W9JOZ

Volume 10, Issue 11 November 2020

Next Meeting is on the Air

Greeting fellow amateurs,

Everyone should stay safe and well.

I will try to have a net during the regular club meeting time.

Dave
Kc8obh

When I hear of any memorial for Mike WB9L, I will send out an email to all of those that are on the email list.

John W3ML

Inside This Issue

Meetings are at the Henry F. Schricker Library on the third Thursday of each month, with the exception of December.

The library is located on west Culver Road, two blocks west of Highway 35.

Are you on the air?

Library Door locks at 7:00 p.m. so if you are late, knock loud.

Still no meetings in person. But, we meet on the repeater.

Events

Meeting is on the air, Nov. 19th. 7:00 pm

on the 145.410 repeater

Birthdays

Nov 21 - Chester, KA9FAW

Nov 24 - Tony, W9AL

If your birthday has not been listed, it is because I do not have the date for it. If you would like it to be included in a newsletter, please email me the date. Thanks w3ml@w3ml.com

---

Starke County Amateur Radio Club Weekly 2 Meter Net will be on each Saturday at 8:00 p.m. Central time.

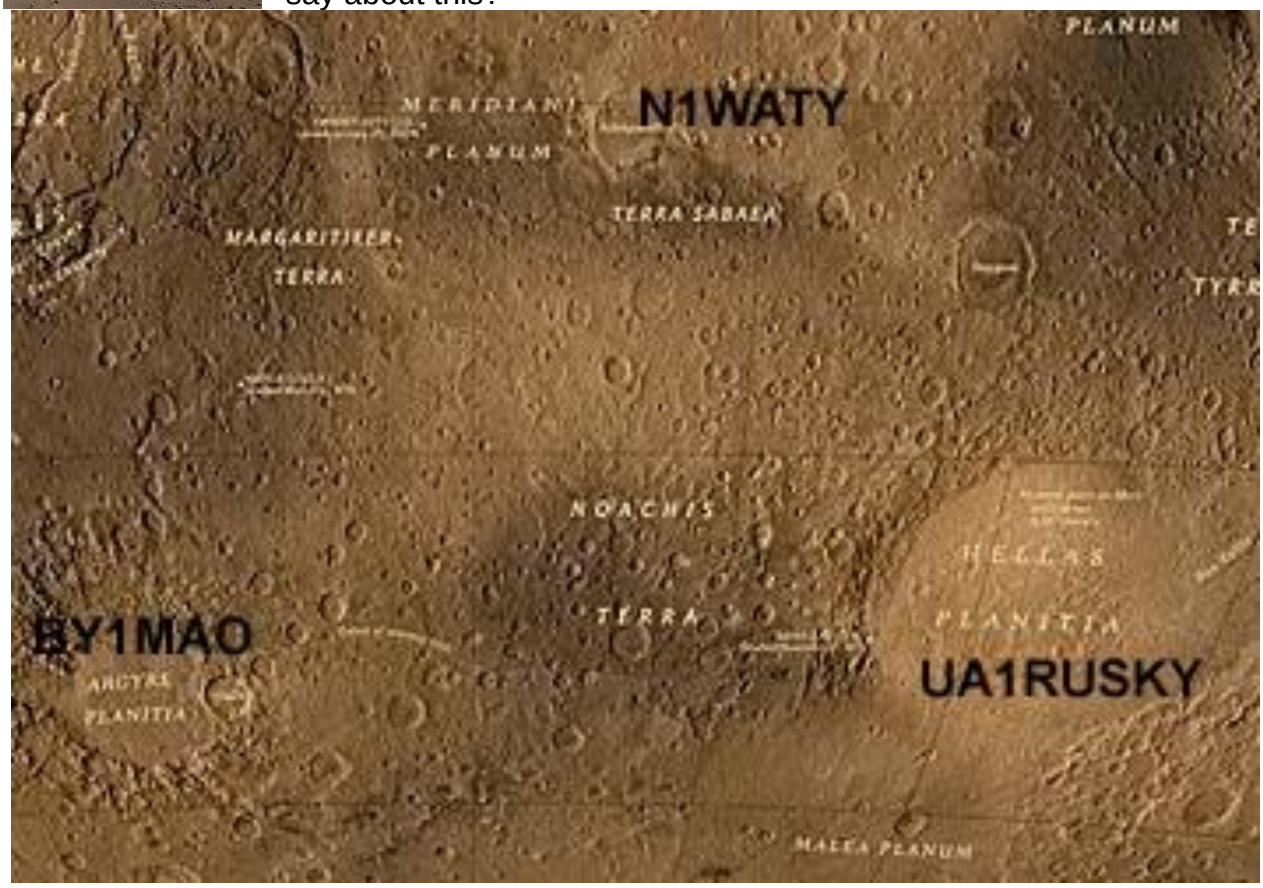
DAY OF WEEK: Saturday 8:00 p.m. Central time
HOST: KN9OX Repeater
FREQUENCY: 145.410 - 600
PL TONE: 131.8

