

APPENDIX I



Guided Chaos:
How Russian Bombs Destroy Civilians
And Infrastructure in Ukraine

**Detailed description of
airfields used by the Russian
Air Force in 2024**

Contents

«Baltimore» airfield	2
«Lipetsk» airfield	6
«Borisoglebsk» airfield.....	10
«Buturlinovka» airfield.....	13
«Morozovsk» airfield	14
«Belbek» airfield (2023)	16
«Marinovka» airfield	18
«Yeysk» airfield.....	20
«Primorsk-Akhtarsk» airfield	25
«Maikop» airfield (until March 2024).....	26
«Kushchevskaya» airfield (since March 2024).....	29
«Akhtubinsk» airfield	32

«Baltimore» airfield

The «Baltimore» airfield in Voronezh serves as a base of the 47th Bomber Regiment, which operates Su-34s¹. Investigators have geolocated this airfield in a video of Su-34s flying combat missions in the area of responsibility of the Russian military groups «Sever» and «Zapad»² (the border of Bryansk, Kursk and Belgorod regions³ and the Kupiansk direction⁴), but this does not exclude the possibility of them being involved in the tasks of other groups.



The satellite image of the central part of the «Baltimore» airfield shows at least three Su-34s (marked with lines).
Source: Planet, 1 May 2024.



A satellite image of the southeastern part of «Baltimore» airfield shows at least seven Su-34s, nine Su-35S and two Su-30SMs (marked with lines).

Source: Planet, 1 May 2024.

As of early May 2024, at least ten Su-34s, nine Su-35Ss, and temporarily two Su-30s were stationed at the airfield.

Interestingly, after the Ukrainian Armed Forces received permission to use US weapons on Russian territory in the frontline zone in June 2024⁵, the Russian military removed most of the Su-35S and Su-34 aircrafts from the Baltimore airfield. This is evidenced by satellite images from 19 June 2024, which show only five combat-ready Su-34s.



The satellite image of the western part of «Baltimore» airfield shows at least two Su-34s and two Su-24s (marked with lines).
Source: Planet, 19 June 2024.



A satellite image of the central part of «Baltimore» airfield shows at least three Su-34s (marked with lines).
Source: Planet, 19 June 2024.

That is, out of ten Su-34s, at least five aircraft have left the airbase. The Russian Aerospace Forces also redeployed all the Su-35S that were at «Baltimore». Since this airfield was the only one that could have been hit by ATACMS ballistic missiles, its «cleansing» was a natural step for the Russian Air Force leadership.

It is not known for certain which airfield most of the Su-34s were redeployed to. However, after June 2024, the number of Su-34s increased at two airbases in the Lipetsk and Voronezh regions. These are the «Lipetsk» and «Borisoglebsk» airfields. We will explore this fact further at these airfields.

«Lipetsk» airfield

The «Lipetsk» airfield or Lipetsk Aviation Centre is the base of the 4th Centre for Combat Use and Retraining of Aircrew⁶. It includes the 968th Experimental Instructional Mixed Aviation Regiment, which is armed with Su-34 fighter-bombers, among other things⁷.

Truth Hounds investigators have not found any video footage from this airfield filmed after the start of the full-scale invasion, so it is difficult to determine exactly which groups are taking off from this airfield to carry out their missions. As it is close to the northern border of Ukraine, it is likely to be used for combat missions within the «Zapad» and «Sever» groups. However, it is possible that aircraft from this airfield could also operate under the command of other groups, depending on the specific tasks.



The satellite image of the northern part of «Lipetsk-2» airfield shows at least nine Su-34s, four Su-30SMs and one Su-35S (marked with lines).

Source: Planet, 22 June 2024.

The first satellite image of the airfield shows at least nine Su-34s at one of the sites where Su-34s are waiting to take off for combat missions. One of these aircraft is returning from the runway.



Satellite image of the southern part of the «Lipetsk-2» airfield shows at least three Su-34s, one Su-35S and five Su-24s (marked with lines).

Source: Planet, 22 June 2024.

Additionally, the second satellite image of a different section of the airfield on the same day indicates the presence of at least three additional Su-34s. This brings the total number of Su-34s to twelve. It is notable that such a considerable number of aircraft have never been observed on any previous images of this airfield.

Truth Hounds investigators compared satellite imagery of «Lipetsk» with images of the same airfield from May 2024 to check whether the aircraft could have been redeployed from «Baltimore» to this particular airfield.



The satellite image of the northern part of the «Lipetsk-2» airfield shows at least three Su-34s, five Su-30SMs and one Su-35S.

Source: Planet, 1 May 2024.



The satellite image of the southern part of the «Lipetsk-2» airfield shows at least one Su-34 and five Su-24 (marked with lines).

Source: Planet, 1 May 2024.

In the images from 1 May 2024, only four Su-34s are visible at the «Lipetsk» airfield. It is likely that some of the aircraft were in the air on a combat mission, as the total number of Su-34s at this airfield ranged from 7-8⁸. Thus, we can state that the number of Su-34s has increased by at least four units compared to May.

Obviously, in early June 2024, Su-34s were redeployed to «Lipetsk-2» airfield from their previous location, which may have been the «Baltimore» airfield mentioned in the previous section. Unfortunately, there is insufficient information in public sources to confirm that the transfer took place from «Baltimore» airfield specifically.

«Borisoglebsk» airfield

Nominally, the «Borisoglebsk» airfield is used to train pilots of the Faculty of Attack and Bomber Aviation of the Krasnodar Higher Military Aviation School,⁹ but since the beginning of the full-scale invasion, Su-34s have been deployed at the airfield.

In 2022-2023, the airfield was home to aircraft from the 277th Bomber Regiment, which have been repeatedly identified by various OSINT researchers.¹⁰



The freeze frame from the video of the Su-34 aircraft shows battle stars near the cockpit.

