The 1935 Guyana event and the 1908 Tunguska event

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Dedicated to the blessed memory of my grandmother (Tuzlukova Anna Ivanovna) and my mother (Ol'khovatova Olga Leonidovna)

Abstract. This paper is a continuation of a series of works, devoted to various aspects of the 1908 Tunguska event. In 1935 a remarkable event took place in Guyana (at that time British Guiana). A meteor was seen and a large area of devastated forest was discovered. The main source for information on this event was an article published in an astronomical magazine in 1939. The 1939-article provided 2 possible explanations for this event. The first one is that these destructions were caused by the meteor, the second one is that the destructions were caused by a tornado. The 1939-article says that this event may be equal to or superior to the great Siberian meteor of 1908 (i.e. the 1908 Tunguska event). According to the author of the present paper, from the analysis of the available data, it follows that it is extremely unlikely that the devastation of the forest was caused by the infall of a spacebody. There is a hint of a role of a meteorological factor in the 1935 Guyana event. The paper also briefly examines a remarkable natural event that took place in Brazil in 1930, which in some publications is compared to the 1908 Tunguska event. There is too little data on this event to draw a more or less reliable conclusion. Nevertheless, the available data casts doubt on the assumption that this phenomenon was caused by infalls of spacebodies. Some comparison of the 1935 Guyana event with the 1908 Tunguska event has been made.

1. Introduction

This paper is a continuation of a series of works in English, devoted to various aspects of the 1908 Tunguska event [Ol'khovatov, 2003; 2020a; 2020b; 2021; 2022; 2023a; 2023b; 2025a; 2025b; 2025c; 2025d; 2025e; 2025f; 2025g; 2025h; 2025i]. The works can help researchers to verify the consistency of the various Tunguska interpretations with actual data. A large number of hypotheses about its causes have already been put forward. However, so far none of them has received convincing evidence. As it is written on the title web-page of the web-site created by KSE (see below about KSE) tunguska.tsc.ru/ru/ (translated by A.O.):

> "About a thousand researchers have devoted years of their lives to the Tunguska phenomenon. However, there is still no well-founded scientific understanding of what happened over the Siberian taiga on June 30, 1908."

This is probably why new hypotheses appear almost every year, not only in the mass-media, but also in scientific literature. At the same time, any hypothesis should not contradict the known facts about the event. Unfortunately, the authors of new hypotheses, as well as the authors of popular science articles, often use data, many of which turned out to be not entirely accurate, or even incorrect (some examples can be read in [Ol'khovatov, 2025c]). The author of this paper hopes that it will help both the authors of various hypotheses and their readers to evaluate the validity of the proposed hypotheses.

Let's start with brief info about research of the Tunguska event. The Committee on Meteorites of the USSR Academy of Sciences (KMET) stopped research the area of the Tunguska event in the early 1960s. Later amateurs (consisting mainly of scientists, engineers and students) most of whom united under the name Kompleksnaya Samodeyatel'naya Ekspeditsiya (KSE) continued research (KSE started research in 1959). Since the late 1980s foreign scientists take part too.

Please pay attention that so called the epicenter of the Tunguska forestfall (the forestfall is named "Kulikovskii") is assigned to 60°53' N, 101°54' E.

In this paper its author (the author of this paper i.e. A.O.) for brevity will be named as "the Author".

Please pay attention that Guyana was named as British Guiana at the time of the event considered.

2. The 1935 event in Guyana

The main source for information on the 1935 Guyana event is an article "Tornado or Meteor Crash?" published in the magazine "The Sky" [Korff et al., 1939]. According to the editor's note, Dr. Serge A. Korff returned in 1936 from an expedition which carried him through the interior of British Guiana. He reported evidence that immediately prior to his visit there a large meteor had apparently fallen in that region. An official cable was sent by the American Museum of Natural History to Dr. W. H. Holden, who was at the time on an expedition in the vicinity of the fall. Dr. Holden then made a side trip to the region of the fall, explored the devastated area as far as was practicable, and reported his confirmation over a radio broadcast. Upon returning to New York, Dr. Holden has reaffirmed his belief that the devastation was probably of meteoric origin. Later Desmond Holdridge, explorer and author, has returned from this same region, bringing additional information. "The Sky" presented the reports, written by Dr. Korff (a prominent expert in cosmic rays), Dr. Holden and Mr. Holdridge.

