PCARA Update

Volume 12, Issue 3 Peekskill / Cortlandt Amateur Radio Association Inc. March 2011

Marching about

PCARA will be taking a table at the upcoming Orange County Amateur Radio Club Spring Hamfest on March 26, 2011, at the Town of Wallkill Community Center in Middletown, NY. This would be an excellent opportunity for jump starting your Spring cleaning efforts around the shack. Members are most welcome to bring along any of their "wares" they would like to try and sell. Additional information can be found at the OCARC website (http://www.ocarc-ny.org/index.shtml).

Our friends at the QSY Society are planning a visit to ARRL Headquarters and the Maxim Memorial Station W1AW in mid-March, and PCARA has been asked if we would like to participate. The trip would be on a weekday when W1AW is fully staffed and open for guest operations. We would meet up with QSY at ARRL HQ in Newington, CT. If you are interested, please let me know (kb2cqe 'at' arrl.net).

W1AW, the Hiram Percy Maxim Memorial Station at ARRL Headquarters.

Our next regularly scheduled meeting is at 3:00 pm on March 6, 2011 at Hudson Valley Hospital Center in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

Cat-a-log

*The Presidential pussycat Spencer is shown here monitoring Greg's scanner. a Bear**cat** 150, circa 1980 (the scanner not the cat)...*

PCARA Officers

President:

Greg Appleyard, KB2CQE, kb2cqe *at* arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr *at* arrl.net

Net night

Peekskill/Cortlandt Amateur Radio Association holds a weekly net on the 146.67 MHz W2NYW repeater on Thursdays at 8:00 p.m. Join net control Karl, N2KZ for neighborly news and technical topics.

Contents

Adventures in DXing

- N2KZ

Get In Line!

Great things usually require great effort. If you are really lucky, sometimes miracles happen unintentionally! I commute back and forth from Stamford, Connecticut several times a week and spend a lot of time on the PCARA repeater. Trying to hit the repeater from a very long distance, through rough and rocky terrain, can be quite a challenge. My reception reports often feature the words 'choppy' and 'broken.' With just a little experimentation, I think I have solved this problem!

Hustler CGT-144

I have been using an old design Hustler CGT-144 long whip mounted on my trunk lid. This tall antenna is easy to identify. Just look for the signature long white loading coil in the center. It provides lots of gain with its 5/8 over 1/4 wave design but the gain is omnidirectional. Just for fun, I wanted to see how my little dual-band two meter and 70 centimeter mag-mount whip would compare to the long whip on my trunk. I placed the mag-mount on the center of my car roof. It worked much better than I ever thought it would.

Surprise! What I think I have created is a novel design two element beam for two meters! The mag-mount whip acts as the active driven element. The long whip acts as a passive reflector creating a uni-directional pattern. This arrangement works out really well. In the morning, I chat on the LIMARC repeater in Eastern Queens. Coming home, I choose the PCARA repeater. Both repeaters are located roughly in front of my car so the gain goes the right way for the moment. Great!

The ultimate verification of this design came from Bob, N2CBH. He recently commented: 'I don't know what your doing, but this is the first time I've worked you in the mobile and I didn't lose you!' I am still experimenting with the design to see if I can further maximize the gain. Articles I have read regarding two meter Yagi design suggest reflector to driven element spacing of anywhere from 7 to 17 inches apart. My real-world results agreed and disagreed.