New Items Listed

See all the For Sale Items at
http://www.w9joz.org/forsale.htm
There are a lot of them there. Updated regularly.
See the For Sale Page on the Club website. If you have items to sell email me a list with prices and contact information.

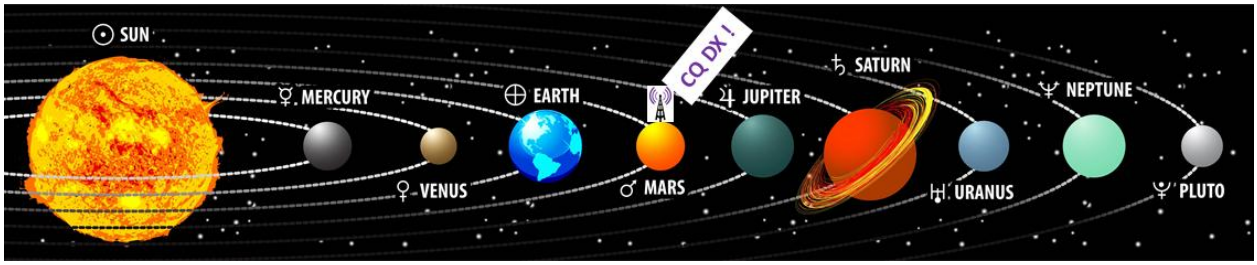
DXing on Mars Revisited
By
Jerry Hess, W9KTP

Recently I came across an article by Carl Luetzelschwab, K9LA, describing propagation conditions on Mars. That struck a chord with me since I really enjoyed the book and movie, "The Martian." If you only saw the movie, you really need to read the book. The technical details glossed over in the movie are amazing and confirmed to be accurate by NASA. The main character, Mark Watney, was a botanist and succeeded in blowing up the Hab with his potato plantation. Way to go, Mark! Well, let's retrain him and send him back with a ham license in hand, perhaps as N1WATY. By the time we get him there, the Russians, UA1RUSKY, and Chinese, BY1MAO, probably will already be there. Let's put Mark at Schiaparelli Crater where he blasted back Earth last time. Also, let's put the Russians at Hellas Planitia about 3200 kilometers away and the Chinese at Argyre Planitia about 3800 kilometers. How well does Watney do with his latest model Elecraft transceiver and a tribander? What does Carl say about this?



