Photoanalyses of Digital Images Taken on February 14, 2010 at 1717 Hours above the Andes Mountains in Central Chile[1]

by

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Abstract

Sixteen medium and high resolution, digital photos were taken on Sunday, February 14, 2010 at 1717 hrs. local time at 33 47.8’ south; 69 53.35’ W (about 45 miles SE of Santiago, Chile) high in the Andes Mountains. They were received by the author on May 28, 2010 from the Comite de Estudios de Fenomenos Aereos Anomalos (CEFAA) for analysis and comment. This paper describes the results of various photo-optical measurements made on several of these photographs showing the solar disc, cumulus clouds, reddish clouds at a higher altitude, and an angularly small and unusual image that appeared in one photograph. These analyses showed that (1) There was a symmetrical, apparently solid object (hereafter referred to as an unidentified aerial phenomena: UAP) with several interesting surface details present in one photograph, (2) No evidence was found for a digital cut-and-paste operation (a hoax), (3) The UAP was not visible in any of the other photographs taken of the same location in the sky, (3) The location of the UAP was indicated to be on or near a Chilean commercial airway and might possibly have posed a threat to flight safety under certain operational conditions, and (4) The identity of this UAP remains unidentified at this time.

The Social Setting and Photographer

Mr. and Mrs. X. X. and their twenty-plus, year-old daughter[2] were in the Andes Mountains for a Sunday picnic (driving on a gravel road) when they arrived near the El Yeso reservoir seen in the background of Figure 1. This high resolution photograph clearly portrays the barren landscape having little vegetation because of the extreme cold of winter, lack of top soil, high altitude, high solar energy flux, and the over-flooding that takes place. Mrs. X. said she took the sky photographs because they were, “unusually pretty.”[3] The family has not sought publicity or

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[1] This investigation was conducted as part of a joint agreement between NARCAP and the Comite de Estudios de Fenomenos Aereos Anomalos (CEFAA), an official organization within the D.G.A.C. of Chile. All data was provided by CEFAA.

[2] The family lived in Chile but were Venezuelan citizens. Both parents are professionals and their daughter is a student.

[3] Personal correspondence from Jose Lay, CEFAA, June 10, 2010.

money from these photographs. They indicated that nothing unusual was sensed during the time the photographs were taken nor were any unusual noises heard.

It was not until viewing the photographs later on a computer monitor that the UAP was noticed by family members. They showed the photos to friends among whom was a (male) investigator of UAP. He arranged for the images to be made available to CEFAA.

The Photographic Series

Five "pre-main sequence" photographs were taken at the reservoir site before the photograph was taken that contained the UAP image. For the first three frames (nos. 211 – 213) the camera was aimed horizontally and showed a broad valley with steep hills on both sides and the family's car crossing a wooden bridge over a river. In the next two (nos. 215- 216) frames the camera was aimed upward into the bright blue sky with a very bright sun and a grouping of cumulus clouds between it and the top of hills to the west of the photographer. This paper presents the six photographs in the "main sequence" (Figures 1, 2, 7 – 10). In addition, five "post-main sequence" photos were received on June 22, 2010. In the first three of them the camera was aimed horizontally and showed the El Yeso reservoir surrounded by steep mountain hillsides. The last two photos were of a yellow cactus plant.

It is assumed that Mrs. X, who took all of the following "main sequence" photos, obtained them from this same approximate location. Sunlight enters (generally) from the right side of Figure 1 at an elevation of 39 degrees above the horizon at 1717 hrs., the approximate time these photos were taken. The measured slope angle of the darkest, mid-distance mountainside on the right side of the valley seen here is about 40 degrees so that this mountainside would soon be in shadow as the sun descended.

Figure 1. Photograph Site Near El Yeso Reservoir, Chile

Camera and Lens. An inexpensive Canon Powershot A580 compact digital still camera with 8.0 megapixels capacity was used. It employs a 1/2.5 inch CCD array with a 3:4 aspect ratio. It is assumed that the photographer used an automatic exposure control, i.e., she did not manually adjust the shutter speed or f stop for each exposure. If this is correct an exposure of about 1/2 ,000 sec. at f8 or 1/500 sec at f22 would be reasonable. The effective focal length of the lens varied from 5.8 to 23.2 mm. (4x digital zoom) and the aperture varied from f = 2.6 to 5.5. Normal range of focus was from 1.5 feet to optical infinity. It is clear that Mrs. X changed the zoom setting of the lens several times during this series of photos and was quite familiar with the camera's operation. There is no image blur in any of the main sequence photos studied here which suggests that she had very good eye-hand stability and that the shutter "speed" was fast.

Unfortunately, there is no available information about the zoom setting of the lens for any photograph. As can be noted by comparing each photograph, some zoom adjustments were made within this main sequence. This is unfortunate because it makes it more difficult to determine the angular field of view of any photograph.

It also isn't known whether the photographer reset the white balance, exposure compensation, or light metering controls on the camera for any of these photographs. When the camera was aimed directly at the sun the CCD exposure controls tried to respond but did not possess sufficient dynamic range; this caused details elsewhere in the image to become extraordinarily dark. As will be noted below, the details of the UAP image only became evident when the entire frame was lightened and its contrast increased.

Astronomical and Weather Data for Photo Site

Weather data was received from CEFAA on June 23, 2010 and consisted of the atmospheric lapse rate data for station SCSN Santo Domingo (12 UTC; February 14 and 15, 2010),[4] GOES Infrared Satellite cloud imagery for Chile, winds aloft and air temperature. The GOES imagery clearly shows the clouds that were photographed at El Yeso reservoir. Winds ranged from about 10 to 30 kts out of the west at altitudes ranging from 2,980 to 5,820 m MSL.

The sun was at 39.47 degrees elevation and 281.8 degrees azimuth (CW from true north) at 1717 hrs.[5] The photographer said that she took a new photograph approximately every 40 to 45 seconds so that all six took place over about 4.5 minutes time. If this is accurate the position of the sun would have moved only 1.1 degrees arc across the sky in those 4.5 minutes; the sun's position is a particularly useful spatial reference point. Local sunset was at approximately 2037 hrs and solar noon occurred at 1357 hrs at an altitude of 70.1 degrees.

With the sun at 282 degrees azimuth the approximate azimuth of the UAP was estimated to be 276 degrees, using the camera's view finder's angular width as a reference.

