

NARCAP International Air Safety Report 1
NARCAP IR-1, 2009

Near-Miss with UAP near Sao Paulo, Brazil Airport in 2004¹

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June 2009

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Abstract

This report summarizes a near-miss aerial encounter between a Brazilian passenger flight and a single, self-luminous and self-propelled sphere-shaped phenomenon during an afternoon in 2004. The UAP was in sight for over 14 minutes. The Captain had to make an abrupt evasive maneuver while approaching Sao Paulo airport's runway 17 localizer. Both cockpit crewmembers ducked down instinctively as they watched the white sphere pass by in front of them at an undetermined but relatively near distance. A beam of light swept through the cockpit as the UAP (unidentified aerial phenomenon) passed. It is highly unlikely that the object was an unmanned aerial vehicle, a helicopter, or a balloon of some kind. The UAP was not recorded on ground radar at any time and remains unidentified at this time.

Date, Time and Location of Sighting

The exact date of this near-miss event is not known because the primary reporting witness (i.e., Capt. XX, First Officer; F/O) did not record it in his log book because the Sr. Captain "... refused to acknowledge the event in public." In a correspondence with the author of April 30, 2009 the reporting witness wrote that this flight took place "during the week and not on the week-end." He also said, "I cannot be precise (about the season) because the weather around here has been changing a lot and you have warm days, bright sunny days even during the winter. The time of this encounter was sometime during the afternoon."² He recalls seeing cockpit shadows from the sun.

¹ The primary reporting eye witness is referred to as Capt. XX. Although he gave permission for his name to be used the author decided against it for his future protection.

² The witness wrote, "...we were arriving during the afternoon, most probably (at) the end of the day in VMC Visual Meteorological Conditions." (Personal Correspondence, April 15, 2009)

Flight Crew Witnesses and Passengers

The primary reporting eye witness was Capt. XX, 45 yrs. old. He was flying this leg. He had accumulated about 3,000 hours flight time in this airplane type at this time. By 2008 he had logged over 10,000 total flight hours and also had flown many different small propeller aircraft as well as the EMB-110 Bandeirante (1,300 hrs.), ATR-442 (3,500 hrs.), and Citation II and Citation Ultra (1,500 hrs.). He had no military flight experience. He had seen another unexplainable self-luminous phenomenon while flying sometime between 1989 and 1991 flying a Citation jet in the vicinity of Sao Paulo.

The second eye witness was Capt. YY, 52 yrs. old sitting in the left seat. During the sighting the reporting witness turned to his left and asked him, "Did you see this? Have you seen this?" He answered, "I saw it, but if you say that I will deny that I did. I know what it was, but I'll deny (it)." Nothing more was said between them for years. More recently the Sr. Captain has been employed by another airline.³

There were about sixteen to twenty passengers on board and two cabin attendants. Due to the position of the UAP relative to the airplane it is very unlikely that anyone else onboard saw the UAP although this isn't known for certain.

Weather

The witness indicated generally clear air enroute to Sao Paulo from the north. The witness said, "I remember a clear day, city in view. Someway it comes to my mind (that there were) some small cumulus (cloud) around (the) Guarulhos area, but not significantly.... it was rather a dry day... (When flying between the navigation fix "ERIC" and "EVER") the air was clear horizontally and vertically. I do not have the Metar, but I think that Sao Paulo was Cavok (Ceiling and visibility unlimited)."⁴ "The sky was blue."⁵ "Winds from 6 to 12 kts."⁶

The Airplane

The pilots were flying a French built (Aerospatiale/ Alenia, Avions de Transport Regional) ATR-42-300, two-engine, short-haul, regional, turbo-prop aircraft. Figure 1 shows a similar model as flown by a different airline. This model aircraft has been in revenue service in many countries since 1985 with over four hundred built to date. The "42" refers to number of passengers. Its short take-off field length of 3,822 feet at sea level makes it an attractive aircraft for many locations. It is considered a relatively high performance aircraft. The latest version (ATR-42-500) has a maximum cruise speed at 17,000 feet = 300 kts; time to reach 17,000 feet from 1,500 feet = 9.9 minutes. The airplane involved here was not equipped with a Terminal Collision Avoidance System (TCAS).

³ An attempt is being made to locate him for purposes of an interview.

⁴ Personal correspondence, May 20, 2009.

⁵ Personal correspondence, June 1, 2009.

⁶ Personal correspondence, June 2, 2009.

Figure 1
 ATR-42/300 In-flight
 aircat_FC_SaoPaulo_ATR42-500.jp



Flight Path and Sighting Details

This flight was returning to Sao Paulo's Congonhas Airport (SBSP) from one of the following small cities northwest of Sao Paulo: Bauru, Marilia, Presidente Prudente, Aracatuba, or Araraquara. The reporting witness cannot recall which one. All are within about 300 miles (or less) of the airport, the busiest in Brazil. SBSP uses two primary navigational approach entry points for landing:⁷ Point 1 is SANTANA (STN) (to be discussed below and shown in Figure 2) generally for flights approaching from the northeast, north, and northwest and landing on runway 17 L and 17R, and Point 2 is referred to as the REDE fix (RDE) for flights arriving from the coast to the southeast, south, and southwest and landing on runway 35 L and 35 R. Runway elevation is 2,631 feet MSL. There are a number of mountains surrounding Sao Paulo ranging in height from 3068 to 4167 feet (MSL).

The following reconstruction of events is based upon the primary witness' memory and his extensive flight experience flying to and from Sao Paulo's Congonhas Airport (SBSP). Without radar confirmation of the UAP's position at any time during this fourteen minute-long visual sighting its location must be considered only approximate. The author has arbitrarily selected three locations along the airplane's flight path from which to consider various characteristics of the UAP. These three airplane locations are shown on Figure 2 with bold, block letters as:

- A. At or very near the VOR fix named "ERIC"; airplane on heading of 158 deg.
- B. Passing just north of the VOR fix named "SANTANA" (STN) shown by concentric circles in lower center of Figure 2. Here the airplane is banking left and altering its heading by 52 degrees to a new heading of 106 deg.

