Natural Radio

News, Comments and Letters About Natural Radio

July 2009

Last Friday night we were preparing to leave for a weekly gathering and dinner with a group of friends. I was watching a line of thunderstorms on the radar and it appeared that the larger ones had detoured around us to the North and South. There was one more thin line of storms coming and that line looked so narrow on the radar that I announced we'd have a brief shower that would last no more than 10 minutes and then the storms would be over for the night. A couple of minutes later we were hit by very strong winds and then a downpour and massive thunderstorm. My wife again mocked my weather predicting ability.

Suddenly, there was an almost simultaneous flash of lightning and crack of thunder -- then the power went out. Fortunately, it came back on after about 15 seconds, but a split second later, we were startled by a very loud sharp explosion. The power stayed on and I went for another look at the radar, but the DSL was dead. That was OK, because with the super-saturated ground as the result of a very wet spring, sump pumps are more important than data.

I didn't find out until yesterday that it was the transformer across the street that blew and the whole block was without power. Finally, Sunday night, the crews finally replaced the transformer a little before 9pm. We only had a few branches down, but my neighbors suffered through two days without power on the hottest weekend of the year so far. I am always amazed whenever I witness the power of lightning and can only hope that this storm created some nice whistlers for listeners in the Southern Hemisphere.

The rough weather had cleared out for Father's Day, so my son Jeff and I went to the 6-meter Club of Chicago's annual hamfest. Lately, I've been doing more looking than buying, but I did find a nice set of thin screwdrivers, some isolation transformers and some really big shrink tubing. VLF equipment is usually rare at hamfests, but I saw an interesting vacuum tube VLF transmitter with a chrome chassis and an output of 100 watts. I had thought that maybe it was a beacon transmitter, but found out that it was used for an intercom/paging system in a TV studio. The instruction manual said that it operated around 100 kHz. I wonder how they dealt with the LORAN interference? It was a beautiful curiosity piece, but at $150, way too expensive for an item with no conceivable use.

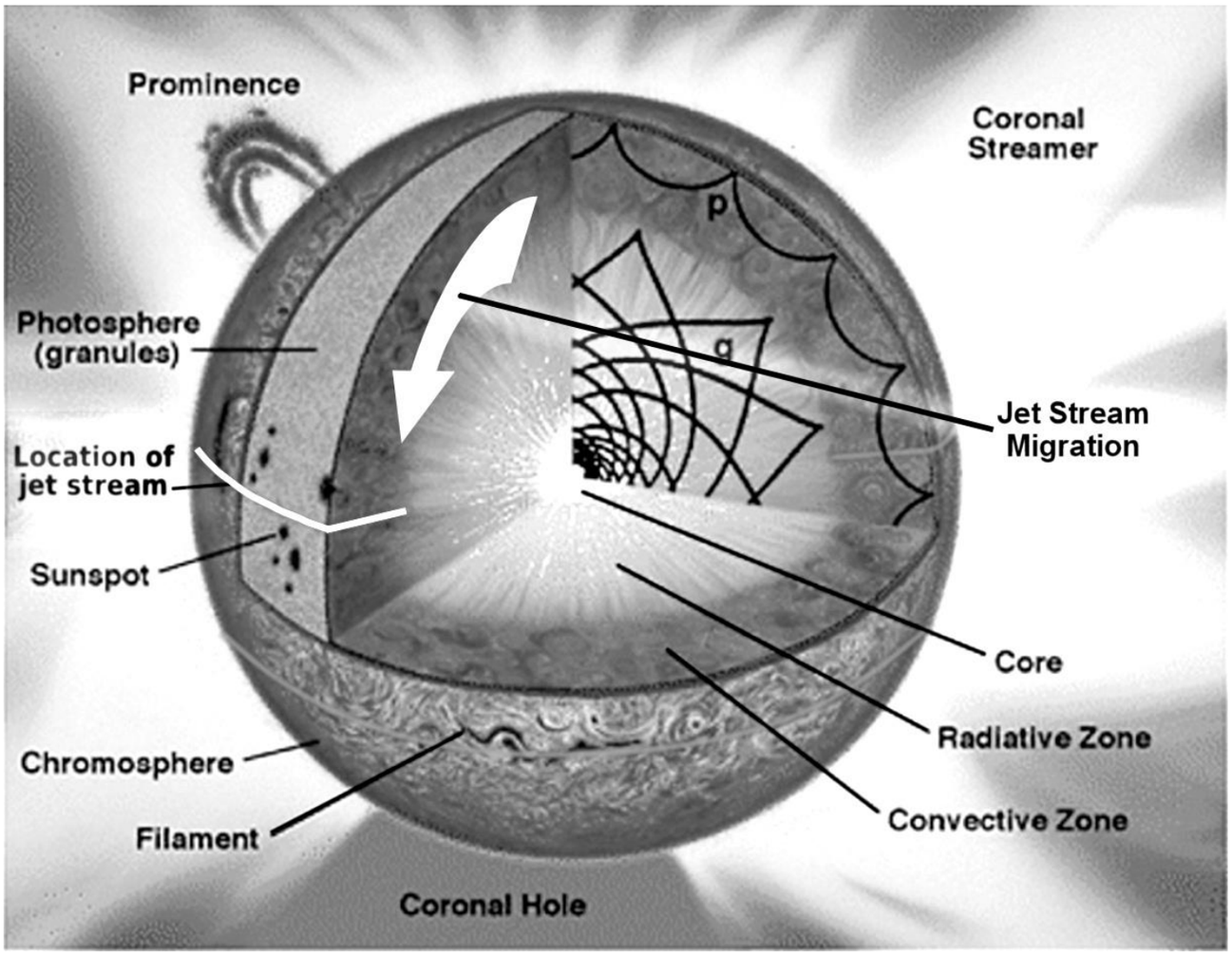
New VLF Receiver – I received a nice surprise in the mail this past week. Edgar Greene, a frequent contributor to the VLF_Group, sent me his newly designed loop receiver for evaluation. Edgar has been working on this design for over a year and the circuit board became available from FAR Circuits last winter. I'll put it through its paces this month and have a review and circuit details in the next issue as well as information on how to obtain the circuit board. Thanks Edgar!

