

Zaroshchens'ke Revisited *Almaz-Antey's New Launch Areas* A Bellingcat Investigation



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Introduction

The tragedy of the downing of Malaysian Airlines Flight 17 (MH17) on 17 July 2014 is one of the key events in the Russian-Ukrainian¹ war. The cause of the crash of MH17 was investigated by the Dutch Safety Board (DSB). In their final report, presented on 13 October 2015, the DSB identified a 9M38 series missile, launched from a Buk surface-to-air missile launcher positioned in an area near Snizhne, as the cause of the crash.² This finding has been criticized by Russia.³

Almaz-Antey, the successor to the original producer of the Buk M1, had already published its own calculations, including a proposed launch area, on 2 June 2015.⁴ The DSB report indicates that these findings were forwarded to them. On 13 October 2015, just hours before the DSB's presentation, Almaz-Antey presented new findings, including the results of a live explosion test performed on the ground. The new Almaz-Antey presentation also included two new launch areas, one for a 9M38 missile and one for a 9M38M1 missile.⁵

The Almaz-Antey launch areas are based on their estimate of the terminal orientation⁶ of the missile that downed MH17. As part of their investigation, the DSB also considered the terminal orientation assumed by Almaz-Antey. However, following the results of the simulation performed by the Netherlands Organisation for Applied Scientific Research (TNO) for the DSB, the observed damage is not consistent with this terminal orientation.⁷ As a result of the different terminal missile orientations, there are considerable differences between the launch area defined by the DSB and the launch areas defined by Almaz-Antey. Compared to the first Almaz-Antey launch area south of Zaroshchens'ke, there are also differences between the Almaz-Antey's newly proposed launch areas and the old one. Even so, Almaz-Antey still points in the same general area between Shakhtars'k and Amvrosiivka.

The plausibility of the first launch area presented by Almaz-Antey was already discussed in a previous Bellingcat investigation. That investigation analyzed situation maps, satellite imagery, and press reports from the area and arrived at the following main conclusions:⁸

- The Almaz-Antey launch area presented on 2 June 2015 was under Russian control, and there were no Ukrainian troops in the area on 17 July 2014
- There were no Ukrainian Bucs in the proposed launch area on 17 July 2014
- There is not enough information to reject a missile launch from the area

1 Instead of using "pro-Russian separatists" or a similar formulation, the terms "Russia" or "Russian troops" are used in this report. This term includes official (i.e., regular) Russian armed forces, unofficial Russian armed forces (mainly formed by Russians and supported and/or trained by Russia) and the locally recruited pro-Russian armed forces. This naming convention reflects the reality of Russia's deep involvement in the Russian-Ukrainian war and is meant to avoid the impression that the war in eastern Ukraine is solely an internal conflict.

2 cf.: Dutch Safety Board, MH17 Crash: Crash of Malaysia Airlines Flight MH17 – Hrabove, Ukraine, 17 July 2014, The Hague, October 2015

3 cf.: <http://de.sputniknews.com/panorama/20151013/304915797/russland-zu-ermittlungen-nicht-zugelassen.html> (last accessed on: 5 November 2015) and <http://www.favt.ru/novosti-novosti/?id=2311> (last accessed on: 8 February 2016)

4 cf.: <http://tass.ru/boeing-presentation/vvedenie/> (last accessed on: 8 February 2016)

5 cf.: <http://tass.ru/eksperiment-almaz-anteya/naturnyy-eksperiment/2343662> (last accessed on: 8 February 2016)

6 The term "terminal orientation" refers to the orientation of the missile at the moment of detonation.

7 cf.: <http://www.onderzoekeraad.nl/uploads/phase-docs/1006/372a035ab776report-mh17-crash-appendix-tno-2.pdf> (last accessed on: 5 November 2015)

8 Bellingcat, Zaroshchens'ke Launch Site: Claims and Reality, 13 July 2015, [online] <https://www.bellingcat.com/news/uk-and-europe/2015/07/13/zaroshchenske-launch-site-claims-and-reality-a-bellingcat-investigation/> (last accessed on: 11 February 2016)

Given the second finding, a missile launched from the analyzed area could only have been fired by a Russian Buk. However, the complete absence of evidence documenting a launch from the area also made this scenario highly unlikely.

Because there are relevant differences between the old launch area and the two new launch areas, it should be asked whether these conclusions still hold for the new launch areas. This question will be covered in this report. Note, the information already presented in the investigation discussing the first Almaz-Antey launch area and the plausibility of the Russian Ministry of Defense (MoD) satellite imagery will not be presented again in detail in this report. Familiarity with Bellingcat's and others' preceding work is assumed in the following piece.

This report is organized into four sections. The first section presents the new Almaz-Antey launch areas. The second section provides additional information about the area under consideration between Shakhtars'k and Amvrosiivka. Section three draws upon available information, either presented in this report or preceding work, to provide a final assessment. This involves testing the same three different hypotheses for each launch area. The final section of the report concludes with a brief discussion of the results.

Almaz-Antey Launch Areas Presented on 13 October 2015

Almaz-Antey presented two new launch areas in their 13 October 2015 presentation. They arrived at these locations by simulating the flight paths of two missiles – a 9M38M1 (which was also assessed in their first presentation) and the 9M38.⁹ The two new launch areas are depicted in figure 1. The left side shows a part of an Almaz-Antey presentation slide, which includes in the old launch area in black (added by the author) and the two new launch areas in red and blue; the right side shows the launch areas overlaid on Google Earth.