Here are some fragments (with accent on facts) from the Korff report, Korff passed through the Rupununi region of British Guiana in February, 1936 [Korff et al., 1939]:

> "My chief informant was Dr. Godfrey Davidson, a Scotch gold prospector who was operating auriferous gravel mine at Marudi Mountain. <...>
>
> According to Davidson's account of the circumstances of the meteor fall, he was awakened one night by what sounded like an explosion, and upon looking out was surprised to see a trail of fire in the sky. <...> His house had evidently been considerably shaken, for he noticed phenomena usually associated with earthquakes, such as kitchen utensils knocked off the table, articles askew on shelves and a lamp swinging from the ceiling."

The word "trail" hints a bit on a "meteor", but it is an interpretation, not a fact.

Shortly thereafter, Davidson came across a region (at approximate latitude 2° N, longitude 59° 10' W), where the forest had been devastated. Trees had apparently been pushed over on their sides, as if by a great hand. In the Davidson's opinion, the devastated region was perhaps 5 by 10 miles. Davidson noted the complete absence of all animal life, including birds and insects. Due to a tangle of trees, lying on their sides, Davidson did not penetrate the devastated region deeply.

Please pay attention that the devastated region had a rather sharp border.

Now let's consider the report by W. Holden, who was in the site at the end of 1937. Here are some fragments (with accent on facts) from the Holden report [Korff et al., 1939]:

"About 10:30 in the morning we climbed to the top of the mountain in order to get a panorama of the surrounding country. We could see some areas that had been swept down by some great force, trees twisted off some 25 feet above the ground. We tried to enter one of these areas but the bush was in such a tangle that we had to give it up. <...> It was only through extreme care and backtracking that we finally picked up our old trail.

There was considerable game on the trails. I encountered. three peccaries on the trail on the way in. Both the spider monkey and the smaller species are all through this region. <...>

We could see from the top of the mountain an area, possibly five or six or even more miles that had been apparently devastated. However, due to the fact that about two years had elapsed since this occurred, the vegetation had so grown‘up over this area that it was quite difficult, to distinguish it from the surrounding areas. It was only in places bordering on this area that we could see the damage that had been done, where trees had been broken off 25 feet above their bases. The secondary growth had intertwined all through this tangle making it an impenetrable mass.

Whether or not the devastation in this area which we explored was of meteoric cause is questionable, as I understand similar conditions are to be found as a result of cyclonic destruction or twisters."

Now let's consider the report by D. Holdridge. Here are some fragments (with accent on facts) from his report [Korff et al., 1939]:

"Mr. Teddy Melville said that he and his family had been awakened in the night some years ago by a body that passed overhead, between him and the Kanuku Mountains, with a terrific roar, lighting up the savannah during its passage with a brilliant illumination described by Mr. Melville as being “like broad daylight.” The body crossed the Kanukus and disappeared to the south."

The place of the observation is near the Rio Takatu, in lat. 3° 15' N. and long. 59° 12' W.

The second report collected by Holdridge was given to him by Dr. Godfrey Davidson regarding the experience of his partner, Mr. Ashburner, who had been camped on the open savannah when the supposed meteor passed. Dr. Davidson believed the date to have been Dec. 11, 1935 and the time about 9 p.m.. Here is a fragment from his report [Korff et al., 1939]:

"Like Mr. Melville, Mr. Ashburner was, I am informed, awakened by

the brilliant light and accompanying noise and concussion, as the body passed over him and disappeared to the south. He felt certain that it had landed very near to Marudi Mountain.

At Marudi Mountain, where gold working is now in progress, books, basins, pots, pans and other household appurtenances were flung from their places by concussion."

A remarkable point is the sound with concussion accompanying the body overflight. This will be discussed below. Unfortunately the position of Mr. Ashburner was not given. But the fact that he was a partner of Dr. Godfrey Davidson hints that he was not far from Marudi Mountain. The concussion also hints on this.

Holdridge presented an important account from Mr. Art Williams, local airline operator. Williams was flying near the head of the Kuyuwini River and noticed an area of destroyed forest more than twenty miles in extent. He stated that the shape of the patch of shattered forest was elongated rather than circular.

