

Subject: Lightning Data Center Minutes for March 14, 2003
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LIGHTNING DATA CENTER
MARCH 14, 2003
MINUTES
ST. ANTHONY HOSPITAL, DENVER, CO
www.stanthonyldc.org

Quote of the Month:

"A storm was way off to the west, beyond the mountains. Stanley could count more than thirty seconds between the flash of lightning and the clap of thunder. That was how far way the storm was. Sound travels a great distance across a barren wasteland...and every time the lightning flashed, the dark shape of the mountains would briefly appear."

Louis Sachar in Holes, Dell Yearling 1998

1. Meeting began at 11:30 am and adjourned at 1:30 pm.
2. Members present: Blanke, Breed, Burrows, Cherington, Collier, Gift, Glancy, Gutman, Keen, Kozak, Langford, Lines, McDonough, Olson, Rackley, Russon, Sahn, Sanders, Stewart, Wachtel, Yarnell.
3. I brought the following articles from the literature (abstracted in part here):
 - a. Voldman SH. Lightning rods for nanoelectronics. Sci Amer 2002 Oct:90-7

"Like tiny lightning bolts, discharges of static electricity can ruin modern microcircuits. Every time chip features become smaller and more delicate, designers must improve the protective measures against electrostatic discharge {ESD}...What causes electronics to fail when ESD occurs? The main culprit is heat generated by the electric current of the discharge, which can be enough to melt the material...Today all microprocessors and many other devices...use ESD protection circuits and power clamps...ESD protection is of great concern for the space applications, in which charges build up on surfaces from sources such as the Van Allen belts near the earth and particles streaming from the sun.

- b. Cherington M. Neurologic manifestations of lightning strikes. Neurol 2003;60:182-5

"The neurologic syndromes can be divided into the following four groups: immediate and transient, immediate and prolonged or permanent, delayed, and traumatic lesions secondary to falls and blast effects. Neurobehavioral complications are frequent and resemble the symptoms of patients with traumatic brain injury."

4. Professor Philip Krider of University of Arizona sent an email message to inform us of the Summer School of Mountain Meteorology to be held in Trento, Italy on August 17-22, 2003. Deadline for application = May 30, 2003. Website: www.unitn.it/ssmm <<http://www.unitn.it/ssmm>>

5. Mike Foley reports that on Thursday, March 20, 2003 the IEEE/PES/IAS Denver Chapter meeting will be held at Brooklyn's Restaurant, 2644 W. Colfax (303-572-3999). Dinner will begin about 6:25 pm. Presentation will start about 7:00 pm. The presentation: "The Four Theories of Lightning Protection." Speaker: Paul Resler, National Lightning Protection. Non-member cost = \$15.00. Check with Mike Foley about more details. Reservations (303 388 6322) should be made by noon on March 19.

6. Dr. Mary Ann Cooper of University of Illinois (Chicago) reports that the American Society of Safety Engineers is meeting in Denver, June 22-25.

7. Dr. M. Shmatov sent information on the 8th International Symposium on Ball Lightning in Chung-Li, Taiwan. Dates: August 5-8, 2003. For more information contact: Mr. Hideho Ofuruton email: ofuruton@kouku-k.ac.jp

8. Vicki Middleton, Office of Medical Education, was unable to attend today's meeting. She was going to give us an update on plans for LDC' sponsorship of an International meeting. She did submit her memo for our group to consider. She invites our members to send their comments via email to her (VickiMiddleton@Centura.org).

9. Our guest speaker today is Seth Gutman who is Chief of the GPS-Met Observing Systems Branch of the NOAA-Research Forecast Systems Laboratory in Boulder, CO. The title of his talk: "Possible Use of GPS for Improved Lightning Prediction."

Seth gave an outstanding presentation. I cannot give a full synopsis of his talk here. I can set down the few notes that I took during his lecture:

- a. GPS = global positioning system. GPS was developed by the U.S. Military to provide accurate positioning, navigation, and timing anywhere on earth.
- b. GPS has been used to monitor atmospheric water vapor from ground-based GPS sites.
- c. Goal is to improve lightning forecasting at Cape Canaveral Air Station and the Kennedy Space Center.
- d. GPS water vapor monitors installed by the Coast Guard.
- e. How does the atmosphere affect GPS signal? Slowing and bending of GPS signal is caused by temperature, pressure, and water vapor in the troposphere.
- f. 95% of moisture in the atmosphere is within 5 km.

- g. Most ground based lightning detectors use time of arrival methods.
- h. Water vapor (gaseous phase) moving rapidly through the atmosphere redistributes energy through evaporation and condensation.
- i. Three ingredients in developing thunderstorms: moisture in lower troposphere; cold temperature in mid-troposphere; lift that pushes moisture upward.
- j. Storms tend to dissipate when downdrafts dominate over updrafts.
- k. Moisture flow is important in predicting lightning at Cape Canaveral.
- l. Can the "Mazany model" be applied in other locations? Answer not yet known.

For those wanting more detailed information, the following reference is recommended: Mazany RA, Businger S, Gutman SI, Roeder W. A lightning prediction index that utilized GPS intergrated precipitable water vapor. Weather and Forecasting 2002;17:1034-47.

- 10. Next meeting: April 11, 2003 at 11:30 am in the Main Auditorium of St. Anthony Central Hospital.

Speaker: Professor Howard Wachtel, University of Colorado at Boulder
Topic: Can "Invisible Lightning" Kill?

Respectfully submitted,

Michael Cherington, MD