DXing on Mars

Carl Luetzelschwab K9LA February 2017



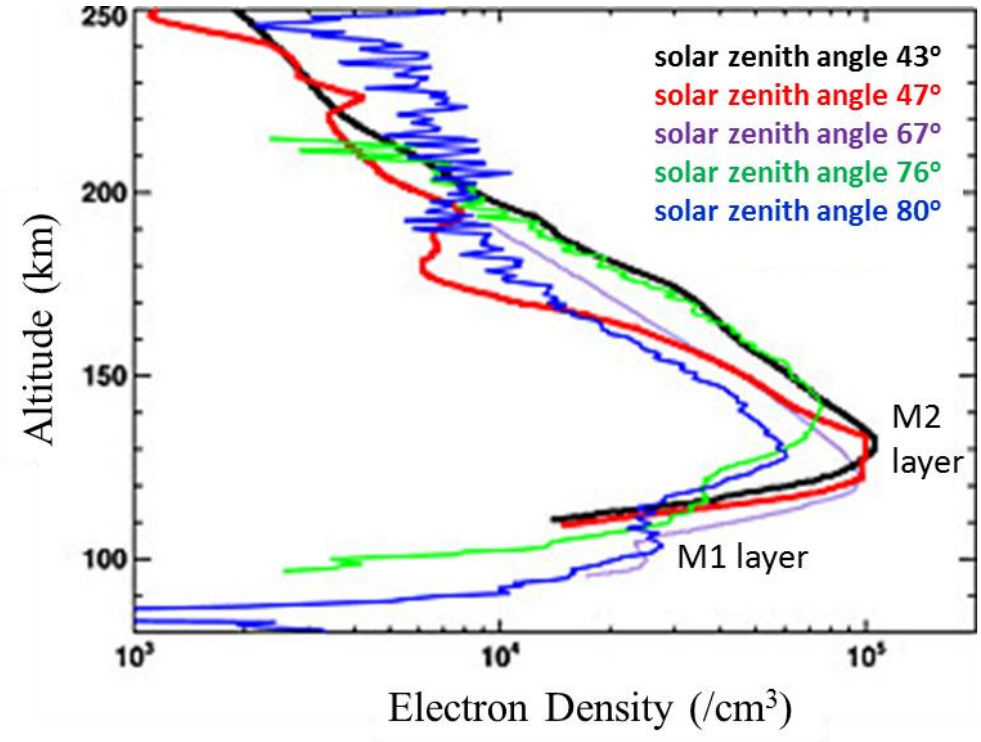
One of these days humans will go to Mars. At first it will be for scientific reasons, but eventually we'll likely colonize Mars with permanent settlements. More than likely there will be Amateur Radio operators participating in the colonization. How will DXing be on Mars?

Let's start with some comments about noise. Initially the man-made noise environment will be quiet since there won't be that many humans on Mars. But if there's a population explosion on Mars, we'll have man-made noise levels similar to Earth. I don't think we'll have atmospheric noise (QRN) problems as I'm not aware of any thunderstorms on Mars. But perhaps dust storms could create QRN.

Now let's look at HF propagation. To do this we need to know what the ionosphere of Mars looks like. I guess the first question is "does Mars have an ionosphere?" The answer to that is "Yes". And we've already sent enough probes to Mars to have a decent idea what the atmosphere and the ionosphere of Mars look like. The following table compares the neutral species (non-ionized atmospheric constituents) in the atmosphere of Mars to the neutral species in the atmosphere of Earth.

Mars	Earth
Carbon dioxide 95.32%	Nitrogen 78.1%
Nitrogen 2.7%	Oxygen 20.9%
Argon 1.6%	Other 1.0%
Oxygen 0.13%	
Other 0.25%	

With CO_2 leading the pack on Mars, the Mars ionosphere is formed by photoionization of carbon dioxide (CO_2) by solar flux at EUV wavelengths. The resulting electron density profile features a main peak that is typically located around 120-130 km altitude. This main peak is analogous to the F1 layer on Earth and is frequently called the M2 layer. There appears to be an intermittent underlying layer, called the M1 layer, at around 100 km, with a density about one fourth as much. The following plot (reference 1) shows typical electron densities on Mars versus the solar zenith angle.



Remember that a solar zenith angle of 0 degrees means the Sun is overhead. A solar zenith angle of 90 degrees means the Sun is on the horizon.
From the electron density plot above, the largest M2 layer peak density is around 1 x 10^5 electrons per cubic centimeter, which translates to 1 x 10^{11} electrons per cubic meter. This gives an M2 layer critical frequency of 2.8 MHz. Applying spherical geometry to this scenario gives a maximum useable frequency (MUF) of around 14 MHz for low elevation angles with an M2 peak height of 120-130 km. In a similar manner, the MUF for the M1 layer at low elevation angles is around 7.6 MHz.
Thus there should be some good 20-Meter openings – if the frequency allocations on Mars parallel those on Earth. On the downside, the M1 layer (if present – note that it's not seen at all solar zenith angles) could block low elevation angles from getting to the greater electron density (higher MUF) of the M2 layer. As for hop distances, the 120-130 peak height of the M2 region should give us 2500 km hops – not as far as the 4000 km or so F2 region hops on Earth, but we'll have to take what we get.