⁷ There are several others as well that will not be discussed.

Airplane at Location A "ERIC"

The reporting witness kindly provided an approach chart⁹ a portion of which is presented as Figure 2. He definitely remembers arriving at a navigation fix called "GRADE" and continuing on autopilot toward the SSE toward the SANTANA VOR beacon (labeled B in lower center of Figure 2) following a straight course approximately 60 miles long on a heading of 158 deg. The flight was conducted under Instrument Flight Rules. Atmospheric visibility was good at the time. The flight itself was under active ground radar monitoring and vectoring at the time.

Upon arriving at "ERIC" the primary reporting witness noticed a single, relatively intense white light at his ten thirty or eleven o'clock position (about 30 or 40 deg to left of his flight path). There is another large airport to the north of Sao Paulo called Cumbica (see Figure 4); its official acronym is SBGR. At this location the witness' aircraft was at about FL080 (approximately 8,000 feet) and travelling about 180 kts.; it was descending and slowing in conformance with air traffic control (ATC) instructions prior to landing. In a later correspondence regarding the judged location of the UAP, the witness said, "I would rather say (it was) somewhere ... in between Cumbica (SBGR) airport and Congonhas (SPSP) airport."¹⁰

In order to help visualize the apparent location of the UAP and its approximate angular size within the outline of the windshield the witness kindly provided several composite illustrations. He used cockpit photos he had taken (while on the ground) of the same model airplane; he stood just behind the pilots' seats on the cockpit's centerline. Then he superimposed other daytime aerial photos of the ground he had taken from the air at different locations. Figure 3 depicts the small, round, white UAP seen just left of the aircraft's center windshield post and low on the horizon when he was at location A (ERIC), basically straight ahead of them.

Figure 3
Approximate Location and Appearance of the UAP
when the Airplane was at Location A
aircat_FC_Sao_erik.jpg



⁹ MADA Arrival, Sao Paulo, Congonhas International Airport, (dated December 6, 2002) The original arrival plate was not available, however, the distances shown on this plate are still accurate.

¹⁰ Personal correspondence dated May 13, 2009.

The witness' initial estimate of the distance to the UAP from location A was twenty nmiles. "... in the neighborhood of Sao Paulo airport (SBSP)." The measured distance from point A and airport SBGR is about 38.2 nmi.¹¹ The measured distance from point A to his destination airport, Congonhas Airport (SBSP) is about 33.5 nmiles. Of course the actual distance to the UAP is not known.

The witness also provided estimates of the angular size of the UAP at each of these three locations. At location A it appeared as "just another traffic (airplane) approaching them,"¹² "only as a single white light" (that) flew along a "constant course."¹³ He said its initial angular size was equivalent to about 1.5 times the thickness of a pencil lead or about 3 mm (d), the pencil held at arm's length. Assuming the viewing distance to the pencil to be 71 cm (D) the resulting angle ($\alpha^1 = \tan \alpha^1 = d/D$) or Tangent 0.00423. The resulting angle = about 14 minutes arc or just under one-half of the full Moon's diameter of 32 min. arc.

The reporting witness said that somewhere between location A and B he asked the captain to contact center to ask about other possible traffic in the area. But even when they arrived near the SANTANA VOR fix he had not done so. So Capt. XX contacted center himself and learned two things, (1) there was another aircraft to his left and at a higher altitude probably bound for Cumbica Airport (SBGR) and (2) the ground radar showed no other traffic in their area.

The witness also stated that his first plotting of the probable location of the UAP while flying near Location A was visually near prohibited area SBP 429 (2337.83 S; 04629.03 W). This airspace extends from the ground to 4,000 feet altitude and is listed as a permanent restriction.¹⁴ The area is labeled "Petroquimica." (Petrochemical factory) He identified two other prohibited areas¹⁵ of possible relevance to the location of the UAP: (1) SBP 408 USINA CONGAS (Thermoelectric plant; 2334.03 S; 04637.03 W). This airspace extends from the ground to only 1,000 feet altitude and is listed as a permanent restriction. (2) SBP 436 CIDADE UNIVERSITARIA (exists to protect the Sao Paulo University Campus). Unless someone at the university was launching and flying a spherically shaped UAV or conducting high energy physics experiments in the lower atmosphere this prohibited area does not appear to play any role in this event.

Airplane at Location B Near VOR Fix "SANTANA"

While the SANTANA (STN) VOR is used as a fixed navigation point most flights turn left just before reaching it to achieve a smooth outbound VOR radial heading of 106 deg in order to intersect the runway's ILS path's inbound bearing of 166 deg. Capt. XX recalls that his altitude

¹¹ This underestimation of distance in clear air is a well known phenomenon of visual perception, particularly when the identity and actual size of the target object isn't known and there are no intervening distance cues present with which to judge the separation distance.

¹² Personal correspondence April 12, 2009.

¹³ The witness clarified this point on May 18, 2009; "I would say (the UAP flew) parallel with the ground. Imagine that I was concerned with his horizontal displacement in relation to the (flight) path I had to make, thus we would get together (collide) nearby the localizer interception." (Personal correspondence, May 18, 2009).

¹⁴ www.aisweb.aer.mil.br/aisweb_files/indices/AIP-Brasil/enr5.pdf (pg. 21)

¹⁵ The locations of these prohibited areas are found on the Juliett 5 NDB descent chart for runway 35L at Congonhas airport.

passing STN was about 6,500 feet AGL. He was traveling about 165 kts.¹⁶

Figure 4 has been prepared to help understand better the possible azimuth angles of different locations and the UAP as seen from location B.

