## IPACO expert report

<table>
<thead>
<tr>
<th><strong>Expert name</strong></th>
<th><strong>Report date</strong></th>
<th><strong>Last update</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Antoine COUSYN</td>
<td>17/11/2016</td>
<td>24/02/2017</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th><strong>Type</strong></th>
<th><strong>Class</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IFO</td>
<td>A</td>
<td>Bird of the species common swift</td>
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<tr>
<th><strong>Imaging location</strong></th>
<th><strong>Imaging date</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Along the coast, around Saint-Raphaël (06) France</td>
<td>October 14, 2016 between 09h19’29” and 09h19’30” Local time</td>
</tr>
</tbody>
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20161014_091929_16.jpg

1
I. Imaging circumstances

The witness was on the coast close to a « Saint Raphaël (06) » small island, on October 14, 2016, and was shooting the waves that broke on the rocks with its smartphone in burst mode.

He did not observe anything at the time he took the photos and it was only afterwards, by looking at them on his computer, that he noticed something odd that he describes as follow:

“An object appears in the sky, follow a 50-60° upward trajectory, almost facing the wind, before doing a stage.

The movement is done very quickly, the five photos sequence lasts one and half second (the first one does not show the object, the fifth is the last one on which the object is visible)

The appearance of the object changes in each photo: it’s more gripping while zooming.

On the fourth photo, what looks like a fuselage and two wings can be seen. »

The witness specifies besides that the sky was cloudy, and that there was a storm with strong east winds (90-100 km/h).

He gave us afterwards the GPS coordinates of the location.
II. Camera settings

It is a camera of the Samsung smartphone model “SM-G388F” commonly called “Galaxy Xcover 3” of which technical characteristics are shown in details here.

The useful technical data of the photograph, extracted from the EXIF metadata, are available under the IPACO menu “Camera – Technical data” and are detailed below:

- Focal length (mm): 3.3
- Equivalent focal length 35mm camera (mm): 31.00
- Exposure time (s): 0.030303
- F number: 2.20
- Speed ratings (ISO): 50

All these data are identical for all photos, as they were created in burst mode.
III. Data examination and analysis

1. Authentication

Once the image converted into a JPEG file and imported into IPACO, the first verification to do is to check if the photograph can be considered as “original authentic” according to IPACO’s methodology definition, without implying necessarily any forgery from the photographer.

This can be done by three means:

1- Using the “Suspect tag” function under the menu “Authentication”:

Photographs n° 20161014_091930_19.jpg and 20161014_091930_20.jpg are free from any suspect tag.
Photographs n° 20161014_091929_16.jpg, 20161014_091929_17.jpg and 20161014_091929_18.jpg do have however four lines of suspect tags.

These four lines indicate that:

- A software was used ("Windows Photo Editor 10.0.10011.16384"). Its use generates XMP tags as well as a special tag named « Marqueur JPEG/JFIF ».

2- Using the “Comparison with CamCAT” tool under the menu “Authentication”. This function is used to bring into evidence certain types of touching up in the currently displayed photo, by comparing the technical characteristics of this photo with the capabilities of the camera from which it was taken.

For instance, the size of the file is compared to the different possible output file sizes for this camera, which will show evidence of a possible cropping by a hoaxer in order to dissimulate a part of the original photograph.

Parameters that are available in the Image’s technical data and in CamCAT appear in green if they are consistent or in red if they are not.

Parameters that are available in the Image’s technical data but not in CamCAT are mentioned in black.

All parameters of photographs n° 20161014_091930_19.jpg and 20161014_091930_20.jpg are consistent:
However, for photographs n° 20161014_091929_16.jpg, 20161014_091929_17.jpg and 20161014_091929_18.jpg the size of the image is not consistent:
3- Using the “Remote check” function used to quickly establish the authenticity of one or several photos present in a given folder readable by IPACO, without having to import these photographs into IPACO. The principles are identical to those of the **Suspect tags** function.

As expected, the same tags with the same values as in the “Suspect tags” function are present. The difference lies in the lowest window where all details of the raw metadata can be listed according to their type (JPEG, EXIF, IPTC or XMP):
EXIF tags

XMP tags
The only modification that was done to the non « original authentic » photos by the use of the software « Windows Photo Editor » is that of the pictures size, which is converted from their native format recognized by CamCAT, from 2952x1944 pixels (photographs n° 20161014_091930_19.jpg and 20161014_091930_20.jpg) to :

- 2436x1826 for photo n° 20161014_091929_16.jpg
- 2570x1928 for photo n° 20161014_091929_17.jpg
- 2481x1861 for photo n° 20161014_091929_18.jpg

For all the pictures, the ratio length/width is the same i.e. 1.33. That means that the software « Windows Photo Editor » only slightly resized down the pictures.

Generally, such a picture would not be considered worth in-depth analysis, since it is definitely not an authentic original document.

However, since it does not look like a hoax (today’s hoaxes are far more “exotic”) and since it was shot by a reliable witness, the analysis was conducted.

The use of the software “Windows Photo Editor” was most probably fortuitous.
2. Deblurring

The UFO appeared to be quite blurred on the four photographs where it is visible. This blur is more present along an axis that does a 29° angle to the horizontal on photograph n° 20161014_091930_19.jpg.