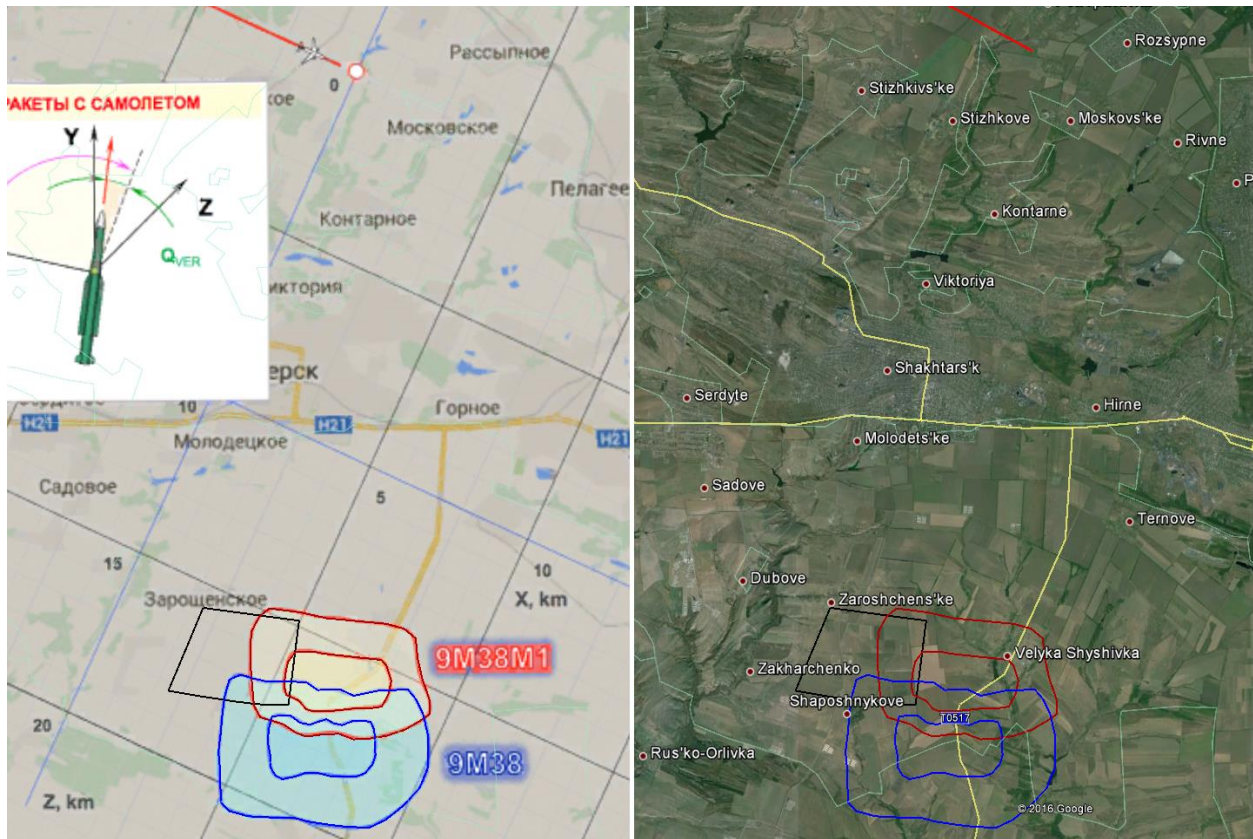


Figure 1: Detail of Almaz-Antey presentation slide showing the new launch areas (left) and a representation of these launch areas in Google Earth (right). The area outlined in black represents the Almaz-Antey's assessed launch area for the 9M38M1 missile from 2 June 2015, while the two new launch sites are outlined in red and blue. Note that the bright red line representing the flight course of MH17 in the right image used the course depicted in the DSB report and the last position according to MH17's flight recorder, also provided by the DSB. Sources: <http://tass.ru/> (Almaz-Antey), DSB and Google Earth.

There is a sizable overlap between the old 9M38M1 missile launch area and the new 9M38M1 launch area. However, the new 9M38M1 launch area is clearly farther east. The distance between the launch areas and the last known position of MH17 is almost identical. The launch area for the 9M38 missile has the same orientation relative to the last position of MH17 as the new launch area for the 9M38M1 missile. However, this launch area is clearly farther south and, therefore, farther away from the last position of MH17. With the new orientation relative to the last position of MH17, the two new areas are more in line with the claimed terminal orientation of the missile by Almaz-Antey. Note that the Russian MoD

⁹ The DSB has concluded that a missile with a 9N314M warhead was used to down MH17. This specific type of warhead would point to the 9M38M1 missile of the 9M38 series. Almaz-Antey rejects this assessment and assumes a 9N314 warhead was used, which would point to a 9M38 missile. cf.: Dutch Safety Board, MH17 Crash: Crash of Malaysia Airlines Flight MH17 – Hrabove, Ukraine, 17 July 2014, The Hague, October 2015 and <http://tass.ru/eksperiment-almaz-anteya/naturnyy-eksperiment/> (last accessed on: 8 February 2016)

imagery that allegedly shows Ukrainian BukS in the area on 17 July 2014 only depicts part of the *old* launch area. Both new launch areas do not include the area depicted in the Russian satellite imagery. The two new launch areas are presented in greater detail in figure 2.