A quick on-air check on 146.58 MHz simplex with Malcolm, NM9J, proved quite interesting. I pointed my car towards the west in the direction of Malcolm's QTH. Listening to Malcolm chat at the other end, I moved the driven mag-mount antenna back and forth from the fixed long loaded whip on my trunk lid monitoring his signal strength. Yes, there was a sweet spot at about one foot away from the whip, but this proved impractical. Mag-mount whips do not adhere to glass back windows very well! I found an even

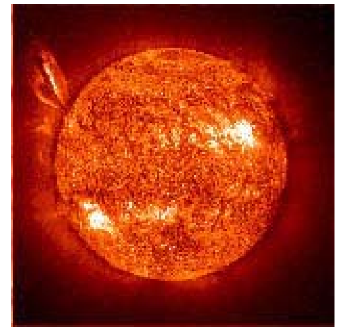
N2KZ / mobile now boasts an optimized 2-element directional array with a dual band 2 meter/440 antenna on the roof and Hustler CGT-144 2 meter antenna on the trunk.

stronger peak in performance at 82½ inches away, just at the edge of the top of the front window frame. I listened from noisy null to noisy null and placed the antenna in the center of that range. Malcolm measured my signal rising from an original 2 S-meter units up to nearly 5. The sweet spot was found! Now I get to field test it to see just how it performs in the real world.

In any case, it certainly looks like the two-whip approach is narrowing down my pattern and raising the forward gain of the N2KZ-mobile. Reports from the last week or two encourage me that two elements are definitely better than one. I'm lucky that my forward gain is always pointing in the right direction! The broad uni-directional pattern seems to be forgiving of slight changes of my bearing as I drive home. A more directional array might be counter-productive. What an interesting discovery!

I See Spots

It is certainly obvious to me that the long-awaited sun spot season might finally be in full swing. Great adventures have been filling my log book lately. I am having a great time! One morning, at about 10:30 am, I tuned around 15 meters and there was not one signal to be heard. Using my 40 meter dipole, I sent CQ using my trusty Heathkit HW-16 at about 25 watts output. I received an



Active sun

immediate reply from Rune, SM5COP, near Stockholm, Sweden.

Rune, SM5COP

Later in the day, I ventured onto 20 meters using my little Small Wonder Labs SW+20 at one watt powered by eight AA batteries. I immediately contacted Bob, KE7GKM, in Boise, Idaho. Bob was using a homebrew five watt QRP rig built into an old briefcase. Nice copy was had at both ends!

Bob, KE7GKM briefcase radio

At the end of the QSO, I was back-doored by Hugo, VE7API from Duncan, British Columbia. (Since when do DX stations call me?) The fun continued with Hector, KP4LV down in Puerto Rico. The session ended with a call from a Brazilian club station, PY7CRA, operating as a portable station on batteries! What an amazing ride!

These may seem like pedestrian contacts to some, but keep in mind that I am operating with just one watt to a simple wire dipole up about thirty feet from my chimney to a nearby tree. To work the west, then the Caribbean and finally transequatorial skip demonstrates how much punch sunspots are adding to create such a robust band for operating.

My Radio Shack Realistic HTX-100 will soon be in my car for ten meter mobile CW operation. Who knows what I might find on the way home if band conditions continue to flourish? As a recent contact said to me during a QSO a few days ago: "Talk is cheap. Real hams beep!" The secret of my success? Morse code is the key.

Big Ears

Although I have to take some credit for persuading one watt signals to be heard around the world, most of the accolades need to go to the operators and their stations at the other end. The level of sophistication of these hams is often pretty admirable. Many of the quite distant stations I work are armed with Yagis or other sharply directional antennas perched on high towers. This is only one element of their success.

I have come to appreciate just how amazing modern radio design has become. High sensitivity with low noise levels is a great place to start. Especially on the higher HF bands, modern radios can be so quiet you might think they are broken. Filtering adds enormous value to this soup. Many older receivers might have selectable fixed passband filters and, sometimes, a single notch filter, as well. When I think of remarkable filtering, I think of the Collins-designed R-390A. I was also impressed with a Kenwood TS-940S I used to use at a former workplace. With a little practice, their filter sets could make your operating experience so much better.