Source: @GuyPlopsy, 18 July 2022.¹¹

One red star under the cockpit of a Su-34 indicates 10 successful combat missions,¹² meaning that this aircraft had flown at least 100 combat missions at the time of the video.

The aircrafts of this regiment were stationed at the «Borisoglebsk» airfield from the summer of 2022,¹³ but by the summer of 2023, they had changed their location. After analysing satellite imagery, Truth Hounds investigators concluded that the airfield was not actively used by Su-34 aircraft until June 2024.¹⁴

As mentioned earlier, at least five Su-34s and nine Su-35Ss from «Baltimore» airfield were redeployed to another location. It seems reasonable to conclude that the locations was most likely «Borisoglebsk». This is evidenced by the following facts.

The images of this airfield from 2 July 2024 show four Su-34s and six Su-35Ss, which were not previously present at «Borisoglebsk» airfield.¹⁵



A satellite image of the «Borisoglebsk» airfield shows at least four Su-34s and six Su-35Ss (marked with lines).
Source: Planet, 2 July 2024.

The photo clearly shows that one of the Su-34s is covered by black camouflage. The black «distinctive» camouflage of an aircraft clearly identifies the unit to which it belongs. As we have already noted, Su-34s had two camouflage colours (black and blue) only until 2013,¹⁶ so this aircraft may belong to a unit that received

Su-34s before then. There are two such units in the Russian VKS: the 47th Bombardment Regiment (home airfield «Baltimore», Voronezh region) and the 559th Bombardment Regiment (home airfield «Morozovsk», Rostov region). Given the fact that at least five Su-34s have recently been redeployed from «Baltimore», it is likely that these aircrafts flew to the «Borisoglebsk» airfield. This is evidenced by the black camouflage of one of the aircraft and the presence of six Su-35Ss, which were probably relocated with the Su-34.

Thus, since the beginning of July 2024, another airfield has emerged from which Su-34s have been launching strikes, including those targeting the Kharkiv region.

«Buturlinovka» airfield

«Buturlinovka» airfield in the Voronezh region is used to base Su-34 aircraft during Russia's full-scale invasion of Ukraine.

In the first six months of 2024, at least six Su-34s¹⁷ from the 2nd Mixed Aviation Regiment were stationed at the airfield. ¹⁸ Since June 2024, following news of the authorisation of US weapons strikes on Russian territory in the frontline zone, these aircraft have been redeployed to another, currently unknown airfield.



A satellite image of the «Buturlinovka» airfield shows at least three Su-34s (marked with a line).

Source: Planet, 28 May 2024.

«Morozovsk» airfield

The 559th Bomber Regiment's permanent home base is «Morozovsk» airfield in Rostov Oblast.¹⁹ As of 23 May 2024, there were at least 22 Su-34s at the airfield. They perform missions within the «Tsentr»,²⁰ «Yug»,²¹ «Vostok»,²² and «Dnepr»²³ groups.

The Truth Hounds investigators came to this conclusion by analysing video footage of Su-34 aircraft taking off from the «Morozovsk» airfield to perform combat missions in each of these groups. As for the missions in the area of responsibility of the «Dnepr» group, in December 2023, three Su-34s from the «Morozovsk» airfield were shot down within the Kherson region.²⁴ At that time, they were on a combat mission to bomb the village of Krynyky, which is located in the area of responsibility of the «Dnepr» group, but came under attack by Ukrainian air defence.²⁵



The satellite image of the «Morozovsk» airfield shows at least 22 Su-34 and five Su-35S aircraft (marked with lines).

Source: Planet, 23 May 2024.

During Russia's invasion of Ukraine, aircrafts from the 559th Regiment were repeatedly redeployed to other airfields, including the «Belbek» airfield in 2022-2023.²⁶

After a strike by the Ukrainian Defence Forces on «Morozovsk» airfield on 3 August 2024, which destroyed an ammunition depot and one Su-34,²⁷ most of the aircraft were redeployed to «Marinovka» airfield.

As of the end of August 2024, up to five Su-34s were based at the «Morozovsk» airfield.²⁸

«Belbek» airfield (2023)

The «Belbek» airfield, located near Sevastopol, was widely used during 2022-2023 by both Su-34 and Su-35 aircraft. Since the Ukrainian Armed Forces expanded their ability to hit targets at long distances, the Russian VKS withdrew Su-34 and Su-35 aircraft from this airfield, so we will only be interested in the year 2023 in this investigation. According to Ukrainian military correspondents, at least six Su-34s and six Su-35s were based at the airfield at the time.²⁹

In satellite images from 2 May 2023, five Su-34s can be seen.



A satellite image of the western part of the «Belbek» airfield shows at least five Su-34s and six Su-27/35s (marked with lines).

Source: Planet, 2 May 2023.

Truth Hounds investigators were able to identify at least six Su-34s at this airfield, all of which belong to the 559th Bombardment Regiment.

However, in late 2023 and early 2024, the Su-34s left the «Belbek» airfield. To confirm this, Truth Hounds obtained a satellite image of «Belbek» from 16 May 2024 and verified that the Su-34s were no longer based at the airfield.



No Su-34s are visible on the satellite image of «Belbek» airfield.
Source: Planet, 16 May 2024.

It is likely that all Su-34s were sent to their home base in «Morozovsk» in late 2023. This makes it possible to identify an additional six aircraft that have likely been deployed to the «Morozovsk» airbase since early 2024.