Figure 2: 13 October 2015 Almaz Antey launch area for the 9M38M1 missile (left) and the 9M38 missile (right).
Source: Google Earth.

The launch area for the 9M38M1 missile is east of Zaroshchens'ke and covers almost all of the village of Velyka Shyshivka, which represents around one-fourth of the specified launch area. The launch area for the 9M38 missile is south of Velyka Shyshivka, north of Mala Shyshivka, and east of Shaposhnykove, which is almost completely within this alleged launch area. Both launch areas were presented by Almaz-Antey as being close to Zaroshchens'ke. While true to a certain degree, it would seem much more fitting to name each area after the largest village close to them. This being the case, this report will use "Velyka Shyshivka launch areas" instead of "Zaroshchens'ke launch areas." The latter will be exclusively used for the older Almaz-Antey launch area presented on 2 June 2015, which was discussed in the preceding investigation.

Additional Information on the Area under Consideration

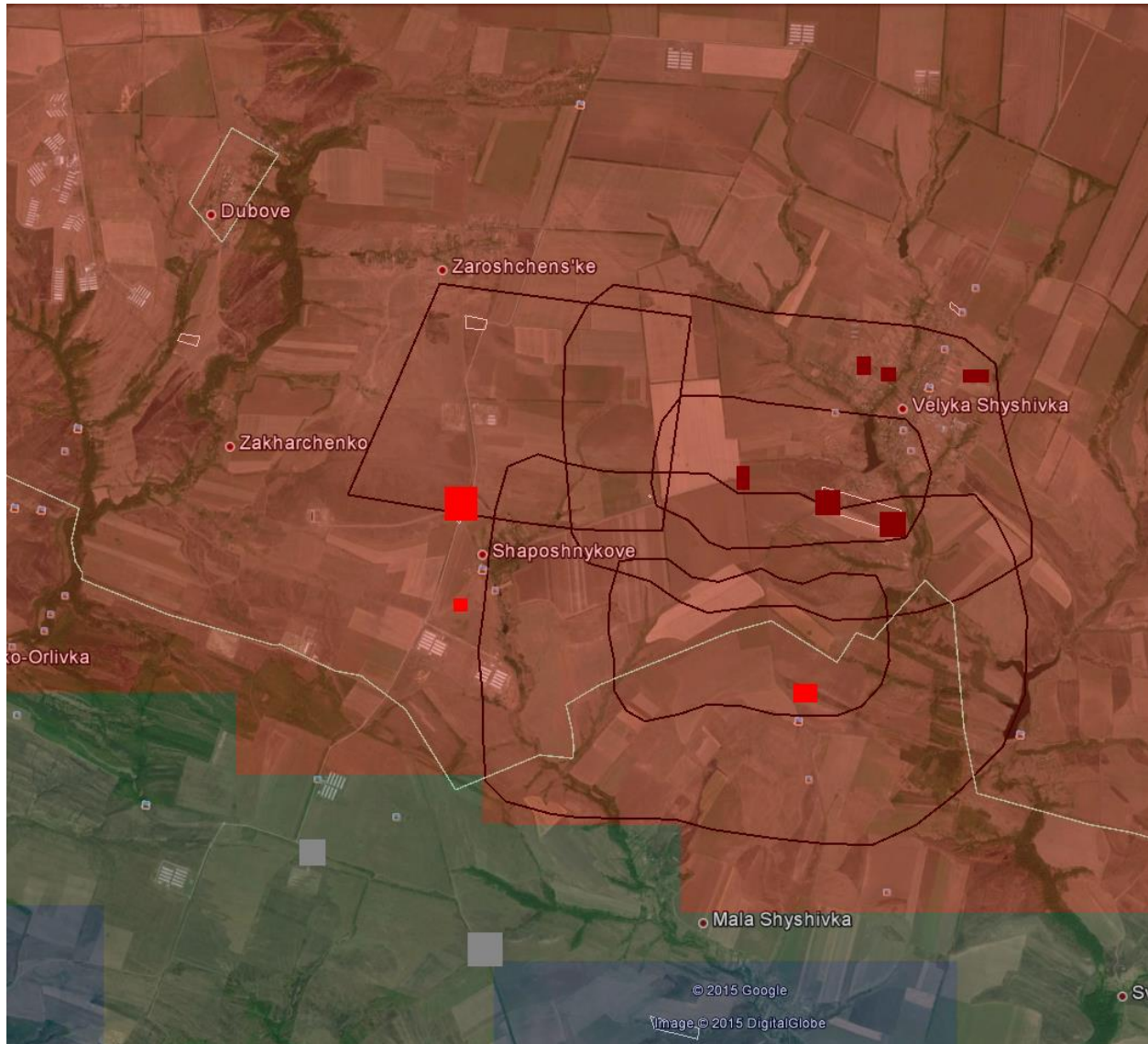


Figure 3: Estimated area under control based on Google Earth satellite imagery (see the preceding report "Zaroshchens'ke Launch Site: Claims and Reality" for details). Estimated ownership of identified positions or likely positions is specified by the color and intensity, where blue stands for Ukrainian control, red for Russian control, and grey for undetermined. Zaroshchens'ke and Velyka Shyshivka launch areas as depicted by Almaz-Antey. Sources: <http://tass.ru/> (Almaz-Antey) and Google Earth.

