

TECHNIQUES APPLIED FOR THE INVESTIGATION OF THE CASE OF ICE FALL FROM SKY IN AMAKHOH (M.P.), INDIA

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Abstract:

An incident of fall of a block of ice estimated to be weighing about 50 kg fell from the sky with a big rattling thunderous noise. The ice block was hazy-coloured and slightly smelly. The incident occurred on 17th Dec 2015 when there were no rains, no clouds and Sun was shining during the broad daylight. The ice block, after hitting a tin shed, fell over the shoulders of a 60-year-old poor tribal woman who was cleaning utensils outside her house under a shed, resulting in grievous injury to the lady and she had to remain hospitalized for many days. The matter was also reported to the office of the India Meteorological Department in Bhopal which denied the incident claiming that it could never be a weather-related incident.

The ice fall created great commotion all around and questions were raised as to how the incident could occur on a cloudless day and what was the source of ice. The author of this paper was contacted in the capacity of an Aviation Expert to explore the matter from the aviation point of view to probe the possibility of the ice being from aircraft.

The author while investigating the occurrence, made attempts to apply the process of elimination in isolating various causes of the fall of ice from the sky. Ultimately the probe was zeroed in on the target which was none than a commercial aircraft flying over the site at that moment.

Key Words: Blue Ice, Ice fall from Sky, Aircraft Toilets, Non-Meteorological Ice, Sewage from aircraft toilets

The Icy Saga of Sagar District in Madhya Pradesh, India

'Vangram Amakhoh' (Also known as Aamkhoh) located at Geographical Coordinates 23°14'03.39"N, 78°53'06.08"E is a medium-sized village located in Tehsil Kesali, District Sagar, Madhya Pradesh, PIN-470235, India, which lies at a distance of 70 km to the South of its District Headquarters, Sagar. The place has a small population of about 600, most of which are tribal.

That part of Madhya Pradesh usually remains dry during the month of December with no sign of rain, though it is normally quite cold. The same was the case on 17th December 2015 (Thursday) also the sky was clear and bright in the afternoon at about 13:00 Hrs.-Indian Standard Time. (This time corresponds to 7:30 Hrs. morning, Coordinated Universal Time UTC).



Residents of Amakhoh were engaged in their daily routine activities. And then suddenly, a most astonishing event took place, and the tranquillity of the village was shattered, compelling Amakhoh to welcome an uninvited monstrous guest. Out of the blue, an ice ball estimated to be weighing about 50 kg fell with a big rattling thunderous noise, as if something had crashed. Along with that screams were also heard. The ice block after hitting a tin shed in the village, fell over the shoulders of a 60-year-old poor tribal woman named Rajrani Gaud (Wife of Bihari Gaud & Mother of Hanumant Gaud) who was cleaning utensils outside her house under a shed, resulting in grievous injury to the lady.

Deepak Jain, the school teacher from the nearby Government school of Amakhoh narrated that he was hardly 25 feet away from the spot when the ice fell on the roof with a rattling noise. School children and many villagers also witnessed the fall, and the children informed that they had seen a white object falling.

The village people were stunned after the occurrence of such a strange phenomenon, but no one was sure as to how it could have happened and from where the odd object appearing as an ice slab had arrived. The injured lady Rajrani Gaud was taken to the nearest Community Health Centre at Kesali by ambulance and was admitted there. The lady remained hospitalized for a couple of days and then was discharged. She was lucky enough to survive since the chunk of ice first crashed into the edge of a terrace of a house before hitting her.

The matter was also reported to the office of the India Meteorological Department in Bhopal (Capital of M.P.), who denied the incident claiming that it could never be a weather-related incident.

When the news of the incident of ice fall was received, the media took special interest and deputed its correspondents to the site. The author of this paper was also contacted in the capacity of an Aviation Expert to get the authentic views of the author after probing the matter so that the proper cause of the incident could be determined.

The line of Investigation

As a matter of fact, for many years reports of bizarre incidents of large blocks of ice falling from the sky even in dry weather are appearing in the newspapers, TV and other media. Such incidents create a lot of commotion and panic around the world due to the sudden appearance of the ice block from nowhere, its unusual size, potential danger caused by them and other features.