Today's receivers take this idea to a whole new level. Being able to equalize and manipulate the audio output of a rig is quite useful. Add the ability to create custom bandpass filters at the I.F. level produces remarkable results. Throw in multiple notch filters and AGCs, noise blankers and spectrum 'scopes and you have quite a toolkit at your fingertips. No wonder they can hear me! Instead of looking at a simple receiver and thinking 'just give me what I want - not all this noise with it,' you dreams are now attainable with little effort. Isn't it an amazing world?

Small Wonder Labs SW-20+ 20 meter CW transceiver

Appreciate my perspective. I usually operate with homebrew Small Wonder Labs QRP transceiver kits. The SW+ series only has two knobs: Frequency tuning and RF gain. (No audio gain control is provided.) That's it! Attach power, headphones, a code key and your antenna and you are on the air! I watch my little Lafayette field strength meter barely move to verify 'getting out.' Can you imagine how different it must be at the other end where my flea-powered signals arrive into world-class rigs like an Icom IC-7800? Can these guys pick up the local oscillator of my 5 tube radios? I bet they can! Regardless of equipment, we both have a lot of fun!

Flea powered signals arrive at a world-class rig like the IC-7800.

I Want You!

A recent contact made some terrific suggestions I should share with you. It never hurts to recruit new faces into the world of ham radio. It doesn't take a lot of effort, either! One great way is to recycle your *QST* or *CQ* magazines. Leave a copy or two at doctor's offices or barbershops or even car repair waiting rooms. Talk about your hobby to friends and passers-by. From grade schools to old age homes, ham radio can serve as a wonderful demonstration topic or on-going activity. What you can do is only limited by your imagination!

Leave old magazines at the doctor's office

A lot of things can be enjoyed for free. The PCARA offers a Facebook page with constantly up-dated breaking news, years and years of archives of our multiple-award winning *PCARA Update* newsletter (go to pcara.org) and you can always hear the PCARA's Old Goats Net every Thursday night at 8:00 pm via radioreference.com. Tell a friend to join the fun!

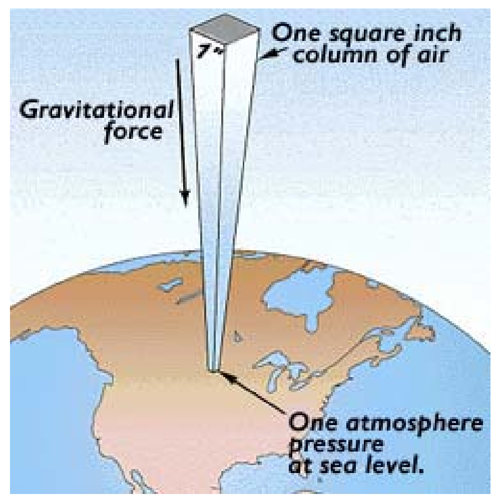
73 and enjoy the Spring de N2KZ dit dit.

Essential$_2$ air waves

Previous "Essential$_2$" articles have tried to show how chemical products are essential to electronics and to our hobby of amateur radio. In this article, we'll take a chemical tour up through the atmosphere to see how it affects radio waves.

Life in the ocean

The first thing to realize is that wherever you are on earth, you live at the bottom of an ocean of air. This ocean is similar in some ways to an actual ocean made of sea water. For example, the pressure at the bottom of a real ocean — in pounds per square inch — is much higher than the pressure at the top of the ocean, as a result of the weight of all the fluid piled above the ocean floor. It is just the same for our ocean of air. If you were to measure the weight of a column of air with a cross-section of one square inch, from where you are standing to the top of the atmosphere it would weigh around 14.7 pounds. We say that the atmo-spheric pressure at the earth's surface is 14.7 pounds per square inch. But pressure reduces as you go higher, so driving from sea level to the summit of Bear Mountain (1284 feet) reduces the pressure from 14.7 psi to 14.0 psi. At the summit of Everest — 29,029 feet — the pressure falls to 4.6 psi, less than one third of the value at sea level. This thinning of the atmosphere is why jet aircraft, flying at 30,000 feet and above, need to be pressurized.