A comparison of the present photographs of the white cumulus clouds shows clear variations from frame to frame. However, basic cloud groups can still be made out relative to the sun's

[4] The Santo Domingo weather station is about 100 miles due west of the photographer's location.
[5] www.srrb.noaa.gov/highlights/sunrise/azel.html

position. If the photographer was at an altitude of about 2,600 m (8,530 feet MSL)[6] a CEFAA meteorologist indicated that these cumulus clouds would have been from 3,000 m to 6,000 m MSL. Discovering the altitude and nature of the reddish parallel clouds seen in Figure 2 is more problematic but very important.

Clouds and Cloud layers. There are two types of clouds visible in this series of photographs. The brightest white are clearly Cumulus which are common above the Andes Mountains in this season. We are more interested in the second type of cloud seen near the UAP image (see Figure 2, 3, and 11) that appears more reddish and striated. They are very likely cirrus or possibly cirrocumulus and lie at an altitude of between 15,000 and 25,000 feet AGL.[7] This range of altitudes becomes important because a portion of the UAP appears to be occluded by these clouds making a rough assessment possible of the size of the UAP. These calculations are presented below.

Photoanalysis Results

Figure 2 is the primary photograph that was studied; it contained the UAP. It consisted of a 1.26 MB file (1741 x 1306 x 8) at 96 dpi resolution. Figure 3 is the same full frame as Figure 2 increased in brightness and contrast, and divided into sixteen numbered, equal-area rectangles as shown. Specific image details are located by area number and approximate location within each area. For example, the sun is in the lower left corner of area eleven and the reddish UAP is in the upper left-corner of area six.

6 Jose Lay, personal correspondence, June 24, 2010.
7 Personal communications from NARCAP meteorologist William Puckett, July 1, 2010.

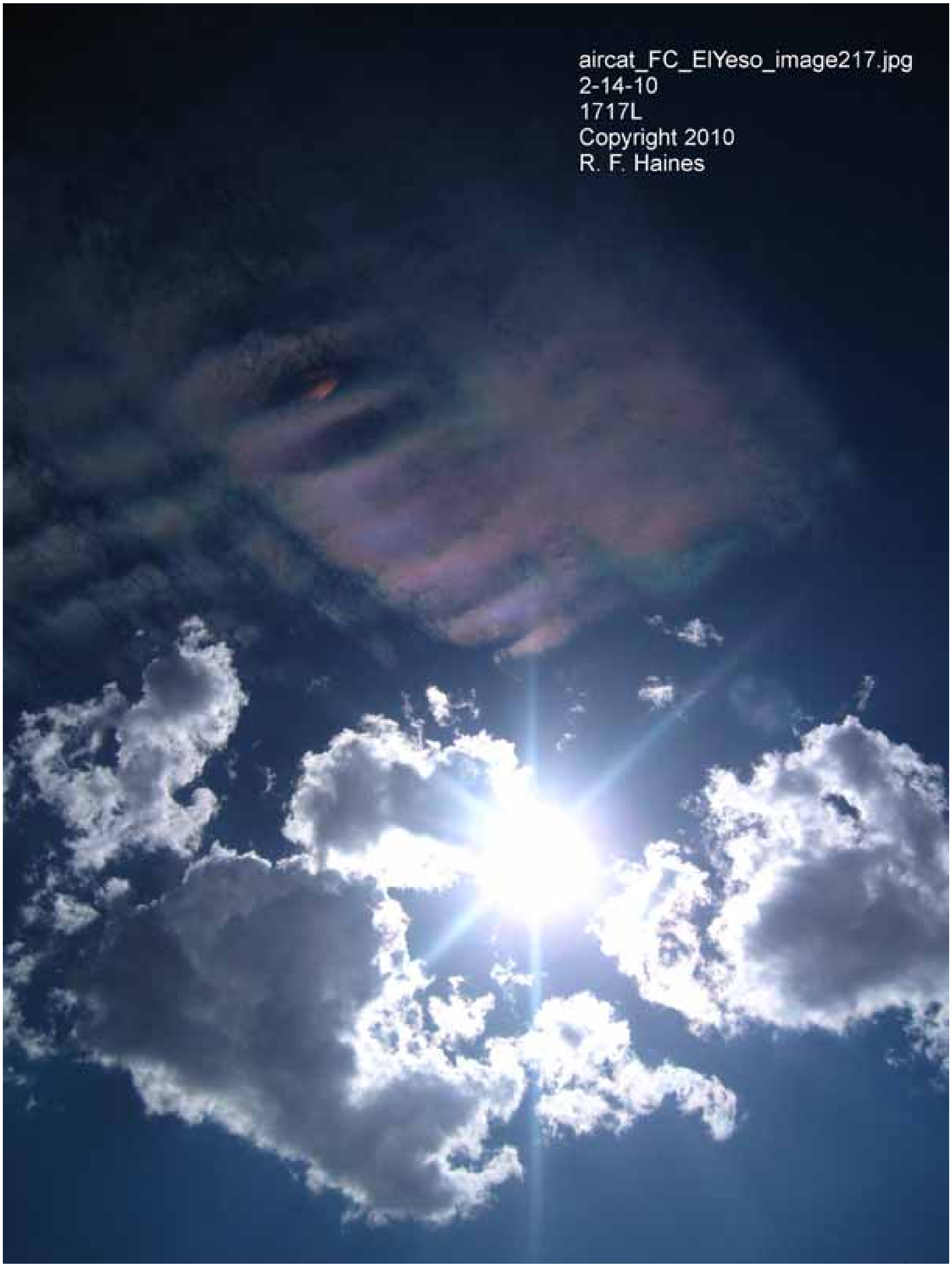

Figure 2. Original Unretouched Photograph
(Photograph Rotated 90 deg. CW from Original Orientation)