Initially, people try to relate the mysterious object to a particular type of hailstone or a meteorite, many others call it a megacryometeor, some see it as an accidental fall of a box of ice from aircraft, and various other similar theories. Some people try to touch it, carry it home to store in the fridge and a few even dares to taste it thinking that it's heavenly or supernatural ice.

It is a bit strange to believe that the origin of many of the cases of ice falling from the sky is not at all related to the weather but to an odd object; a commercial airliner or a transport kind of aircraft; and that too from the most unexpected place, from one of its toilets. As a matter of

fact, the block of ice, also known as "Blue ice" or "Aircraft Ice" is a mixture of human bio-waste and liquid disinfectant that freezes at high altitudes.



Ice Piece which fell from sky in MP (India) on 17th Dec 2015 causing injury to an old woman.

In a similar manner, after the occurrence of the above-reported case of ice fall, questions were raised from many corners to ask if there was any way to confirm & authenticate the source of ice. Could it be from the angle of weather, from the angle of being some sort of Extra-terrestrial object such as an asteroid or a meteorite, or as a megacryometeor, an after-effect of global warming and many more? Many people on the ground start talking about the piece of ice as heavenly ice cream or a gift of ice from the gods. On many occasions, certain people have taken the ice chunks as a remedy for various ailments and certain others have dared to even taste it.

However, when we look into the situation realistically, the ice sample can be broadly categorised into either a meteorological event or a non-meteorological event. It is also worth considering that preventive measures can only be done with "aircraft ice" and not with any other kind of ice since there is no human control over meteorological or natural incidents. Nevertheless, there is always a possibility of doing something in the case of non-meteorological cases, particularly in the cases of ice chunks falling from aircraft toilets.

The author is of the strong opinion that while keeping in view the safety angle; it is high time that we should change our attitude towards these cases. Thus, if the problem is viewed from the safety angle, then all the cases of ice falling from the sky should be initially presumed to pertain to the aircraft toilets. Particularly the cases of ice fall during dry weather, cloudless sky or the isolated cases of ice falling at a single or two to three limited locations or the cases where the size, colour, odour, texture, physical appearance etc. is unusual or differing from normal hailstones. Exceptions would be the obvious cases of ice falling from the roofs of buildings in cold countries or cold weather, ice with rocks, and perhaps cases of widespread hail. And after subsequent investigations, when it almost gets confirmed that the source was not from an aircraft, only then the case should be treated to non-aviation sources. From the facts & figures unveiled so far, there are many cases which could definitely be put under the category of Non-Meteorological Ice or the ice from the lavatories of the aircraft on account of their blue/ greenish colour, soapy smell or the smell of detergent or due to the smell of urine, or human waste, or their sticky touch.

The site of the incident was located in the interior part of Madhya Pradesh, which was a little difficult to approach. Moreover, the ice had already melted by the time the incident came to light. Thus, no testing of the ice sample could be done, and most of the evidence was gathered through eye-witness accounts and the photographs taken by the eye-witnesses and the newspaper team.

It was learnt from the eyewitnesses that the weight of the ice was about 50 kgs and its colour was not transparent, but rather hazy coloured and slightly smelly. As no direct evidence of the event was available, the only option left to determine the source of ice the author was to follow the process of elimination, which is a method in which initially multiple options are chosen out of the several available choices and then they are eliminated one by one, based on their likelihood.

Ice ball from sky may be frozen plane poo

Chunk Crash Injures Tribal Woman

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Bhopal: A 60-year-old tribal woman suffered a shoulder injury after a football-sized chunk of ice fell on her from the sky in Sagar district of Madhya Pradesh. What was touted as a rare, celestial occurrence in district's Aamkhoh village on December 17, has now grabbed attention of aviation scientists who believe culprit could be a commercial plane which dropped a ball of frozen poo and urine from its toilet.

Experts say this will perhaps be the first incident in India, where a person suffered injuries due to fall of ice from a passing plane. Eyewitness's claim the victim, Rajrani Gaud, is alive only because the 50kg ice chunk crashed into edge of house terrace before hitting her.