Atmospheric pressure at sea level is 14.7 pounds per square inch.

There are other parallels between the atmosphere and the ocean. We are always interested in the daily variations in temperature and currents (winds) passing by — because this represents our local weather. Variations in the height of the atmosphere, flowing past us like waves on the ocean are felt at the earth's surface as changes in barometric pressure.

But there are differences between a watery ocean and our own atmosphere. The top of the ocean is a clear boundary — on one side there is water, on the other side there is air. Our atmosphere stretches high above us, getting continuously thinner and thinner, until it fades away into outer space. Let's take a look at this phenomenon in more detail.

What's in the air

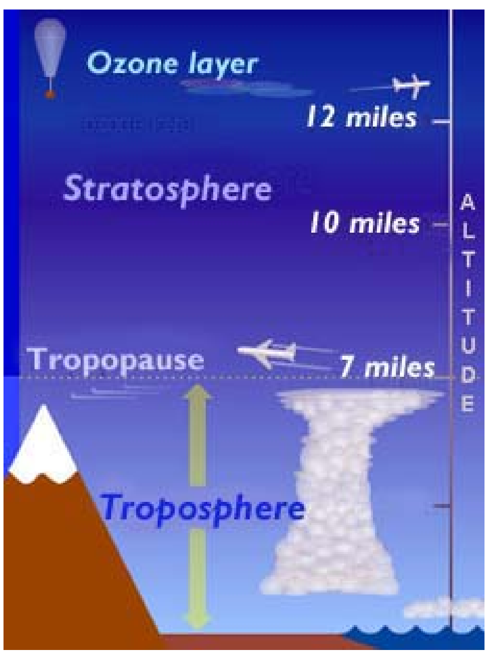
The air around us contains several gases and a vaporized liquid. The main components are the gases nitrogen and oxygen, plus water vapor — as shown in the table below.

Gas	% by volume
Nitrogen (N_2)	78.08%
Oxygen (O_2)	20.95%
Water vapor (H_2O)	Variable, few percent.
Argon (Ar)	0.93%
Carbon dioxide (CO_2)	0.036%
Neon (Ne)	0.0018%
Helium (He)	0.0005%
Methane (CH_4)	0.00018%
Ozone (O_3)	Variable, 0 to 0.000007%

Weather Layer

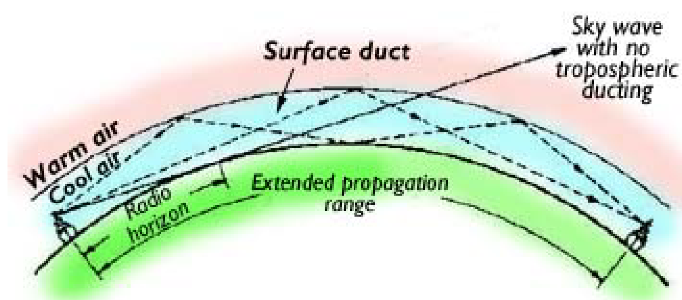
We'll start at the lowest and most familiar layer of the atmosphere, which is called the **Troposphere**. This is where most of the earth's weather take shape, including the formation of clouds and the precipitation of rain and snow. The troposphere, stretching roughly 5 miles high at the poles and 10 miles high at the equator, contains around four fifths (4/5) of the mass of the atmosphere and 99% of the water vapor.

At our latitude, the temperature in the troposphere reduces with height up to the **tropopause**, around 7 miles above the earth. At this point, the temperature has fallen to approx -50 deg C. Water vapor also reduces with height to ~0% at the tropopause. The main driver of weather is heating of the atmosphere at ground level, causing warm, moist air to rise (convection), carrying moisture up into the troposphere, where clouds form as the water vapor condenses. At the top of the troposphere, jet streams carry air and moisture around at high speed.