Holdridge also presented important info from Mr. Charles Melville, resident at Wichabai (Charles Melville accompanied Dr. Holden into the region of the devastated area). Charles Melville attempted to reach the area where the meteor was supposed to have landed. C. Melville stated that the destruction of the trees was so great and the undergrowth that had risen in the debris so thick that it was impossible to penetrate even a few feet into the tangle. The trees were described as being twisted and mangled in a fashion completely new to C. Melville (he has lived all his life in this region).

Mr. Holdridge added that whether the observed meteor was actually responsible for the destruction of forest, it is of course quite impossible for him to say.

3. Discussion

The area of the devastated forest was "more than twenty miles in extent", and "elongated rather than circular". In the Author's opinion, this allows to estimate its area at about a couple of hundred square kilometers at least. Please pay attention, that according to the accounts, the borders of the area were rather sharp, so it is the area of the complete (or almost complete, at least) destruction. For comparison: the area of complete destruction in the 1908 Tunguska event was about 500 km^2 [Ol'khovatov, 2025c].

Now let's consider the meteor (a spacebody infall) interpretation of the 1935 Guyana event. Let's estimate the energy of the hypothetical spacebody. Comparing with the area of the complete destruction in the 1908 Tunguska event, it is possible to say about ~1 Mt TNT at least. The 2013 Chelyabinsk bolide with energy of ~0.5 Mt had peak brightness of -27.3 ± 0.5 magnitude [Popova et al., 2013], i.e. was brighter than Sun. So it is reasonable to suppose that the hypothetical Guyana meteoroidal

bolide had to be as bright as Sun (or even brighter) on a lower part of its trajectory at least.

According to the spacebody interpretation the spacebody flew near the Teddy Melville's position 3° 15' N, 59° 12' W, and then disappeared to the south. Later the spacebody overflew Mr. Ashburner, and disappeared to the south where the alleged spacebody produced the forestfall near Marudi Mountain.

However there are some problems with such interpretation.

a) Teddy Melville said that the fireball illuminated the savannah during its passage with a brilliant illumination as being “like broad daylight”. However, it should be borne in mind that Sun had set a few hours ago, so it was already quite dark. And it would be impossible to look at the alleged bright as Sun (at least) fireball. Moreover, the alleged super-bright fireball even would have blinded the eyewitness at least temporarily. The above is even more true in relation to Mr. Ashburner, who probably was much closer to the site of the forestfall. This points that the brightness of the fireball was much lower than of the hypothetical meteoroidal bolide.

b) Such hypothetical super-bolide would have to be observed at distances of many hundreds of kilometers. There were many settlements at such distances, including towns (and also in neighboring countries). For example, Georgetown is about 500 km to the north from the forestfall. Cloudiness in Georgetown was 5 at 18 h. on Dec. 11, 1935, and 4 at 7 a.m. on Dec.12, 1935 (see below for details). So such hypothetical super-bright phenomenon would have to be observed by hundreds if not thousands people. And for many of them it would transform night into day for several seconds. But just 2 eyewitnesses of the fireball were discovered. This hints that the altitude of the fireball was much lower than of the hypothetical meteoroidal bolide.

Also it is noteworthy that neither of both eyewitnesses mentioned that the meteor went out (disappeared) in the air, or that it ended with a flash. According to their reports, the meteor simply disappeared from the line of sight (that is, beyond the horizon), which also hints at the low flight altitude, especially in the case of the Ashburner's account.

c) The concussion that accompanied the overflight (according to Ashburner) hardly can be explained in the frame of the spacebody infall interpretation. Of course, a proposal that he was mistaken could help, but the proposal would put the whole story into doubt.

By the way, an airburst by a meteoroid producing several hundred sq. km of full destruction of the forest would generate a rather energetic earthquake. Indeed even the 2013 Chelyabinsk airburst generated a seismic event with magnitude's evaluation in ~3-4 (see [Wei, et al., 2018] and references in there). Such seismic event would have to be recorded by many seismic stations. However searching the Bulletin of the International Seismological Centre (https://doi.org/10.31905/D808B830) shows absence of such seismic event. But as the eyewitnesses reported the concussion, so there was some seismic event of low energy. So maybe some seismic

station near-by recorded it? The Author hopes that some of the readers will be interested to investigate.

d) The reported damage of the forest does not resemble the one produced by the spacebody's airburst. Indeed the rather sharp border of the damage, trees twisted off some 25 feet above the ground - such damage is in agreement with tornado/whirlwind action.