"I was only 25 feet away from the spot where the monster came crashing from the sky. Children and villagers witnessed the fall and then heard screams. We ran towards Rajrani house



Injured tribal woman in Sagar

and referred her to hospital," Deepak Jain, a government school teacher in Aamkhoh village told TOI. "The ice ball hit the roof first. Otherwise, it would have smashed her skull," he said.

It could either be a 'Blue Ice' - a term used in context of aviation for frozen sewage material leaked mid-flight from aircraft's toilet or a 'megacryometeor' - extremely large atmospheric ice conglomerations that fall under blue-sky atmospheric conditions.

If it was a 'Blue Ice', the incident will be termed as 'aircraft accident and victim is entitled to compensation under Aircraft (Investigation of Accidents and

Incidents) Rules, 2012, said expert. However, administrative authorities are not bothered about the incident, which was not officially reported.

Then district collector A K Singh said he did not get the matter investigated as he thought it was a rumour.

But for Bimal Kumar Srivastava, Delhi-based independent aviation consultant, who had been working on "Blue Ice falls from sky" for last many years, the

►Shit happens, P4

Aamkhoh ice fall incident was a subject of investigation and documentation. He reported the matter to Director-General of Civil Aviation & Director General of India Meteorological Department. He got to know about the ice fall from a Hindi daily which quoted it as a mysterious incident.

"There is a strong possibility that the ice block may have fallen from the toilet of some aircraft cruising on the flight route and injured the old woman," said Srivastava, who has more than 45 years of aviation experience in field of air traffic control, aircraft accident investigation, airport planning, airport management and airport obstacle survey.

Elimination of the possibility of super sized hail:

Could the ice be a collection of ice flakes formed within rain clouds or could it be an accumulation of hail? Of course, this was highly improbable, since as usual, the weather was dry in December in that region with a bright Sun. Then, there were no rains and no rain forming clouds such as cumulonimbus.

Furthermore, normally the cases of hailstorms are accompanied by rainfall, and they cover a widespread area. Thus, the fall of a chunk of ice at one particular isolated location over the roof of a house cannot be related to a hailstorm.

The Meteorological Officer from India Meteorological Department (IMD) at Bhopal also ruled out the possibility of a weather-related phenomenon. Moreover, the photographs of the ice chunks appearing in the newspapers showed the shape of the ice as amorphous & rugged, unlike the common hailstone. Thus, the possibility of any kind of super-sized hail was ruled out.

Elimination of the possibility of global warming:

Could it then be a part of global warming? May not be possible, as global warming normally affects a widely spread area and it may not occur at a single isolated location over a hut.

Elimination of the possibility of being a megacryometeor:

Megacryometeors are extreme atmospheric events: a large atmospheric ice conglomeration that, despite sharing many textural, Hydrochemical and isotopic features with hail, are formed under unusual atmospheric conditions which clearly differ from those of the cumulonimbus clouds scenario (via clear-sky conditions).

The term 'Megacryometeor' was coined in January 2000 by Dr Jesus Martinez-Frías, a planetary geologist at the Centre for Astrobiology in Madrid, Spain, who pioneered research into megacryometeors, after ice chunks weighing up to 6.6 pounds (3.0 kg) rained on cloudless skies for ten days. According to Dr Jesus Martinez-Frías, more than 50 megacryometeors have been recorded since the year 2000. [Megacryometeor, a term where "mega" means "big", "cryo" means "ice" and "meteor" means related to outer space.

It was least likely to be a case of megacryometeor since the shape, tint (colour shade) and other features of the ice chunk didn't match with the expected clear & transparent definition. Thus, the possibility of a megacryometeor was also ruled out.

Elimination of the possibility of some sort of Extra-terrestrial object:

Had the ice chunk been of celestial origin, the object or a part of the object should have contained a rocky, stony, or hard metallic structure. Further, when such objects fall through the atmosphere, they tend to become very hot or emit a fire trail or sparks, which was not seen in that particular case.

It can be seen from the photograph of the ice that it was without any evidence of solid material. Furthermore, the ice melted after the fall and did not leave any trace of solid particles. Thus, it was evident the ice was not of celestial origin.

Elimination of the possibility of ice from the roof of a multi-storied structure:

In cold countries, a lot many cases of falls of frozen blocks of ice from the roofs of multi-storied structures or hi-rise buildings are being reported regularly. This is however not applicable to India, which has a warm climate.

