IPACO expert report

Expert name	*Report date*	*Last update*
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Type	*Class*	*Explanation*	*Complement*
IFO	**B**	*Chinese lanterns*	

Document	*Imaging location*	*Imaging date*
Videos	39 Burdeau Street, Lyon France	June 28, 2013 22:58 GMT

[1] Screenshot of the second video (0:07s)

[2] Screenshot of the second video (0:06s)

[3] Screenshot of the second video (0:55s)

I. Imaging circumstances

Here's the complete testimony of the witness, with his comments on the two video sequences, excerpts from an email exchange:

- Observation happened in the Lyon center town, from the window of my apartment, located, at 39 Burdeau Street.
- Duration of the observation: a few minutes (up to 5).
- Direction toward which the luminous phenomenon moved: southeast.
- Phenomenon came from: northwest.
- No noise related to the phenomenon although a distant sound of an engine (airplane?) was perceived that I think it has no connection with the luminous phenomenon observed.
- Movement of the phenomenon: continuously, without acceleration or pause.
- Yellow-orange brightness similar to that of a city street lamp at a distance of 50 meters.
- Total number of light points: 6.
- Distance: not knowing the size of the phenomenon, with no reference point, I am unable to give a reliable distance. My impression was that these bright spots were not at a great distance.
- Weather: the sky was relatively clear. Only a thin layer of misty clouds veiled the sky in places.

- Geometric configuration:
    - [1] In the first sequence: 3 points forming a small triangular shape and stable in its spatial configuration.
    - [2] In the first sequence 2 other points appearing again form a larger triangle, the third would be hidden behind the roofs. (I do not have confirmation of the existence of this => not accessible from my place of observation).
    - [3] In the second sequence: a sixth point being largely displaced and isolated. This was the last observed light point (It followed the whole group according to a NNW/SSE direction).

- Timeline:
    - [1] Observation of the "small" triangle.
    - [2] Observation of the larger triangle (one of the points of which was hidden).
    - [3] An isolated point some hundred meters away.

- Visual observation: there had been a break in my visual observation and in my video. After seeing the first triangle I immediately took my camera to film. I had to stop the shooting, as well as my visual observation to plug in my camera to power (the battery was almost empty). Hence the presence of two distinct scenes of footage as well as a "hole" in my visual observation (the timeline between the small and the large triangle is absent).

- Videos: the special quality of the sequences is due to a special manual setting of my camera. The "night mode shoot" being enabled (diaphragm and shutter speed at maximum); sharpness was also manually set. Hence a totally blurred image when zooming. The choppiness is due to night mode. It is a heavy mode, which does not support the movement.

I switched to “I-A” mode, i-e automatic, during the second sequence. This explains the sudden almost completely black image. One hardly sees the 2 points of the "big triangle". I switched again in manual mode after a few seconds, looking at the result in automatic mode image on the camera screen (part of the video gradually sliding to black to a clearer image).

- Visual Impressions of the phenomenon: I had a strong sense of solidarity among the bright spots indicate clearly drawing triangles. It's totally subjective, but that impression lasted throughout my visual observation on each of two triangular shapes. I have not seen any solid object or any surface between these points of light. On the small triangle, visually, the distance made it impossible. On the big triangle, the absence of surface structure between the two bright spots seemed to me a fact.

- After image processing on the first sequence, there seems to be a darker form. The filter installation via the video editing software «*Magix Delux Video 2008 Plus*» potentially shows what I could not visually perceive because of the distance at which was the phenomenon. This is not in any way a "proof", but simply additional information. It is quite possible that this is due to the "noise" of the video image.

- After the disappearance of the luminous phenomenon, I quickly went down to the street, to access a location overlooking a large view of Lyon. This place is a few hundred meters (“*montée Saint-Sébastien*”) away. This view unfortunately did not allow me to look in the right direction. The south/ southeast area was not visible. I did not see anything special ... even after staying more than a quarter of an hour.

- Treatment by the media: I contacted the local newspaper "*Le progrès*" by relating my observation the same day. A journalist contacted me by phone and an article appeared in the newspaper the next Monday (July 1st).

Some days later, a second article appeared in the newspaper that alludes to a Thai lantern dropping that occurred at a wedding in the neighborhood "*Confluence*", this wedding was celebrated during that same evening of June 28.

- My investigation: after successfully finding the name of the company that organized the wedding in the Confluence neighborhood, I have had confirmation of the information given in the article in “*le Progrès*”. Mrs. V. P. of the company "*xxx*" confirmed to me having organized a release of 30 Chinese lanterns of the brand "*Sky*" during the June 28th. She gave me the time range of the launch: "*between 10:30PM and 11:00PM.*" Asking her about some details, such as the color of these lanterns, Mrs. P. was not very accurate. However, she gave me important information: the phone number of the professional photographer that she hired.

- So I made telephone contact with the photographer, Mr. Y.M. to ask him to send me a sample of the photographs taken at the launch of the lanterns during the wedding, in order to compare them with my observation. During our exchange, about the explanation I gave him to justify my request, he said emphatically: “*ha, but it cannot be our lanterns that you saw over Burdeau Street, they went due east, with the wind blowing towards the east”.* I was surprised because usually people do not pay attention to such details. I said to him: *“But ... you're sure about that? ...” “Yes, yes ... I see very well where the Burdeau Street is, it's not possible.”*

This person seemed confident, and to answer a question that I did not ask her reinforces, to me, the credibility of his testimony. To reach my street, these lanterns should have gone to the north/northeast (the path, according to Mappy, seemed somewhat straightaway curious, they should have taken due north to tack to the east, around Burdeau Street).

- Feelings on the moment and conclusion:

I was at the time "shocked", in the sense that I did not understand with certainty what I saw; at the time, it's the only thing I thought, except to keep a video record.

After watching, I immediately thought of two possibilities to explain my observation.

Either it was simply a release of Chinese lanterns or, if this assumption proves incorrect, I was then faced with "*something*" I did not know and could not identify.

A planet (Mars, Venus, and Jupiter) is excluded; I have experience of the sky and astronomy in general. An airplane or a helicopter is to be excluded: no noise. A satellite is also excluded.

I knew the relatively new cultural phenomenon in France of Chinese lanterns and their possible confusion with a UFO. I however never actually had the chance to see such a release. I have knowledge of their visual appearance, behavior etc. only through Internet videos. It has to be noted that the first thing I did that evening was to look on the Net for some examples of lanterns' releases... and then to find out about the possibility that they are connected by any whatever structure ... explaining, then, what was the most disturbed for me, i-e a stable geometric shape. I did not find this information on the Internet. Apparently, the release is always done in isolation, the lanterns being never attached to each other.

The media treated my observation in the "*sensational*" sense. The interest in the subject has been as fast disclosed as dropped away, after an erroneous explanation was given.

Here is a comment I sent to the written article about my observation (the moderator has rejected the comment, while transmitting it anyway to the editorial board ...), I have no news since then.

"Lyon July 7, 2013
The information given in "Le Progrès", 07.03.2013, is wrong.

After telephone contact was made with the professional photographer 'xxx', he confirmed to me categorically that the release of the Chinese lanterns of the brand "Sky" took the due east direction. From the Confluence district to the location of my observation (lower slopes of the Croix Rousse district), the direction that they should have taken is "northwest". Hence my observation whatsoever is not factually THIS lanterns' release. This does not exclude the possible existence of other releases that could have occurred the same evening of June 28, but it is not conceivable that they were those launched during the celebration of the wedding from the Confluence district. Best Regards ".

II. The camera

The model used is a JVC GS-TD1BE Everio. Technical characteristics can be seen here.

Useful data for the analysis are the following

- Image size: 1920 x 1080 pixels
- Image frequency: 25 images per second
- Sensor type and size: CMOS 1/4,1'' x2
- Focal (mm): 3,76 – 37,6 (equivalent 35 mm: 37,3 – 373,0)

III. Analysis

The Chinese lanterns release hypothesis being several times mentioned (particularly about the release that occurred the same evening and at the same hour of the witness's sighting, from the