«Marinovka» airfield

The «Marinovka» airfield, located in the Volgograd region, is the base for the 11th Mixed Aviation Regiment, which is equipped with Su-24MR aircraft. During the full-scale invasion, the Russian VKS began using the airfield to deploy Su-34s. Truth Hounds investigators have pinpointed at least several aviation units to which the identified Su-34s could have belonged, including the 559th Bombardment Aviation Regiment, the 2nd Mixed Regiment and the 277th Bombardment Aviation Regiment.

Satellite imagery from 25 May 2024 shows at least eight Su-34s at the airfield. This coincides with reports by Ukrainian war correspondents who have written about eight Su-34s in service.³⁰



A satellite image of the «Marinovka» airfield shows at least eight Su-34s and five Su-24s (marked with lines).

Source: Planet, 25 May 2024.

In general, the «Marinovka» airfield is used by many Russian units, as almost all Su-34 regiments have been stationed at the airfield at one time or another.

On 22 August 2024, the Ukrainian Defence Forces conducted a strike on the airfield, destroying at least one Su-34 and damaging two more Su-34s.³¹ Before the attack, there were about 15 Su-34s at the airfield (some of them redeployed from Morozovsk airfield).³² After the attack, at least five Su-34s remained at the airfield. At the time of the completion of this investigation, it was not known where the aircraft from «Marinovka» had been redeployed.

«Yeysk» airfield

The «Yeysk» airfield is located near the city of the same name in the Krasnodar Territory. The 859th Naval Aviation Combat and Retraining Centre is based at this airfield,³³ but since the beginning of the full-scale invasion of Ukraine, various types of aircrafts, including Su-34s, have been based there. Aircrafts from this airfield mostly performed their tasks in the southern operational zone «Yug» and were involved in combat missions within the groups operating in the relevant area in 2023.³⁴

During 2023, up to five Su-34s were stationed at the airfield.³⁵ Russian propaganda media repeatedly filmed footage at the airfield.³⁶

The Truth Hounds investigators managed to geolocate the filming location at the «Yeysk» airfield and identify the unit stationed there. They were helped by traces of a characteristic shape on the territory near the runway of the airfield, which coincide with those depicted on the satellite image of this area of the «Yeysk» airfield.



Freeze frame from a video by a Russian media outlet at the «Yeysk» airfield in Krasnodar Territory, showing a distinctive landscape feature that allows for the identification of the airfield.

Source: @zvezdanews, 12 July 2023.³⁷



Google Earth image showing the same landscape feature as in the video.
Source: Maxar, 10 May 2022.

The video enabled the Truth Hounds investigators to ascertain that the aircraft in question belonged to the 277th Bombardment Aviation Regiment.³⁸ As a conclusion, Su-34s from this particular unit were deployed at the «Yeysk» airbase in the summer of 2023.

The presence of Su-34s at the airport is also evidenced by satellite photographs. For example, satellite images of the «Yeysk» airfield from 23 August 2023 show that at least 4 Su-34 aircrafts were deployed at the airfield in 2023.



A satellite image of the eastern part of the «Yeysk» airfield shows at least four Su-34s and two Su-35S (marked with lines).

Source: Planet, 23 August 2023.

Photographs of the airfield published in September 2023 show five Su-34s parked at the airfield.³⁹



An image of the «Yeysk» airfield taken in autumn 2023 shows at least five Su-34s parked in their designated spots.

Source: @EasternEagleAvia, 27 June 2024.⁴⁰

To monitor the presence or absence of Su-34s at specific airfields, it is sometimes sufficient to use low-quality satellite imagery. Truth Hounds investigators used them to determine the final date of deployment of these aircraft at the «Yeysk» airfield. According to Sentinel-2 satellite imagery, the Su-34s were based at this airfield until mid-October 2023. The images from 25 October 2023 onwards do not show any Su-34s at the airfield.



A satellite image of the «Yeysk» airfield shows at least five Su-34s (marked with lines).
Source: Sentinel-2, 20 September 2023.



The satellite image of the «Yeysk» airfield shows empty parking lots that used to house Su-34s.
Source: Sentinel-2, 25 October 2023.

The aircrafts were probably relocated to the «Morozovsk» airfield, where they were later spotted.

«Primorsk-Akhtarsk» airfield

The «Primorsk-Akhtarsk» airfield, located on the coast of the Azov Sea in the Krasnodar Territory, sometimes serves as a jumping-off point for Su-34 aircraft. During 2023-2024, between one and two Su-34s took off from this airfield to carry out combat missions,⁴¹ but Su-34s are not permanently deployed at this airfield. Instead, there are painted full-size images of these aircraft, as in the photo below.



The satellite image of the western part of the «Primorsk-Akhtarsk» airfield does not show any Su-34s, but instead shows a silhouette of an aircraft (graphically superimposed on the enlarged image).

Source: Planet, 25 May 2024.

«Maikop» airfield (until March 2024)

The «Maikop» airfield or Khan Air Base is the 272nd training airbase in Adygea, one of the republics of the Russian Federation.⁴² However, during the full-scale invasion, the base was used by the Russian VKS as a combat base. From autumn 2023 to 3-5 March 2024, Su-34 and Su-35S aircraft were deployed at the airfield.⁴³

Ukrainian military correspondents reported that four Su-34 aircraft from the 968th Experimental Instructor Mixed Air Regiment («Lipetsk» airfield, Lipetsk region) were relocated to the «Maikop» airfield in February 2024.⁴⁴

Some Russian military officials have explicitly asserted that the 277th Bomber Regiment is currently stationed at the airfield in question.⁴⁵

Additionally, the aircraft of the 968th Research and Instructional Mixed Aviation Regiment were redeployed to the «Maikop» airfield between February and March 2023, as reported by Ukrainian military correspondents.⁴⁶ Prior to that, the aircraft had already been spotted at the «Morozovsk» airfield.⁴⁷ According to another version, these aircraft were transferred to the 277th Bombardment Regiment amid its losses.

