

# LIGHTNING DATA CENTER MINUTES

May 10, 2019

ST. ANTHONY HOSPITAL WEST, LAKEWOOD, CO

[www.lightningdatacenter.org](http://www.lightningdatacenter.org)

Quote of the Month: “According to the ancients, no one could be struck by lightning while asleep, and no tree struck by lightning could be burned. Splinters from such a tree, diligently chewed, were an infallible cure for toothache and were, of course, pleasanter to the taste than the dentists’ forceps.”  
*The Day Book*, Chicago, IL, December 1, 1913.

1. Members Present: Clark, Langford, Elder and Claus. Meeting began at 11:55 AM and ended at 1:20 PM. Clark moderated.
2. The LDC is accepting donations, either as cash or check. If you donate via check, please make your check payable to Steve Clark at 755 S. Clinton Street, #2A; Denver, CO 80247. He will cash the check and keep the cash holdings specifically for the LDC. When the LDC incurs expenses, Steve will pay for services rendered through his bank account using the cash from LDC’s cash holdings. A log will be maintained detailing the inflow and outflow of monies. At the present, the LDC has \$154.00 in cash holdings.
3. Rich Kithil sent us a link on the photonuclear reactions resulting from lightning discharges. These reactions have long been suspected to occur but have not been observed conclusively until fairly recently. The science journal *Nature* published these findings in 2017. Links to the abstract and to an illustration showing the reaction mechanism can be found below.
4. Robert Gift and Carl Swanson sent us a couple of “lightning in the news” items.

On May 5, a Russian Aeroflot jetliner, a Sukhoi Superjet 100, made an emergency landing at Moscow’s Sheremetyevo Airport and burst into flames. There were 78 passengers and crew on board and of those, there were 41 fatalities reported as of May 7. Two persons on board, the pilot and an engineer, said lightning struck the plane shortly after takeoff. The engineer said it is possible the lightning could have damaged the internal electronics. The investigation into the crash is ongoing at the time these minutes are being written; therefore, it is premature to reach conclusions until it is complete.

A tree in Littleton, Colorado was hit by lightning in a recent storm. Three photos from a Denver TV station vividly illustrate the power of lightning. A large part of the tree, looking much like a 2x4, was speared through the exterior and interior walls of a house. The point of the “spear” was on a bed in someone’s bedroom. Thankfully, no one was in the bed at the time this happened. The photos are at the bottom of these minutes.

5. Brooke Pearson, a businessman who has been with Vaisala for 32 years, gave us a presentation titled: “Destructive Lightning Strikes”, which addressed what is referred to as “continuous lightning”.

He started his presentation with some background information on Vaisala. Vaisala is headquartered in Helsinki, Finland and has operations around the world. During the 1930's, Professor Vilho Väisälä invented some of the operational parts of a radiosonde, an instrument used to measure meteorological variables as it rises in the air while tied to a weather balloon. The company was established in 1936 and has become a world leader in the design and manufacture of sensors for meteorology, indoor environments, and industrial applications. They have even designed sensors used onboard interplanetary spacecraft.

Globally, approximately 24,000 deaths and 240,000 injuries are attributed to lightning per year. The actual number of those killed and injured globally is difficult to estimate as most deaths and injuries occur in developing parts of the world.

The United States is impacted by approximately 70 million strikes per year. In the United States, when lightning strikes, an electromagnetic signature is detected in a network of approximately 120 detectors. Triangulation and other methods determine where the lightning struck.

The detectors can only detect peak current amplitudes from around 2 kA up to around 400 kA. Until recently, the network was never able to determine which strokes cause the most damage. A typical lightning strike has a duration on the order of 120 microseconds. About 5-10% of all lightning flashes last 1000 times longer than typical flashes. More specifically, only about 5% of lightning is positive. Of those positive strikes, about 50% of those are continuing current strikes. These longer-lasting flashes transfer more electrical charge, which causes extreme heating. Those flashes are far more likely to start fires or cause other damage. Negative strikes can also be continuing current strikes.

These longer-duration flashes were discovered using a combination of the new GOES-R satellites and the National Lightning Detection Network (NLDN). More specifically,

the new GOES satellites carry the Geostationary Lightning Mapper (GLM), which:

- detects the optical signal of most lightning events,
- detects the duration of the optical signal and
- sees the earth as a grid of 80-100 km pixels.

the NLDN:

- detects the electromagnetic signals of the lightning event and determines if it is a cloud-to-ground stroke rather than in-cloud lightning,
- estimates the peak current and polarity, and
- identifies the location of the strike to within 150 meters.