Figure 4
Sao Paulo Regional Chart
(Annotated points and lines explained in text)
aircat_FC_saopaulo_rfh1.jpg



Referring to Figure 4, the flight path of the airplane is shown by the diagonal blue arrow entering at the left-center.¹⁷ It points at the SANTANA VOR beacon (STN) but the line has been extended beyond (on heading of 158 deg.) to Y. This straight line is useful in measuring azimuth angles from the cockpit to various locations. Line STN - A is directed toward the Congonhas Airport (SBSP), some 17.3 nmi. away. Line STN - C is directed toward the Cumbica Airport (SBGR) about 23.8 nmi. away. Finally, the small red dot that represents the estimated location of the UAP (along the line STN - B) when first seen at location A. Its distance would have been about 29 nmiles away.

Assuming that the airplane was just approaching STN and had not yet begun its left turn, the UAP would have been located between 30 and 40 deg to their left side. However, if the UAP was not at the red dot location but somewhere else between Cumbica and Congonhas Airports then the UAP could have been between about 30 and 60 deg. arc to the left of their heading.

¹⁶ These are only rough estimates and are likely based on prior flight experience and reference to flight charts.

¹⁷ This chart with its various marked locations was provided by the witness on May 6, 2009.

Upon leveling their wings on their new heading of 106 degrees beyond STN the UAP was now seen at a bearing of about 125 degrees or about twenty degrees arc on their right side. In other words, their change in heading caused the distant UAP to appear to move across to their right-hand side.

Based on his recent recollection of the UAP while he was near STN, the reporting witness wrote, "As I was concerned about the (presence of) the object... I would prefer not to go faster but slower (than about 165 kts)¹⁸ in order to see better (how) the situation developed... I don't recall...any increase in airspeed while traveling along the 106 deg heading."¹⁹

I asked the reporting witness whether the UAP seemed to be descending with their airplane, i.e., whether it appeared to be matching their descent, so as to be on a collision course? On May 2, 2009 he wrote, "I couldn't notice any descent movement on the part of the object. As I was descending it remained at the same angle of the cockpit. As it was always steady, (i.e., maintained a smooth horizontal motion), that called my attention (to it) because if it were following the approach to runway 17, any traffic along the LOC course should not be there for a long time. What I could perceive was that it was moving in a way that I calculated that, if it continued, we would get together (collide!). So, as regarding some sort of (perceived) motion, (there was) only that of an approaching target. But I could not observe that it was descending with me."²⁰

Capt. XX asked the Captain if he was looking at the other unidentified traffic and learned that he was. The traffic continued to appear to be approaching their airplane. He also asked the Captain how long approach control would remain silent about the other traffic. About then he noticed that the other object had no navigation lights but looked only like a self-luminous point or ball. He then asked the Captain to contact ATC.

Figure 5 is the witness' photographic composite image of the UAP when the airplane was on a heading of 106 degrees and nearing a navigational fix indicated by **X** on Figure 8 but before beginning to turn right.

¹⁸ Words in parentheses within quotation marks are inserted for clarification by the author.

¹⁹ Personal correspondence, May 13, 2009. The MADA Approach chart specifies that all airplanes must not exceed 190 kts and cross SANTANA at between FL080 and 6,000 feet unless specific instructions to the contrary are received from ATC.

²⁰ The accurate visual perception of vertical displacement of a distant object in clear air is difficult at best unless there are fixed visual reference points also present against which the moving object's displacement may be compared over time.

Figure 5
 Approximate Location and Appearance of
 the UAP when the Airplane was on a Heading
 of 106 Degrees at Location B
 aircat_FC_Sao_stn.jpg F-2 orig.



After an unspecified period of time when the Sr. Captain had not called air traffic control Capt XX. called them himself. He was informed that they did not "see" the other traffic on ground radar. Because the airplane had turned farther left to the new heading of 106 degrees, from the cockpit the UAP appeared to have stayed in basically the same two o'clock relative position which would signal an eventual mid-air collision if nothing else changed.²¹

The reporting pilot said that the relative bearing to the UAP from the airplane²² was now only about six degrees to their right which confirms the pilot's stated concern that it might collide with them if the both continued their present flight paths.

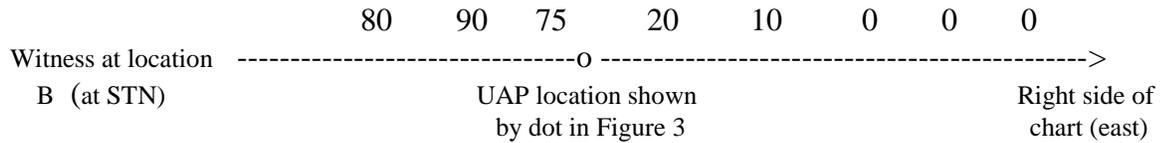
The author attempted to obtain a more accurate determination of the distance to the UAP as seen from location B. Using the chart presented in Figure 4 for basic ground reference points the

²¹ It is a well known fact that if an oncoming airplane does not change its visual position on the windshield it is on a converging course and will eventually strike the other airplane.

²² The longitudinal axis of the airplane defines zero degrees bearing.

witness was asked to assign a probability number from zero to 100²³ for each of seven equally-spaced distances away from his own location at STN. The witness's assignment of probabilities is presented in Figure 6.

Figure 6
Probability Estimates of Range between Witness and UAP



What these probability estimates suggest is that the reporting witness modified his earlier estimation of the location of the UAP [as he was passing location B (STN)] and now thought that its could have been nearer to him by an unknown amount.