The troposphere is where our weather takes shape. *[Pic courtesy Windows to the Universe]*

The range of VHF and UHF radio transmissions can be affected by variations in the properties of the troposphere, and we call this type of extended propagation "tropo". The refractive index of air is around 1.0003 at the earth's surface, and this normally drops slowly with height as a result of the falling temperature. Pressure and humidity also affect the refractive index. If there is a layer of air above the surface layer, with a higher temperature (or higher humidity), then the sudden rise in refractive index can bend radio waves back towards the earth's surface. The presence of a warm layer above cooler air is known as a temperature inversion. Under some conditions, radio waves can be trapped inside the layer of cool air until they emerge, several reflections further on. This is known as "tropospheric ducting" and can provide extended propagation up to several hundred miles. If the duct is elevated above ground, even greater ranges become possible.



Extended VHF/UHF propagation can occur through tropospheric ducting

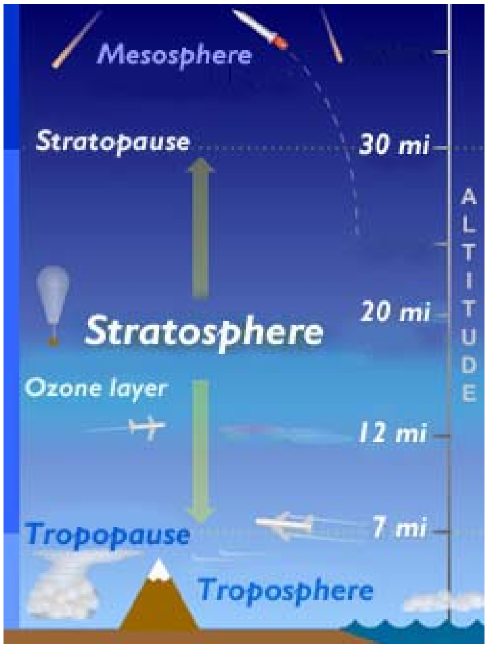
Tropospheric propagation is closely connected with weather, and the VHF/UHF radio enthusiast keeps a close eye on the weather forecasts. An area of stable, high pressure air in summer can be a portent of good conditions as a result of higher humidity in the high pressure area. Another indicator is the arrival of a cold front, where warm air may be pushed above the approaching cold air. Temperature inversions can occur in the early morning while the ground is still cold, and the sun warms the higher air. Cool air in the bottom of a valley or over a large body of water, or trapped in a layer of surface fog can also be helpful.

In the days of analog television, patterning on the screen was an indicator of extended VHF or UHF propagation as a distant station began to interfere with the local signal. This helpful clue is no longer available with digital TV, so nowadays VHF-FM broadcasts provide a better indicator, along with monitoring of VHF and UHF beacons.

Protection layer

Above the troposphere lies the **stratosphere**, between 7 and 30 miles high. Instead of falling with height, the temperature in the stratosphere slowly rises. There is little or no water vapor, so there are very few clouds. Because temperature increases with height, there is also no convection, so conditions are much more stable than in the troposphere. As a result, this part of the atmosphere is a favorite for commercial jet pilots, who can climb above the nasty weather into a cool, stable environment with good fuel economy.

Some interesting chemistry takes place in the stratosphere — density of the air is relatively low and in the upper layers there is significant ultra-violet radiation from the sun. Oxygen molecules (O_2) absorb ultraviolet radiation and are split into two separate oxygen atoms. Each of these oxygen atoms will then rapidly combine with another molecule of oxygen to produce a molecule of ozone (O_3) and thermal energy.



The stratosphere is a stable layer of the atmosphere. *[Pic courtesy Windows to the Universe]*

Ozone (O_3) can itself absorb more UV radiation, forming another oxygen atom and a molecule of oxygen (O_2). Further reaction of the oxygen atom with ozone results in two molecules of oxygen (O_2). This reaction cycle, discovered by British mathematician Sydney Chapman in 1930, results in the continuous absorption of ultraviolet radiation and warming of the stratosphere.