There is a hint that a meteorological factor played some role in the event. In 2007 Ian MacGregor (Archive Information Manager, Met Office, National Meteorological Archive, UK) kindly emailed to the Author (on the Author's request) weather observations from Georgetown for Dec. 1935. Readings for most elements were taken at 7 a.m., 1 p.m., and 6 p.m. Ian MacGregor added in his email that unfortunately, the columns for wind speed have been obliterated, but wind speed 8 a.m. to 6 p.m. on the 11th was 10 mph, and from 6 p.m. on 11th to 8 a.m. on 12th was 7.58 mph.

On Fig.1 there is an air-pressure graph (from 7 a.m. Dec.8 to 6 p.m. Dec.14) based on the weather observations from Georgetown, emailed by Ian MacGregor. The measurement (18 h., Dec.11) closest to the time of the event is marked in red. On Fig.1 along the vertical axis: air-pressure (inches), along the horizontal axis - time in hours counted since midnight Dec.7/8, 1935.

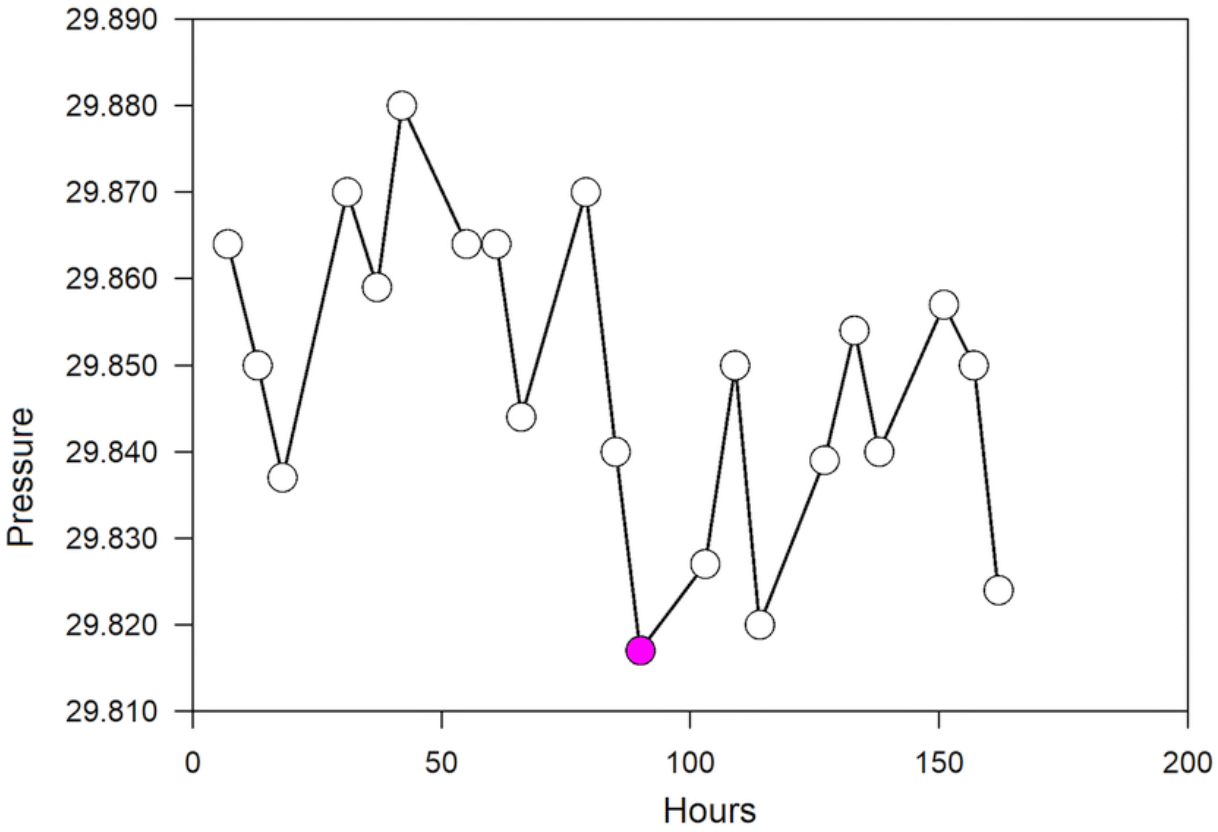

Fig.1

Also in the Georgetown meteorological log a squally rain was noted on Dec.11, and strong wind on Dec.12.