Thus it was almost a definite case of fall of non-meteorological ice that could have fallen from an aircraft flying over the Amakhoh village. Eyewitnesses at the village also informed that they always happen to see many aircraft flying over the village at high levels, whenever the weather is clear and the sky is not cloudy.

Passage of ATS Route A-791 Over the Village

For further analysis of the event, the author made attempts to determine the location and the Geographical Coordinates of the Village Amakhoh situated at a distance of 68 km from Sagar Railway Station on a bearing of 168°. It worked out as 23°14'03.39"N, 78°53'06.08"E. The coordinates were plotted on Google Maps and also on the Aeronautical Charts, showing various ATS Routes (Air Traffic Services Routes) in the area along with the Geographical Coordinates.

ATS Routes are like highways for ground vehicles with a particular defined path connecting one airport with another. The ATS routes are structured in such a manner that the aircraft flying over those routes have to use various Radio Navigational Aids such as VORs (Very High-Frequency Omni-directional Radio Ranges), NDBs (Non-Directional Beacons). Or they may be in terms of assumed ground positions based on GPS Coordinates.

Radio Navigational Aids provide directional and vocational guidance to the aircraft using transmission of radio waves from the Radio Beacons located on the ground. All aircraft while passing over those reporting points are required to communicate with the relevant Air Traffic Control Centre (ATS Centre) and transmit their position, Report & flight details in terms of aircraft Call Sign, Place of Departure & Destination, Time of crossing the reporting point, Flight Level, expected time of arrival over the next reporting point etc.

In this case, the ATS Route A-791 passes over various Radio Navigational Aids such as Udaipur VOR, Pratapgarh VOR, Bhopal VOR, Jabalpur VOR, Jamshedpur VOR and then over Kolkata VOR and beyond. In between, the route passes over various ATS Reporting points (such as ATOBU, DABKI, GOLOX, ASOPO, BEGUM Etc.). It may be mentioned

that the location of Amakhoh is quite close to the ATS reporting point DABKI. It has also been reported by eyewitnesses from Amakhoh Village that in good weather they find aircraft flying at great heights over their village from East to West or West to East on a regular & frequent basis. A sketch showing the location of various ATS Routes existing in that area is attached.