It is also interesting to note that Russian correspondents reported that aircrafts from this airfield were flying combat missions under the direction of the «Zapad» group (Kupiansk direction),⁴⁸ while Ukrainian correspondents noted that the aircrafts were flying missions in the Avdiivka and Mariupol directions (the «Tsentr», «Yug», «Vostok» groups).⁴⁹ It is likely that aircrafts from this airfield could be involved in missions for all of these groups.

Satellite imagery from 27 February 2024 shows at least eight Su-34 and seven Su-35S at an airfield near Maikop.



A satellite image of the central part of the «Maikop» airfield shows at least eight Su-34s, seven Su-35Ss and one Su-30SM (marked with lines).
Source: Planet, 27 February 2024.



Satellite image of the eastern part of the «Maikop» airfield shows at least four Su-35Ss (marked with lines).
Source: Planet, 27 February 2024.

The images from 18 March 2024 do not show any of these aircraft as they were relocated to «Kushchevska» airfield.⁵⁰



The satellite image of the Maikop airfield does not show any Su-34 or Su-35S.
Source: Planet, 18 March 2024.

«Kushchevskaja» airfield (since March 2024)

On a permanent basis, the «Kushchevskaja» airfield is the base for the 195th training base in Krasnodar Territory.⁵¹ However, as early as 2022, the Russian VKS began using this airfield to deploy aircraft involved in the invasion, in particular, to deploy MiG-31s.⁵²

As noted above, since March 2024, Su-34 and Su-35S aircrafts have been permanently based at this airfield and can carry out combat missions on the territory of Ukraine, including bombing with guided aerial bombs under the command of various groups, including «Zapad», «Tsentr», «Yuh» and «Vostok».⁵³



A satellite image of the «Kushchevskaja» airfield shows at least eight Su-34s, eight Su-35S and four Su-27/35s (marked with lines).

Source: Planet, 19 March 2024.



At least nine Su-34, five Su-35S and three Su-27/35 are visible on the satellite image of the «Kushchevskaya» airfield (marked with lines).

Source: Planet, 11 May 2024.

At least four of the Su-34s at this airfield belong to the 968th Experimental Instructor Mixed Aviation Regiment,⁵⁴ and at least four Su-35Ss belong to the 23rd Fighter Aviation Regiment.⁵⁵

Given the presence of a Su-34 of the 277th Bombardment Regiment,⁵⁶ Truth Hounds investigators have suggested that the remaining Su-34s at «Kushchevskaya» airfield also belong to the 277th Aviation Regiment.

According to low-quality Sentinel-2 satellites, in the 20s of May 2024, aircrafts from this airfield returned to the «Maikop» airfield in the Republic of Adygea.⁵⁷



A satellite image of the central part of the «Maikop» airfield shows at least eight Su-34s and possibly two Su-35s.
Source: Sentinel-2, 25 May 2024.

«Akhtubinsk» airfield

The «Akhtubinsk» airfield in Astrakhan region belongs to the 929th State Flight Test Centre. It is home to aircraft of various types, including Su-34, Su-35, Su-57 and others.⁵⁸

At least six Su-34 aircrafts are under the control of this test centre.



The satellite image of «Akhtubinsk» airfield shows at least six Su-34s (marked with lines).

Source: Planet, 14 May 2024.

Su-34s from this airfield are primarily used to launch X-59 missiles,⁵⁹ not bombing strikes. Therefore, this unit does not usually participate in combat operations involving the launch of guided bombs.