The preceding investigation on the alleged Zaroshchens'ke launch area primarily based its conclusions on three sources of information: press reports from the area after the downing of MH17, situation maps depicting forces controlling the area, and satellite imagery to assess the situation on the ground.

The press reports covering the situation in Zaroshchens'ke can in general only provide limited information on the entire area now of interest, which includes the new launch areas. Nonetheless, a Buk missile launch from within the two Velyka Shyshivka launch areas should have been noticed even in nearby Zaroshchens'ke. Besides the two reports already mentioned in the preceding report, there are now two new press reports confirming the statements of these earlier articles. A statement made by Dutch journalist Rudy Bouma is especially interesting because it includes not only additional confirmation that no Buk

missile was launched in the area close to Zaroshchens'ke but also a description of the frontline. He states that villagers said that the Ukrainian army was 4-6 km "out" of the village.¹⁰

Comparing the areas under control depicted in the situation maps and the Velyka Shyshivka launch areas shows that both launch areas are inside Russian-controlled territory. The final DSB report also includes a situation map.¹¹ While the description of the area depicted only states "area of armed conflict, mid-July 2014," an interview with Tjibbe Joustra clarified that this area depicts the area under Russian control.¹² Both Velyka Shyshivka launch areas are well within the area depicted as under Russian control in the DSB's map.

Figure 3 shows that all of Almaz-Antey's launch areas are within territory judged to be under Russian control in the preceding report. (The different-colored polygons represent identified or likely military positions.) The northernmost 9M38M1 launch area is well within the Russian controlled territory and encompasses all military positions identified in Velyka Shyshivka. The 9M38 launch area to the south encompass the southernmost positions identified in Velyka Shyshivka and what is likely a military position south of Velyka Shyshivka. The two likely positions near Shaposhnykove are outside this launch area but still close to its western border. The following two subsections will introduce new information not included in the preceding report regarding two villages of special interest, Shaposhnykove and Velyka Shyshivka. Given the relocation of the Almaz-Antey launch areas, the importance of both villages for the assessment has increased.

Shaposhnykove

Two likely military positions were identified near Shaposhnykove. Because of their position, orientation, and relation to other positions, Russian control was assumed in the preceding report. Rudy Bouma's comment about the situation close to Zaroshchens'ke provides additional verification for this assessment. Locals stated the no Ukrainian forces were within 4-6 km of Zaroshchens'ke.¹³ The distance between the southernmost likely position close to Shaposhnykove and Zaroshchens'ke is around 4 km.



Figure 4: Still from the BBC report from the Shaposhnykove village on 24 July 2014 (left); satellite imagery from the area from September 2014 (right); the destroyed building and the house in the background are marked. Sources: BBC, Google Earth.

10 cf.: <http://www.bbc.com/news/world-europe-33549845> and <https://twitter.com/rudybouma/status/653848728126816256> (last accessed on: 8 February 2016)

11 See Figure 65 on page 146 in: Dutch Safety Board, MH17 Crash: Crash of Malaysia Airlines Flight MH17 - Hrabove, Ukraine, 17 July 2014, The Hague, October 2015

12 cf.: https://www.youtube.com/watch?v=JgMVu_X8U28 (last accessed on: 8 February 2016)

13 cf.: <https://twitter.com/rudybouma/status/653848728126816256> (last accessed on: 8 February 2016)

More direct evidence of who controlled the village was provided by a BBC reporter who visited the village on 24 July 2014. According to the BBC, the village was shelled by Ukrainian forces the previous night, a fact attested to by visible damage to one of the houses.¹⁴ A comparison between the video and satellite imagery, presented in figure 4, further substantiates the BBC's reporting. Google Earth has satellite imagery for the area from 16 July 2014 and 13 September 2014. The destruction of the house is only visible in the later imagery.

Given the visible craters, from which an estimated trajectory can be derived, it seems plausible that the attack came from the south.¹⁵ Furthermore, it is possible to find blast marks south of the village, east of Amvrosiivka, which are likely related to this attack. Using preview imagery from Digital Globe, it is possible to establish that the attack occurred after or on 20 July 2014 and on or before 23 July 2014.¹⁶ The craters and a burnt area in a field close to the village are not visible in the earlier imagery, while the latter imagery clearly shows both. Blast marks east of Amvrosiivka can also be seen in this preview imagery.

In addition to documenting the attack, the report also includes circumstantial evidence that the village was under Russian control on 17 July 2014. The BBC journalist is accompanied by a person who is introduced as not coming from the village but who serves as a local coordinator between the Russian troops and population of the village. Furthermore, a later sequence shows two members of the local "militia" blocking the journalist from using a road leading to the south. Figure 5 presents the location of this sequence as being at the beginning of the road leading to the likely military position south of Shaposhnykove.



Figure 5: Comparison between a still from the video and Google Earth satellite imagery from 13 September 2014. Some of the features used to geolocate the video sequence are marked. Sources: BBC, Google Earth.