The data in the plot is from September 2015, which had a smoothed sunspot number of 40 (this is in terms of the "old" sunspot numbers, not the "new" sunspot numbers – remember the April 2016 Monthly Feature?). This results in pretty low solar activity and suggests that the electron density of the ionosphere of Mars could be much greater at the peak of a solar cycle. So 17-Meters and higher could be viable for DXing efforts.
What about nighttime DXing? The above electron density plot only goes to a solar zenith angle of 80°, which says the Sun is still above the horizon. Note that the peak electron density decreases as the solar zenith angle increases. After sunset, photoionization essentially stops, and it is believed that the electron density will decrease significantly because Mars does not have a magnetic field as does Earth. On Earth at night, residual F2 region electrons are trapped in the magnetic field, and do not escape into space.
It is believed that early in its life Mars had a magnetic field similar to Earth. But it switched off long ago when the molten core cooled and solidified. All that's left are patches of remnant magnetism spread across the surface – these are called crustal fields (reference 2). At best, the nighttime ionosphere of Mars may be patchy thanks to Mars crustal fields.

Might there be something similar to Earth's sporadic E? With Mars crustal fields influencing the ionosphere, the dayside ionosphere may also be patchy. This could be thought of as sporadic M2 or sporadic M1.
What about auroral issues similar to Earth's auroral issues? Interestingly, large portions of the southern hemisphere of Mars (and to a lesser degree in the northern hemisphere) remain magnetized to some degree. These crustal fields appear to be strong enough to drive features in the upper atmosphere of Mars akin to auroral displays seen on Earth. So maybe VHFers will enjoy Mars, too.
In summary, HF propagation on Mars is certainly possible for DXing endeavors. Our understanding of the ionosphere of Mars is fundamental at best, so what was presented here is rudimentary. The only way we'll get a deeper understanding of our neighbor's ionosphere is to do in situ measurements (for example, with ionosondes when we colonize Mars).
Two final thoughts: I hope there won't be any HOAs (Home Owner Associations) to restrict antennas in the colonies on Mars and I wonder what the call sign structure will be for Amateur Radio operators on Mars. ☺

References:

1. Marissa F. Vogt, et al; MAVEN Observations of Dayside Peak Electron Densities in the Ionosphere of Mars; Journal of Geophysical Research – Space Physics; 2016; doi 10.1002/2016JA023473
2. http://sci.esa.int/mars-express/58554-mars-ionosphere-shaped-by-crustal-magnetic-fields/

Well, doesn't sound so good for frequent QSO's for Watney but who knows, maybe an advanced FT8 or a solar orbiting satellite between Earth and Mars will add a few new ones to DXCC and keep Mark from getting lonely.

In any case, many thanks to Carl for his article. Hopefully we will see more of his vast archive of articles in the future.

73's,
Jerry, W9KTP

Amateur Radio License Map

Want to know who has a ham license in your area. Visit here and see.

https://haminfo.tetranz.com/map/z

ARRL Urges Members to Join in Strongly Opposing FCC's Application Fees Proposal

10/27/2020

ARRL will file comments in firm opposition to an FCC proposal to impose a $50 fee on amateur radio license and application fees. With the November 16 comment deadline fast approaching, ARRL urges members to add their voices to ARRL's by filing opposition comments of their own. The FCC *Notice of Proposed Rulemaking* (***NPRM***) MD Docket 20-270 appeared in the October 15 edition of *The Federal Register* and sets deadlines of November 16 to comment and November 30 to post reply comments, which

are comments on comments already filed. ARRL has prepared a ***Guide to Filing Comments with the FCC*** which includes tips for preparing comments and step-by-step filing instructions. File comments on MD Docket 20-270 using the FCC's Electronic Comment Filing System (**ECFS**).