List of references

- ^[1] BMPD / Return to Baltimore [@bmpd], (27.11.2021), LiveJournal, URL: <https://bmpd.livejournal.com/4436801.html> (Accessed 31.08.2024).
- ^[2] Ministry of Defence of Russia / 'The combat power of this bomb cannot be ignored' (@mod_russia), (14.07.2024), Telegram, URL: [@mod_russia](https://t.me/mod_russia/Ministry_of_Defence_of_Russia/'The_combat_power_of_this_bomb_cannot_be_ignored'), (14.07.2024), Telegram, URL: https://t.me/mod_russia/41020 (Accessed 31.08.2024) (Accessed 31.08.2024); Ministry of Defence of Russia / The crew of the Su-34 fighter-bomber destroyed the accumulation of enemy manpower and equipment on the Kupiansk direction (@mod_russia), (26.02.2024), Telegram, URL: https://t.me/mod_russia/36055 (Accessed 31.08.2024).
- ^[3] Zvizdets Mangustu / About the enemy group of troops (GT) 'Sever' (@zvizdecmanhust), (17.04.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1782> (Accessed 31.08.2024); Zvizdets Mangustu / How it becomes clear (@zvizdecmanhust), (07.08.2024), Telegram, URL: <https://t.me/zvizdecmanhust/2098> (Accessed 31.08.2024).
- ^[4] Zvizdets Mangustu / Thus, the interim conclusion (@zvizdecmanhust), (10.07.2024), Telegram, URL: <https://t.me/zvizdecmanhust/2022> (Accessed 31.08.2024).
- ^[5] US and Germany allow Kyiv to strike targets in Russia, but there are restrictions, (2024). BBC NEWS Ukraine, URL: <https://www.bbc.com/ukrainian/articles/cxeeilz9v3vc> (Accessed 31.08.2024); US allowed to hit Russia with US weapons, Germany supported, (2024). Suspense Novyny, URL: <https://suspline.media/758985-ssa-dozvolili-biti-amerikan-skoup-zbroeu-po-rosii-nimecckina-pidtrimala-suspilne-dajdzest/> (Accessed 31.08.2024).
- ^[6] armysymbol / 4 Centre for Aviation Personnel Training and Military Testing (4 CAPT&MT) (@armysymbol), (01.01.2019), LiveJournal, URL: <https://armysymbol.livejournal.com/1200.html> (Accessed 31.08.2024).
- ^[7] Khodarenok M., Syrian campaign: where Russian VKS pilots were trained, (2019). Gazeta.ru, URL: <https://www.gazeta.ru/army/2019/03/23/12261271.shtm> (Accessed 31.08.2024).
- ^[8] Monitoring of Sentinel-2 satellite images, (20.04.2024). EO Browser, URL: https://apps.sentinel-hub.com/eo-browser/?zoom=16&lat=52.65059&lng=39.43757&themeld=D-EFAULT-THEME&visualisationUrl=U2FsdGvKX1%2F9JG0U1lc%2Bq2wI5tUamGAZY7f15WMwgsEGgl-pAQ17f6RGPXLs2d9iz%2BasVOFLMMhr%2BP01y8z4IFkHtE8plus2u6WS79yYhwWYBhTqIBoY84%2BBGg&datasetId=S2_L1C&fromTime=2024-04-20T00%3A00%3A00.000Z&toTime=2024-04-20T23%3A59%3A59.999Z&layerId=1.TRUE_COLOR&demSource3D=%22MAPZEN%22 (Accessed: 31.08.2024); Zvizdets Mangustu / As promised, today 'About Air'. (@zvizdecmanhust), (05.03.2023), Telegram, URL: <https://t.me/zvizdecmanhust/552> (Accessed 31.08.2024); Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine (@zvizdecmanhust), (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024).
- ^[9] 'Borisoglebsk' airfield. Borisoglebskoe VVAUL, URL: <http://www.bvvaul.ru/content/iap/aerodrom/aerB/aerBorisoglebsk.php> (Accessed 31.08.2024); Ukraine in the semicircle of Russian air bases: 6 airfields and hundreds of aircraft (photo), (2014). Details, URL: <https://podrobnosti.ua/1003832-ukraina-v-polukolte-aviabaz-rossii-6-aerodromov-i-sotni-samoletov-foto.html> (Accessed 31.08.2024).
- ^[10] Guy Plopsky / 1/ TV Zvezda forgot to blur out the registration number of this Su-34 (RF-81255) [@GuyPlopsky], (18.11.2022), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1548914528196632576> (Accessed 31.08.2024); Guy Plopsky / 1/ A still from a new TV Zvezda segment on Su-34 operations against Ukraine [@GuyPlopsky], (20.06.2022), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1538868949483671553> (Accessed 31.08.2024).
- ^[11] Guy Plopsky / 1/ TV Zvezda forgot to blur out the registration number of this Su-34 (RF-81255) [@GuyPlopsky], (18.11.2022), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1548914528196632576> (Accessed 31.08.2024); Guy Plopsky / 1/ A still from a new TV Zvezda segment on Su-34 operations against Ukraine [@GuyPlopsky], (20.06.2022), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1538868949483671553> (Accessed 31.08.2024); *Invincible 'Utenok': footage of Su-34 during the operation in Ukraine, (2022). Zvezda, URL: <https://tvzvezda.ru/news/2022718313-yPdEf.html> (Accessed 31.08.2024).*
- ^[12] Fighterbomber / Reminder of the stars on aircrafts [@Fighterbomber], (17.03.2023), VKontakte, URL: https://vk.com/wall-182816816_85831# (Accessed 31.08.2024).
- ^[13] Ministry of Defence of Russia / Air support: combat work of Su-34 fighters of the Eastern Military District in the special operation zone [@mod_russia], (20.04.2023), Telegram, URL: https://t.me/mod_russia/25823 (Accessed 31.08.2024); Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine (@zvizdecmanhust), (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024).
- ^[14] Monitoring of Sentinel-2 L1C satellite images, (04.05.2024). EO Browser, URL: https://apps.sentinel-hub.com/eo-browser/?zoom=16&lat=51.36624&lng=42.17516&themeld=D-EFAULT-THEME&visualisationUrl=U2FsdGvKX1%2BvgqzhDdotJIDZzn9fJ%2FIBAdMY1JfsUYLvkL0zLISSoOonli%2B0hISYfnAT-wUfUjXkdE470m%2Ftuop%2BdlGe4zfVar2qE4xiRwJ9BjPEb-kRGM4XKiv4zAkRym&datasetId=S2_L1C&fromTime=2024-05-04T00%3A00%3A00.000Z&toTime=2024-05-04T23%3A59%3A59.999Z&layerId=1.TRUE_COLOR&demSource3D=%22MAPZEN%22 (Accessed: 31.08.2024).
- ^[15] Monitoring of Sentinel-2 L1C satellite images, (04.05.2024). EO Browser, URL: https://apps.sentinel-hub.com/eo-browser/?zoom=16&lat=51.36624&lng=42.17516&themeld=D-EFAULT-THEME&visualisationUrl=U2FsdGvKX1%2BvgqzhDdotJIDZzn9fJ%2FIBAdMY1JfsUYLvkL0zLISSoOonli%2B0hISYfnAT-wUfUjXkdE470m%2Ftuop%2BdlGe4zfVar2qE4xiRwJ9BjPEb-kRGM4XKiv4zAkRym&datasetId=S2_L1C&fromTime=2024-05-04T00%3A00%3A00.000Z&toTime=2024-05-04T23%3A59%3A59.999Z&layerId=1.TRUE_COLOR&demSource3D=%22MAPZEN%22 (Accessed: 31.08.2024).
- ^[16] Su-34 Utenok, (2018). YAPLAKAL, URL: <https://www.yapla-kal.com/forum2/topic1735350.html> (Accessed 31.08.2024); Uacruscia / Air camouflage: painting aircraft – when ensuring stealth takes on a symbolic meaning [@uacruscia], (16.06.2016), LiveJournal, URL: <https://uacruscia.livejournal.com/46032.html> (Accessed 31.08.2024).
- ^[17] Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine (@zvizdecmanhust), (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024).
- ^[18] Guy Plopsky / Took several better quality still images (from a video published on the Russian MoD site) [@GuyPlopsky], (09.01.2024), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1744742389049344456> (Accessed 31.08.2024).
- ^[19] Zvizdets Mangustu / 559th Bomber Aviation Regiment, Morozovsk Air Base (AB), with a bad morning [@zvizdecmanhust], (05.04.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1758> (Accessed 31.08.2024).
- ^[20] Su-34 destroyed Ukrainian militants with UMPC bombs, (2024). Zvezda, URL: <https://tvzvezda.ru/news/2024641014-1pnHS.html> (Accessed 31.08.2024).
- ^[21] Su-34 crews levelled an enemy command post in the area of the Special Military Operation, (2024). Zvezda, URL: <https://tvzvezda.ru/news/2024481025-46AV9.html> (Accessed 31.08.2024).
- ^[22] Su-34 crews destroyed the command post of the Ukrainian Armed Forces in the area of the Special Military Operation, (2024). Zvezda, URL: <https://tvzvezda.ru/news/20246131019-dLayu.html> (Accessed 31.08.2024).
- ^[23] monitor / Report on the activities of enemy aircraft and fleet as of 12:00 23.12.23. [@war_monitor], (23.12.2023), Telegram, URL: https://t.me/war_monitor/13168 (Accessed 31.08.2024).