Referring to Figure 4, if the UAP was at the location marked by the witness (with a red dot) then: (1) its azimuthal location would have been somewhere between the two airports mentioned above, and (2) its distance (from point STN) would be about 28.8 nmiles. If the airplane were flying at about 165 kts (just beyond STN) and the UAP was 12 nmiles away at location B' (cf. Fig. 9) and both were on a direct collision course they would have met after 4.3 minutes of flight.

Using known distances and airspeeds of the airplane (Fig. 2) between locations A, B, and C the duration of flight was 10 minutes from A to B and 3.8 minutes from B to C. Knowing these durations to first order accuracy permits calculations of the velocity of the UAP from A' to B' and from B' to C' assuming that the X marks on Figure 8 are approximately correct. We find a UAP velocity of 28 kts between A' to B' and 58 kts between B' to C'.

Location C
Position C on Figure 2 just Before the
Near Miss with UAP

At location C the airplane was at about 5,500 feet altitude and travelling about 150 knots airspeed. Normally he would have started his right-hand turn to intercept the runway's LOC upon arriving at the navigational fix labeled EVER.

At this point during the flight Capt. XX said, "this guy is very close and is (still) approaching us. This is not an aircraft, only a light, and we are very close." "(As) I was heading to EVER then the object was to my right at about 20 deg. or 25 deg."²⁴ "... and the object (was) approaching (me) I saw that it was round, like a ball, so it was a sphere."²⁵

²³ A zero was to be inserted (at any distance to the UAP) where the witness thought there was absolutely no possibility at all that the UAP was there. A probability score of 100 was to be inserted where he was absolutely certain that the UAP was there. Any number between zero and 100 could be used.

²⁴ Personal correspondence, May 27, 2009.

²⁵ Personal correspondence, May 20, 2009.

Then, when the airplane was "...very close to the interception point on the localizer," the UAP was now so close that Capt. XX decided to turn off the autopilot, bank sharply to the right, and descend slightly to "...avoid a collision." He wrote that he thought he did this about one minute's flight time before reaching the fix at EVER. This is portrayed by the witness in Figure 7.

Figure 7
Approximate Location and Appearance of
the UAP when the Airplane was at Location C
at Beginning of Right-hand Banking Turn
aircat_FC_Sao_curve.jpg F-5 orig.



At this point both crewmen saw "...a great torch of light (that) swept the cabin (and) caused great confusion. The cabin was suddenly and unexpectedly illuminated from the UAP appearing to come from the left side and moving across to the right. Both crewmen ducked down behind the instrument panel (for protection?) for several seconds, anticipating a mid-air collision. When I asked how long both crewmen bent forward and looked down the primary witness wrote, "Well, as soon as I initiated the curve (began to bank right and descend) perhaps in 2 seconds the beam came. I guess I would say about 8 seconds until the beam of light went away. ... Well, I was with the controls, having the object (so) close by and having to detour and fly the airplane. I think that when I (made) that decision, I started to look at him, like conveying, "you see what I am doing?" and immediately (the) light came around (and the) cockpit alert went high at that moment - and I saw him with his head bowed while the light passed, gazing at the (floor) and I guess he remained like that for the following seconds."²⁶

²⁶ Personal correspondence, May 9, 2009.

The reporting witness provided the following additional comments about these final moments during the close encounter. "I don't know why I didn't look at (the UAP) in its closest moment. Something I would not (have) missed at any cost. But I missed the very moment that I could have (had) more answers - or perhaps more to wonder (about). But somehow, I did not look (at it) and I cannot understand why."²⁷

It was then during the flight that Capt. XX asked the captain, "Did you see this? Have you seen this?" He answered, "I saw it, but if you say that I will deny that I did. I know what it was, but I'll deny (it)."

I wrote to the reporting witness to ask if he would feel comfortable with me remarking that any pilot would have been very frightened or panicked by seeing such an aerial object approaching them while in flight. He replied, "I was worried. The other captain was apparently not worried. At our closest moments with the object we were silent. And (I conducted the) detouring maneuvers, at least on my part in (a state of) apprehension, uneasiness. There was no panic, but perhaps a reflexive behavior when the light passed from left to right in the cockpit, making us duck (in) some way. At the moment I started to bank right I really did not see the size of the object and I cannot explain why I did not look at it. Afterwards, when we looked at each other, I would say that a relief came. My thought at that moment was, that was too close for comfort."²⁸

Location C' in Figure 2 is where the UAP appeared to be when the airplane was at location C. The calculated separation distance between them was only about 3.8 nmi. With the airplane travelling at 150 knots and the UAP also an assumed velocity of 150 knots the time to impact would have been about 77 seconds.

After the UAP had passed beyond the airplane Capt. XX maneuvered to intercept the localizer and completed its approach and landing on runway 17R.²⁹ The UAP departed off toward the left side of the airplane maintaining its altitude. Capt. XX continued to look at the UAP from his seat on the right side of the cockpit until the airplane was nearing the outer marker about 5.5 nmi. from the runway.

Significantly, no air turbulence was felt at any time during this event. It is also important to note that this near-miss took place only about 15 miles north of the runway threshold. The question can be asked whether tower personnel could have seen this event if they had been alerted in advance and looking in that direction? This is particularly possible if the UAP was continually emitting bright light in all directions as the witness' following testimony suggests. The Capt. wrote that, "The interesting fact at this time (was) that regardless of the angle you looked at the object (it) was still a bright light discarding the possibility of (it being) an

²⁷ Personal correspondence, May 20, 2009.

²⁸ Personal correspondence, May 20, 2009.