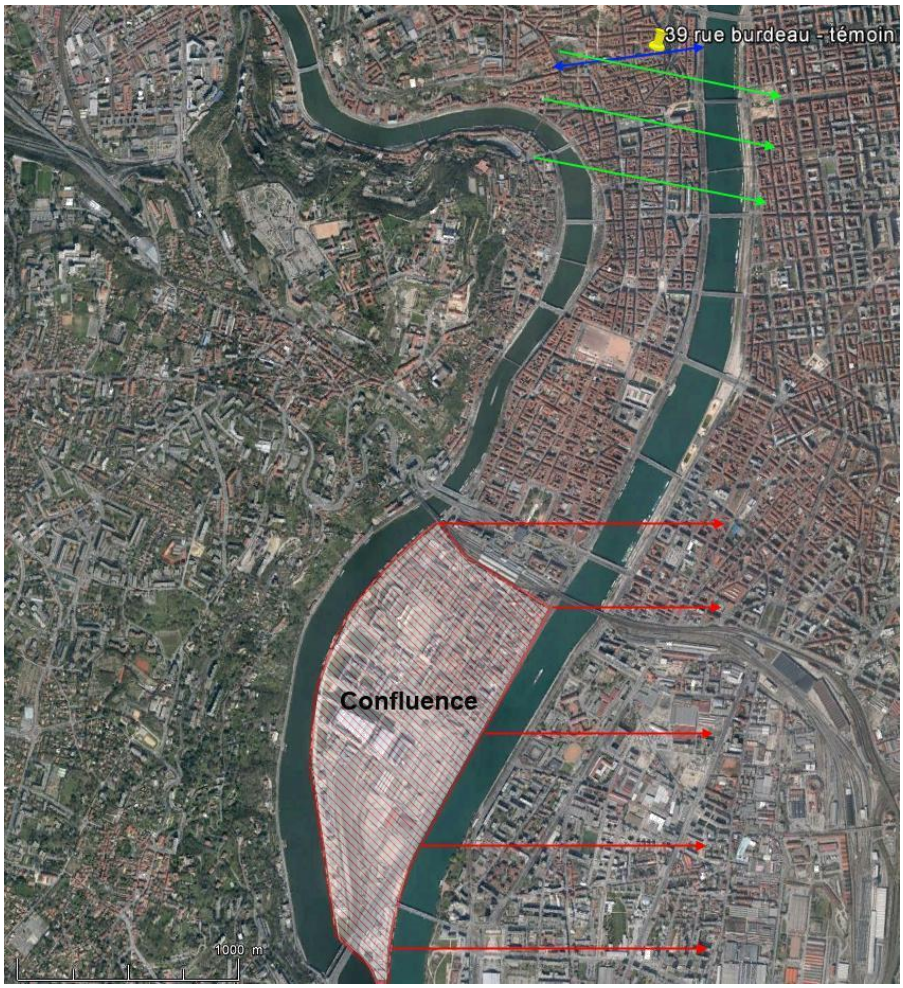
« Confluence » district), we will try to check whether it is consistent with the factual, testimonial and technical elements that we have in our possession.

1. General geographical situation

We annotate on a *Google Earth* screenshot all the various geographic coordinates that we know, then:

- Position of the witness (yellow tack), at the 4th stage of its building located on the north side of Burdeau Street.
- Situation of the « *Confluence* » district (red stripes).
- Orientation of the Burdeau Street (azimuths 262°/82°), then almost east-west, materialized by a two-way blue arrow):

- Apparent movement of the objects as noted by the witness and observed in the videos (green arrows).
- Approximate apparent movement of the objects as reported by the wedding photographer, on the « *Confluence* » district where the Chinese lanterns were released (red arrows).



2. Weather situation

As Chinese lanterns depend of the wind for their movement, it is therefore important to know both its orientation and speed for the analysis.

We may also usefully note the data about the cloud cover in order to eventually give possible estimations of the object's movement.

The archiving of weather data by airports being globally indexed by the Internet site Weather Underground and freely accessible to all, we can easily visualize those for the date and hours of interest (between 10 :30PM and 11 :30PM) of the closest airport (Bron) located a few kilometers east of Lyon city :

10:30 PM	15.0 ° C	11.0 ° C	77%	1024 hPa	10.0 km	Nord	5.6 km/h / 1.5 m/s
METAR LFLY 282030Z AUTO 01003KT 9999 SCT036 BKN044 OVC050 15/11 Q1024							
11:00 PM	15.0 ° C	11.0 ° C	77%	1024 hPa	10.0 km	Variable	3.7 km/h / 1.0 m/s
METAR LFLY 282100Z AUTO VRB02KT 9999 BKN040 OVC048 15/11 Q1024							
11:30 PM	15.0 ° C	11.0 ° C	77%	1024 hPa	10.0 km	NNO	5.6 km/h / 1.5 m/s
METAR LFLY 282130Z AUTO 34003KT 9999 BKN037 OVC044 15/11 Q1024							

These data, coded under a «METAR » report, can be decoded as follow:

1- Wind: coming from almost due north (azimuth 10°) and blowing at a very low speed of 3 knots (5.6 km/h) at 10:30PM, it becomes variable, less than 4 km/h at 11 :30PM, then blows again from near due north (azimuth 340°, NNW) at 5.6 km/h at 11 :30PM.

2- Cloud cover: there are scattered clouds (3/8 to 4/8) with a ceiling of 3600 ft (1100 m) at 10:30PM, and the cloud covers more between 11:00PM and 11:30PM (5/8 to 7/8) with a cloud ceiling around 1100 and 1200 m.

3. Inspection of the video sequences

These two documents, which respectively last 17'' and 1'09'', exhibit sporadically a rather good visibility of the objects.

They can be cut into three sequences that can be individually studied then compared with each other in order to determine if some constants exist and, if so, to quantify them.
These three sequences are defined by the witness himself as follows:

- [1]: 3 points that define a small triangular shape, stable in its spatial configuration.
- [2]: 2 other points that appear to define as well another bigger triangle, whose third point, hidden behind the roofs, whilst never seen
- [3]: a 6th point is largely isolated and shifted back. This is the last luminous point that was observed.

We consider additionally that witness's position hasn't changed between the videos.

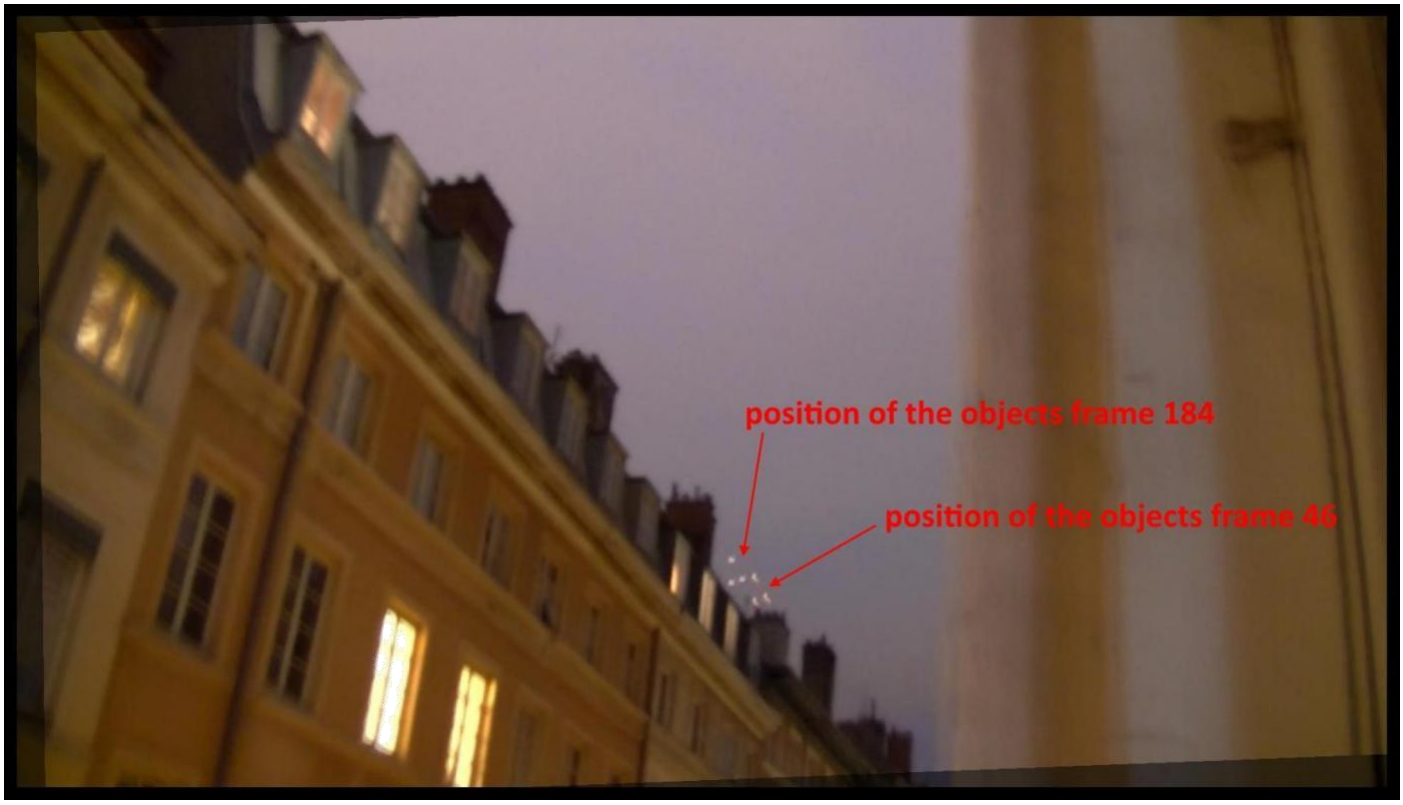
a. Computation of angular speed

We will try at first to determine for each of these three sequences (noted « sq1 », « sq2 « and « sq3 ») the angular speed of the objects, and check if this speed stays constant all along the video duration as well as between each component of the two first sequences.

After having loaded the two original videos in .mts format, converted in .avi format and extracted the whole frame sequence (446 for the first and 1742 for the second), we select the most workable one (sufficiently distinct, without or with little motion blur, without zoom effect, etc.) for our measurements, then we open IPACO.
Details of the workable frames:

- Sq1 : n°46, 84, 136 and 184
- Sq2 : n°145, 157, 220, 271 ; all the frames in automatic mode from the n°593 up to n°685 and n°692 to n°753.
- Sq3 : n°1173, 1298, 1396 and 1716.