The forestfall occurred about 500 km from the Georgetown meteorological station, so more weather data is needed for a reliable conclusion. The Author hopes that some readers could be interested to find the data.

Now a few words about the meteor reported. The position of Teddy Melville was near Makaparima mountain. Here is from [Holdridge, 1939]:

> "According to Mr. Melville, the tradition of the people is that the region was "bewitched." The name of the near-by mountain, Makaparima, can be roughly translated as "the place of the fire monster," and it is said to be a locale of those curious and unexplained sounds of explosion reported by many travelers in Guiana and heard by the writer at Roraima in 1926."

So it can't be ruled out that the remarkable meteors appear from time to time near the mountain. The mentioned explosive sounds are known from various places of the world [Hill, 2011; Corliss, 1983]. Corliss made a good compilation of the reports of the sounds [Corliss, 1983]. The names of the sounds vary from place to place: Brontides, Barisal guns, Seneca guns, and so on. Two of the most popular explanations are explosive endogenic gas outbursts and sounds from shallow earthquakes. The first explanation was advocated in [Gold and Sorter, 1979]. However in 1981 Stierman [Stierman, 1981] criticized this point of view. Stierman also argued for the role of the shallow earthquakes. In response to this criticism, Gold and Sorter wrote [Gold and Sorter, 1981] that they agree that many faint booming sounds may indeed be produced by direct ground-to-air transmission from unfelt earthquakes. They also gave examples in which this explanation is unlikely to work. So it appears that an additional mechanism is required to explain some of the brontides.

It looks like one more argument in favor of the additional mechanism of the sounds appeared in 2020. A team of seismologists at the University of North Carolina published some preliminary research concerning Seneca guns. Here is from [Bressan, 2020]:

> ""We wanted to go through local news articles, create a catalog of instances of the Seneca Guns, and then try to verify them with actual seismo-acoustic data,", said researcher Eli Bird, an undergraduate studying geological sciences at the university. <...>
>
> Though the skyquakes can cause ground shaking, the scientists didn't find any earthquake records that coincided with the events, effectively

ruling out ground shaking as the cause of these booms.

"Generally speaking, we believe this is an atmospheric phenomenon — we don't think it's coming from seismic activity, we're assuming it's propagating through the atmosphere rather than the ground," Bird concludes. "Presumably, these are not all the same thing producing the booming sounds."

Here the Author recalls the idea by C. Tomlinson [Tomlinson, 1896] that Barisal guns and other natural booming sounds are likely due to ball lightning explosions.

Makaparima mountain ("the place of the fire monster") is the locale of unexplained sounds of explosion. In the opinion of the Author, besides sounds of shallow local earthquakes, there could be also earthquake lights in various forms, including fireballs (which can also take place without accompanying detected seismic events).

Indeed sometimes earthquake lights can be rather remarkable. Here are two examples. Here is from [Musya,1932] about an earthquake in Japan in 1931:

"A fire-ball rose in the sky and disappeared. A sound like “ Bah ...” was heard. The lower sky was coloured pink-red for some time after the disappearance of the light."

The second example is about the 1995 Kobe earthquake in Japan in 1995 [Kamogawa, et al., 2005]:

“In Osaka Bay, many fishermen had been working before the main shock. They also saw an orange luminous object moving from the edge of Awaji Island toward Mt. Rokko. Since the luminous object was of an observable size from their locations (approximately 40 km distance) and close to the sea surface in their reports, the diameter and the height would be estimated to be around 100 m. They additionally claimed that the luminous object finally hit Mt. Rokko, causing lightning to strike from the sky toward the ground. Almost immediately after that, they also felt the sea surface moving up and down.”

An interesting event accompanied a moderate earthquake in the Russian town of Chembar in 1886. At one o'clock in the morning, when a strong wind suddenly rose, a meteor flew "very low" over the town, which exploded on the road outside the town with a crash resembling a strong thunderclap. The explosion killed the horse, and the surviving driver was so scared that the only thing he can say is that a fiery serpent flew and killed the horse. Ten minutes later, there was a sound like an explosion. After a short time, there is an even stronger sound, accompanied by ground

oscillations. The roof of one of the houses collapsed, and chimneys collapsed in the other house, and swinging lamps were noticeable in the rooms. The ice on the lake was cracked and the ice floes piled on top of each other. Despite the small area of the town, in some places the earthquake was not noticeable at all, but in others it was difficult to stand on your feet. This earthquake was also felt in a place 20 km away from the town of Chembar on the Spitsyny farms/village.