- [241] monitor / Report on the activities of enemy aircraft and fleet as of 12:00 23.12.23. [@war_monitor], (23.12.2023), Telegram, URL: https://t.me/war_monitor/13168 (Accessed 31.08.2024).
- [251] monitor / Report on the activities of enemy aircraft and fleet as of 12:00 23.12.23. [@war_monitor], (23.12.2023), Telegram, URL: https://t.me/war_monitor/13168 (Accessed 31.08.2024).
- [261] Defence Intelligence of Ukraine / #GURinforms After the latest events in Crimea, the ruscists urgently move their planes and helicopters deeper into the peninsula and to the airfields of the Russian Federation [@DIUkraine], (17.08.2022), Telegram, URL: <https://t.me/DIUkraine/1118> (Accessed 31.08.2024).
- [271] Dossier of the Spy / Regarding the strike on the 'Morozovsk' airfield (@dosye_shpiona), (04.08.2024), Telegram, URL: https://t.me/dosye_shpiona/578 (Accessed 31.08.2024); Dossier of the Spy / Consequences on the 'Morozovsk' airfield (@dosye_shpiona), (05.08.2024), Telegram, URL: https://t.me/dosye_shpiona/579 (Accessed 31.08.2024); Dossier of a Spy / Contents of the 'Morozovsk' airfield warehouse (@dosye_shpiona), (06.08.2024), Telegram, URL: https://t.me/dosye_shpiona/580 (Accessed 31.08.2024); Defence Intelligence of Ukraine / Destroyed Su-34 and BC warehouse - details of 'cotton' at the 'Morozovsk' airfield (@DIUkraine), (05.08.2022), Telegram, URL: <https://t.me/DIUkraine/4216> (Accessed 31.08.2024).
- [281] Su-34s counted using Sentinel-2 LIC satellite imagery monitoring, (27.08.2024). EO Browser, URL: https://apps.sentinel-hub.com/eo-browser/?zoom=16&lat=48.31512&lng=41.78847&themeld=DEFAULT-THEME&visualizationUrl=U2:FsdGVkX1%2BjInFrADy%2BB3ZrHbQnSRiEPsoIHurvzRE7SbT%2BIUYKNyq8QHghuac3G4ZelZf666nZ4Lkv9YfrkVPd%2BzWRPvcSjall5xGIAG%2BC0L07%2B4CrizmDOLq&datasetId=S2LIC&fromTime=2024-08-27T00%3A00%3A00.000Z&toTime=2024-08-27T23%3A59%3A59.999Z&layerId=1_TRUE_COLOR&demSource3D=%22MAPZEN%22 (Accessed: 31.08.2024).
- [291] Zvizdets Mangustu / 3. Now, as promised... on the enemy's air component concentrated in the Southern operational direction... [@zvizdecmanhust], (21.04.2023), Telegram, URL: <https://t.me/zvizdecmanhust/710> (Accessed 31.08.2024).
- [301] Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine [@zvizdecmanhust], (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024); Zvizdets Mangustu / As promised, today 'About the Air' [@zvizdecmanhust], (05.03.2023), Telegram, URL: <https://t.me/zvizdecmanhust/552> (Accessed 31.08.2024).
- [311] The Military Watch / On 22 August 2024, a Ukrainian Armed Forces carried out a massive OVA UAV strike on the Marinovka Air Base, Volgograd Oblast, Russia [@MarcinRogowski14], (22.08.2024), X (Twitter), URL: <https://x.com/MarcinRogowski14/status/1826684125480141113> (Accessed 31.08.2024).
- [321] MT Anderson \ Marinovka Air Base. Here is a 'before' image from 19 August [@MT_Anderson], (22.08.2024), X (Twitter), URL: https://x.com/MT_Anderson/status/1826467369809514975 (Accessed 31.08.2024).
- [331] ^[1] <https://859cbp.mil.ru/>; eagle_rost / 859 centre of combat training and retraining of the Naval Aviation personnel of the Russian Navy [@eagle_rost], (28.11.2014), LiveJournal, URL: <https://eagle-rost.livejournal.com/274738.html> (Accessed 31.08.2024); BMPD / MiG-29KR arrived at the 859th Naval Aviation Training Centre in Yeysk [@bmpd], (29.09.2015), LiveJournal, URL: <https://bmpd.livejournal.com/1495069.html> (Accessed 31.08.2024).
- [341] Zvizdets Mangustu / It's Sunday, so a review from the 'Miscellaneous' category [@zvizdecmanhust], (29.10.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1358> (Accessed 31.08.2024).
- [351] Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine [@zvizdecmanhust], (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024); Zvizdets Mangustu / As promised, today 'About Air' [@zvizdecmanhust], (05.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/552> (Accessed 31.08.2024).
- [361] Zvezdanews / Su-34 pilot called the psychological state before departure the most difficult aspect of a combat flight [@zvezdanews], (12.07.2023), Telegram, URL: <https://t.me/zvezdanews/123997> (Accessed 31.08.2024); Ministry of Defence of Russia / Air support: combat work of Su-34 fighters of the Eastern Military District in the special operation zone [@mod_russia], (20.04.2023), Telegram, URL: https://t.me/mod_russia/25823 (Accessed 31.08.2024).
