendata.aws/noaa-goes/>
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20. Iowa Environmental Mesonet. *ASOS/AWOS/METAR data download service*. <https://mesonet.agron.iastate.edu/request/download.phtml>
21. Celestrak. *Spacetrack Report No. 3: Models for propagation of NORAD element sets*. <https://celestrak.org/NORAD/documentation/spacetrk.pdf>
22. Celestrak. *Supplemental GP element sets documentation and current endpoint index*. <https://celestrak.org/NORAD/elements/supplemental/>