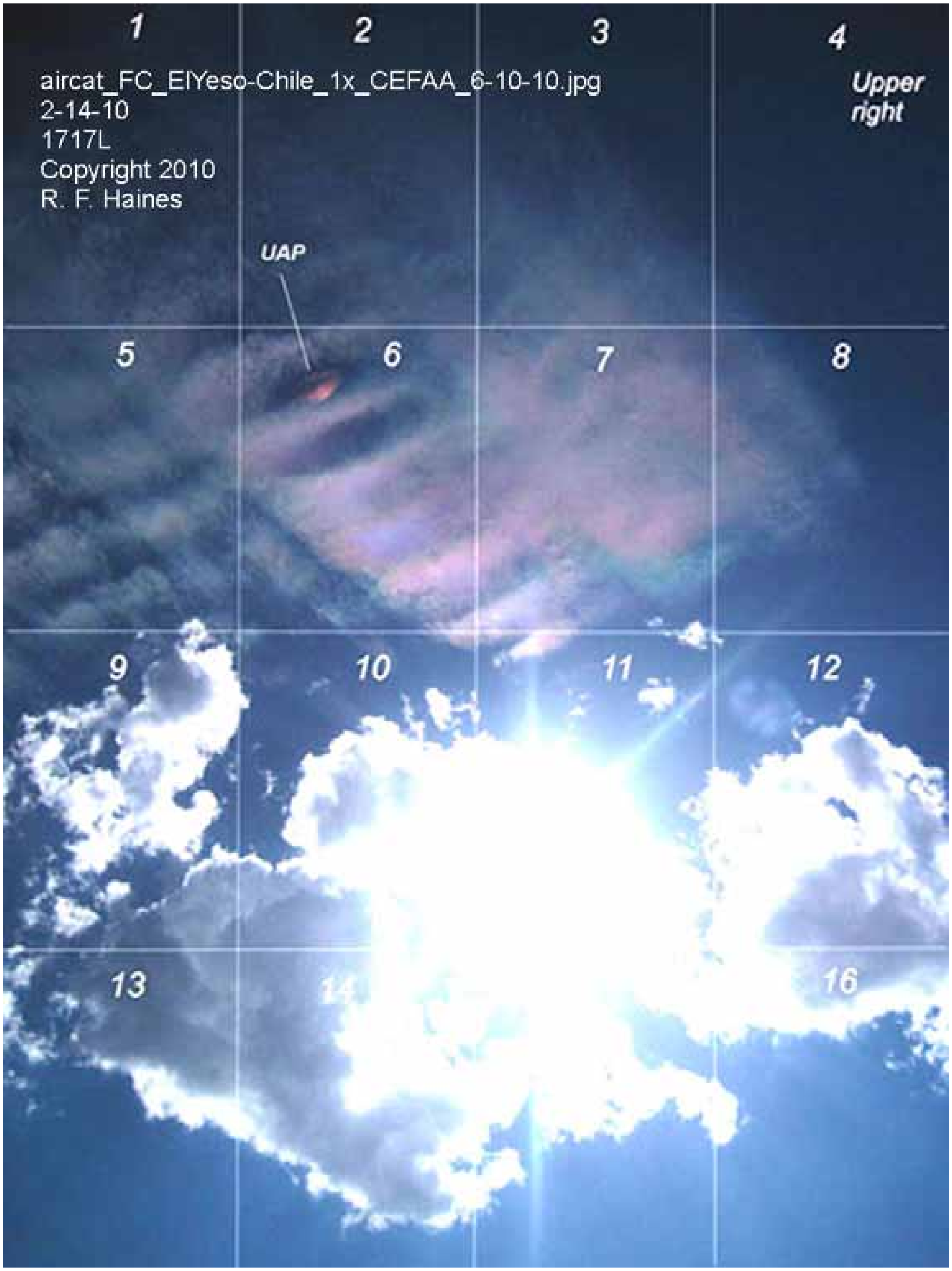

Figure 3. Image with Sixteen Reference Areas
(Image Brightness and Contrast Increased Slightly)

Photometry Results of UAP Image

The relative image brightness of many areas of the UAP was measured and recorded in the three spectral bands to which this CCD sensor was sensitive: red (R); green (G), and blue (B). All brightness's reported here were the average of a 3 by 3 pixel area. Maximum luminance was registered as 255 bits of density[8] (8 bits depth) for the entire solar disc (in all three hues) and also the brightest edges of the white clouds. The medium or dark gray cloud areas registered RGB values of (typically): 102, 116, 143. Sky background luminance across the bottom of the photograph registered RGB values of 17, 42, 64; for the lower left corner in area 13, 61, 93, 136; for the center of the photograph in area 15; and 30, 59, 91 for the lower right corner of the photograph in area 16. Similarly, the upper left corner of the photograph in area 1 registered RGB values of 7, 8, 10 while the upper right corner in area 4 registered values of 8, 11, 16. These relative luminance values are consistent with atmospheric scattering of sunlight as a function of angular altitude in the very clear area at this time and place.

Figure 2 can be generally characterized as containing two types of clouds: (a) cumulous within areas 9 through 16, and (b) higher altitude cirrus (or perhaps lower level nacreous) (within areas 5 through 7 of Figure 3). The relative image brightness of these clouds and nearby sky background were measured in several locations.

<u>UAP Details</u>. The small, reddish area in area 6 was greatly enlarged and presented in Figures 4 through 10 to support a discussion of several interesting features. Both the brightness and contrast was increased to "bring out" these details. This reddish area will be called the unidentified aerial phenomena (UAP) hereafter. As shown in Figure 4, the UAP is in quite good focus with reasonably sharp edges and other surface details that are discussed below. The UAP is partially illuminated along its long axis but its entire length (assuming it is a body of revolution) is not visible. This is interesting because the sky background visible at the upper-right side of the UAP possesses similar chromatic and luminance characteristics as does the sky seen at the left end of the visible portion of the UAP and yet the rest of the UAP is not visible. Except for the left-hand end of the UAP foreground clouds appear to occlude the rest of the UAP even though these clouds appear to be too thin to do so. If the UAP is not a complete circle but a half-circle or other form it would help explain its apparent missing part.

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[8] The CCD sensor was fully saturated by photic energy within the area that imaged the solar disc so that it is not possible to know how much more UAP image luminance the sun was producing over and above this physical limit.

Figure 4. Greatly Enlarged Image of UAP Seen Between Cloud Bands in Area 6 of Figure 3
(Brightness: +58; Contrast: +45)

Photometric measurements were made at eight evenly spaced distances along the white line in Figure 5. The RGB values for these eight locations are given in Table 1 and show the very smooth progression of values.