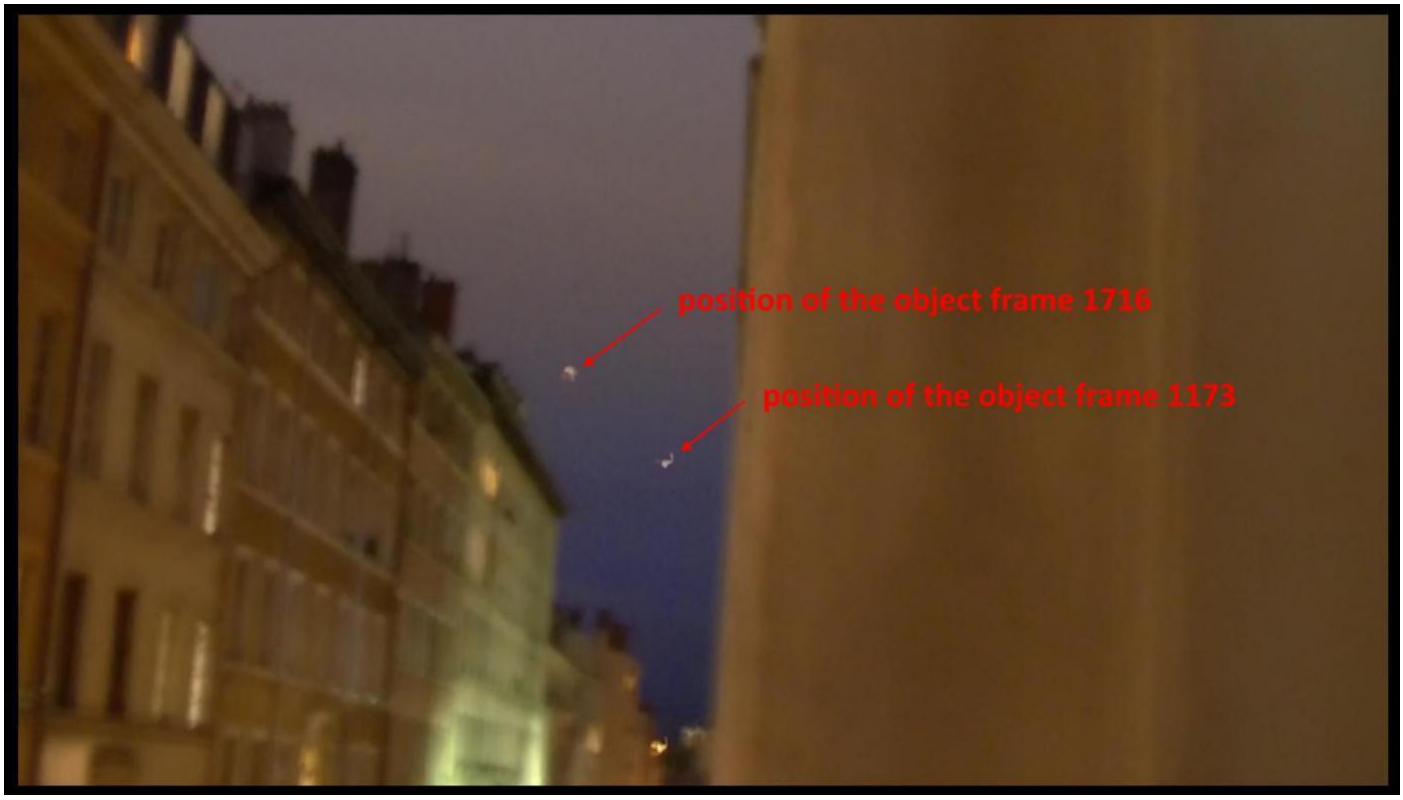
The « *3 points registration* » of the IPACO analysis tools allows the analyst to superimpose two reference frames of his choice and to underline any movement of the objects before any computation, by compensating, besides other things, the zoom factor. The two frames selected here are at n°46 and the last (n°184) of sequence 1:



Registration sequence 1

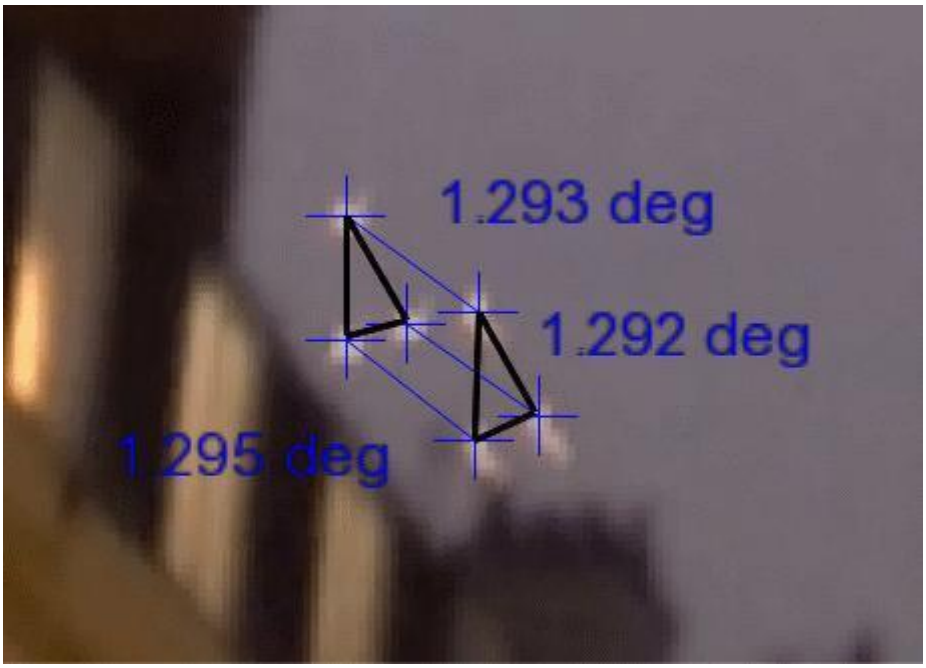
The same process can be repeated for sequences 2 and 3:

Registration sequence 2



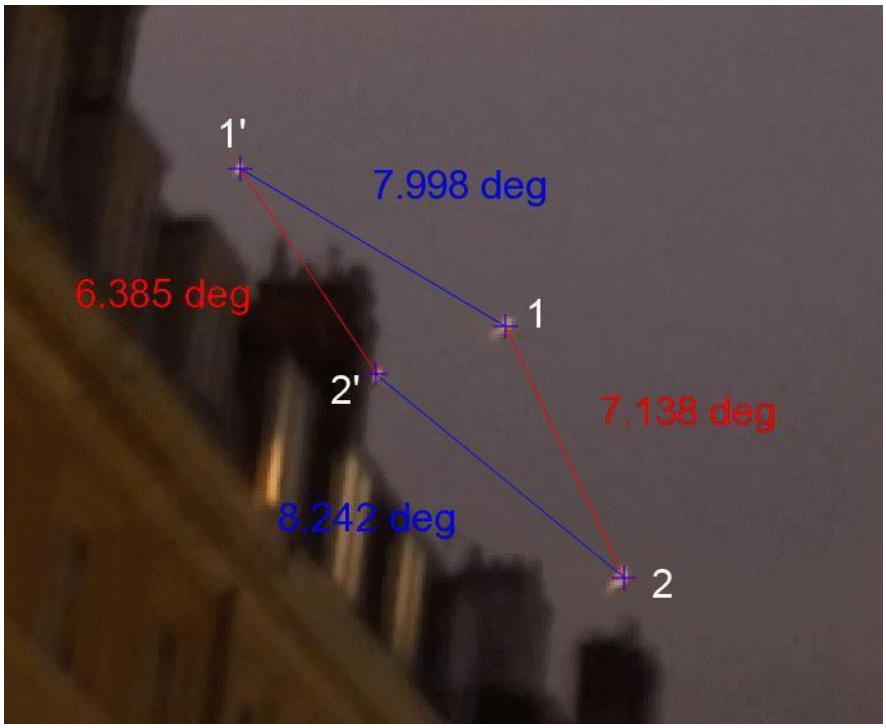
Registration sequence 3

Next step consists in directly measure on each registration the angular sizes that separate all the objects between them and between their movements:

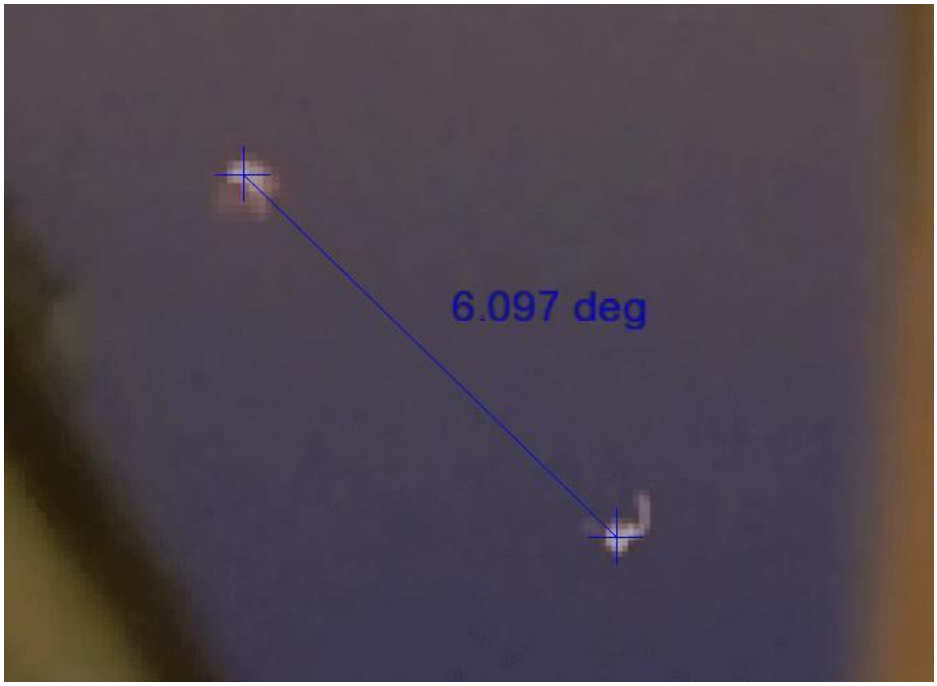


Angular measurements of the movements of each object, sequence 1 (1)