The video documents that there was a Russian presence in the village on 24 July 2014. Furthermore, there is no indication throughout the entire video that there was a Ukrainian

14 cf.: <http://www.bbc.com/news/world-europe-28457797>; a longer version of this video can be found on YouTube: <https://www.youtube.com/watch?v=kdvT0d8vC40> (last accessed on: 08 February 2016)

15 Note, it was not possible to estimate the trajectory with complete certainty using the 13 September and 14 September 2014 satellite imagery from the area. The assessed trajectory (pointing either north or south) depended on the orientation in Google Earth and the analyst. The presented final assessment is mainly based on three craters close to the village, which more clearly indicate a trajectory leading to a launch site south of the village. Assuming an opposite trajectory, it is also possible to find blast marks near Shakhtars'k in the 13 September satellite imagery that were not visible on 21 July 2014. It was not possible to further narrow down the missile launch that caused these blast marks with Digital Globe preview imagery.

16 Catalog numbers: 105041001108D700 (20 July 2014) and 1020010032E13A00 (23 July 2014)

presence in the village in the days before the attack or that there was a missile launch in the area that could be related to the downing of MH17. Tellingly, none of the locals or militiamen used the opportunity to show a Western journalist the traces of the Ukrainian Buks claimed by the Russian MoD to be just north of Shaposhnykove on 17 July 2014 or even the launch site of the missile in the area.

Velyka Shyshivka

Velyka Shyshivka represents the area with the largest number of military positions in or around the alleged Almaz-Antey launch areas. The previous report estimated control over military positions visible in Google Earth using their position, orientation, and relation to other positions. It was estimated that all positions were under Russian control on 17 July 2014. Because of the proximity of the new Almaz-Antey launch areas to this village, Velyka Shyshivka has become the new Zaroshchens'ke for the Russian claims.

Besides the Google Earth imagery and the short discussion of the positions in the previous report, it is possible to present a more compelling case for the presence of Russian forces in the village. One soldier¹⁷ uploaded an image geotagged¹⁸ just south of the village on 20 July 2014 to his VK account. The photograph and the geolocation verifying the position is presented in figure 6. The image shows a prominent border of a field on the hill in the background. The same structure is visible in satellite imagery of a field south of Velyka Shyshivka. The tree lines in the background also correspond with the tree lines on the hill and close to the road leading to Velyka Shyshivka. The estimated position of the camera is slightly south of the southeastern fortification near Velyka Shyshivka.

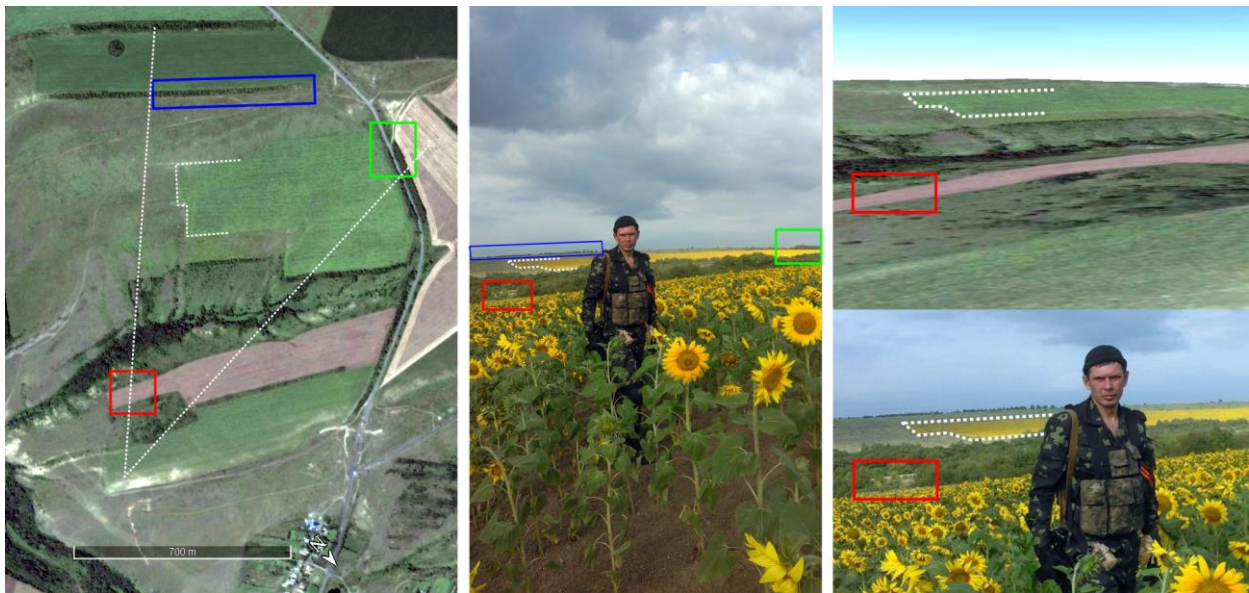


Figure 6: Geolocation of the image uploaded on 20 July 2014 (left) geotagged near Velyka Shyshivka, the image itself (middle), and a comparison between Google Earth and the image using the same perspective (right). Some prominent features used for the geolocation are marked. Sources: VK, Google Earth.