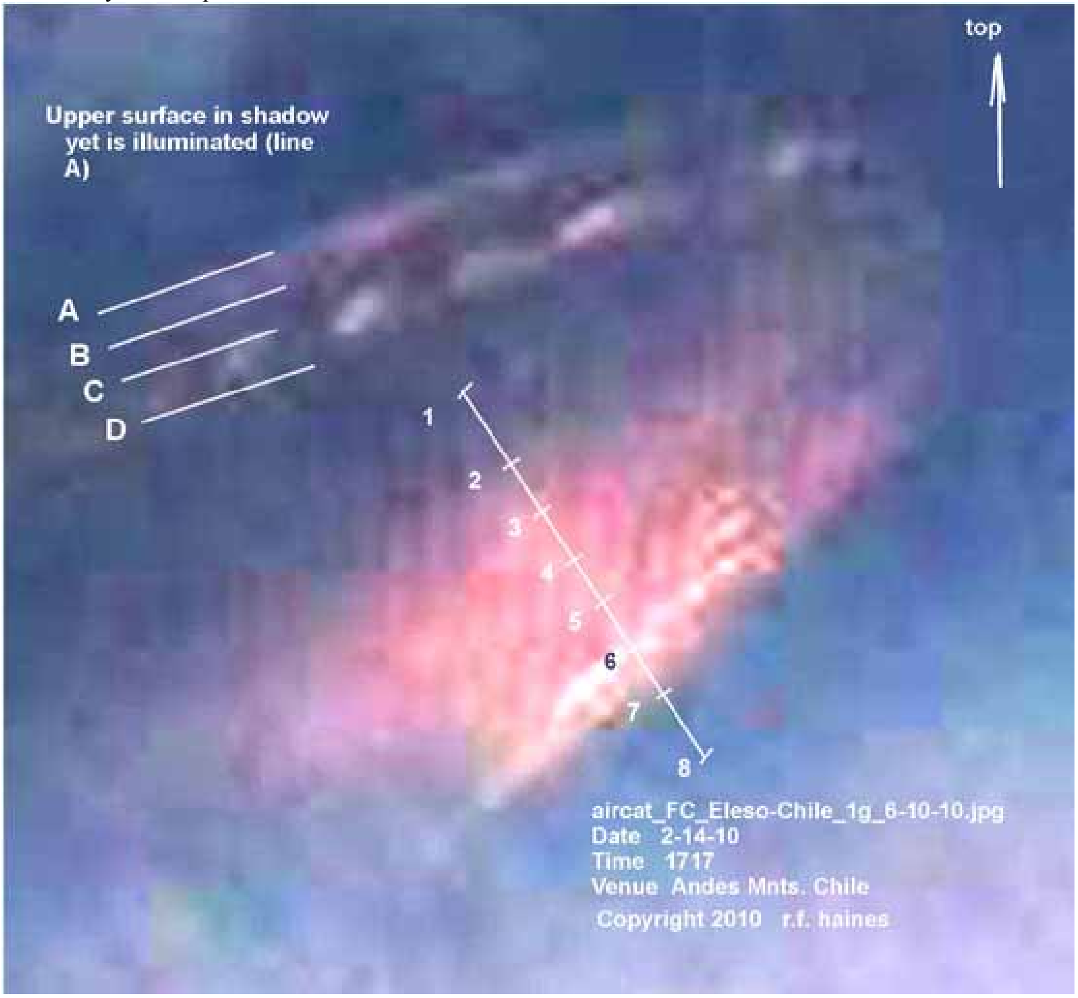

Figure 5. Greatly Enlarged Image of UAP with Relative Luminance Measurement Locations with Pixelation Effects Visible (Brightness: +65; Contrast: +48)

Table 1

Measured Relative Luminance at Eight Locations Noted in Figure 5

Location Number	Relative Luminance Red	Green	Blue	Comment
1	102	98	148	Shadow area on UAP
2	176	140	165	Sunlit area of UAP
3	248	155	173	
4	255	181	199	
5	255	192	206	
6	255	226	236	Maximum sunlit area
7	124	138	175	Sky background
8	110	146	203	Sky background

Also of interest in Figure 5 are the more detailed edge-like regions pointed to by lines A, B, C, and D. These regions appear to be relatively consistent in detail along their entire length, e.g., area A is continuous and lighter than is area B. Region C contains at least nine[9] separate whitish areas in a gently curved row seen against a darker background while region D is continuously dark Figure 4 makes it clear that the regions indicated by lines A, B, C, and D are actually a part of the elliptical shaped UAP. A question of some importance is what is the source of light that is illuminating region A? If this source is sunlight reflected from a nearby cloud then the UAP must be relatively near the cloud. Another question is why is the second convex surface (lower on the UAP) reddish? Again, it is acting like a mirror and only reflecting the hue of nearby clouds that are illuminated by sunlight or is this surface emitting its own reddish hue?

Additional brightness measurements were made in various regions of Figure 2 and are given in Table 2. Measured values for the body of the UAP are close to those measured in Figure 6. Likewise, the sky brightness below the UAP and between the reddish cloud fingers is comparable with measurements made from Figure 11.

Table 2

Measured Relative Luminance at Selected (unmarked) Locations in Figure 2

Location No.	Red	Green	Blue	Location and Comments
1.	7	8	10	Upper left-hand corner
2.	8	11	16	Upper right-hand corner
3.	17	42	64	Lower left-hand corner
4.	30	59	91	Lower right-hand corner
5.	255	255	255	Center of solar disc
6.	137	85	91	Body of UAP
7.	255	255	255	Bright cloud-lower center in ref. area 10 (Fig. 3)
8.	102	116	143	Shadowed cloud-lower center in ref. area 12
9.	97	92	125	Center of reddish cloud-center in ref. area 6
10.	31	41	64	Center of dark sky below UAP-center in ref. area 6

The area of the UAP in Figure 2 was greatly enlarged without modifying any chromaticity, saturation, or luminance values and then filtered using a seven-hue step poster function (Adobe Photoshop). Figure 6 presents the results. Capital letters have been inserted to mark the locations of six small regions lying above and outside the boundary of the UAP that appear to be separate darker areas. If the sky was the only background there should not be such separated areas but, rather, a more even, homogeneous area of darkness. Are these separated areas related to some aspect of the UAP itself as I have suggested elsewhere? (Haines, 1997)