The Author is unaware of the geological structure in the Makaparima mountain area, but there are high-grade iron ore deposits in Wichabai (about a couple dozen miles from the mountain). Here is from [Holdridge, 1939]:

> "Of great industrial interest was the occurrence near Wichabai of several outcrops of high-grade iron ore, tentatively identified as titaniferous magnetite. The spacing and alignment of the outcrops suggest that the ore is present in large quantities."

Marudi mountain is known for gold deposits. Iron is also present [Heesterman, 2019]. It is remarkable that there are deposits of various metals in the Tunguska event region, including gold scattered deposits. The 1978 Bell island event took place in the region of iron ore deposits - see [Ol'khovatov, 2025f]. In some other cases, the impact occurs in an elevated location (as, for example, in the 1993 Jerzmanowice event [Ol'khovatov, 2025f] and possibly in the 1994 in Spain [Docobo et al., 1997]). The gravitation of phenomena towards tectonic faults is also noted. Similar features are observed in lightnings in thunderstorms.

This hints at the role of electromagnetic phenomena in the phenomena. The Author gets the impression that there is some kind of interaction between electromagnetic processes in the Earth and in the atmosphere. More research is needed for more or less reliable conclusion.

Let's briefly consider the 1930 Curuça event (also known as the 1930 Brazilian Tunguska event. In August 1930 Father d'Alviano went to region near the Brazilian–Peruvian border, and here is from [Cordero and Poveda, 2011]:

> "Hundreds of eyewitnesses reported to the catholic missionary that at around 0800 hours on August 13, 1930, a fine red dust began to fall onto the forest and into the river; then people heard several ear-piercing whistles that became increasingly loud. Fishermen on the river could see the fall of large fireballs. There were three distinct explosions, each causing earth tremors. The ash continued to fall until midday (Huyghe, 1996). Father d'Alviano concluded that a meteoroid had exploded in the Earth atmosphere, ..."

The fireballs were not seen in nearest towns, this allows estimating limit of their upper altitudes. The authors of [Cordero and Poveda, 2011] came to conclusion

that the limit was 5 km. This makes the interpretation of the event as spacebody infalls as very unlikely, especially as the fireballs even did not leave any trails.

It is possible to add the following. According to accounts [Bailey et al., 1995]: a) the Sun suddenly became “blood-red” before the explosions; b) there was a fall of fine ash before the explosions.

The 1930 Brazilian event resembles to the Author a bit enlarged the 1993 Jerzmanowice event in Poland [Ol'khovatov, 2025d]. Unfortunately the Author does not have meteorological data from nearest meteostations. Maybe some readers can obtain and publish the data?

It should be noted that such phenomena, similar to meteoroidal bolides, can often be misleading. So, in the late 1980s, the Author suggested, based on several eyewitness reports from the catalog of the electrophonic bolides [Bronshten et al., 1988], that in some cases meteoroidal bolides can (somehow) trigger rather strong concussions simultaneous with the electrophonic sounds. However, later, a more detailed analysis by the Author of these eyewitness statements led the Author to the conclusion that the observed bolide phenomena do not correspond to the meteoroidal bolides, but sooner resembles ball-lightnings or/and earthquake lights.

In his publication called “Instructions for observing lightning”, L. Kulik wrote as the first phrase [Kulik, 1933] (translated by A.O.):

> “Of exceptional interest is a continuous uniform and monotonous burn, in some cases similar to a lightning burn, which I observed in the center of a radial windfall at the site of the Tunguska meteorite 30 VI 1908, forced me to make an attempt to collect observations of burns caused by lightning to various objects.”

In the article Kulik also mentioned that a ball-lightning is (translated by A.O.):

> "...often mistaken by the population for a bolide ("a ball of fire" is the effect of a flying meteorite),..."

Did Kulik begin to suspect something about the Tunguska event? However, even if he started, then after he wrote many articles, made many statements and promoted the Tunguska meteorite to the whole world, and also spent a lot of time, effort and government/public money searching for the Tunguska meteorite, it would be very difficult for him to publicly change his mind.