I gave it a quick listen from my non-ideal front porch location and sferics were quite audible from all the thunderstorm activity in the Midwest and the loop provided a very noticeable hum null. I can't wait to get out to my quiet site with it as the new Sunspot Cycle takes off in the upcoming weeks. (Veiled sarcasm. See the next article for yet another Cycle 24 prediction.)

Jet Stream & Sunspots – The sunspot speculation continues. I'll have to check with the Las Vegas odds makers to get the real story. Nevertheless, scientists have found the reason for the late arrival of sunspots. According to an announcement at the American Astronomical Society press conference in Boulder, Colorado, there is a "jet stream" that flows deep beneath the suns surface and migrates from the polar regions toward the equator. The sluggish movement of this stream has delayed the onset of the next Solar Cycle causing all sorts of consternation and the even predictions of another Maunder minimum and the onset of "global cooling".

Back in 1997, using SOHO data, scientists first discovered the presence of "jet streams" or "rivers" of hot, electrically charged gas called plasma flowing beneath the surface of the Sun. They also found features similar to trade winds that transport gas beneath the Sun's fiery surface.

At that time Dr. Jesper Schou of Stanford University said "We have detected motion similar to the weather patterns in the Earth's atmosphere. Moreover, in what is a completely new discovery, we have found a jet-like flow near the poles. This flow is totally inside the Sun. It is completely unexpected, and cannot be seen at the surface."



Since 1997 we've found that with each sunspot cycle, every 11 years, the sun generates twin streams of plasma at each of its poles. These jet streams lie 4,350 miles below the surface of the sun and unlike the ones on earth, are magnetized and flow only toward the equator. We still don't know why, but slowly, at a little over 6 miles per hour, the streams begin their journey to the equator. When the streams reach 22 degrees of latitude, north and south, they initiate a new solar cycle, and the sunspots reappear.

At the National Solar Observatory (NSO) in Tucson, Arizona, researchers Frank Hill and Rachel Howe used a relatively new science called helioseismology that traces sonic waves on the surface of the Sun to reveal what's going on in the interior.

The masses or plasma moving inside the sun send pressure waves vibrating through the stellar interior. These "p modes" (p for pressure) propagate through the interior and cause the sun to ring like a massive gong. Scientists can measure the vibrations on the sun's surface, and calculate and map what is happening inside. Geologists have been using similar techniques for a long time to map the interior of the earth.

For this study, Hill and Howe combined data from GONG and SOHO. GONG, short for "Global Oscillation Network Group," is an NSO-led network of telescopes that measures solar vibrations from various terrestrial observation sites. SOHO, the Solar and Heliospheric Observatory, makes space based observations of oscillations on the Solar surface.

Howe and Hill found that this "jet stream" associated with Cycle 24 has moved sluggishly, taking three years to cover a 10 degrees in latitude compared to only two years for the previous Solar Cycle 23. Since the jet stream is finally reaching critical latitude, maybe we'll see Cycle 24 begin in earnest.

"It is exciting to see", says Hill, "that just as this sluggish stream reaches the usual active latitude of 22 degrees, a year late, and we finally begin to see new groups of sunspots emerging."

As to the how and why of this "jet stream" and why it triggers sunspot cycles, not much is known according to Dean Pesnell of NASA's Goddard Space Flight Center.

"We still don't understand exactly how jet streams trigger sunspot production," says Pesnell. "Nor do we fully understand how the jet streams themselves are generated."

NASA plans to launch the Solar Dynamics Observatory (SDO), the first mission of NASA's Living With a Star program, in mid-October of this year. SDO will study how solar activity is created and how Space Weather comes from that activity. The SDO will fly with three instrument packages including sophisticated helioseismology sensors that will allow it to probe the solar interior better than ever before.

"The Helioseismic and Magnetic Imager (HMI) on SDO will improve our understanding of these jet streams and other internal flows by providing full disk images at ever-increasing depths in the sun," says Pesnell.

Many thanks to Bill Hooper, KF6AR for alerting me to this story.

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