9 These whitish areas are discussed relative to Figure 9.

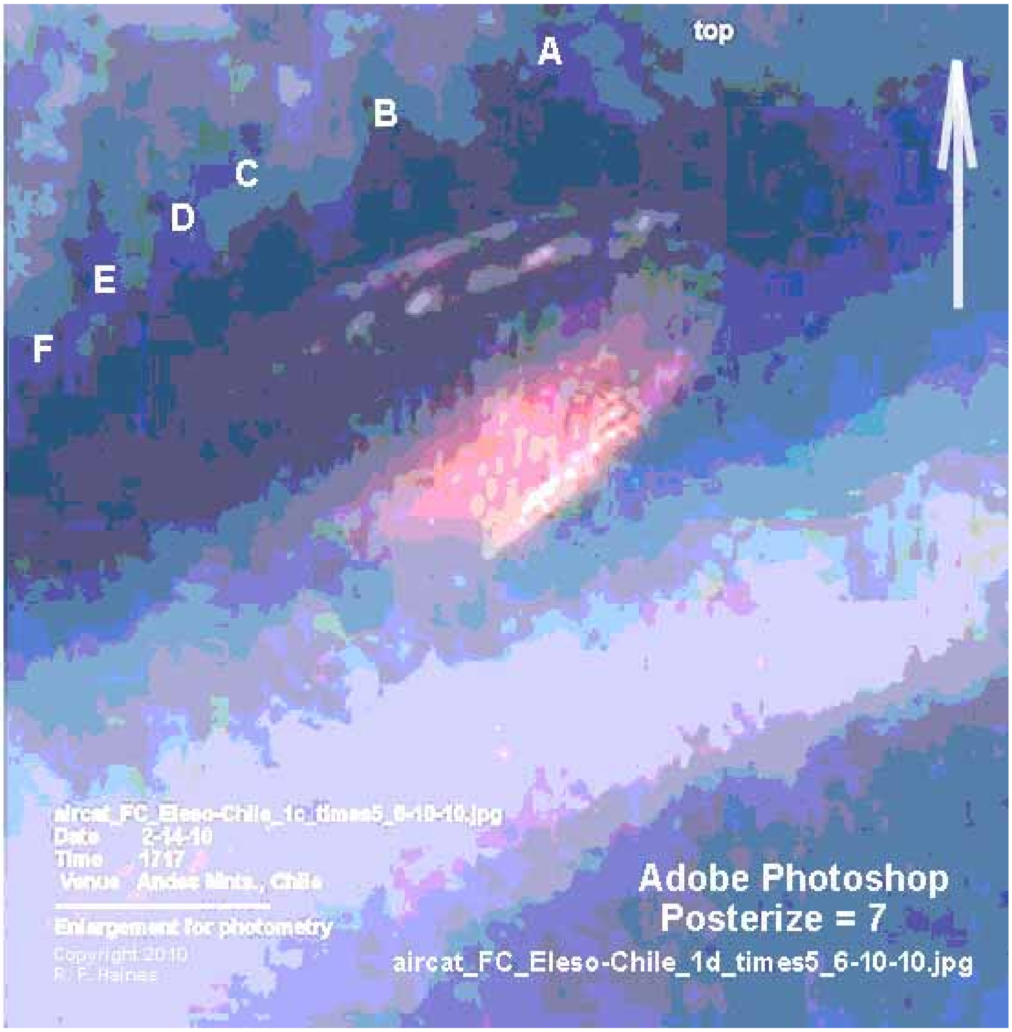

Figure 6. UAP Reduced to Seven Levels.

Angular Size of the UAP. An estimate of the angular size of the UAP can be made by comparison with the sun's diameter of 32 min. 24 seconds arc. The extreme brightness of the sun, however, makes it appear much larger than it actually is on this photograph due to light scatter within the lens; therefore, only an approximation of its actual image size can be made. Referring to Figure 2 the sun's diameter is about 12 mm (+/-) while the length of the visible portion of the UAP is about 9 mm. (the entire length of the UAP cannot be seen) This approximate ratio yields a subtended angle for the UAP of 24 minutes arc.

Calculated Length of the UAP. Using the above UAP subtended angle and simple trigonometry[10] the following values (Table 3) were obtained for several possible distances.

[10] Where: $\alpha = 24.3'$; $\tan \alpha = 0.006870$ = UAP (visible) length / Distance

Table 3

Calculated Length of the Visible Portion
of the UAP for Various Distances

Distance (Miles;	Feet)	UAP Visible Length (feet)
1;	5,280	36
2;	10,560	72
5;	26,400	181
6;	31,680	218

Hue Components of the UAP. The camera's CCD sensor array records colors in three wavelength bands: red, green, and blue. They are combined at the output stage to form the final "color(s)" of whatever is being photographed. When an image is deconstructed on the basis of each of these three hues and its luminosity stretched as it has been in the following three figures it is possible to learn something of the emitted and/or reflected wavelengths from the image in question. In Figures 7, 8, and 9 we see the UAP image in component red, green, and blue, respectively. It may be noted that: (1) red and green wavelengths contribute more detail and outline definition to the UAP than does blue, (2) the occlusion of the UAP by the cloud is most readily seen in red and green, and (3) the upper "edge" of the UAP is visible in each of these three hues as if it is being illuminated by some source of light. Atmospheric light scatter could be contributing to the blue hue here.

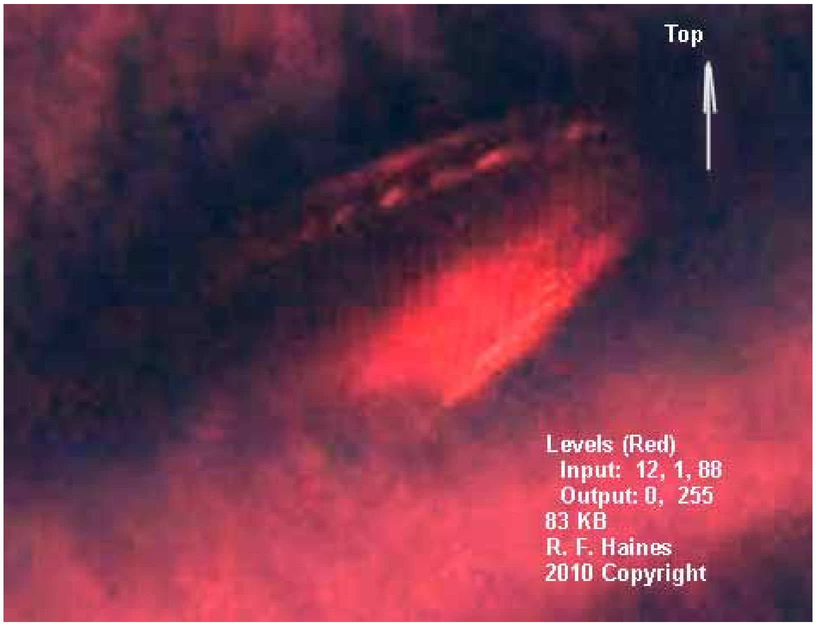

Figure 7. UAP Seen only in its Red Sensor Output and
Stretched from 76 Total Input bits to 255 Total Output bits