Angular measurements that separate each of the three objects at the beginning and the end of the sequence 1 (2)



Angular measurements that separate the two components and their movement in sequence 2 (3)



Angular measurement of the movement of the object in sequence 3 (4)

The following items can now be deducted from the above measures:

1- The spacing of the components of the sequence 1 between the beginning and the end remains constant (2), except for the rightmost point that seems to slightly approach the other two points over its movement. This can be explained in three ways:

a- <u>If it is a solid triangular object</u>: by a slight rotation of the lower right corner in an axis formed by the two other angles.

b- <u>If it is three independent bright objects:</u> either by:

a. A slightly greater speed of the object on the lower right, or by
b. A slightly lower altitude, for a same speed for the three objects.

c- <u>The measures margin error</u>, as the objects are not clearly defined as isolated and as the difference being only between 2 and 3%.

2- Each of the three objects of the sequence 1 has moved in the same apparent distance (1), which would tend to show that they are at the same altitude, invalidating then the above “1.b.b.” proposal.

3- For sequence 2, the distance that separates the two objects has decreased over their movement, again, either because they are at a different altitude, for a same speed, or because they have a slightly different speed.

4- Finally, for sequence 3, nothing can be further clarified at this stage.

Note that for all sequences; displacement is slightly oblique to the axis of the Burdeau Street, confirming what the witness said and the surveys made in the ground plane of the above chapter "*General geographical situation*".

b. Estimates of the actual speed and of the distance to the observer

We will try now to give the actual speed measurements of the objects in all the sequences, depending of their distance to the observer and of their estimated size.

Although hardly visible on the video, it is possible, by pushing the contrasts, to highlight the presence of some clouds, also confirmed by the METAR data as shown in the chapter "*weather situation*":

The altitude of these clouds, being at least at 1100 m, as well as the average wind speed (5.6 km/h) will serve as a basis for the following computations, even if actually the distance camera/clouds is greater, due to the fact that the observation did not occur at the zenith.

We will also keep in mind, for the lantern's hypothesis, the following data:

- Maximal possible altitude: **600 m.**
- Maximal duration of the lantern's ignition: **7 minutes.**

The camera has a frame rate of 25 frames per second, and they were extracted periodically, whichever mode used. We can therefore say that:

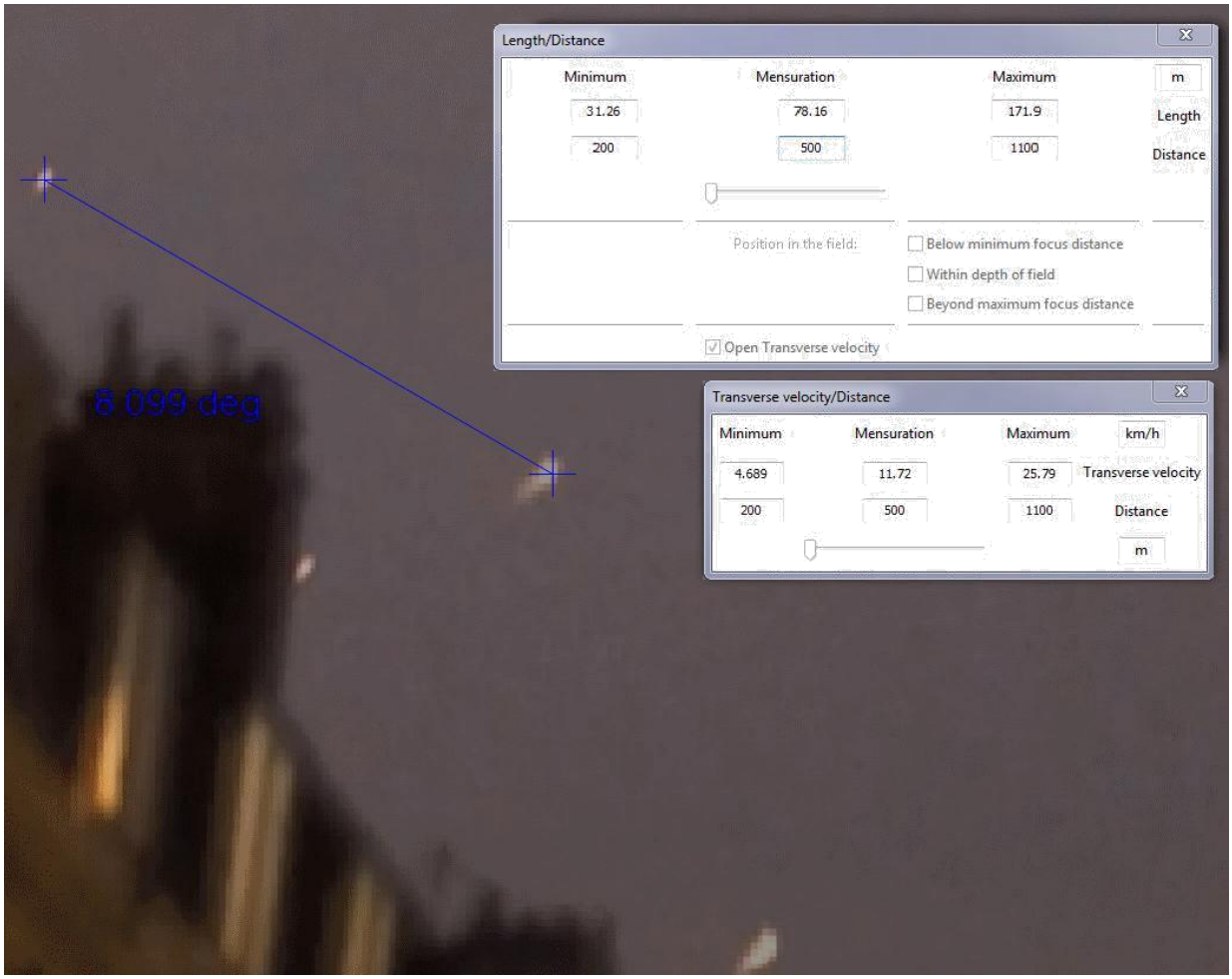
- For sequence 1: objects have traveled an angular distance of 1.3° (rounded) in 138 frames, so in 5''5.
- For sequence 2: objects have traveled an angular distance of 8.1 ° (average means of the two movements) in 608 frames, so in 24''3.
- For sequence 3: objects have traveled an angular distance of 6.1° (rounded) in 543 frames, so in 21''7.

The "*Length/Distance*" function of IPACO allows, in addition to establishing a relationship between the possible **length** (perpendicular to the line of sight) of an object in the scene designated by 2 points on the screen, and the possible **distance** between the camera lens and this object, to establish a relationship between the possible **transverse speed** of the object (perpendicular to the line of sight), and the possible **distance** between the camera lens and this object.

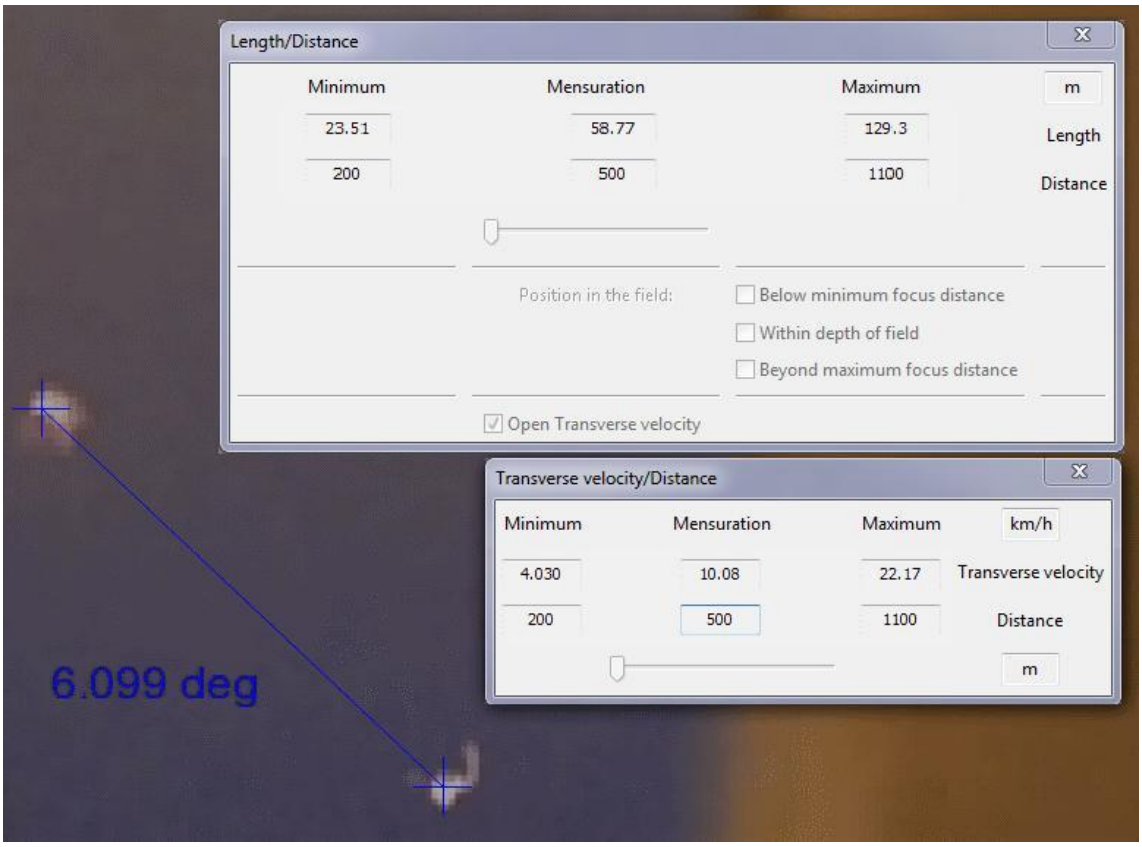
In the three sequences, the objects are not observed moving exactly perpendicular to the observer, we will neglect at first the difference (lower in the first two sequences) generated by this data. The speed obtained by computation will have then to be slightly increased thereafter (the object having covered more distance during the same time lapse).