- [371] Zvezdanews / Su-34 pilot calls the psychological state before departure the most difficult aspect of a combat flight [@zvezdanews], (12.07.2023), Telegram, URL: <https://t.me/zvezdanews/123997> (Accessed 31.08.2024).
- [381] Zvezdanews / Su-34 pilot called the psychological state before departure the most difficult aspect of a combat flight [@zvezdanews], (12.07.2023), Telegram, URL: <https://t.me/zvezdanews/123997> (Accessed 31.08.2024); Guy Plopsky / 1/ Upon reviewing the video again, it appears that the first two seconds & last four seconds of the clip below show two different Su-34s taxiing [@GuyPlopsky], (18.03.2024), X (Twitter), URL: <https://x.com/GuyPlopsky/status/1769742242388824257> (Accessed 31.08.2024).
- [391] Eastern Eagle / Parking of the Yeysk airfield in September 2023 [@EasternEagleAvia], (27.06.2024), Telegram, URL: <https://t.me/EasternEagleAvia/1809> (Accessed 31.08.2024).
- [401] Eastern Eagle / Parking of the Yeysk airfield in September 2023 [@EasternEagleAvia], (27.06.2024), Telegram, URL: <https://t.me/EasternEagleAvia/1809> (Accessed 31.08.2024).
- [411] Zvizdets Mangustu / To the beginning of the large-scale invasion of Russia in Ukraine [@zvizdecmanhust], (26.12.2023), Telegram, URL: <https://t.me/zvizdecmanhust/1520> (Accessed 31.08.2024); Zvizdets Mangustu / As promised, today 'About Air' [@zvizdecmanhust], (05.03.2023), Telegram, URL: <https://t.me/zvizdecmanhust/552> (Accessed 31.08.2024).
- [421] Colonel Vadym Hurov was killed in the crash of a training aircraft, (2023). Radio Liberty, URL: <https://web.archive.org/web/20230815183710/https://www.svboda.org/a/p-ri-kruhenii-uchebnogo-samolyota-na-kubani-pogib-polkovnik-vaдим-gurov/32549326.html> (Accessed 31.08.2024); Head of the Maikop Training Aviation Regiment Killed in a Plane Crash, (2023). RBC, URL: <https://web.archive.org/web/20230815125121/https://www.rbc.ru/rbcfree-news/64db688f9a7947360b141166?from=newsfeed> (Accessed 31.08.2024).
- [431] Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [@zvizdecmanhust], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1675> (Accessed 31.08.2024); Zvizdec Mangustu / Review category 'different' [@zvizdecmanhust], (16.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1709> (Accessed 31.08.2024).
- [441] Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [@zvizdecmanhust], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1675> (Accessed 31.08.2024).
- [451] Warrior DV / Su-34 fighter-bomber of the 11th Army drops bubbly gifts on the positions of the Ukrainian Armed Forces in Velyka Novosilka [@voyn_dv], (18.07.2024), Telegram, URL: https://t.me/voyn_dv/9810 (Accessed 31.08.2024); Warrior DV / Su-34 fighter-bombers of the 11th Army clear forest belts north of Urozhaine from Ukrainian formations [@voyn_dv], (16.07.2024), Telegram, URL: https://t.me/voyn_dv/9783 (Accessed 31.08.2024).
- [461] Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [@zvizdecmanhust], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1675> (Accessed 31.08.2024).
- [471] Russian Ministry of Defence / Su-34 fighter-bomber crews struck at enemy command post and manpower [@mod_russia], (13.03.2024), Telegram, URL: https://t.me/mod_russia/36555 (Accessed 31.08.2024).
- [481] Su-34s destroyed a temporary deployment point of the Ukrainian Armed Forces with high-explosive bombs, (2024). Zvezda, URL: <https://tvezda.ru/news/20247161020-fjLxe.html> (Accessed 31.08.2024); Su-34s dropped aerial bombs from the UMPCC on the Ukrainian Armed Forces' deployment point, (2024). Zvezda, URL: <https://tvezda.ru/news/20247241053-4dVnU.html> (Accessed 31.08.2024); Su-34 destroyed Ukrainian militants with UMPCC bombs, (2024). Zvezda, URL: <https://tvezda.ru/news/2024721148-NLrQx.html> (Accessed 31.08.2024).
- [491] Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [@zvizdecmanhust], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1675> (Accessed 31.08.2024); Zvizdets Mangustu / Review category 'different' [@zvizdecmanhust], (16.03.2024), Telegram, URL: <https://t.me/zvizdecmanhust/1709> (Accessed 31.08.2024).