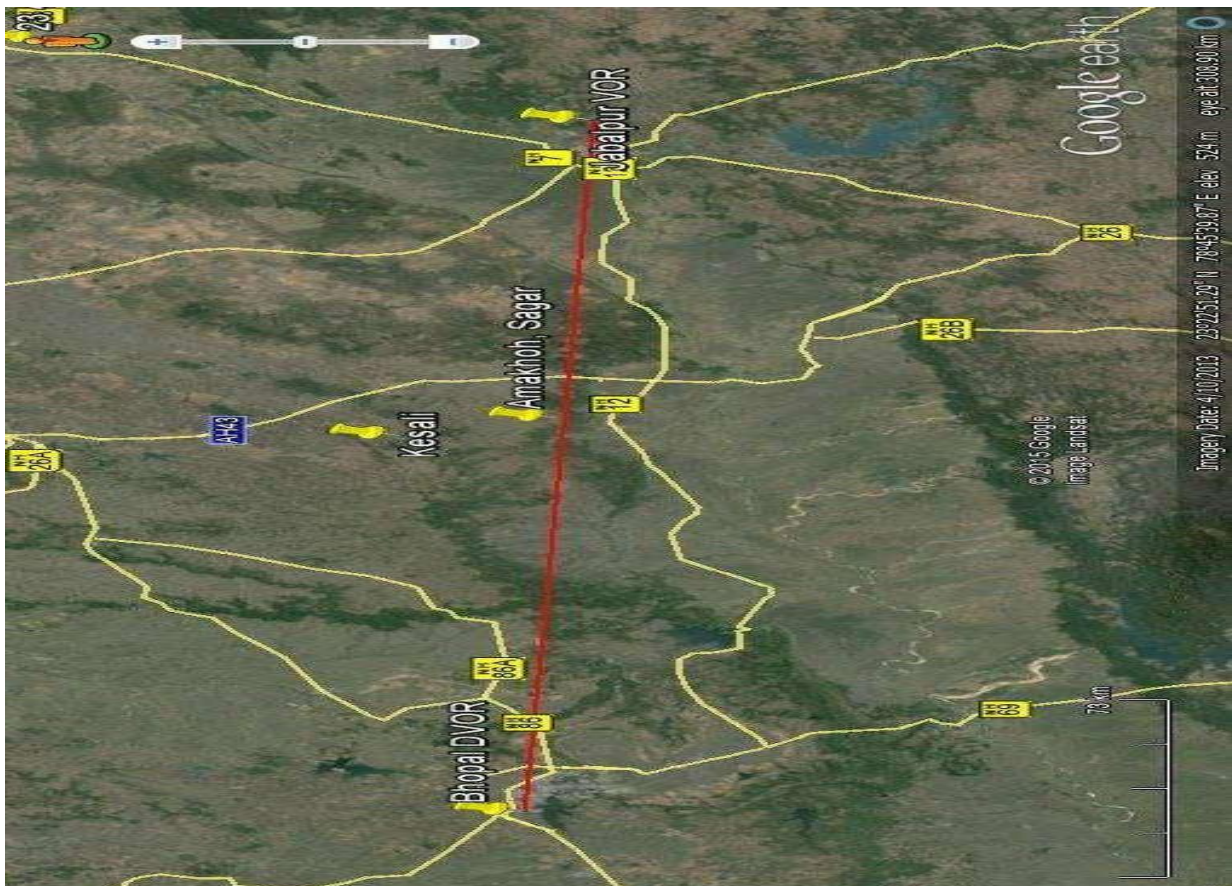
On the examination of aeronautical charts, it was observed that the incident site (Amakhoh) was located exactly underneath the ATS Route A-791, which is lying in the East/ West/East direction connecting Karachi-Kolkata or Karachi/Bangkok airports. The precise position of Amakhoh, was found to be at a distance of 160 km East of Bhopal Airport on a bearing of 91° and 121 km West of Jabalpur Airport. It may be mentioned that Bhopal and Jabalpur are equipped with Radio Navigational Aids (D-VORs) and are designated as compulsory reporting points for the ATS Route A-791. On this route, international flights for Karachi/Kolkata or Karachi/Bangkok are frequently operating.

It supported the theory that there was a strong co-relationship between the ice falling and the site of the incident and that the block of ice most probably would

have fallen from the toilet of an aircraft cruising on the flight route. A rough sketch of Google Earth shown below will show this in more detail.

Air Traffic Control Centre Nagpur/ Mumbai functioning under the Airports Authority of India, where records of all aircraft movements (for a limited period) operating in that area are maintained. All Scheduled and Non-Scheduled airlines overflying on any particular air route normally maintain their altitudes at between 10 to 15 km (About 30, 000 ft to 45, 000ft).

As this was too late, however, it would have been better if the records of all aircraft flights which had operated on A-791 on the day of incident viz 17-12-2015 between say 1200 Hrs. to 1400 Hrs. IST (Including their timings of crossing over Bhopal & Jabalpur), could be found out, including the Registration & Type of those aircraft. This job could have been done only by the Airports Authority of India (In charge of ATC) and under the overall control of DGCA, which is the regulatory authority for Civil aircraft in India



Once this job was done, it would have been possible to determine details of overflying aircraft which was over the village Amakhoh at that time.

The author, to his own satisfaction, used two aircraft tracking software systems viz., "Flight Radar24" (Link: <https://www.flightradar24.com/28.56,77.16/13>) and "Plane Finder" (Link: <https://planefinder.net/>) to identify the aircraft involved. And lo, he was able to zero down on three aircraft, which had overflowed Amakhoh during that period. One of the aircraft was found to be flying at around 1300 Hrs. IST, almost matching the reported time of the incident, and most probably it had caused the incident, on account of the drop of ice from its toilets. The same aircraft should be checked for evidence of any leakage from the toilet lines. This could have confirmed the involvement of the particular culprit.