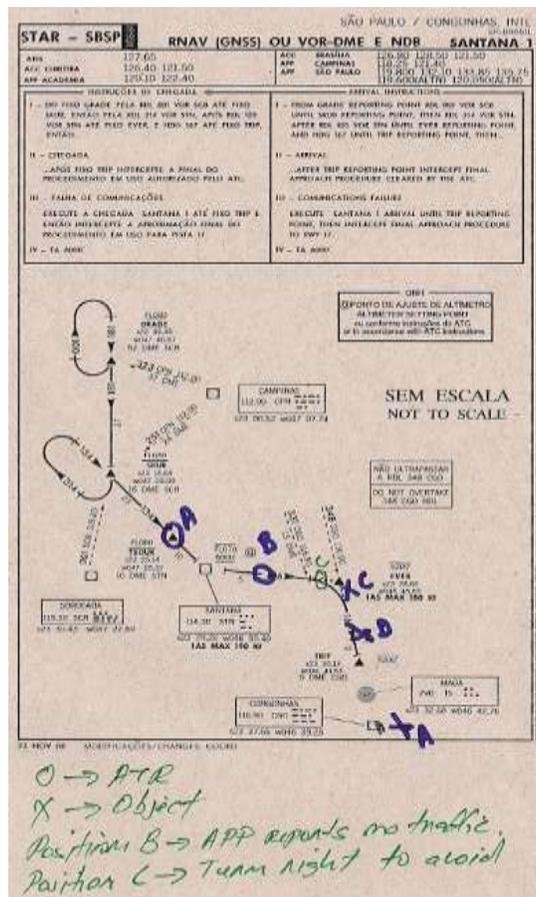
²⁹ Normal approach to landing procedure requires that the pilot contact the airport tower when at the outer marker. The reporting pilot didn't remember any airplane making a landing in front of him. If there was a UAP in this vicinity either it was not seen by tower personnel or they disregarded it because it was travelling away from the airport.

aircraft."³⁰

At this point it is necessary to consider another approach plate for Sao Paulo airport (SANTANA 1 Arrival) presented as Figure 8. This is the first approach chart the witness provided the author before he had more carefully reconsidered the flight path he had followed during the incident. He marked six locations in black pen on this chart.³¹ Circles labeled A, B, and C correspond to the three airplane locations discussed above. Crosses labeled A', B', and C' are the estimated positions of the UAP at corresponding times.

It is important to note that the apparent flight path of the UAP was linear and directed toward or near) the EVER navigational fix where the airplane also was headed. The UAP never appeared to veer toward the airplane; i.e., both were on a converging course. "By no means (did) the UAP move towards my path when I was (flying on a heading of) 106 deg before my detour."³²

Figure 8
Annotated SANTANA 1 Approach Chart to Runway 17, Sao Paulo
(Original flight chart received with witness notations in blue ink)
aircat_FC_SaoPaulochart.jp



³⁰ Personal correspondence, April 30, 2009. Implicit in this statement is the fact that no external airplane fuselage light sources shine in all directions simultaneously. Most are confined to narrow beams that disappear when pointed away from the viewer.

³¹ Personal correspondence, April 30, 2009.

³² Personal correspondence, May 27, 2009.

It will be noted that the three positions of the airplane depicted in Figure 8 differ somewhat from those shown in Figure 2. This is because the witness subsequently remembered that he hadn't used the SANTANA 1 arrival chart during this event but, rather, the MADA arrival (i.e., Figure 2). Figure 8 is presented only for its depiction of the three UAP positions and their relative distances apart relative to the more accurately known position of the airplane at location A, B, and C; this helps establish durations between these three locations to a first order of accuracy. Table 1 presents the result of these calculations.

Table 1
Distances, Speeds, and Flight Durations
Based on Witness Narrative Data and Figure 5

| <i>Locations</i> | <i>Distance (nmi.)</i> | <i>Velocity</i> | <i>Time to Travel (min.)</i> |
|-------------------|------------------------|--------------------|------------------------------|
| <i>Airplane</i> | | | |
| <i>A - B</i> | 17 (K) | 180 (K) | 5.7 (K) |
| <i>B - C</i> | 10.6 (K) | 165 (K) | 3.85 (K) |
| <i>C - EVER</i> | 1.2 (K) | 150 (K) | 0.5 (K) |
| <i>UAP</i> | | | |
| <i>A' - B'</i> | 4.7 (A) | 28.2 (C) | 5.7 (K) |
| <i>B' - C'</i> | 3.7 (A) | 57.7 (C) | 3.85 (K) |
| <i>C'' - EVER</i> | 2.6 (A) | 102.5 (C) | 1.54 (K) |
| | <i>K = Known</i> | <i>A = Assumed</i> | <i>C = Calculated</i> |

Note in Figure 8 that the UAP was drawn as traveling farther from A' to B' relative to the airplane's travel distance from A to B while the opposite is true between points B' and C' versus B and C. It is as if the UAP seemed to be approaching the intersection point at a higher rate of speed in order for it to cover the greater separation distances portrayed in Figure 2. This is made apparent in the calculated velocity values of the UAP in Table 1. Of course, if these marked UAP locations are not correct then this analysis is mute.

For the sake of completeness and possible useful reference Figure 9 presents the DESCENT HOTEL 1 Approach chart to ILS Runway 17 to Sao Paulo. It contains much useful information for the region north and west of Congonhas International Airport (SBSP). This is an enlarged flight chart compared with Figure 2 and is useful for plotting the possible locations of the airplane and UAP relative to one another over time. Points C, A', B' and C' have been replotted according to the locations provided by the witness in Figure 8.

Figure 9
 Annotated Descent Hotel 1 Approach Chart to Runway 17, Sao Paulo
 aircat-FC_saoPaulohotel1_final1.jpg



The reporting witness claimed that, as he originally sketched on Figure 8, the UAP appeared to be in the vicinity of the Congonhas Airport (SBSP) when first seen (location A'). Then the UAP moved continuously toward the NNW by about 4.7 miles over the same period of time as the airplane traversed from A to B or 5.7 minutes. This represents a UAP velocity of about 28 kts.