The 1935 Guyana event resembles the 1908 Tunguska event. However it looks like the damage to the forest in the 1935 Guyana event was done by tornado-like actions, while in Tunguska Evenki reported about whirlwinds, but general shape of the Kulikovskii forestfall resembles the one produced by a downburst.

It is a pity that the 1935 Guyana event has not been studied in more detail.

4. Conclusion

From the analysis of the available data, it follows that it is extremely unlikely that the devastation of the forest in the 1935 Guyana event was caused by a meteoroid. There is an argument in favor of the role of the meteorological factor in the 1935 Guyana event, but more data is needed for a solid conclusion.

The general conclusion is that such events are very complex phenomena. Research of these events requires the participation of experts in various fields. In the opinion of the Author, researching these events will allow us to better understand the life of such a complex system as our planet.

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References

Bailey, M.E., Markham, D.J., Massai, S., Scriven, J.E. (1995). The 1930 'Brazilian Tunguska' event. The Observatory, vol. 115, pp. 250–253.

Bressan, David (2020). Seismologists Investigate Unexplained Skyquakes. // https://www.forbes.com/sites/davidbressan/2020/12/22/seismologists-investigate-unexplained-skyquakes/

Bronshten, V. A., Grebennikov, V. S., Rabunskii, D.D. (1988). Katalog elektrofonnykh bolidov. // Aktual'nye voprosy meteoritiki v Sibiri. Novosibirsk. Nauka, pp.158- 204 (in Russian).

Cordero, Guadalupe ; Poveda, Arcadio (2011). Curuça 1930: A probable mini-Tunguska? // Planetary and Space Science, Vol. 59, Issue 1, pp. 10-16. https://doi.org/10.1016/j.pss.2010.10.012.

Corliss, W.R. (1983). Earthquakes, Tides, Unidentified Sounds and Related Phenomena: A Catalog of Geophysical Anomalies. Sourcebook Project. 214 p.

Docobo, J.A., Spalding, R.E., Ceplecha, Z., et al.(1997). Investigation of a bright flying object over northwest Spain, 1994 January 18 // Meteoritics and Planetary Science. 1998. Vol. 33 (1). P. 57–64.

https://doi.org/10.1111/j.1945-5100.1998.tb01607.x

Gold, T., and Sorter S.(1979). Brontides: Natural explosive noises.// Science, v. 204, pp.371–375. DOI: 10.1126/science.204.4391.371

Gold, T., and Sorter S.(1981). Response: Natural Explosive Noises. // Science, v. 212, Issue 4500, pp. 1297-1298. DOI: 10.1126/science.212.4500.1297

Heesterman, L. (2019). Stratigraphy of Guyana Greenstone Belts. // SAXI-XI Inter-guiana Geological Conference 2019: Paramaribo, Suriname. – 2019.

Hill, D. P.(2011). What is That Mysterious Booming Sound? // Seismological Research Letters, vol. 82, issue 5, pp. 619-622. DOI 10.1785/gssrl.82.5.619

Holdridge, D. (1939). An Investigation of the Prospect for White Settlement in British Guiana.// Geographical Review, Vol. 29, No. 4 (Oct., 1939), pp. 622-642. DOI: 10.2307/209831

Kamogawa, Masashi ; Ofuruton, Hideho ; Ohtsuki, Yoshi-Hiko (2005). Earthquake light: 1995 Kobe earthquake in Japan. // Atmospheric Research, Volume 76, Issue 1-4, p. 438-444. https://doi.org/10.1016/j.atmosres.2004.11.018

Korff, Serge A.; Holden, William H.; Holdridge, Desmond (1939). Tornado or Meteor Crash? // The Sky, vol.3, pp. 8–10,24.

Kulik, L. A. (1933a). Instruktsiya dlya nablyudeniya molnii. //Trudy LIGEM AN SSSR, N 2, pp.83-87 (in Russian).

Musya, K. (1932). Jisin ni Tomonau Hakkō- Gensyō no Kenkyu Oyobi Shiryō (Study on Luminous Phenomena Associated with Earthquakes and the Related Materials); Iwanami-Shoten: Tokyo, Japan, 416 p. (In Japanese with English summary).