The combination of the duration of the lightning events as seen by the satellite and the high resolution of the NLDN allow for the detection and location of these longer-duration flashes. Researchers have determined if the duration of the flash exceeds 20 milliseconds, it is deemed to be a continuous current flash. There is some discussion of redefining that parameter, along with the possibility of having a flash duration scale, somewhat akin to scales of intensity for other natural phenomena. Also, this marriage of technologies is relatively recent and will likely be updated and refined for years to come.

6. LDC welcomes your medical questions. Please send them via e-mail to Steve Clark at [sclarktoto@gmail.com](mailto:sclarktoto@gmail.com). Your medical questions will be forwarded to Dr. Phil Yarnell for his review and will usually be taken up for discussion in the next month's meeting. Please be advised any questions posed are for the general consideration by the group and do not constitute a formal medical opinion. If a formal evaluation is requested, arrangements can be made directly with Dr. Yarnell. If you have a medical emergency, please call 911 or your local emergency services provider.
7. Questions, comments, notification of errors, and critiques of these minutes are welcome. Please forward those to Steve Clark at: [sclarktoto@gmail.com](mailto:sclarktoto@gmail.com). Please keep your communications professional and respectful. Communications will be forwarded to the appropriate author(s) of the minutes and addressed accordingly.
8. LDC Disclaimer: These minutes do not represent official positions of the LDC or its members. They simply reflect the comments made at the meeting. Furthermore, the LDC does not implicitly or explicitly recommend or endorse any product or service. Any product or service presented in these minutes is done so for purposes of discussion and analysis. The merit (or lack thereof) is open for the consideration and review by the entire membership.
9. Next meeting: Friday, June 14, 2019, from 11:45 AM to 1:00 PM at St. Anthony Hospital West. Room: Conference Rooms E & F. Meeting Format: TBA.

Respectfully Submitted,  
Steven E. Clark, Consulting Meteorologist

## **Lightning Links**

**This is a monthly listing of periodicals, websites, and videos about lightning and allied areas from a variety of sources. A headline or description is listed, followed by the link. Please note that some of the links are perishable, which means you'll need to go to the source for the information.**

Pearson, B. 2019: Vaisala Develops First-Ever Methodology to Identify Lightning Strikes with Continuing Current. Blog. January 2019.

Link: <https://www.vaisala.com/en/blog/2019-01/vaisala-develops-first-ever-methodology-identify-lightning-strokes-continuing-current>

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Porter, L. 2019: Can a Lightning Strike Bring Down a Passenger Jet? *The Telegraph*. May 7, 2019.

Link: <https://news.yahoo.com/happens-lightning-hits-aeroplane-100000004.html>

CBS/AP. 2019: Russian Plane Crash Survivor Recalls Lightning Strike Moments Before Descent. *CBS Evening News*. May 7, 2019. Link: <https://www.cbsnews.com/news/russian-plane-crash-survivor-recalls-lightning-strike-moments-before-descent/>

R. M. 2019: A Plane Crash in Moscow Raises Safety Questions About the Sukhoi Superjet. *The Economist*. May 7, 2019.  
Link: <https://www.economist.com/gulliver/2019/05/07/a-plane-crash-in-moscow-raises-safety-questions-about-the-sukhoi-superjet>

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CBS4 Denver. 2019: Lightning Strikes Tree, Wood Flies into Home. *KCNC-TV*. May 7, 2019.  
Link: <https://denver.cbslocal.com/2019/05/07/littleton-lightning-strike-home/>

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Enoto, T., Y. Wada, Y. Furuta, K. Nakazawa, T. Yuasa, K. Okuda, K. Makishima, M. Sato, T. Nakano, D. Umemoto and H. Tsuchiya. 2019: Photonuclear Reactions Triggered by Lightning Discharge. *Nature* **551**, 481-484 (23 November 2017).  
Link (Abstract): <https://www.nature.com/articles/nature24630#f7>

Illustration of Lightning-Triggered Physical Processes.  
Link: <https://www.nature.com/articles/nature24630/figures/7>

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Image Source: KCNC-TV / Littleton News / West Metro Fire



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