17 The name of the VK account of this soldier is "Anatoly Molchanov"; the account pseudonym is "ss_obersturmbanfuhrer." The soldier behind this account has uploaded images showing him in Crimea in April 2014 wearing a Russian military uniform. In May 2014 he uploaded images geotagged near Novocherkassk, and the first images geotagged in Ukraine later that month. Other images document his participation in the fighting in Sloviansk in June 2014. Images uploaded in February 2015 indicate that he also participated in the fighting near Debal'tseve. cf.: <https://archive.is/X4ler>, <https://archive.is/O9gjB>, <https://archive.is/iEvHn>, <https://archive.is/Un6Dr>, and <https://archive.is/UDC70> (last accessed on: 8 February 2016)

18 <https://archive.is/zxTxD> (last accessed on: 8 February 2016)

The same soldier also uploaded an image without a geotag on 13 July 2014. This image depicts a group of soldiers equipped with weapons, but mainly “armed” with spades. The text below the images suggests that fighting is expected by the soldier. Given the nearly featureless terrain, it was not possible to geolocate the image.¹⁹

Given the manner in which he had uploaded images in the past, it is likely that these photographs were uploaded relatively soon after they were taken. This would indicate that the image geolocated near Velyka Shyshivka was made between 13 July 2014 and 20 July 2014, though a date closer to 20 July 2014 seems more likely given the weather. In either case, it conclusively documents that Russian soldiers were in Velyka Shyshivka and provides a southern view from one of their fortifications.

Other information

Besides the additional information for two villages presented above, there are also two events that are often mentioned in the context of this area. The first event is documented in “pro-Russian” reports from the area and describes an attack on a Ukrainian convoy on 16 July 2014.

“У Амвросиевки (ДНР) в районе с. Большая Шишовка в это же время Градами накрыли колонну укров”²⁰

This report was already mentioned in the preceding Bellingcat report. The text can be translated as follows:

At this time around Amvrosievka (DNR) near the village of Bolshaya Shishovka, we/they hit a column of Ukies with Grads.

Or, alternatively:

A Ukrainian convoy was hit by Grads near Velika Shshovka in the vicinity of Amvrosievka, which was DNR-controlled.

The report mentions an attack near or around Amvrosiivka near Velyka Shyshivka. This is a curious description for a number of reasons. Velyka Shyshivka is part of the Shakhtars'k raion and much closer to Shakhtars'k than to Amvrosiivka. Also, Shakhtars'k is the larger city and therefore a more appropriate geographical reference. Therefore, the usage of Amvrosiivka was likely not intended as a general reference, but as a reference to the attacked area. This would indicate that the attack occurred between Velyka Shyshivka and Amvrosiivka.

The crater fields south of Mala Shyshivka described in the preceding Bellingcat report might mark the place of this reported attack. It is also possible that the author mistook two villages named Shyshivka and used *Velyka* Shyshivka instead of *Mala* Shyshivka. However, if the attack occurred there on 16 July 2014, and the craters visible in Google Earth are traces of this attack, it indicates that Ukrainian forces were already unable to move freely north of Blahodatne. Moreover, it indicates that the Russian forces could control and interdict the movement of Ukrainian forces in the area. It also implies that at least some spotters were south of Velyka Shyshivka and could surveil the area south of Mala Shyshivka. However, the validity of such an assessment depends strongly on the correct attribution of

¹⁹ <https://archive.is/MufCB> (last accessed on: 8 February 2016)

²⁰ <http://www.novayagazeta.ru/inquests/68846.html> (last accessed on: 8 February 2016)

the crater field and the alleged attack in the area. Given the contradicting formulation of the report, it must at least be considered as quite weak evidence.

Another event often related to the area is the movement of a Ukrainian convoy from Artemivsk to Saur Mogila. The move is documented by video and was analyzed by the blogger Ukraine@war.²¹ The video shows the movement of Ukrainian troops, most likely at the end of July. The checkpoint south of Hirne, east of Shakhtars'k is visible in the video. Satellite imagery in Google Earth shows this checkpoint intact on 21 July 2014, while the video shows an already damaged checkpoint. Other parts of the area close to the alleged Almaz-Antey launch areas are not visible in the video; the next sequence shows the convoy 8 km east of Velyka Shyshivka.

While the video is genuine, it is also unrelated to the situation on 17 July 2014 and especially the situation south of Shakhtars'k on that specific day. It only shows a small part of the relevant area, which was obviously affected by hostilities at the end of July. Moreover, Ukraine started an offensive operation in the area at the end of July. The vehicles visible southeast of Velyka Shyshivka in satellite imagery from 1 August 2014 most likely belong to the Ukrainian army. Because of the massive change in the situation on the ground after the Ukrainian offensive started (changes that are also depicted in situation maps), it is misleading to use information from after the start of this offensive for an assessment of the situation in mid-July.

21 cf.: <http://ukraineatwar.blogspot.nl/2014/10/ukrainian-company-driving-from.html> (last accessed on: 8 February 2016)

Assessing Almaz-Antey's Velyka Shyshivka launch areas

To assess the validity of the new Almaz-Antey launch areas, the information presented in the preceding section and the preceding report will be utilized. If Almaz-Antey's estimations of the likely launch areas are correct, and a Buk was responsible for the downing of MH17,²² there must have been either a Ukrainian or a Russian Buk in the area.

This report closely follows the principles applied in the preceding report discussing the Zaroshchens'ke launch area. That report tested three hypotheses:

H1: The alleged launch site south of Zaroshchens'ke was under Ukrainian control on 17 July 2014.

H2: There were Ukrainian Buk M1 TELARs present in the alleged launch site south of Zaroshchens'ke on 17 July 2014.

H3: There was a missile launch inside the estimated launch site on 17 July 2014.