The results:

Measures sequence 1



Measures sequence 2



Measures sequence 3

These results can be summarized as follow:

Sequence	If the object is at a distance of...	then it crossed...	at a speed of...
1	200 m	5 m	3,6 km/h
	500 m	12,5 m	9 km/h
	1100 m	27,5 m	20 km/h
2	200 m	31,26 m	4,7 km/h
	500 m	78,16 m	11,7 km/h
	1100 m	172 m	25,8 km/h
3	200 m	23,51 m	4 km/h
	500 m	58,77 m	10 km/h
	1100 m	129,30 m	22 km/h

One notes the almost perfect regularity of the compared speed of the objects in the three sequences, whatsoever are the distances taken into account, **which give credence to the hypothesis of passive objects carried by the wind.**

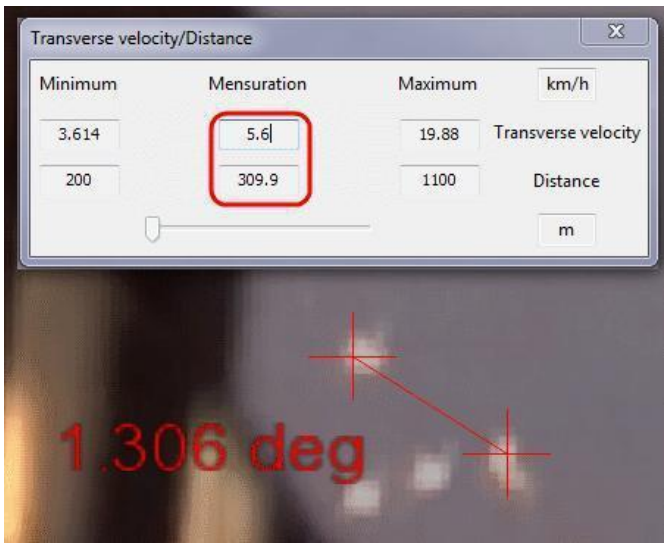
Such objects cannot fly quicker than the maximal registered wind, i-e 5.6 km/h, and then cannot be at a greater or equal distance to the observer than 500 m. We will see below at which exact distance they needed to be to move at 5.6 km/h.

Conclusion 1:

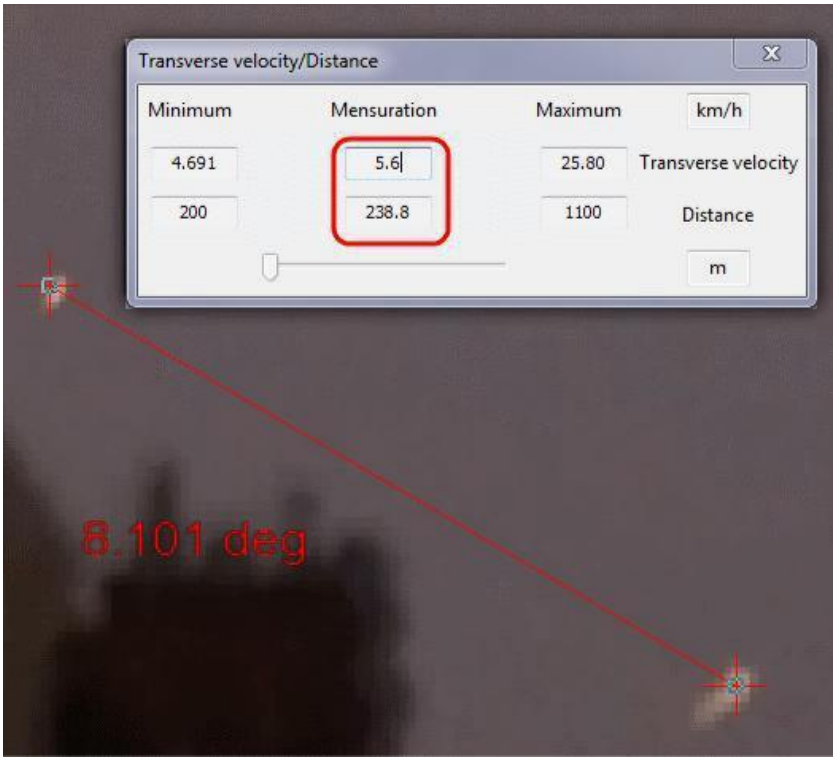
Comparative measured speed and distance to the observer are compatible with the hypothesis of objects carried by the wind.

Further computation done with the IPACO tool « *Length/Distance* » allows us to precise the results of the distance that separates the objects to the observer for a possible maximal wind of 5.6 km/h; the lower the wind speed, the greater this distance is.

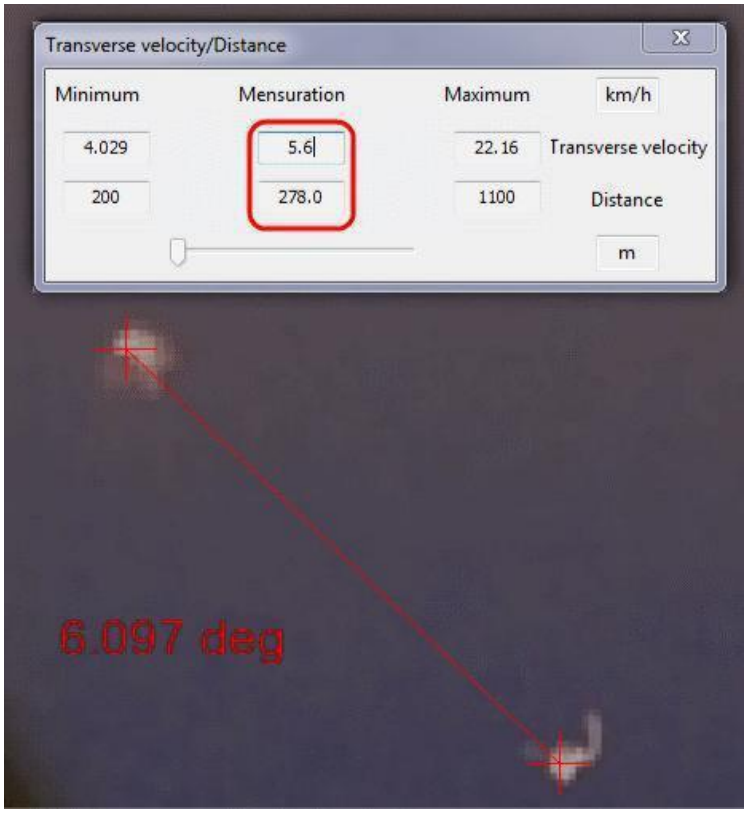
Then, for sequence 1, the objects have to be located at a maximal distance of 310 m for a maximal possible wind of:



For sequence 2, maximal estimated distance to the observer is 239 m, still for a maximal wind of 5.6 km/h:



Likewise, for sequence 3, the maximal possible distance to the observer is 278 m:



One notes that the maximal possible distance to the observer of all the objects in the three sequences is both quite regular and short.

Conclusion 2:

The possible maximal distance of the observer to these objects carried by the wind is comprised between 239 m and 310 m, depending on the considered sequences.

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c. Determination of the angular elevation of the objects and of their altitude

The first step consists, while registering in a single image, for each sequence, a single representative frame, to determine the elevation angle of each of the objects with respect to the horizon line, then their respective altitude.

Luckily, some of the urban landscape elements (buildings) visible in the three sequences are common, allowing the use of the "*3 points registration*" tool of IPACO to superimpose in one image the three registrations already done in chapter "3.3.a". We will consider that this "*final*" registration is done on a horizontal basis, parallel to the ground and thus materializing the horizon line.

On this registration, materialize on the one hand all grouped objects with different color points according to the considered sequence (red and orange for sequence 1; dark blue and sky blue for sequence 2, green and yellow for sequence 3) and determine on the other hand the horizon line by drawing the convergence lines from the elements of the buildings known as horizontal and parallel to each other.