Under the proposal, amateur radio licensees would pay a $50 fee for each amateur radio application for new licenses, license renewals, upgrades to existing licenses, and vanity call sign requests. The FCC also has proposed a $50 fee to obtain a printed copy of a license. Excluded are applications for administrative updates, such as changes of address, and annual regulatory fees. Amateur Service licensees have been exempt from application fees for several years.

The FCC proposal is contained in a *Notice of Proposed Rulemaking* (*NPRM*) in MD Docket 20-270, which was adopted to implement portions of the "Repack Airwaves Yielding Better Access for Users of Modern Services Act" of 2018 — the so-called "**Ray Baum's Act**." The Act requires that the FCC switch from a Congressionally-mandated fee structure to a cost-based system of assessment. In its *NPRM*, the FCC proposed application fees for a broad range of services that use the FCC's Universal Licensing System (ULS), including the Amateur Radio Service. The 2018 statute excludes the Amateur Service from annual regulatory fees, but not from application fees. The FCC proposal affects all FCC services and does not single out amateur radio.

ARRL is encouraging members to file comments that stress amateur radio's contributions to the country and communities. ARRL's ***Guide to Filing Comments*** includes "talking points" that may be helpful in preparing comments. These stress amateur radio's role in volunteering communication support during disasters and emergencies, and inspiring students to pursue education and careers in engineering, radio technology, and communications.

As the FCC explained in its *NPRM*, Congress, through the Ray Baum's Act, is compelling regulatory agencies such as the FCC to recover from applicants the costs involved in filing and handling applications.

In its *NPRM* the FCC encouraged licensees to update their own information online without charge. Many, if not most, Amateur Service applications may be handled via the largely automated Universal License Service (ULS). The Ray Baum's Act does not exempt filing fees in the Amateur Radio Service, and the FCC stopped assessing fees for vanity call signs several years ago.

Christmas Ideas for the Ham Shack

Here are some items that I have received via emails on suggestions for hams this season.

Amateur Radio Logbook are back in stock

This spiral log book is a useful tool for every ham shack. Includes 52 log pages with room for 25 contacts per page (1,300 total log entries). Size 8.50" x 11". http://www.arrl.org/shop/Amateur-Radio-Logbook/

Veritium HFClock 9 Tiger A movie of it in action is on this site. HFClock Internet Based Clock System has many features for the ham radio operator.
https://www.gigaparts.com/veritium-hfclock-9-tiger-maple.html

The Sun is Alive!

The K7RA Solar Update

11/06/2020

Tad Cook, K7RA, Seattle, reports: The 10.7-centimeter solar flux density was 88.1 on Wednesday, November 4, the highest since October 14, 2016, when it was 92.8. The average daily solar flux for that week as **reported** in this bulletin was 76.9, and average daily sunspot number was 18.7, so activity 4 years ago was similar to recent activity; in fact those numbers closely match the flux and SSN in last week's bulletin. But in 2016, Solar Cycle 24 was declining, reaching a minimum about 3 years later in December 2019.

The daily solar flux is measured at noon local time (GMT –8 hours) in Penticton, British Columbia, but actually three daily measurements are taken, at 1800 UTC, 2000 UTC, and 2200 UTC.

Solar flux has been steadily increasing since the 2000 UTC reading on November 2. The three daily readings through November 5 were 81.6, 81.9, 82.9, 82.9, 83.7, 86.9, 88.1, 89, 91.1, 90.7, and 92. But the daily 2000 UTC reading is always reported as the *official* number for the day. (Spaceweather.com **lists** the daily flux values.)

Average daily sunspot number during the October 29 – November 4 reporting week was 21.3, compared to 17 over the previous 7 days. Average daily solar flux was 81.6, compared to 76.9 reported last week.

Average daily planetary A index this week was 6.3, down from 12.3 last week. Average daily mid-latitude A index was 4.9, down from 9.9 last week.