If the distance traveled by the UAP from B' to C' is about 3.7 nmi. and the duration of its flight was 3.8 minutes (again using the airplane's known flight distance and velocity as a reference) then the UAP's velocity would have been almost 58 kts.

Finally, if the distance traveled by the UAP from location C' to the EVER fix is about 2.6 nmi. and it was covered in only 92 seconds, the UAP would have had to be travelling at over 100 kts! Even relatively small changes to the estimated UAP locations shown on Figures 5 and 6 could even out the calculated velocity of the UAP to around a constant 65 to 75 kts.

The lower diagram in Figure 9 shows an elevation view of the nominal ILS flight path that airplanes should follow to runway 17. Note that the localizer should be intercepted at an altitude of 5,200 feet and that there are several mountain peaks lying near the flight path making altitude control very critical. The outer marker should be crossed at 4,300 feet and the middle marker at decision height.

The UAP

The reporting witness provided the following additional details about the UAP over the course of the approximately 14.3 minute-long sighting:

Appearance: Initially the UAP appeared as a very small, self-luminous area of bright white (or "crystal") light, something like a single landing light on some airplanes. It was large enough to not qualify as an optical point, at this point. "I saw no change in color at any time. It only seemed stronger (more luminous) as time went by."³³ When asked about his statement that the center or body of the UAP had a "milky white" appearance he replied, "By milky I mean that it was more concentrated, not that there was a mixture of colors, but a single, unique color that I could infer it was a body, although I could not see its surface directly." Later in this same correspondence he wrote, "It was not silver."³⁴ At no time during this encounter did its outline shape change from "round."

When asked about his general impression of the shape and luminosity of the UAP taking into account his entire time of looking at it the witness replied, "I saw it was round, although I could not say it had any inner surface, that is, something (that) one could touch; in its center it had a more...milky light... Now this center is not a single point (within) the object but the very round shape of a more consistent light, which I refer (to) as a ball (of) light. Around this (ball) there was also light, with some minute streaks coming from (it)... The surrounding light was not as strong (luminous) as was the center object."³⁵

³³ Personal correspondence, May 20, 2009.

³⁴ Personal correspondence, May 20, 2009.

³⁵ Personal correspondence, May 18, 2009.

Considering size proportions of the UAP, the witness said: "...let's say the inner ball (is) 10 cm (then) the outer sphere will be 10 cm plus 2 cm (in diameter)."³⁶ When asked whether there was a hazy appearance like fog that produces a gradation of luminance from the more luminous to less luminous area he replied, "Not exactly. The decrease was abrupt between the two areas (spheres), so that a clear distinction could be seen."³⁷ It is quite clear that the outer shell of light was semi-transparent, of the same color, but also of lower luminance. This description has some elements in common with a spherically shaped, contained plasma where the surface of the innermost sphere is at one energy level and the outer boundary is at a different level. If the outermost shell was less optically dense for some reason then it would tend to possess a lighter luminance than the inner core. What would produce a clear edge or boundary for both the inner and outer cores is not known.

The UAP had no colored "navigation lights" of any color. It is important to note here that the UAP did appear to increase significantly in size during its approach as has been mentioned above.

When asked about the color and origin of the "streaks" of light that seemed to be associated with the UAP during his sighting he answered, "(They were of the) same color as the main body or ball. I cannot say that they emanated from the centroid of it or, let's say, from its surface but they came (from/out of) the denser (inner) ball, not from the surrounding or external, fainter area. ...I could not see any specific area in the inner ball that the streaks came out (of)... The streaks were of the same strength (luminosity) as the inner ball, same quality, same intensity."³⁸

When asked about how often the light streaks would appear he answered, "This (question) is quite a tough one. First, they weren't abundant at all. At (the) distance when I (first) saw it (they) seemed to be fixed (emitted at a fixed interval). As we came nearer I could see that they changed a little. I don't know if that was due to our angle (of view) that changed ... or because it really changed.... At the nearest (position), although I didn't look at it directly, I had the sensation they (the flashes) were fixed.... I think it was a guided beam (not the streaks) that reached us, since it traveled from (our) left to right, as scanning and then mixing with the light coming from the streaks themselves plus the body, for the cockpit became more luminous."³⁹ The witness also said that he was certain the light flashes appeared to travel or extend beyond the edge of the outermost ball of light. Some of the streaks traveled beyond the outer edge by about the thickness of the outer shell of light.⁴⁰

Velocity: The calculated velocity of the UAP from locations A' to B', and from B' to C' is on the order of 28 kts and 58 kts, respectively, if the distance estimates provided by the witness are at all accurate. If the actual distances to the UAP are less then these velocities would also be less. But what is more interesting is the calculated increase in its velocity from location C' to EVER where a velocity of over 100 kts was discovered! If these values are accurate to first order magnitude they suggest that the phenomenon had accelerated (to double its velocity) so as to arrive at location EVER when the airplane would arrive there. The levels of navigational

³⁶ As used here cm. refers only to the relative size of the two spheres.

³⁷ Personal correspondence, May 20, 2009.

³⁸ Personal correspondence, May 20, 2009.

³⁹ Personal correspondence, May 20, 2009.

⁴⁰ The reporting witness was encouraged to work with an artist to reconstruct details of the UAP's appearance.

guidance and energy management technology needed to achieve this objective are very high indeed.

While the airplane was flying between points A and C (Figure 2) the unidentified traffic appeared to be travelling at a "low speed." This judgment by the witness is based on a great many hours of flight experience where other airplanes are seen at large distances. Nevertheless, if a distant moving object (or phenomenon) can't be identified then its absolute size, distance, and also to some extent even its velocity, cannot be judged as accurately. This is particularly true when the viewer is in a moving vehicle himself and the UAP is viewed above the horizon where stable spatial references are not present. Here the UAP appeared to be moving through a horizontal arc in the sky (from the witness's right toward his the left). This horizontal travel was confirmed by the witness by correspondence on May 18, 2009 and again on June 1, 2009.