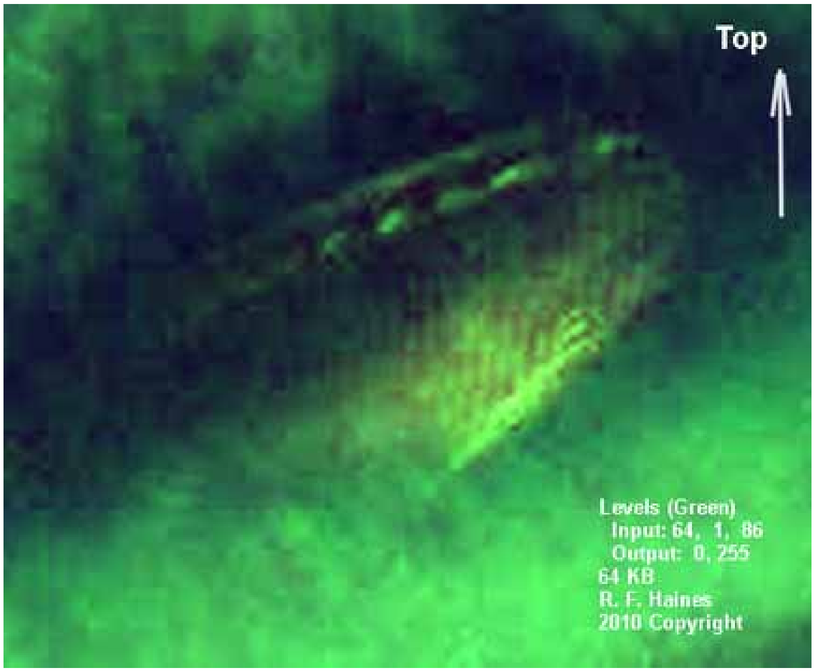

Figure 8. UAP Seen only in its Green Sensor Output and Stretched from 22 Total Input bits to 255 Total Output bits

Figure 9. UAP Seen only in its Blue Sensor Output and Stretched from 69 Total Input bits to 255 Total Output bits

The UAP image also contains other interesting details. In Figure 10 the region of the UAP was cut out, rotated upside down, greatly enlarged, and its exposure was "stretched." Of the total

255 bits of input luminance information only those bits from 5 to 91 were selected. This effectively eliminated the contribution to the final image by the "outlier" bits outside this range. The output was maintained at maximum (0, 255) luminance range thus amplifying very small luminance difference details. A short black bar was also inserted in the upper left corner and its length measured accurately. It was discovered that eleven (square) pixels made up this bar's length.

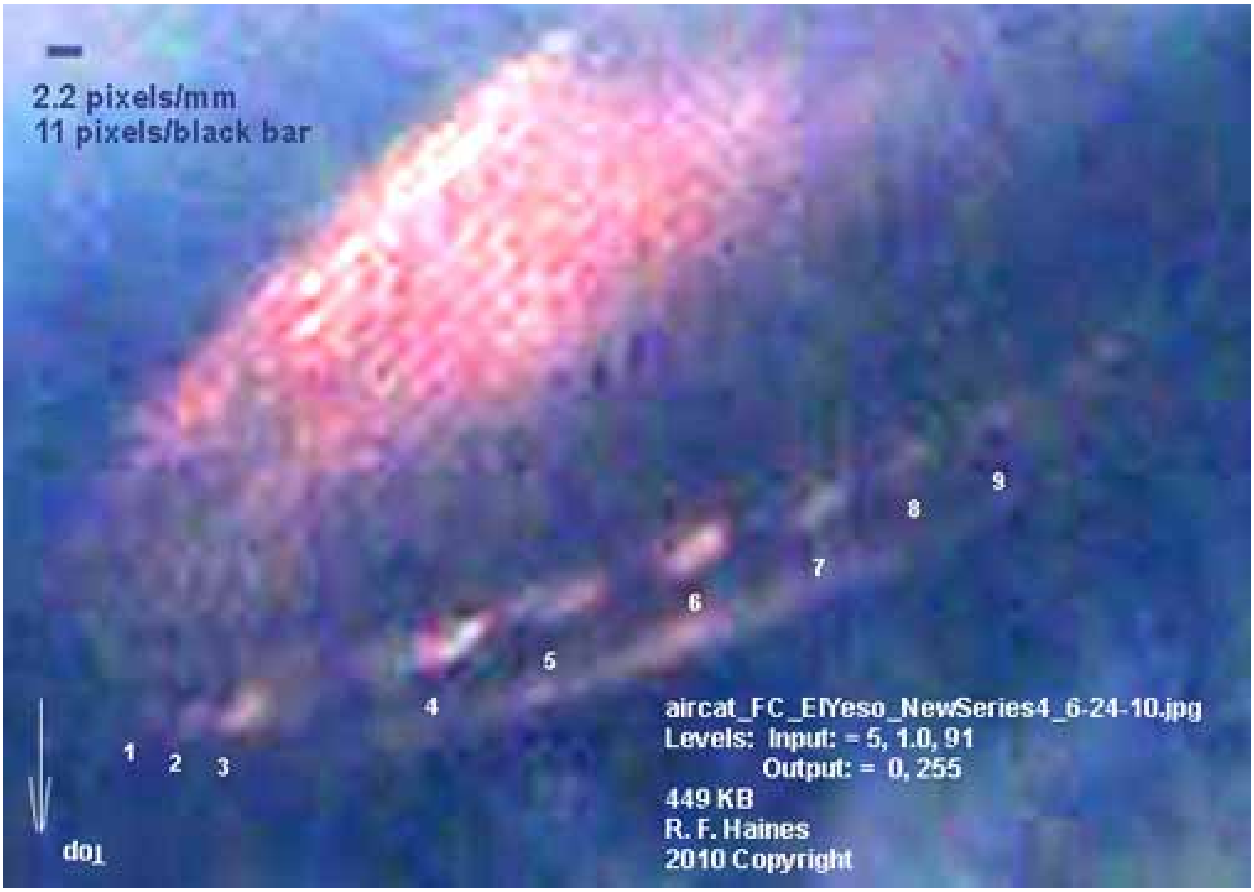

Figure 10. Luminance Stretching to Bring out Finer Details

Referring to Figure 10 it is clear that these surface details are so large that they cannot be pixel artifacts due to compression. In fact, the red and white "woven" pattern within a large region of this UAP image consists of individual *straight* lines that are each 4.4 pixels wide. The nine numbered whitish areas appear to be protrusions from the edge of the UAP.[11]

A long vertical segment of the UAP and clouds was also scanned for relative luminance at twenty one locations shown in Figure 11. The RGB values are given in Table 4. It may be noted that the two locations on the brightest part of the UAP (#9, 10) possess higher red values than the nearby sky and clouds. Also note that the white cumulus clouds in the lower corners of this figure

[11] As absurd as it sounds, this view of the UAP looks remarkably like a woven, canvas shoe with threaded thong stitching around the sole. It was printed upside down in Figure 10 to illustrate this effect.

possess almost fully saturated values. It is known that the illuminance of white cloud in full and direct sunlight is about 12,700 ft-c. (Taylor, 1973, Table 13-5) The illuminance of the convex, reddish surface of the UAP seen in Figure 4 and 5 is considerably less than this value.