Analogous hypotheses will be tested for the two Velyka Shyshivka launch areas. However, because it cannot be expected that reports from Zaroshchens'ke include direct evidence for the nearby Velyka Shyshivka launch areas, and there are so far no specific reports from the area comprising the new launch areas, the expected amount of information and coverage of these new launch areas will be much lower. This being the case, the available news reports will be given a lower weight in this assessment. Also, the hypothesis testing will be presented in a slightly different manner. All hypotheses will be assessed at once, and each launch area will be considered separately.

9M38M1 launch area

Almaz-Antey has presented two launch areas for the 9M38M1 missile. The old Zaroshchens'ke launch area and the newer Velyka Shyshivka launch area are approximately the same distance from the last known coordinates of MH17. The Velyka Shyshivka launch area for this missile type is slightly larger, farther east, and fits better with the terminal orientation of the missile claimed by Almaz-Antey.

As stated in section 2, both the new and old 9M38M1 launch areas are completely inside the area determined to be under Russian control in all three situation maps used in the preceding report. The final DSB report also puts these areas well inside Russian-controlled territory. Furthermore, the Velyka Shyshivka launch area encompasses almost the entire village of Velyka Shyshivka, which represents around one-fourth of this specified launch area. The area and all military positions within it were assessed to be under Russian control on 16 July 2014. News reports from Zaroshchens'ke do not mention the village Velyka Shyshivka. However, a lack of mentioned hostilities in these reports, combined with the Shaposhnykove BBC report from 24 July 2014, which also does not mention earlier hostilities in the area, suggests that there were no hostilities in nearby Velyka Shyshivka on the days around 17 July 2014.

Therefore, it can be assessed that neither Ukrainian forces nor a Ukrainian Buk were in the 9M38M1 missile launch area depicted by Almaz-Antey. Hypotheses 1 and 2 can therefore be

²² Almaz-Antey presented their estimations of the launch areas assuming that a Buk was responsible for the downing of MH17. However, Russia does not recognize a Buk as the only possible weapons system responsible for the downing. Therefore, both points must be assumed as valid for a test of the Almaz-Antey's Velyka Shyshivka launch areas.

rejected for this launch area. The available preview satellite imagery from the area also does not show signs that would indicate a missile launch from the area.²³ Together with the complete lack of reports of a missile launch in the Shaposhnykove BBC report and later reports from Zaroshchens'ke, it can be assessed that no missile was launched from the area on 17 July 2014. The launch area is too close to the inhabited areas that were covered in the interviews and reports. Therefore, hypothesis 3 can also be rejected for this launch area.

9M38 launch area

The Almaz-Antey launch area for a 9M38 missile is south of the launch area depicted for the 9M38M1 missile. However, a considerable part of the northern area of the 9M38 launch area overlaps with the southern part of the 9M38M1 launch area. This launch area can be considered Almaz-Antey's favored launch area because the warhead type identified by Almaz-Antey points to this version of the missile.

The northern part of the launch area can be already considered as assessed through the assessment of the 9M38M1 launch area. For this part of the launch area all three hypotheses can again be rejected by applying the same reasoning. However, the southern two-thirds of the launch area are more difficult to assess.

The entire launch area is again inside Russian-controlled territory as depicted by all three situation maps and the final DSB report. In assessing 16 July 2014 Google Earth imagery, one likely position was identified in the estimated launch area. While the position seems to be plausible and was assessed to be a Russian position, the resolution of the available imagery allowed no definitive conclusion.

However, the assessment of hypothesis 1 strongly depends on the assessment of this position. If it was a Russian position, it is highly unlikely that Ukrainian troops could have entered the alleged launch area uncontested. Because there are no traces of such hostilities visible in the Digital Globe preview imagery from 23 July 2014 (a representation of the launch area in the Digital Globe preview imagery from 23 July 2014 is presented in figure 7),²⁴ such a Ukrainian troop movement can be considered to be highly unlikely. If the assessment is wrong, and it was not a Russian position, Ukrainian troops could have theoretically entered the southern part of the 9M38 launch area.

The previously discussed crater field south of Mala Shyshivka may provide additional evidence. If these craters are traces of a Russian attack on Ukrainian troops on 16 July 2014, it would indicate that while Ukrainian troops might have come close to the alleged launch area, they would have been attacked before they entered the area. However, as stated in section 2, the non-conclusive situation concerning the crater fields south of Mala Shyshivka limits the value of this evidence. Additional information might also be drawn from the fields in the area. As discussed in the preceding report, it was possible to discern that fields had been plowed between 16 July and 20/21 July in the area of Zaroshchens'ke. It is also possible to find additional fields around Velyka Shyshivka that were plowed between the 16 July and 20 July 2014 and between 16 July and 23 July 2014. However, in case of the 20 July

23 The 20 July 2014 Digital Globe preview covers the entire Zaroshchens'ke launch area. With this imagery and the additional evidence from journalists from the area, the hypothesis that a missile was launched from this launch area can now be rejected.

24 It is possible to identify the craters and a partially burnt field near Shaposhnykove. As stated in section 2, neither are visible in the 20 July 2014 preview imagery from the area. The visible dark spots on the top-left and bottom-right of the image are shadows of clouds.

2014 imagery, the southern part is mostly covered by clouds, and in case of the 23 July 2014 imagery, the different satellite makes comparison and identification difficult.