Consequently, it should be possible to use the deblurring tool of IPACO in the following way:

1- Open the picture then the tool “Deblurring” in the « Photo » menu.
2- Designate by 2 clicks on the screen a square including the object to be deblurred.
3- Designate by 2 clicks on the screen a segment that describes as accurately as possible the estimate of the linear motion.
4- Display, according to the analyst’s choice, the pictures and/or the spectra of the motion, original or deblurred.
5- Vary more or less finely (« Accuracy of sliders ») one or more of the three following parameters :
   a. Length (pixels)
   b. Angle (degrees)
   c. Noise/Signal (0-1)

On the following screenshot, all the three pictures and the corresponding spectra are displayed:
6- Display the final result, i.e. the deblurred thumbnail in color:

![Deblurred Image Color](image)

7- After validation, the deblurred image is included inside the photography:

![Deblurred Image](image)

The unknown object now resembles a bird of the species common swift («*Apus Apus* »). The resemblance is more visible after having applied a noise reduction filter and an enhancement of the contrast of the deblurred picture:
On the left a photography of a common swift and on the right the deblurred and enhanced picture

In order to further check this hypothesis, we can now obtain distance, size and transverse speed estimates.
3. Distance, size and transverse speed estimates

a. Size estimates

Specialized literature indicates that the common swift has a 40cm wingspan and a body that has a **16cm** length. It flies at almost 90 km/h with a maximum possible speed that reaches **200km/h**.

This bird is also known for its "aerobatic" fly, with sudden direction modifications and dizzying plunge.

It is a migratory bird that usually migrates from the third week of July on. However, some ornithology sites relate that «late» individuals have been observed up to mid-October, especially in south of France, with an ultimate date around the 20th.

Moreover, if it is indeed a common swift, IPACO’s measurements must be compliant with those of this bird: size and speed.

We can measure this angular length on the original UFO’s image on the deblurred image of the object on the photograph using the tool «Mensuration – Geometric Mensuration – Angle»:

![Image showing a measurement of 0.7020 degrees](image)

This angle corresponds to the length of the body of the supposed swift, as transversally observed.
b. Distance estimates

We can now, with the tool “Mensuration – Geometric mensuration – Length vs Distance” compute the distance where the supposed bird was standing at:

It was located then, for a 16cm length, at 13.06m from the camera.

c. Transverse speed estimates

Considering that the UFO moved in a transverse way to the camera during the exposure time, we can measure the value of its move as well as the corresponding transverse speed by materializing at first the trajectory of the UFO.

In order to do that, considering that all the photographs were made in burst mode within the same frame and in presence of many fixed landscape points (rocks...), we can advantageously use IPACO’s tool “Operations – 3 points registration”.

Once the four images joined together, we use the tool « Mensuration – Geometric Mensuration – Angle » to measure the angular travelled distance between object’s positions on the successive photographs:
Next step consists, for each of the three trajectory parts materialized this way, to use the tool « Length vs Distance » in order to measure the travelled distance by reporting each time the computed distance found at the previous chapter, i.e. **13.06m**.

For the first part of the trajectory between photograph n°20161014_091929_17.jpg and n°20161014_091929_18.jpg, the UFO travelled **2.93m**:
The total angular distance travelled by the UFO between photographs n°20161014_091929_17.jpg and n°20161014_091930_20.jpg was of $12.82^\circ + 8.662^\circ + 5.886^\circ$ i.e. approximately $27.37^\circ$, which corresponds for a $13.06\text{m}$ distance to approximately $6.4\text{m}$.

In order to determine precisely its transverse speed, it would be ideally useful to have the date and the hour precisely recorded in the metadata by the camera, to the tenth of second for example. However, the Samsung Galaxy Xcover 3 records these data only to the nearest second.

The difference recorded in the metadata between two photographs can be consequently estimated to be at least of 1 second and at the maximum of 2 seconds. These values, reported to the total distance travelled by the object, are comprised between 3 and 6 seconds. We will take these two values for the computation of the transverse speed.

These speeds should then be comprised between $7.6\text{km/h}$ for a total elapsed time of 3 seconds and $3.8\text{km/h}$ for a total elapsed time of 6 seconds:

Transverse velocity for 3 seconds elapsed time
These speeds seem very low for a flying swift, whose average speed is around 80-90 km/h. This result is however to be weighed, for three main reasons:

- It is possible that this bird flies slower than its average speed. Indeed, when the photographs were made, a fairly steady wind was blowing from the east (the weather report at 9am of the station of Cannes (06) reports gusts at 52 km/h). As the photographs were taken in a south-westerly direction and the bird retained a nearly identical apparent size all along its course, it was probably moving mainly towards the east, facing the wind.

- We considered that its movement was transverse to the camera. If this were not the case (the bird approaching or moving away from the camera), then the actual distance traveled and the actual speed could be far greater.

- The movement of the flying swift is not necessarily linear and often goes along with short erratic trajectories, even if the main trajectory is itself globally oriented toward the same direction.
IV. Conclusion

*This case is classified “A”* as a confusion with a common swift.