- ¹⁵⁰¹ Zvizdets Mangustu / Review category 'different' [@zvizdecmanhustu], (16.03.2024), Telegram, URL: <https://t.me/zvizdecmanhustu/1709> (Accessed 31.08.2024).
- ¹⁵¹¹ RUSSIAN AEROSPACE FORCES (VKS). PART 1, (2016). Defence express, URL: <https://old.defence-ua.com/index.php/statti/1253>; (Accessed 31.08.2024); Russian Frontal Aviation Arms Order of Battle, (2022). Eastern Order of Battle, URL: http://www.easternorbat.com/html/russian_air_force_eng.html (accessed 31.08.2024).
- ¹⁵²¹ After the events in Crimea, Russians are moving their aircraft deeper into the peninsula and to Russian airfields - GUR, (2022). Militarnyi, URL: <https://web.archive.org/web/20230814221647/https://mil.in.ua/uk/news/pislya-podij-v-krymu-rosiyany-peremishhuyut-aviatsiyu-v-qlyb-pivostrova-ta-na-aerodromy-rf-qurl> (Accessed 31.08.2024).
- ¹⁵³¹ Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [zvizdecmanhustu], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhustu/1675> (Accessed 31.08.2024); Zvizdets Mangustu / Review category 'different' [zvizdecmanhustu], (16.03.2024), Telegram, URL: <https://t.me/zvizdecmanhustu/1709> (Accessed 31.08.2024); Su-34 destroyed a temporary deployment point of the Ukrainian Armed Forces with high-explosive bombs, (2024). Zvezda, URL: <https://tvzvezda.ru/news/20247161020-f.l.xe.html> (accessed 31.08.2024); Su-34s dropped air bombs from the UMPC on the Ukrainian Armed Forces' deployment point, (2024). Zvezda, URL: <https://tvzvezda.ru/news/20247241053-4dVnU.html> (Accessed 31.08.2024).
- ¹⁵⁴¹ Zvizdets Mangustu / Category air + sea and a little 'for the Avdiivka direction' [zvizdecmanhustu], (03.03.2024), Telegram, URL: <https://t.me/zvizdecmanhustu/1675> (Accessed 31.08.2024).
- ¹⁵⁵¹ Zvizdets Mangustu / Review of the category 'different' [zvizdecmanhustu], (16.03.2024), Telegram, URL: <https://t.me/zvizdecmanhustu/1709> (Accessed 31.08.2024).
- ¹⁵⁶¹ Su-34 destroyed Ukrainian militants with UMPC bombs, (2024). Zvezda, URL: <https://tvzvezda.ru/news/20247121148-NLfqX.html> (Accessed 31.08.2024).
- ¹⁵⁷¹ Monitoring of Sentinel-2 satellite images, (20.04.2024). EO Browser, URL: https://apps.sentinel-hub.com/eo-browser/?zoom=17&lat=46.53513&lng=39.55088&themeld=D-EFAULT-THEME&visualizationUrl=U2FsdGvKX19xETRC8si4if3Orlh9LflapGIL49dfyGRl16QIDpxl0qea7opnJAaHJzK-cRzQ%2FkL6HSBX2JXs%2FX%2FmEXcvNqcwxjAupVJWgmCA%2BosyNSIE8PhCy4NOVV&datasetId=S2L1C&fromTime=2024-05-24T00%3A00%3A00.000Z&toTime=2024-05-24T23%3A59%3A59.999Z&layerId=1.TRUE_COLOR&demSource3D=%22MAPZEN%22; https://apps.sentinel-hub.com/eo-browser/?zoom=16&lat=44.68105&lng=40.03167&themeld=DEFAULT-THEME&visualizationUrl=U2FsdGvKX1%2FVv9oM%2BFqxHxXC7E5CPmXl-axV5XBZcdB71TtTHZtl3Dzuv2849F4re8dPbA%2Bto-ayx2HVg5PgNNC8%2BGCpYa0W7r0zpuNkeTsdA%2BIt4VvXOgRo0Ioc5ewbe2&datasetId=S2L1C&fromTime=2024-05-24T00%3A00%3A00.000Z&toTime=2024-05-24T23%3A59%3A59.999Z&layerId=1.TRUE_COLOR&demSource3D=%22MAPZEN%22
- ¹⁵⁸¹ BMPD / Russian VKS received two more Su-34 aircraft [bmpd], (05.11.2020). LiveJournal, URL: <https://bmpd.livejournal.com/4203875.html> (Accessed 31.08.2024); Ukrainian Armed Forces named the reason for Russians' deployment of X-47 missiles to Akhtubinsk, (2022). Korrespondent.net, URL: <https://web.archive.org/web/20220809002828/https://korrespondent.net/world/4497517-vsu-nazvaly-prychynu-stahvanyia-rossyianamy-raket-kh-47-v-akhtubynsk> (Accessed 31.08.2024); For the first time, Su-57 was hit, (2024). Defence Intelligence of Ukraine, URL: <https://web.archive.org/web/20240609063708/https://qur.gov.ua/content/vpershe-urazhenno-su-57.html> (Accessed 31.08.2024).
- ¹⁵⁹¹ monitoring / Report on hostile activity for the day 01.07.24 [monitorwarr], (01.07.2024), Telegram, URL: <https://t.me/monitorwarr/22106> (Accessed 31.08.2024); monitoring / Report on hostile activity for the day 27.06.24 [monitorwarr], (27.06.2024), Telegram, URL: <https://t.me/monitorwarr/22005> (Accessed 31.08.2024); monitoring / Report on hostile activity for the day 26.06.24 [monitorwarr], (26.06.2024), Telegram, URL: <https://t.me/monitorwarr/21973> (Accessed 31.08.2024); monitoring / Report on hostile activity for the day 21.06.24 [monitorwarr], (21.06.2024), Telegram, URL: <https://t.me/monitorwarr/21823> (Accessed 31.08.2024).