In summary, there is not enough evidence available to reject hypothesis 1 for the 9M38 launch area. It is nonetheless highly unlikely that Ukrainian troops were inside the launch area on 17 July 2014.



Figure 7: Almaz-Antey launch area for a 9M38 missile transposed onto a Digital Globe preview from 23 July 2014. Source: Digital Globe

The possible presence of Ukrainian troops in the area does not in and of itself justify the claim that a Ukrainian Buk was also in the area. As discussed in the preceding report, a Buk would not be in a unit leading the movement of troops inside potentially hostile territory. It would follow the units by some distance to be able to cover them. Also, a Buk would certainly not escort a minor Ukrainian force.

While it is not possible to reject the hypothesis that Ukrainian troops were in the launch area, it is possible to reject that a larger Ukrainian force entered the area and advanced far enough for an escorting Buk to have entered the area in question. Circumstantial evidence is provided by the lack of reports of such an event in interviews with locals. A larger Ukrainian force would have also been expected to catch the attention of the inhabitants of the nearby villages and that it would have been mentioned in interviews. Together with the other considerations presented in the preceding report, the evidence is considered sufficient to reject hypothesis 2.

The assessment of a potential missile launch depends on the assumed maximum distance that an observer can be from the launch site and still clearly hear and see the launch.²⁵ The farthest distance between a point inside the launch area and Zaroshchens'ke is slightly over 8 km; the farthest distance between a point in the launch area and Shaposhnykove is around 6 km. There are reports from both villages that either clearly state that no missile was launched or indicate that no missile was launched on 17 July 2014. There are also no known reports that state that a missile was launched in the area south of Shakhtars'k on the day MH17 was downed, which could contradict these claims. The Digital Globe preview imagery from 23 July 2014 also does not indicate a missile launch in the alleged area, as there are no such traces visible. However, the evidence is not strong enough to reject hypothesis 3, namely, that a Russian Buk launched a missile from this launch area. However, the probability that the missile that downed MH17 was launched from this area is quite low.

²⁵ If the evidence supporting the launch site south of Snizhne is used as reference, more than 10 km seems to be a plausible value.

Conclusion

On 13 October 2015, Almaz-Antey presented two new launch areas from which it claimed the missile that downed MH17 must have originated if it was indeed downed by a Buk. Both areas were estimated using their own terminal orientation and the trajectory of two different missile types. Contradicting their earlier assessment that a 9N314M warhead was used, the new favored assessment of Almaz-Antey assumed a 9M38 missile with a 9N314 warhead. Even so, a new launch area for the 9M38M1 missile was provided. The terminal orientation can be considered to be similar or even identical to their first assessment, which pointed to the Zaroshchens'ke launch area.

The final Dutch Safety Board report rejects the technical assessment of Almaz-Antey that led to these launch areas. The terminal orientation of the missile that downed MH17 was considered to be the least likely scenario in their simulation study.²⁶ Furthermore, the DSB is convinced that a missile with a 9N314M warhead downed MH17. The aim of this report is not to assess these contradicting technical claims, but rather to assess the likelihood of the Almaz-Antey launch areas with the available evidence.

The same evaluation principles present in this report were already applied to the Zaroshchens'ke launch area in a previous Bellingcat study, which concluded that neither Ukrainian troops nor a Ukrainian Buk were in the alleged area on 17 July 2014. However, it was not possible to rule out a missile launch from the area. New evidence now makes it possible to also exclude a missile launch from the Zaroshchens'ke launch area. The assessment of the two new Velyka Shyshivka areas reaches a similar but not identical conclusion.

It is possible to reject the hypothesis that Ukrainian troops were present on 17 July in the launch area for the 9M38M1 missile. It is also possible to reject the hypothesis that a Ukrainian Buk was in the area on that day. The rejections of both hypothesis substantiate that a potential missile launch from this area could not have been performed by a Ukrainian Buk. Even a missile launch from this area can be rejected.

The assessment for the alleged launch area for the 9M38 missile does not allow a rejection of the hypothesis that Ukrainian troops were in the area on 17 July 2014. However, the hypothesis that a Ukrainian Buk was in the launch area could be rejected. A missile launch from the area is considered highly unlikely, but there was not enough evidence to reject the hypothesis that a missile was launched from this launch area.

The assessment of both areas allows the conclusion that no Ukrainian Buk was in the alleged launch areas on 17 July 2014. However, it cannot be rejected that Ukrainian troops were in one of the areas or that a missile was launched from one of the areas given the considered evidence and the applied principles.²⁷

It is obvious that an analysis based on open-source information has limits and strongly depends on the available information. So far, it is not possible to provide direct evidence for all assessments. For example, it is not possible to present direct evidence that Russian troops were in Velyka Shyshivka on 17 July 2014. This conclusion is drawn because of the available circumstantial evidence, e.g. their documented presence on a later day and the lack

²⁶ cf.: <https://www.bellingcat.com/news/uk-and-europe/2015/10/17/dsb-launch-site/> (last accessed on: 9 February 2016)

²⁷ Incorporating additional evidence, like the findings of the DSB, or granting a greater weight to the complete absence of evidence documenting a missile launch in the alleged area, might already lead to a more definitive conclusion.

of traces of hostilities in the area. The reasoning using three different sources of information was applied because of this lack of information. Each individual piece of information alone must be considered as too weak for a defensible conclusion.

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