Whereas:

- The perspective effect is small or negligible, especially for sequence 1 and sequence 2, objects are considered as moving on a perpendicular plane to the viewing axis of the camera,

- The measures of the distance between the camera and the objects being those computed in the chapter "3.b." ("Conclusion 2"),

It only remains to measure the angle formed between the straight line representing the horizon and each object of the "final" registration, using the IPACO tool "*angle*". This straight line perpendicular to the horizon line materializes the distance between the objects and the horizon. Finally, thanks to the "*Length/Distance*" tool, accurate altitude measurements for each object in each sequence can be given.

All is summarized in the image below with the example of one of the objects in sequence 1:

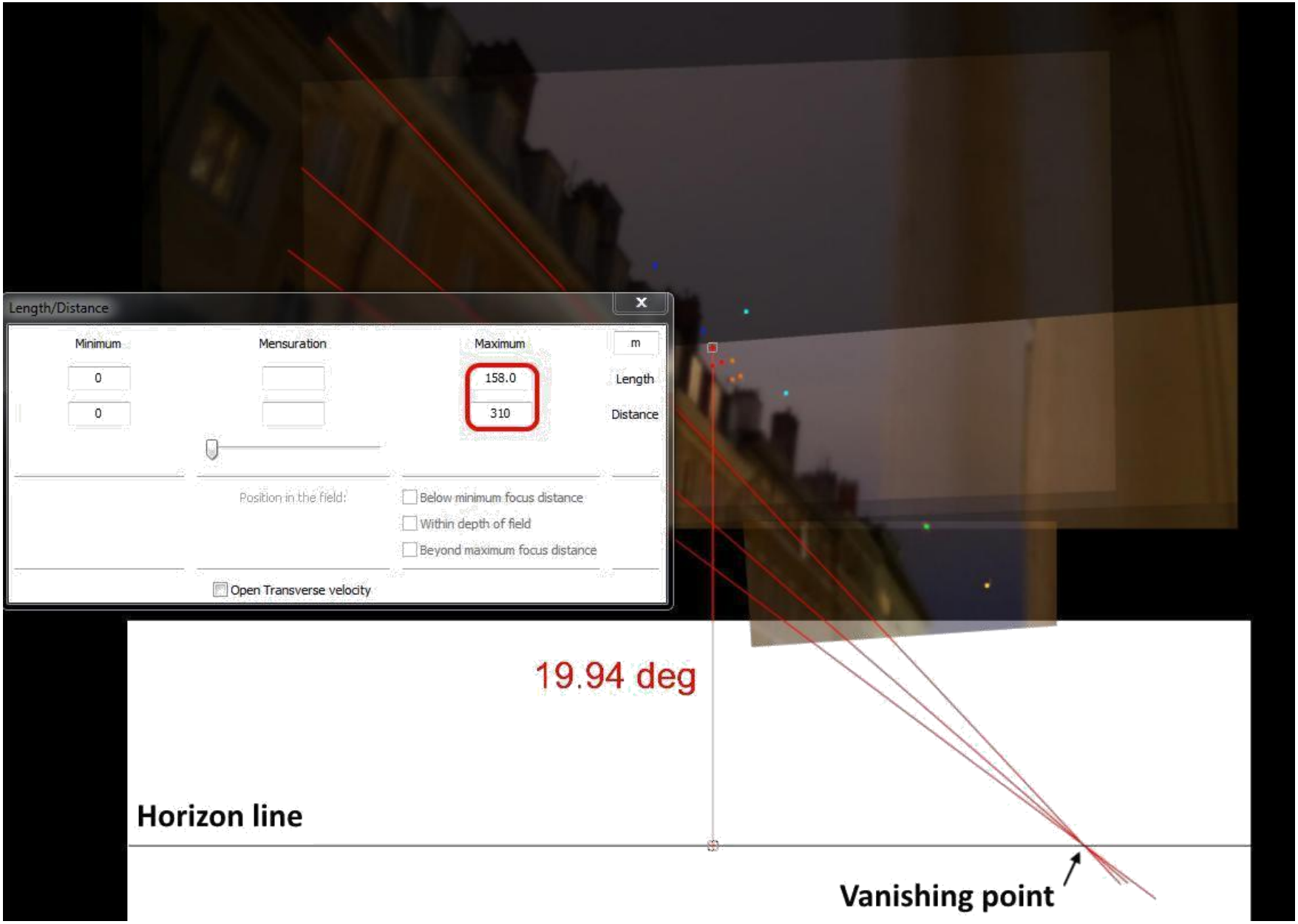
Length/Distance
Minimum
Mensuration
Maximum
m
0
158.0
Length
0
310
Distance
Position in the field:
Below minimum focus distance
Within depth of field
Beyond maximum focus distance
Open Transverse velocity
19.94 deg
Horizon line
Vanishing point

Figure 1

All the objects can be enumerated as follow:

To the obtained results, we have to add the relative altitude to the ground where the witness and his camera was located during the recording. A diagram helps to better understand why:

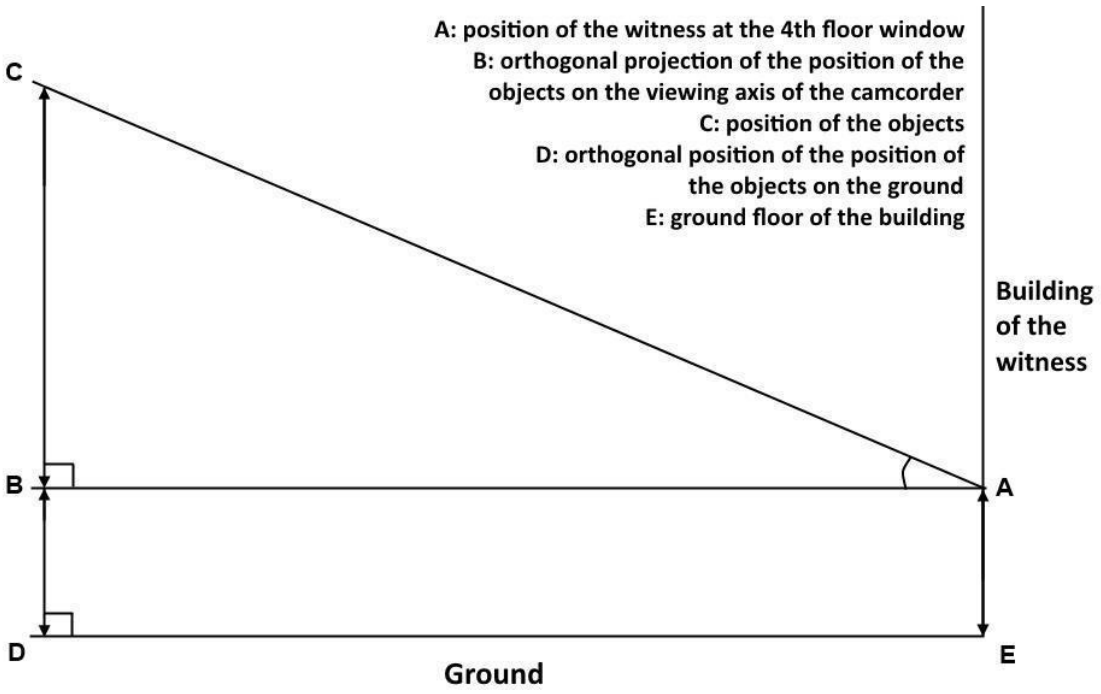

Figure 2

AC materializes the distance between the camcorder and the object, computed at chapter « 3.b. ».

BC materializes the orthogonal projection of the position of the object in C in a fictitious point B located on the horizon line, itself materialized by a straight line in a plane passing by CBD and perpendicular to AB (parallel to the ground).

CD materializes the orthogonal projection of the position of the object on the ground, or the sought « *altitude* ».

AE represents the height of witnesses' position, located at the 4th floor of its building during the recording. This height can approximately be estimated by multiplying the height of the apartments of the building (3.60 m) by the number of floors (ground floor included) and by adding the thickness of the inter-floor slabs (approximatively 20 cm). AE height is then [(3.60 x 4) + (0.20 x 4)] = 15,20 m.

Additionally, as both the ground and the horizon line are horizontals, it is therefore possible to consider the ABDE rectangle to have the sides BD and AE on one hand, and AB and ED on the other hand to be equal and parallel to each other.

Consequently, the sought value (the altitude of the objects) is equal to the sum of BC and BD with BD = AE = **15, 2 m.**

Finally, the whole set of results can be summarized in a chart « *measures of distances and altitudes -1-*»*:*

MEASURES OF DISTANCES AND ALTITUDES - 1 -

Object	Maximal distance to the camera (m)	Angular length object/horizon line	Actual altitude (m) above the horizon	Actual altitude (m) to the ground
1	310	19,94°	158	173,2
1'	310	19,41°	153,4	168,6
2	310	19,20°	151,7	166,9
2'	310	18,61°	146,6	161,8
3	310	19,33°	152,7	167,9
3'	310	18,75°	147,7	162,9
4	239	23,30°	144,1	159,3
4'	239	21,41°	131,4	146,6
5	239	20,63°	126,3	141,5
5'	239	18,01°	108,9	124,1
6	278	12,40°	84,2	99,4
6'	278	10	66,54	81,74

MEASURES OF DISTANCES AND ALTITUDES - 2 -

Object	Maximal distance to the camera (m) (AC)	Actual altitude (m) above the horizon (BC)	Actual altitude (m) to the ground (CD)	Projected distance to the ground (m) (ED)
1	310	158	173,2	266,7133293
1'	310	153,4	168,6	269,3853003
2	310	151,7	166,9	270,3462779
2'	310	146,6	161,8	273,1454558
3	310	152,7	167,9	269,7827089
3'	310	147,7	162,9	272,5522152
4	239	144,1	159,3	190,6729923
4'	239	131,4	146,6	199,6372711
5	239	126,3	141,5	202,9022178
5'	239	108,9	124,1	212,7481845
6	278	84,2	99,4	264,9421824
6'	278	66,54	81,74	269,9192998

To summarize, we found the following values:

- Sequence 1: **between 162 m and 173 m** of altitude.
- Sequence 2: **between 124 m and 160 m** of altitude.
- Sequence 3: between 81 m and 99 m of altitude (less precise, because the objects are likely more distant each other and are not observed according to a perpendicular plane to the camera; the results is very likely largely under-estimated).