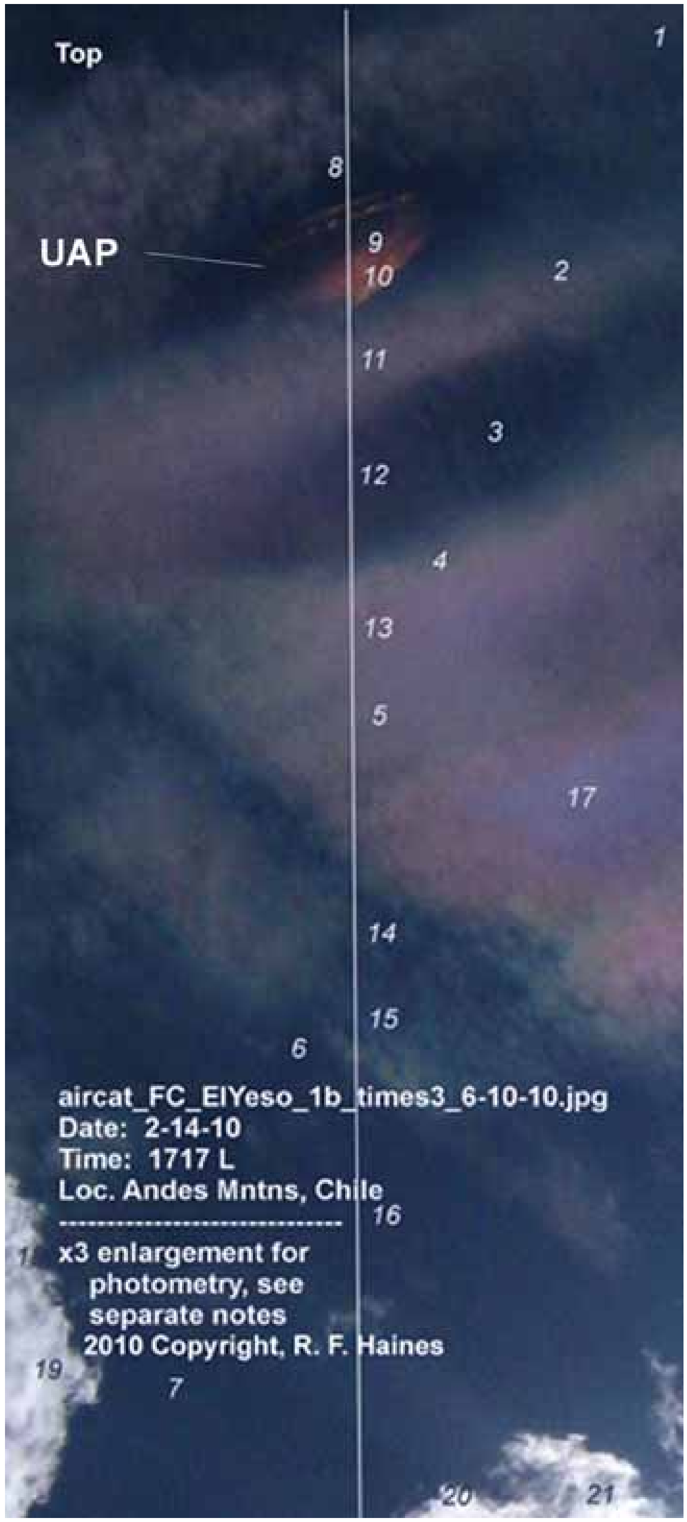

Figure 11. Locations of Relative Luminance Measurements found in Table 4.

Table 4

Measured Relative Luminance at Twenty-one Locations
in Figure 11

Location Number	Relative Luminance Red	Green	Blue	Comment
1	25	41	66	Locations 1 through
2	65	69	83	7 lie along a straight
3	30	44	86	diagonal line from
4	98	102	117	corner to corner.
5	85	84	101	Center of reddish cloud
6	30	46	72	
7	36	52	86	Sky background
8	17	28	47	
9	124	75	83	On reddish body of UAP
10	115	66	76	On reddish body of UAP
11	82	80	101	Center of reddish cloud finger
12	47	45	76	Center of adjacent dark sky
13	99	93	117	
14	55	44	96	
15	47	65	88	
16	35	50	81	Sky background
17	97	98	135	
18	188	195	209	White cumulus cloud on left
19	221	230	237	
20	241	238	252	White cumulus cloud, right corner
21	255	252	255	

Referring to the data in Table 2, note the relatively close RGB values between the dark blue background sky locations: 3, 6, 7 and 16 but not 8 that is located directly next to the UAP in Table 4. Measurement location 8 is relatively darker than these other locations for some reason. An attempt was made to find out why this might be.

No Evidence of Pixel Distortion. It is a well known fact that digital photographs can be easily manipulated to add or delete details. The area around the present UAP was enlarged to the point where individual pixels were apparent in order to discover whether the UAP might have been created (in another file) and then "pasted into" the sky background scene of Figure 2. Details of this method are given elsewhere. (Tortorella, 2009) During the process of deliberate hoaxing of this kind so-called "block artifacts" are produced somewhere within the larger grid of pixels making up the background scene.[12] No such distortions in luminosity or spatial displacement

[12] Images compressed using the JPEG's Discrete Cosine Transform algorithm produce high frequency AC coefficients that are (usually) zero or nearly so. However, images that have been cut and pasted (to produce a hoaxed or false image) produce non-zero coefficients that can be detected because their boundary possesses an inverse relation to the strength of the image, i.e., a difference in luminosity.

were discovered suggesting that the UAP was present when the photograph was taken.

