

Natural Radio

News, Comments and Letters About Natural Radio

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When we bought our house 24 years ago, the former owner was quite a gardener and we inherited some perennial plants amongst which was a patch of horseradish. Horseradish grows with little attention from the gardener, more accurately in spite of the gardener, and it would probably be impossible to eradicate if one wanted to. I didn't know what to do with the stuff at first, but some well meaning person eventually passed along a recipe. Now my wife Natalie is a horseradish lover, and so are some friends and relatives so this tradition has developed that I will dig up the roots the week before Easter and we will subsequently produce jars of prepared horseradish to pass out for Easter. We are now up to doing about 30 – 40 pints.

The Thursday before Easter was a beautiful sunny and relatively warm day, I was a bit concerned because there was still snow remaining in the yard and wasn't even sure that the ground would be thawed enough to dig. But many of the roots had shoots sticking up about 4 inches and the soil had not even a trace of frost, so I was able to laboriously dig a nice pile of roots in a couple of hours and finally get all the mud hosed off of them with only mild frostbite on my hands.

The process of peeling and grinding horseradish is not pleasant and frequent breaks are needed when it becomes impossible to open your eyes because of the burning. One must be careful when opening the food processor after grinding a batch of the roots because a good whiff of the contents could probably knock you to the floor. We usually open doors and windows for this part of the process, but couldn't this year because of the blizzard going on outside. By evening on Good Friday we had about 10 inches of snow on the ground. It was a good thing that I did the digging on Thursday.

Nevertheless, by taking turns peeling, grinding and filling jars, we suffered through the process and kept the annual horseradish tradition going in spite of the weather. Once again, Easter ham and sausage were enhanced by the judicious application of a small amount of this pungent herb, and fortunately, most of the damage to my eyes, sinuses and nasal passages had healed by dinnertime.

Cycles, Cycles, Cycles -- Part of the blame for this snowy Easter was obviously due to the fact that Easter this year is one day away from it's earliest possible date. In the western world, the date of Easter is set as the first Sunday after the first full moon after the Vernal Equinox. It's really more complicated than that since the method used to determine the date of the full moon and the equinox don't always agree with the astronomical observations, but you get the idea. This method of determining the date of Easter goes back to a time when people's lives were governed by the natural cycles of the moon and the seasons.

While this year's weather might cause some to push for a fixed date for Easter at the end of April or beginning of May, the strangeness of following a natural cycle may not

be all that foreign to those of us who listen to low-frequency radio and chase whistlers and other Natural Radio phenomenon. Our hobby is driven by Earthly and solar cycles rather than a fixed calendar.

Probably the most obvious cycle is the 11 year sunspot cycle. It is good that no holidays are attached to the sunspot cycle because the maxima and minimums are determined after the fact by a mathematical averaging method. Since the Sun's magnetic poles flip at the peak of each 11 year cycle, a complete sunspot cycle is really 22 years.

Solar rotation is important because as sunspots move across the surface of the sun, they and the disturbances they might cause may return on a cycle based on the rotation of the Sun. This rotation is called sidereal rotation and is a little over 25 days at the solar equator. This rotation cycle appears longer to us because as the sun rotates, we are orbiting around it in the direction of its rotation and that makes the apparent or synodic rotation appear to be a little over 27 days.

While the sun sets and rises each day, the time of sunrise and sunset change each day and with it the ionospheric ionization and associated propagation. There may also be some longer period solar activity cycles at work, but we haven't been measuring solar data long enough to make that determination yet.

As difficult as tracking all these cycles may be, sometimes the 'fixed' data creates challenges of its own. Read on.

Where Oh Where Are the Van Allen Belts? – If you aren't confused enough trying to figure out when Easter will be or when cycle 24 actually started, try and figure out where the Van Allen belts are. This quest could be either interesting or frustrating depending on your disposition as you attempt this little exercise.

A few weeks ago while developing my naturalradiolab.com website, I was trying to gain a little better understanding of the Space Weather environment around Earth and decided to create a diagram for myself that put distances on all the various features of the magnetosphere and plasmasphere. There are lots of partial drawings on the web, but none really show all features and their distances above the Earth. At one point while I was working on this diagram, I needed to locate the Van Allen radiation belts on my drawing.

So, naively, I thought that by searching the web with the term "Van Allen belts", I'd find some images with distances that I could just add to my diagram. Not that simple. Just about every website I found under Google search had the belts located at different distances from the Earth.

Wikipedia's distances were wrong as were several encyclopedias. Even the University of Oulu in Finland which has one of the most comprehensive Space Weather sites had the distances wrong.

I found a nice official looking site with copies of some of the NASA drawings and the correct distances for the inner Van Allen belt, but they had the outer belt extending past the orbit of Pluto, beyond the Kuiper belt and possibly out to the Heliopause! There were no backlinks to the homepage of the site, so I went to the root name of the link that I found in Google and found that I was looking at an astrology site.

To determine the real location of the radiation belts, I found a book written in the 60's about the International Geophysical Year that had a chapter on the discovery of the Van Allen belts. This original data matched the numbers that NASA published and the NASA numbers were consistent across a number of their websites.

Now, how could so many authoritative sites be wrong? In the case of the Van Allen belts, many of the errors were due to the fact that those creating the sites were obviously not aware of the conventions used in measuring distances in the near Earth environment.

In order to aid visualization of distances, scientists state the distances to the various features of the magnetosphere and plasmasphere in Earth radii. One Earth radius is the radius of the Earth or about 4000 miles (6400 km). This seems simple enough, but you must be aware that the measurement is always taken from the center of the Earth. So if the inner Van Allen belt extends out to 2 R_E (2 Earth Radii), it is 8000 miles from the center of the Earth and *not* 8000 miles above the surface as some of the sites incorrectly stated. There were other errors that couldn't be explained by this misunderstanding of terminology and I really don't know how they crept in other than the fact that website creators were sloppy in their research and didn't verify their data.

The point here is that when doing research on the web, you really need to check your sources. Many sites are created by copying data from other sites and errors quickly can creep in and make their way across the web.

The web is a great research tool but make sure your sources are trustworthy and that the information makes sense. Always try to get to the primary source of data. Sometimes, major news agencies will pick up scientific articles from NASA and other research organizations and rewrite them, sometimes eliminating important information or changing the meaning of the article when it is rewritten. Even worse, other news sources with an agenda will spin the original source into a sensational article that serves their agenda.

So while the web has made research easier and put a wealth of information at our fingertips, due diligence is still necessary to separate the facts from that which is not so.

Online Archive – As time permits, I am continuing to add data to my naturalradiolab.com website. In light of the paragraphs above, I also will be devoting some time to verifying the data on the site. This month I started posting an archive of my columns from past issues of *The Lowdown*. I am starting with the oldest ones and currently have about 3 years worth posted in .pdf format. I hope to have this archive done in the next couple of months.