Spaceweather.com reported at 0703 UTC on November 3 that the new sunspot group produced a minor solar flare, and a pulse of UV radiation "briefly ionized Earth's upper atmosphere, causing a low-frequency radio blackout over the Indian Ocean."

Another flare occurred at 0022 UTC on November 5, which caused a brief blackout over Australia and the Pacific Ocean, causing signals below 10 MHz to fade."

Check the STEREO satellite images: **360° view** | **Conventional format**. A large, new sunspot group, AR2781, is the largest so far in new Solar Cycle 25, according to Spaceweather.com. It should be geo-effective (facing Earth) over the next 10 days.

Predicted solar flux is 88 on November 5 – 10; 83 on November 11; dropping to 75, 74, and 75 on November 12 – 14; 76 on November 15 – 21; 75 on November 22 – 27; 74 on November 28 – 29; 72 on November 30 – December 5; 74 on December 6 – 10; 75 on December 11; 76 on December 12 – 18, and 75 on December 19.

Predicted planetary A index is 5, 8, and 8 on November 5 – 7; 5 on November 8 – 16; 10, 5, 10; and 15 on November 17 – 20; 12 on November 21 – 22; 8, 10, and 12 on November 23 – 25; 5 on November 26 – 27; 10 on November 28; 5 on November 29 – December 13; then 8, 5, and 8 on December 14 – 16; 12 on December 17, and 10 on December 18 – 19. Flux and geomagnetic predictions are **updated daily**.

Here's the geomagnetic activity forecast for November 6 – December 2 from F.K. Janda, OK1HH.

The geomagnetic field will be:

- quiet on November 6-7, 9-11, December 1-2
- quiet to unsettled on November 8, 12-15, 19, 26-27, 30
- quiet to active on November 16-18, 22-25, (29)
- unsettled to active November 21, (28)
- active to disturbed November 20
- Solar wind will intensify on November (18-20,) 21-25 (30, December 2)

Parentheses mean lower probability of activity enhancement.

This weekend is the CW portion of **ARRL November Sweepstakes**, which runs from 2100 UTC Saturday until 0259 UTC on Monday.

Here's a **cool photo** of the WWV antennas in Colorado, and from an unusual perspective.

Sunspot numbers for October 29 – November 4, 2020 were 35, 32, 26, 12, 11, 15, and 18, with a mean of 21.3. The 10.7-centimeter flux was 84.6, 79.6, 76.8, 77.3, 81.6, 82.9, and 88.1, with a mean of 81.6. Estimated planetary A indices were 14, 5, 6, 10, 3, 3, and 3, with a mean of 6.3. Middle latitude A index was 11, 4, 6, 8, 2, 2, and 1, with a mean of 4.9.

For more information concerning radio propagation, **visit** the ARRL Technical Information Service, **read** "What the Numbers Mean…," and **check out** K9LA's Propagation Page.

A propagation bulletin **archive** is available. For customizable propagation charts, visit the **VOACAP Online for Ham Radio** website.

Notice for 2021

Even though we are not meeting in person at this time, it is imperative that we keep the Club together and active. We have a 2 meter net every Saturday at 8 p.m. on the 145.410 repeater. President David, KC8OBH also runs a net on the repeater on the evening of the Club Meeting at 7 p.m.

This way we can keep in touch with each other and know what we are doing and how we are doing.

Dues for 2021 remain at only $12.00 a year. Without dues we can not meet our obligations of insurance, the website/email address, and State Corporation Registration, which keeps each of us safe from any lawsuits brought on the Club. Without this corporation registration, they could sue each and every member.

The website will need to be renewed before the 20th of this month. It is $95.40, I believe. Will know for sure when they send the invoice.

So, please stay a member and pay your dues for 2021. Hopefully, before too long we will be able to meet again at the library.

John W3ML

If you have something for the newsletter, please send it to me before the 20th of the month.

See you at a meeting.

Sometime in the Future

73
John, W3ML


STARKE COUNTY
AMATEUR RADIO
CLUB
WWW.W9JOZ.ORG