Comparison of Photographs

Figures 12 through 15 are the other four photographs said to have been taken about 45 seconds apart following the image of primary interest (Fig. 2). The photographer also confirmed that this was the order in which she took them. Several things can be learned from a careful comparison of these photographs?

First. The UAP is not found in any other photograph but the first one (Figure 2). A careful comparison of Figure 2 with 12 was made by centering both solar discs over each other and rotating one to match the other as nearly as possible using the reddish high altitude cloud pattern as a guide. The reddish clouds in Figure 13 either had dissipated significantly, moved across the sky, or the photo was taken many minutes later or wasn't in the sequence claimed.

Second. Cloud Pattern Changes are apparent and show the effects of time and winds at different altitudes. While one expects clouds to constantly change shape these photographs suggest one of two things: either more than 45 seconds elapsed between exposures, the winds at the cumulus cloud altitude was very high and turbulent, or both. Since meteorology data showed winds to not exceed 30 knots the elapsed time between exposures must have been longer than 45 to 50 seconds.

Figures 12, 13, and 14 include the top of a nearby mountain that can be used to align one image with the other. A slightly greater zoom setting was used in Figure 12 and enlarged the cloud detail somewhat. The cloud patterns are significantly different, however and (once again) suggest the passage of many minutes between exposures.

The reddish clouds are visible in Figure 2 and 12 through 15. If the camera was oriented identically for Figures 2 and 12 then the reddish clouds are traveling generally NE and are rotating (as much as 30 degrees) as a unit and are not fragmenting. Of course the photographer could have rotated the camera between these shots. It seems unlikely that only 45 seconds passed between these two photographs.

Figures 14 and 15 were obviously taken sequentially as shown by the relatively unchanged cumulus cloud patterns yet sometime different from the earlier photographs. Figure 12 was aimed slightly higher than Figure 14 and did not include the top of the foreground mountain. The automatic exposure (f stop and exposure duration) was probably the same for both. If JPEG metadata was available for each image this could be verified.

Third. The obvious aiming point the photographer used was the white, cumulus clouds and the solar disc. All of the sky images contained these same objects.

Figure 12. Photograph 3 in Main Sequence
(No UAP Image could be Found)

Figure 13. Photograph 4 in Main Sequence
(Brightness and Contrast unchanged; No UAP
Image could be Found)

Figure 14. Photograph 5 in Main Sequence
(Brightness: + 68; Contrast: + 24)

Figure 15. Photograph 6 in Main Sequence
(Brightness: + 68; Contrast: + 24; No UAP
Image could be Found)

Discussion

Solar Geometry and Light Scatter in Earth's Atmosphere[13]

The distance between the sun and earth is typically given as 93 million miles (+/-). In the present main sequence photos the sun appears very bright and much larger and closer. The UAP, on the other hand, appears to be farther from the camera than the nearby reddish clouds but its actual distance cannot be determined. Simple geometry shows that sunlight would actually strike the UAP almost from behind and not from the side.[14] Only if the UAP possessed a reflective surface and was far out in space approximately at the distance of the sun itself would it reflect sunlight in the manner shown. If this were the case the UAP would have had to be extremely large. This suggests that the reddish portion of the UAP's surface was not reflecting sunlight but (perhaps) emitting its own reddish luminance. The fact that Figures 4 and 5 show a lighter upper surface suggests that the UAP is reflecting some sunlight toward the camera.

A second visual effect to be expected in daytime aerial photographs is a bluish haze or veil caused by Rayleigh light scattering[15] within earth's atmosphere. As was noted above, there is some blue component to this UAP photograph (see Figure 10) that might include such scattering.

Dantonio has remarked[16] that if an exposure of about 1/2,000 sec. at f8 was used one would expect this UAP to be significantly brighter (to the naked eye) than even the nearby clouds and its excessive brightness could even illuminate these clouds. For some reason, no such effect is seen nor did the witnesses see the UAP according to their testimony.

Given that the angular diameter of the sun is 32 minutes 23 seconds arc its rays are almost parallel upon reaching the earth. This means that an opaque object in the sky may cast a shadow having sharp edges below it depending upon its size, distance, and light scattering characteristics of the atmosphere. If this UAP is above and relatively near the reddish cirrus clouds seen in Figure 2, 3, and 11 it should cast its own shadow on the clouds. It does not! Thisq suggests either that it was farther away (higher) from the reddish clouds, was not opaque, or both.

General Comments and Summary

It is significant that if this object had mass, was within normal flight altitudes, and remained for any length of time in this location it could have been a hazard to commercial flight operations. Anytime an object of this size and high visibility is in the area where airplanes are flying it can distract the cockpit crew from carrying out their normal duties. If the object is near by or approaching the airplane the pilot must decide whether to change his heading and/or altitude to

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13 Comments and some data provided for this section by Marc Dantonio and Richard Tortorella, NARCAP, Research Associate are gratefully acknowledged.

14 People perpetrating hoaxes often disregard this fact and "illuminate" the false object from the side as if it was at the same distance as the sun.

15 Rayleigh scattering refers to a coherent form in which the intensity of the light of wavelength λ scattered in any direction of an angle θ with the incident direction is directly proportional to $1 + \cos^2 \theta$ and inversely proportional to $\lambda^{4.}$ Thus, particles much smaller than the light's wavelength are scattered more; the sky appears blue because of this effect.

16 Personal correspondence of June 23, 2010.

avoid a possible collision. Because the present UAP was partially hidden by a reddish cloud layer it must have been higher than this cloud layer by some amount. Its altitude cannot be determined.

If the photographer had noticed the reddish UAP in Figure 2 wouldn't she have tried to obtain more photographs of it? Why then didn't she center the location of the UAP in the camera's field of view in the following photos? Since she didn't it tends to support her statement that she didn't see the UAP at all.

Mention also must be made (for the sake of completeness) of the occurrence of the huge 8.8 magnitude earthquake[17] of February 27, 2010 (at 0334:14 hrs. local time) that was centered at 35 deg 54' 32" South,; 72 deg 43' 59" W. This was only thirteen days after this photo was taken. The estimated depth of the temblor's epicenter was 22 miles. The horizontal distance between the photographer's location at the El Yeso reservoir and the surface location of the earthquake's epicenter[18] is approximately 225 miles!

In summary, although this UAP could not be positively identified it presented a number of highly intriguing details that deserve further research.

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[17] http://en.wikipedia.org/wiki/2010_Chile_earthquake

[18] The epicenter of this earthquake was offshore from the Maule Region of Chile, about 6.8 miles SW of Curanipe.