Size: It is instructive to try to gain some rough idea of the size of this UAP. Earlier the reporting witness said, "My feeling was not that it (UAP) was huge because I saw a ball of light and (at the closest moment that I could still think "I can wait (to carry out any needed evasive maneuver)." It appeared to be around one meter in size, perhaps a little less or a little more." However, later, the witness provided a second size estimate based on a known object, viz., a Piper Cherokee 140 as seen from another airplane cockpit in flight. "If you draw its diameter (length) on the horizon and add (a) light we are close to what I could see, at the closest moment."⁴¹ A Piper Cherokee PA-28-140 is 23.3 feet long. When viewed at a distance of 3.9 nmiles, i.e., from location C to C' the UAP would subtend an angle of just over 3 min. arc in other words the UAP would be approximately equivalent in actual size to this small airplane.

Post Flight Events

Neither pilot reported this incident to their company. The reporting pilot said, "I myself did not talk about that (the sighting) outside of the cockpit since he (the Sr. Captain) was already quite fed up with (our) company's policies."⁴² There is a possibility that he told another pilot friend of his of long standing. Some years later Capt. XX wrote a brief summary of his sighting and submitted it to ORKUT, a Google Brazilian International Chat Community.⁴³ It is included in Appendix 1.

Other Considerations

At no time was air turbulence felt at any time while flying between Location A and the airport. In addition, the reporting witness does not remember noticing any abnormal cockpit instrument display deviations nor static on the radio between Location A and landing.

⁴¹ Personal correspondence, May 27, 2009.

⁴² Personal correspondence, May 6, 2009.

⁴³ <http://www.orkut.com.br>

Discussion

Quite apart from the important question of what this UAP was is that this near-miss incident raises serious questions concerning flight safety. This is particularly true because it took place very near the busiest airport in Brazil on a weekday afternoon and yet was not detected by any ground radar or (apparently) visually by personnel in the airport tower. However, if the UAP was relatively bright and radiated in all directions (as from a point or an isotropically radiating sphere) it might have been seen from the tower if someone had been looking in that direction at the right time. If this UAP was not detected at all by tower or radar personnel there is no way in which air traffic control could have warned airplanes in the vicinity to avoid it. This kind of incident appears to be a much more common occurrence around the world than is usually acknowledged.⁴⁴ (Haines, 2000; Haines, 2002) Also, whatever this UAP was it passed within a relatively near distance from the airplane putting it in danger either from collision, possibly some kind of electro-magnetic interaction with avionic systems, or the consequences of a rapidly executed yet unplanned control input by the pilot to avoid a collision. Fortunately none of these events occurred here.

The pilot flying did the only thing he could have done to avert an in-flight collision and he did it professionally and safely.

The possibility must be addressed whether this UAP could have been either a helicopter of some kind, an unmanned aerial vehicle (UAV) or a weather balloon. Regarding the former, (AIC, 2005) presents current operational and technical requirements for operating a helicopter within the controlled airspace of Sao Paulo. The effective area of positive control of all helicopter operations in the vicinity of Sao Paulo is defined by a radius of 13 nmi from the airport's established latitude and longitude coordinates (Lazzarini and Guilherme, 2005). All helicopters also must be equipped with Mode C transponders (altitude reporting capability). The maximum velocity of helicopters flying into and away from Congonhas Airport is in the 80 to 100 kts. range. They must be under positive ATC control at all times. The calculated velocity of the UAP (see above) was within this range of velocities.

Many helicopters, light twins, and private airplanes now use the Campo de Marte airfield (Figure 10) along with Air Force aircraft. The witness thought that when first noticed, the UAP could have flown over this airfield. It is located approximately between Cumbica Airport (SBGR) and Congonhas Airport (SBSP) at 23 deg 30 min 32.9 sec. S; 46 deg 38 min 15 sec W.

⁴⁴ A review of such incidents is in preparation at this time by NARCAP personnel.

Figure 10
Aerial Photograph of Campo de Marte Airfield
Sao Paulo, Brazil
aircat_FC_campodeMarte_photo.jpg



Nevertheless, if this UAP had been a helicopter the flight crew would certainly have been able to identify it as such.

Unmanned Aerial Vehicles: It is known that Brazil is continuing to investigate the advantageous features of UAV for various applications. (Brandao, et al., 2007) In reviewing the aerodynamic shapes of the UAV presented at the First Latin-American UAV Conference held in Panama City, August 2007, none were discovered that are spherical. All of the proposed UAV either used (stationary or rotary) wings for lift and traditional means of propulsion except for one. Called the AURORA Project, a 9m long lifting vehicle is under development as a sensor platform. Its dirigible outline shape is very familiar and could not be confused as a sphere for very long as it is viewed from different angles.

Whether or not a spherical UAV was in use in 2004 and flown in the vicinity of Gongonhas Airport is not known. It is very unlikely, however, for several reasons. First, air traffic control authorities told the reporting witness that there were no other transponding aircraft in the area of this flight on their ground radar when this UAP was seen. All UAV are required to be under positive ground radar control at all times and a transponder must be onboard. Second, while there

is a spherically shaped UAV being produced in the USA⁴⁵ there is no evidence of it being used in Brazil in 2004. Unless a spherically shaped UAV was present but flying without any transponder signal it is very unlikely that this UAP was a UAV. Third, an operational or test flight of a UAV would be expected to be announced in advance by NOTAM or other similar means. No such notice was published. Finally, it is unlikely that an operational or a test flight of a UAV would be carried out so near to a runway approach corridor to the busiest airports in Brazil.