We will retain only the results of sequences 1 and 2, more reliable for the rest of the study.

Conclusion 3:

The objects are located at an estimated altitude of between 124 m and 173 m, depending of the considered sequence, which is compatible with the data given by the manufacturer and the reseller for this kind of lanterns (maximal altitude: 600 m).

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d. Determination of the ground projection of object's trajectory

As the objects did not pass at the zenith, and as, the two straight lines formed by their trajectory projection on the ground on one hand, and by the Burdeau Street orientation on the other hand, being not parallels, we will try to determine their exact trajectory with the help of the previous results.

The first step consists of taking the diagram drawn at the previous chapter (« *Figure 2* »); to compute for the two retained sequences, ED value (which is equal to AB). It may be easily deduced in the right-angle ABC triangle, thanks to the Pythagorean Theorem that formulates $AC^2 = AB^2 + BC^2$ in the right-angle triangle in B.

We know the values of AC and BC, so that we deduce AB and ED:

- Sequence 1: 147 m < BC < 158 m and AC = 310 m; then **267 m < AB/ED < 273 m.**
- Sequence 2: 109 m < BC < 144 m and AC = 239 m; then **191 m < AB/ED < 213 m.**

A summarized chart that recapitulates all the results is visible in the previous page under the name "*measures of distances and altitudes -2-* ".

Conclusion 4:

The objects are located at a projected distance on the ground comprised, depending of the considered sequence, between 191 m and 273 m.

4. Situation map and final recap

At first, we take again the final registration done from the three composited frames with the three sequences at chapter « 3.c. » (“*Figure 1*”), assigned with the vanishing lines that materialized the horizon line.

The vanishing point represents the cardinal point of Burdeau Street’s orientation, where the camcorder was pointing at. This cardinal point was defined at chapter « III.1. »: azimuth 262°, i-e almost due west.

Thanks to the indications and photos taken during daylight from the same position by the witness and to tracking done on satellite view and on the street (with « *Google Earth* » and « *Street View* »), it is possible to:

1- Locate the position and numbering of the buildings in the street from a vertical view:

2- After daylight registration with the final one for a better visibility, report the numbers of the buildings visible in the videos. This is only possible with the two first sequences; the third do not have enough reference points.

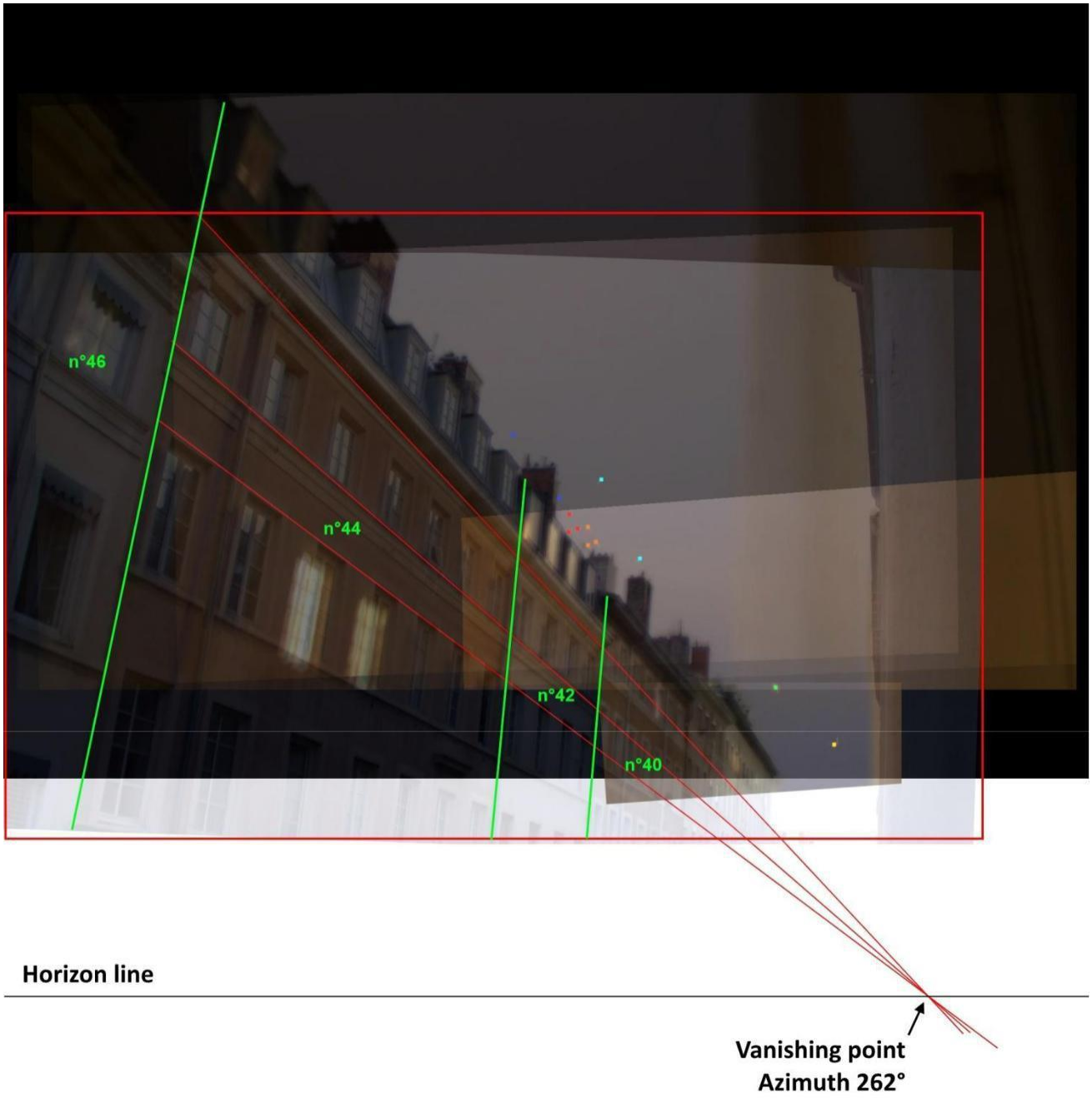
It should be possible by extrapolate the likely trajectory of the object in sequence 3 in its continuity, to do new distances measurements and thus estimate with a good precision its movement. However, the study of the two first sequences should be enough for our analysis.

Next step consists in the report of all the measurements and data on a satellite map at a lower scale, then:

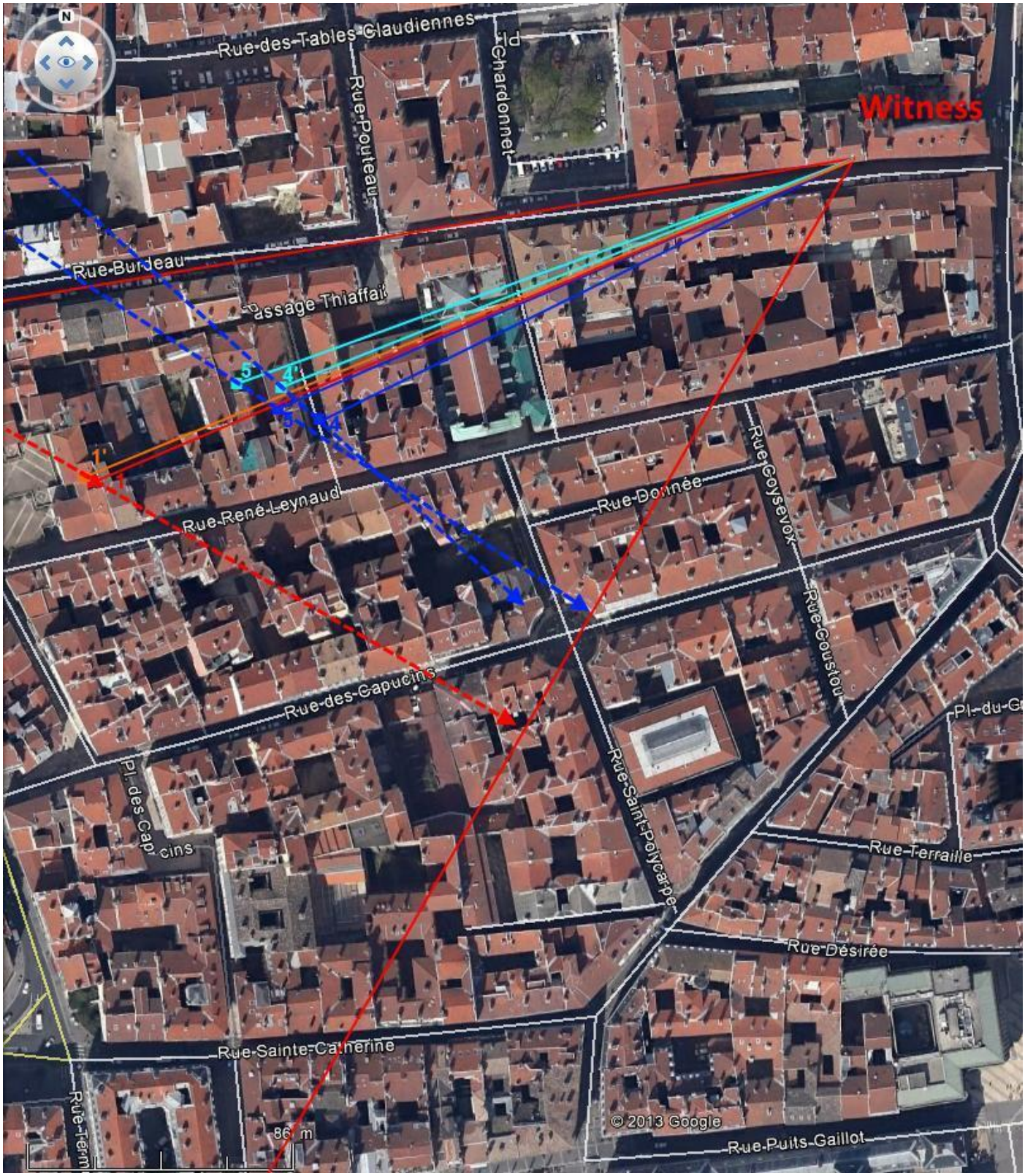
- Horizontal angle of view of the camera (« FOV ») measured thanks to IPACO at **50.47**° and placed on the building position located at n°46.
- Position of each object according to their measured and reported distance in the chart “*measures of distances and altitudes -2-* “and with the help of visual buildings landmarks (windows, chimneys, antennas…) and visible on the final registration reproduced below.
- Reconstructed trajectory of each object by drawing the straight line that relies their respective and successive position.

Note: for convenience, as the objects of sequence 1 are very close each other as well as the orientation of their movement, we will choose to represent only the position and the trajectory of 1 and 1’.

Final registration improved and annotated:



Final situation map:



Blue arrows materialize the trajectory of the objects in sequence 2, red arrow that of objects in sequence 1.

Objects are moving coming from:

- Sequence 1: azimuth 300 (west-north-west)
- Sequence 2, object 4/4': azimuth 312 (north-west)
- Sequence 2, object 5/5': azimuth 303 (west-north-west)

These results are slightly different from the first estimation, i-e a general movement of the objects rather orientated in the street axis (from west-north-west to east-south-east), while in fact the movement axis is a little more tilted (from north-west to south-east).

Conclusion 5:

This result is quite compatible with the weather data that indicates a global wind coming from north, variable, then coming from north-north-west, between 10PM and 11PM (see chapter III.2.).

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5. Where the objects can come from? (Hypothesis of the Chinese lanterns)

The question is legitimate and it should be possible to mark out an area more or less important depending of the lantern's lifetime and of the fact that they are considered to be either "in end life" or at the contrary "at the beginning" of their lifetime.

Mean lifetime of a lantern is between 6 and 7 minutes and we saw besides, thanks to the weather data, that the wind never blows more than 5.6 km/h.

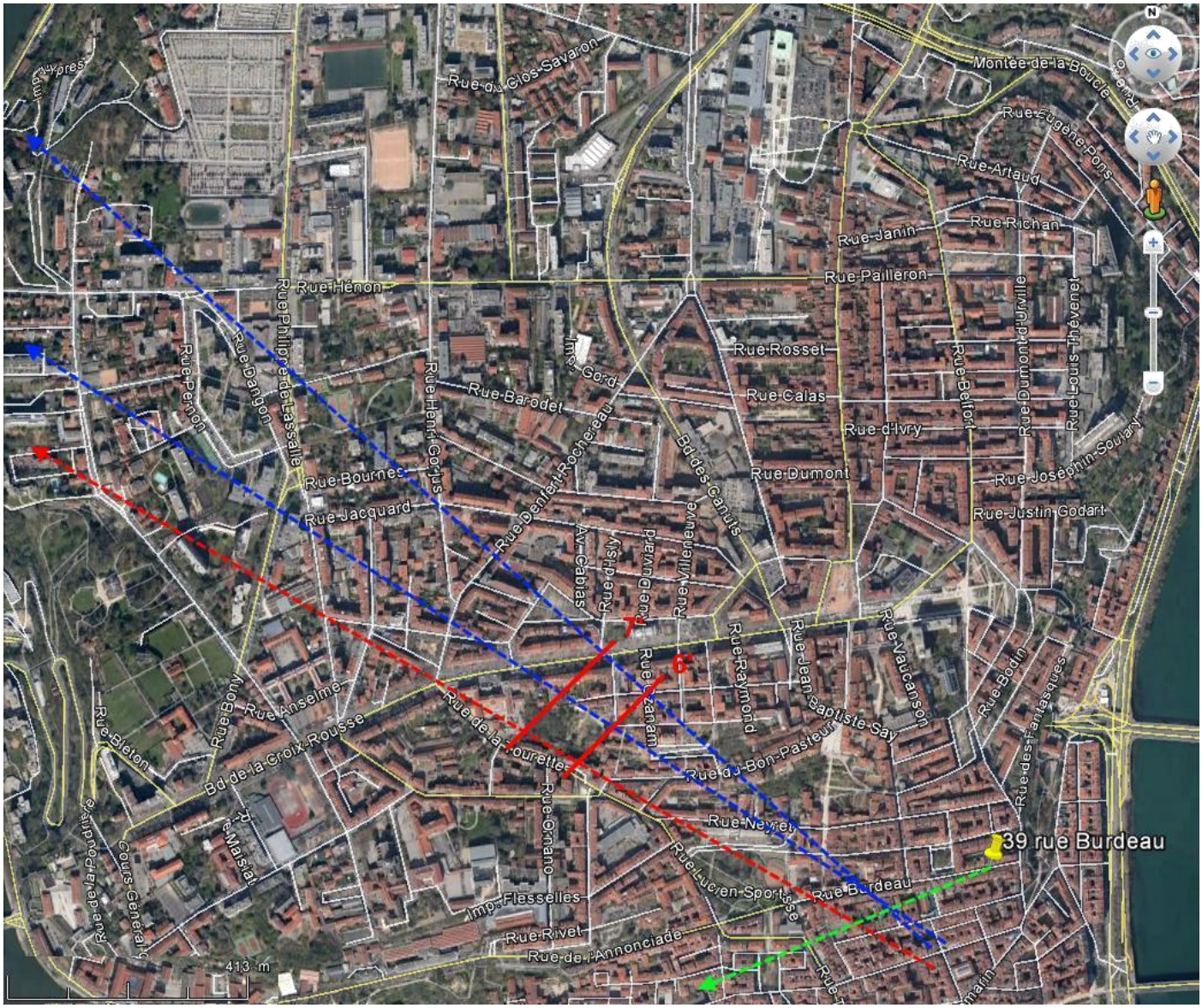
A simple cross-multiplication allows us to compute the distance travelled by a lantern during this lapse time.

5600 m travelled in 60 minutes give us a distance of:

- 560 m for a 6 minutes lifetime and
- 653 m for a 7 minutes lifetime.

These distances are very short and the marked area on the map, depending on the azimuths found on the previous chapter is rather limited, but this area is to be extended because of the margin error caused particularly by:

- The estimation of the wind speed that can be lower and shortened as well the travelled distance.
- The trajectory computation, which angle can vary a few degrees and which effect on the ground is more important if we moved away from the star point of the measures.
- The lifetime of the lanterns.



On the above map, the blue arrows materialize the source and the travelled path of the objects in sequence 2; the red arrow that of the objects in sequence 1.

The green arrow represents the mean boresight of the camera in direction of the objects gather together on the final registration.

The two red marks annotated « 7’ » and « 6’ » represent the maximal possible limit of the objects source, according to their estimated lifetime and in the hypothesis that they are in their « *ending life* » coming closer to the green arrow.

IV. General conclusion

Although all the data and the results show with a strong probability that the objects are Chinese lanterns carried out by the wind, it can't be those that were released the same evening, during a wedding and around the same hour from the south of witness' position, in « Confluence » district, located approximately 3-4 km away, as the crow flies.

Indeed, these lanterns should take the wind direction, i-e in the south-west, nearly at the opposite of the direction in which the witness was recording at.

The source point of the release of these lanterns would have to be searched in the north-west or the west-north-west; likely from an open space: park, public garden, open amphitheater, wilderness, etc.

Lacking more information regarding the origin of these lanterns, this case is classified as « **B** ».

V. Sources – credits

At first, I would like to thank the witness, Sébastien Nové-Josserand for the original documents and for his availability to give the necessary and indispensable information for the development of this report.

Journalists' papers (in French):

- France 3 Rhône-Alpes (Internet's archives)
- Le Progrès, June 30, 2013
- Le Progrès, July 03, 2013
- Le Progrès, June 30, 2013 that relates the existence of about twenty UFO observations since mid-June in the area.
- Blog "OVNI 91" that relates the case (in French).