

LIGHTNING DATA CENTER MINUTES
DECEMBER 10, 2010
ST. ANTHONY CENTRAL HOSPITAL, DENVER, CO
www.stanthonyldc.org

Monthly Quote: “The best way for delicate electronic equipment, such as computers and transmitters to survive expected heavy electromagnetic pulses from a pole shift, would be...to be in a box of Mumetal.” On the web at:
<http://www.zetatalc.com/info/tinfo22p.htm>

1. Meeting began at 11:50 AM and adjourned at 1:05 PM.
2. Members present: Clark, Langford, Wells, Yarnell, Collier, Wachtel (Howard and Claire), Stewart, Nibbe, Elder, Gift, Cui-Gift, and Cherington (Michael and Nancy). Clark moderated the meeting.
3. There is a minor correction to the November 2010 minutes, where we were discussing ball lightning. In the minutes, Cherington noted he was not aware of any fatalities due to ball lightning. Let the correction indicate that Cherington was not aware of any “convincing” reports of fatalities from ball lightning, although he says there are reports of fatalities by ball lightning in the literature. This was further elaborated during this month’s meeting. Cherington indicated he had reviewed the medical literature using Pubmed and other online medical resources. Langford stated there are some reports of fatalities by ball lightning and gave Cherington some photocopies describing the cases. Clark wondered if the fatalities may be missed due to physicians not knowing the signs of ball lightning-induced injuries and fatalities, similar to the way injuries and fatalities had been underreported due to conventional lightning.
4. Howard Wachtel, Professor of ECEE and Neuroscience at the University of Colorado, was the featured speaker with his presentation “You Have A Magnetic Personality!” This talk was about the instrumentation used to detect magnetic fields generated by the human body, with emphasis on the MEG.

Over 20 years ago, magnetic fields were recorded in the brain at MIT.

A magnetocardiogram (MCG) is generated by the magnetic fields resulting from the electrical current, which causes the heart to beat. These fields are very similar to the more familiar EKG, and thus are not all that useful to physicians.

Functional Magnetic Resonance Imaging (fMRI) relies upon a change of the resonant frequency of hydrogen or other ions. Oxygenation of hemoglobin in the blood will result in increased neural activity, which will change the resonant frequency, allowing for detection by the instrument.

Transcutaneous Magnetic Stimulation (TMS) uses strong magnetic pulses to induce internal stimulation currents. The rapid rise in the magnetic field over a short time period results in a brief induced current, which stimulates the nerve cells. Howard thinks nearby lightning strikes may produce similar pulses. First, lightning can produce severe injury, such as v-fib, even without burns or other obvious signs of entry/exit. Second, this could also explain why, in closely congregated groups of lightning-struck people, why some have burns and survive the strike, and others do not show burns and are killed. Third, a lightning flash is apt to have extremely high currents, thousands of amps, rising very rapidly, in microseconds. This will produce an induced magnetic field as strong as that used in TMS, if not greater.

A psychiatrist at the University of Colorado, Marty Wright, started the school's magnetoencephalography (MEG) unit, which was one of the earliest facilities in the nation. It is thought the facility was the first to be established west of the Mississippi River. MEG senses magnetic fields produced by intraneuronal currents. It is estimated that between 50,000 to 100,000 neurons must be synchronously active for a detectable MEG signal to be produced. Magnetic fields are measured in femtoteslas. One femtotesla is 10^{-15} tesla, or one millionth of one billionth of a tesla. Small indeed! By comparison, the Earth's magnetic field is in the range of 30 to 60 microteslas, which is substantially larger. The most successful application of MEG is in the location of loci associated with epileptic seizures, which are detected at around 1000 femtoteslas. So how are epileptic seizures detected if the Earth's magnetic field is so much larger? Both the patient and the MEG are housed in a large room totally surrounded by 3-inch aluminum walls and mumetal. Mumetal is a nickel alloy, which shields the interior of the room from the Earth's magnetic field. The MEG unit itself looks somewhat like a large cone that is bent slightly in the middle and it can be positioned for a patient sitting in a chair or lying down on a bed. At the narrow end of the cone is a cavity, which covers the top of the head. In the cavity, there are 256 magnetic coils. The MEG is cooled by liquid helium to near absolute zero. If the MEG is not cooled, the electronics will have sufficient background noise to mask the smaller signals.

Finally, Howard contrasted MEG to FMRI and EEG. As compared to FMRI, MEG has a better temporal resolution (1.5 ms vs. 6-10 seconds: return time to baseline following stimulation). FMRI has a better spatial resolution (~0.25 to 3 mm in high fields vs. 5 to 10 mm). As compared to EEG, MEG has a better spatial resolution (0.5 to 1 cm vs. 1 to 2 cm). MEG instruments are much more costly to purchase and they also have higher operating costs as compared to EEG. The MEG measures the magnetic field, whereas the EEG measures the electric field. The water in the brain does not distort the magnetic field, but it does distort the EEG field.

Thank you, Howard, for a most informative talk. I hope these notes are sufficient.

5. These minutes do not represent official positions of LDC or its members. They simply reflect the comments made at the meeting.
6. Next meeting: Friday, January 14, 2011 at 11:45 AM in Main Auditorium at St. Anthony Central Hospital. Subject: TBA.

Respectfully Submitted,

Steven E. Clark, Consulting Meteorologist

In Case You Missed It...Lightning in the News

This is a monthly listing of news and videos about lightning and allied areas as reported in the media. A headline is listed, followed by a link to the article. Please note that some of the links are perishable, which means you'll need to go to the source for the article. Enjoy!

No "Lightning in the News" for the December minutes.