Weather Balloon: The witness said that he has seen a great many balloons of all kinds in his flying career. They appear dark on the horizon during the daytime and other pilots will report their presence to ATC for transmission to other pilots in the region. Also, all weather balloon launches must be reported to ATC in advance. "They are completely different (from this UAP) as to brightness and shape."⁴⁶

Conclusions

This sighting incident leads to virtually the same conclusion as was presented elsewhere regarding another busy airport-related case (Haines, et al., 2007). It is becoming increasingly clear that some kind of uncontrolled and non-responsive visual phenomenon is flying within or very near the controlled airspace of modern-day airports yet they are not detected visually from the control tower or by ground radar. Aviation officials should take these events seriously and mandate the installation of radar systems that have a broader range of wavelengths than they now do.⁴⁷ At the same time pilots should report their sightings to the authorities in real-time in order to document them and to improve the chances of immediate ground detection of the UAP. Finally, government aviation officials and airline management must encourage, not discourage, such pilot reports for the long-term benefit of flight safety.

This UAP remains unidentified at this time.

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⁴⁵ A series of lighter-than-air UAV ships are in production by Techsphere Systems International (TSI) of Columbus, Georgia in conjunction with 21st Century Air Ships of Canada. The SA-60 made a successful test flight on June 24, 2004 in Maryland. A review of UAV designs and operational characteristics is found elsewhere (Osborn, 2009)

⁴⁶ Personal correspondence, June 2, 2009.

⁴⁷ For useful technical information in this regard see the detailed analysis of twenty one ground and radar UAP contact reports between 1948 and 1976 is presented elsewhere (Shough, 2002).

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Appendix 1

Article Published in Brazilian UFO Group ORKUT

Quase colisão em SP

Bem não me lembro se contei ao Milton sobre este caso. De qualquer maneira o faço aqui para dar conhecimento.

Em 2004 estava fazendo um vôo de retorno a São Paulo. Me encontrava em fase de aproximação para o Aeroporto de Congonhas no final do dia.. Após o bloqueio de STN (Santana), fomos vetorados para interceptação do curso do localizador.

O fato intrigante começou a ocorrer exatamente após o bloqueio de STN, onde na posição 14:00h havia um tráfego a cerca de 20 nm (estimativo) em movimento o qual nos meus cálculos corresponderia as vizinhanças de Cumbica.

Ao longe apenas parecia ser um tráfego no circuito de Cumbica. Apresentava pela distancia uma luz branca homogênea e mantinha o seu curso.

Durante o nosso curso de interceptação para o Loc (aprox. 100°) o tráfego continuava a evoluir em baixa velocidade e a medida que o tempo passava começava também a se aproximar de nossa aeronave devido ao rumo que mantinha.

Perguntei ao outro piloto se ele estava fazendo acompanhamento visual daquele tráfego e ele me disse que sim. Bem, a partir de um determinado momento comecei a ficar perturbado, pois o tráfego continuava a manter o seu curso e comecei achar que estava ficando muito próximo...
02/11/06 excluir

Eu continuava a falar com o outro piloto indagando por quanto tempo o controle de aproximação iria mantê-lo naquele curso. Entretanto comecei a ver que aquele tráfego estava esquisito demais. Devido a proximidade deveria ver outras luzes de navegação e o que via era apenas uma bola luminosa... Crescendo.

Pedi ao meu amigo piloto que indagasse o controle acerca daquele tráfego, pois ele estava responsável pela fonia enquanto eu pilotava. O tempo foi passando e o meu amigo nada de perguntar. Solicitei outra vez e ainda mais outra e então peguei o microfone e indaguei ao Controle acerca daquele tráfego. O Controle não reconheceu nenhuma aeronave na posição indicada, porém me confirmou a existência de uma outra em aproximação para Guarulhos na posição de 10:00h aproximadamente. Este outro também era avistado, mas não era o tráfego em questão. Reportei o avistamento, mas o Controle negou a existência por uma segunda vez.

Novamente falei ao meu amigo o que ele achava. Oras, era impossível o Controle não ter conhecimento daquele tráfego que se encontrava entre 5,500 a 6,000 pés! Meu amigo continuava em silêncio. Eu continuava a falar: Gui (meu amigo) este cara está muito próximo e está vindo em nossa direção. Isto não é uma aeronave, é somente luz... Está muito perto.
02/11/06 excluir

Naquela época a nossa aeronave não estava com TCAS disponível, portanto o nosso contato era somente visual. Estávamos muito próximos da interceptação do Loc, e conforme disse a luz de tão próxima já estava ponderando em abandonar o curso que mantínhamos a fim de evitar uma colisão.

A coisa foi ficando tão preta que exatamente neste momento decidi girar a aeronave para a direita e em uma pequena descida como que fechando o arco para a interceptação do Loc e exatamente neste momento foi a coisa: Um grande fecho de luz varreu a nossa cabine, gerando grande confusão e apreensão. Tanto eu como o outro piloto nos abaixamos, pois a coisa foi realmente inesperada. Perguntei ao meu amigo – Você viu isto?? Você viu isto??? Ele respondeu: Vi, mas se você disser que eu vi eu negarei. Sei o que foi, mas nego.

Neste momento interceptamos o curso do Loc e então o objeto ficou a nossa esquerda e então se afastando e mantendo a sua altitude. Continuei a acompanhá-lo até onde a minha janela permitiu. O fato interessante nesta hora e que observei é que independentemente do ângulo que você olhasse para o objeto ele continuava a ser uma luz brilhante descartando a possibilidade de se tratar de uma aeronave. Tive que cuidar do prosseguimento para pouso.

Minha conclusão? OVNI com certeza. 02/11/06 excluir