Ol'khovatov, A.Y. (2003). Geophysical Circumstances Of The 1908 Tunguska Event In Siberia, Russia. // Earth, Moon, and Planets 93, 163–173. https://doi.org/10.1023/B:MOON.0000047474.85788.01

Ol'khovatov, A. (2020a). New data on accounts of the 1908 Tunguska event.// Terra Nova,v.32, N3, p.234. https://doi.org/10.1111/ter.12453

Ol'khovatov, A. (2020b). Some comments on events associated with falling terrestrial rocks and iron from the sky.// https://arxiv.org/abs/2012.00686

https://doi.org/10.48550/arXiv.2012.00686

Ol'khovatov, A. (2021) - The 1908 Tunguska event and forestfalls. // arXiv:2110.15193 ; https://doi.org/10.48550/arXiv.2110.15193

Ol'khovatov, A. (2022) - The 1908 Tunguska Event And The 2013 Chelyabinsk Meteoritic Event: Comparison Of Reported Seismic Phenomena. // eprint arXiv:2206.13930 , https://arxiv.org/abs/2206.13930 ; https://doi.org/10.48550/arXiv.2206.13930

Ol'khovatov, A. (2023a) - The 1908 Tunguska event: analysis of eyewitness accounts of luminous phenomena collected in 1908. // arXiv:2310.14917 ; https://doi.org/10.48550/arXiv.2310.14917

Ol'khovatov, A. (2023b) - The Evenki accounts of the 1908 Tunguska event collected in 1920s – 1930s. // arXiv:2402.10900 ; https://doi.org/10.48550/arXiv.2402.10900

Ol'khovatov, A. (2025a). The 1908 Tunguska Event and Bright Nights. // arXiv:2502.01645, https://arxiv.org/abs/2502.01645 ; https://doi.org/10.48550/arXiv.2502.01645

Ol'khovatov, A. (2025b). Some mechanical and thermal manifestations of the 1908 Tunguska event near its epicenter. // https://eartharxiv.org/repository/view/8790/ ; https://doi.org/10.31223/X52F0H

Ol'khovatov, A. (2025c). Some Historical Misconceptions and Inaccuracies Regarding The 1908 Tunguska Event. // https://arxiv.org/abs/2505.05484 ; https://doi.org/10.48550/arXiv.2505.05484

Ol'khovatov, A. (2025d). The 1993 Jerzmanowice event in Poland and the 1908 Tunguska event. // https://eartharxiv.org/repository/view/9435/ ; https://doi.org/10.31223/X59F0P

Ol'khovatov, A. (2025e). Some Geophysical Aspects Of The 1908 Tunguska Event. // http://arxiv.org/abs/2507.21296 ; https://doi.org/10.48550/arXiv.2507.21296

Ol'khovatov, A. (2025f). The 1908 Tunguska event and electromagnetic phenomena. https://eartharxiv.org/repository/view/9781/ ; https://doi.org/10.31223/X5RR0T

Ol’khovatov, A. (2025g). The 1908 Tunguska event and the atmospheric optical anomalies. // https://arxiv.org/abs/2510.03239 ; https://doi.org/10.48550/arXiv.2510.03239

Ol’khovatov, A. (2025h). On radiocarbon near the epicenter of the 1908 Tunguska event. // https://eartharxiv.org/repository/view/10610/ https://doi.org/10.31223/X5V46T

Ol’khovatov, A. (2025i). The 1908 Tunguska event and some distant phenomena. // https://arxiv.org/abs/2511.17549 ; https://doi.org/10.48550/arXiv.2511.17549

Popova, O.P., Jenniskens, P., Emel’yanenko P.V., Kartashova A., et al. (2013) - Chelyabinsk Airburst, Damage Assessment, Meteorite Recovery, and Characterization // Science, Volume 342, Issue 6162, pp. 1069-1073, DOI: 10.1126/science.1242642

Stierman, D.J. (1981). Natural Explosive Noises.// Science, vol. 212, Issue 4500 pp. 1296-1297. DOI: 10.1126/science.212.4500.1296

Tomlinson, C. (1896). Barisal Guns and Similar Sounds. // Nature, v. 53, p. 295.

Wei, Zhi, Zhao, LianFeng, Xie, XiaoBi, et al. (2018). Seismic characteristics of the 15 February 2013 bolide explosion in Chelyabinsk, Russia.// Earth and Planetary Physics, vol. 2, issue 5, pp. 420-429. doi: 10.26464/epp2018039