However, the most unfortunate fact was that the author was not in the capacity to reveal the identity of the aircraft due to reasons that such work can be done only by the regulatory authorities and not by a private individual, who doesn't have any other evidence available except the analysis of past events. Nevertheless, looking at the circumstances and data from the aircraft tracking software, it was a definite and confirmed case of ice falling from an overflying aircraft.

Nevertheless, it is felt that in future, under such circumstances, Aviation authorities should take note of the events, so that a thorough and complete investigation could be done.

Legal Angle:

This could perhaps be the first reported incident in India where a person got injured due to ice falling from the sky, and according to the author, the occurrence should have been categorised as a case of third-party damage caused by an aircraft, which is covered under the Rome Convention 1952, to which India is a signatory.

Further, as per the ICAO and the "Aircraft Manual," the definition of Serious Injury is

'Serious injury.' An injury which is sustained by a person in an accident and which:

- *requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received: or*
- *results in a fracture of any bone (except simple fractures of fingers, toes, or nose); or*

- *involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or*

Taking into consideration the facts & figures it could be concluded that the poor old woman 'Rajrani Gaud' from the village Amakhoh suffered serious injury as a result of being hit by the ice from the aircraft and that she was eligible for suitable compensation. At least a compensation on account of the 'Third Party damage'. However, the biggest questions are "the compensation from whom?" and "how?" for which the author has no answer.

Subsequently, taking cognizance of the newspaper reports, the Madhya Pradesh Human Rights Commission (MPHRC) issued a notice to the MP Government seeking a report on an unusual incident injury to an old woman. It seems there was no further development in the matter, and thus, that was the end of the episode.

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BIO DATA



The author, Bimal Kumar Srivastava is a B.Tech. Degree Holder from IIT Kanpur in Electrical Engineering passed out in the year 1968, and also holds equivalent degrees in Aeronautical Engineering with Aircraft Navigation & Operations Group, and with Avionics Group from the Aeronautical Society of India.

Mr Srivastava commenced his career at as Assistant Aerodrome Officer at Mumbai Airport with Director General of Civil Aviation in 1970 and finally retired in the year 2006 from Airports Authority of India (AAI), New

Delhi as General Manager. He then set up his own company "Aero Survey" in New Delhi working as an independent Aviation Consultant & Director.

Thus, Mr Srivastava has 52 years of experience of working in various fields of Aviation including Air Traffic Controls, Airport Management, Airport Obstacle Survey (OLS Survey), Aircraft Accident Investigation, Aircraft Engineering, airport Management and in other miscellaneous fields related to aviation. He had also worked as Airport Director In-charge of Hyderabad International Airport, Guwahati International Airport and Pune Airport.

While functioning as Air Safety Officer at Mumbai Airport, he was handling the matter pertaining to Air Safety and the Accident & Incident Investigation of aircraft. He was closely associated with the investigation of a number of cases of major & minor aircraft accidents of commercial airliners.

Mr Srivastava has written a number of books mainly on the topic of aviation in Hindi & English. Most of his books in Hindi were honoured with several awards from the Government of India (From the Ministry of Civil Aviation, Ministry of Science & Technology, Ministry of Tourism, and Ministry of Home affairs. He was also awarded "Indira Gandhi Rajbhasha Awards by the President of India. He has also published a number of Technical Papers in various Technical Journals. His name also appears in the Limca Book of Records for simultaneous publication of four of his articles on four different topics of Science on the cover pages of four different Science Magazines in Hindi & English in Sept 2006. It may be mentioned that 'Limca Book of Records' is an annual reference book published in India documenting world records, categorised in education, literature, agriculture, medical science, business, etc. His articles on the topics of Aviation, Science, Tourism and General subjects have been published in more than 1000 Hindi & English Newspapers & Magazines. His latest book on topic "**FALL OF ICE FROM THE SKY- A GLOBAL NUISANCE**" has been published by Amazon (KDP) in June 2021

Mr B K Srivastava's recent book is published in March - June 2021 entitled "Fall of Ice from the Sky - A Global Nuisance", contains a list of about 600 cases of ice fall from all over the world from aircraft and thereby shows the dangerous implications of such incidents.

Mr B.K. Srivastava is presently working as an Aviation Consultant and the Director, in Aero Survey Pvt Ltd, in New Delhi providing technical consultancy in the field of

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