$O_2 + h\nu \rightarrow O + O$ ($h\nu$ = UV radiation with $\lambda < 240$ nm)

$O + O_2 + M \rightarrow O_3 + M$ ('M' carries away thermal energy)

$O_3 + h\nu \rightarrow O_2 + O$ ($\lambda < 320$ nm)

$O_3 + O \rightarrow 2O_2$

As a result of the heat generated by this reaction cycle, the stratosphere warms with increasing height from -50 deg C at the tropopause to around 0 deg C at the stratopause, approx. 30 miles high.

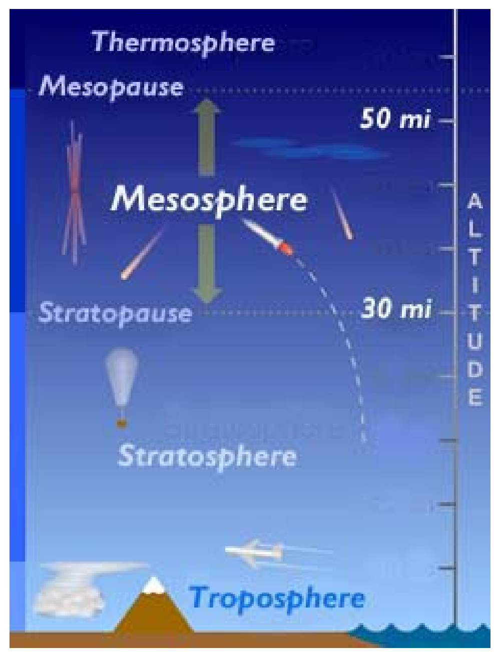
The amount of ozone from the Chapman cycle is reduced by naturally-occurring hydroxyl radicals (OH), and nitric oxide (NO). Atoms of chlorine (Cl) also affect the reaction, resulting in a thinning of the ozone layer. Those chlorine atoms are not naturally present, but were discovered in the late 1980s to be coming from chlorofluorocarbons released into the atmosphere. Bromine atoms from halons are also a problem.

Mystery layer

Above the stratopause is another layer of the atmosphere known as the **mesosphere**. The processes taking place in the mesosphere are more of a mystery than for the other layers because of the difficulty of observation. Jet aircraft can probe the troposphere and meteorological balloons can record conditions in the stratosphere. Higher above the earth, satellites and space stations can take continuous readings. But the mesosphere, lying between 30 and 50 miles high, can only be probed by sounding rockets and then only for short periods of time.

What is known about the mesosphere is that temperature declines with height once again, from around 0 deg C at the stratopause to -90 deg C at the top, which is the coldest part of the earth's atmosphere. This temperature decline is partly due to infrared emissions from molecules of carbon dioxide, (CO_2).

While the stratosphere protects the earth from UV radiation, the mesosphere protects us from meteors, most of which burn up in this layer. Meteors are pieces of interplanetary matter in orbit around the sun that strike the earth's atmosphere, at high speeds from 5 to 45 miles per second.



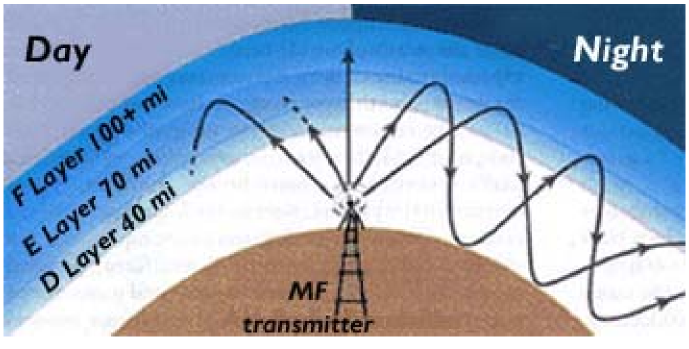
The mesosphere is home to meteor trails and the D-layer. *[Pic courtesy Windows to the Universe]*

Small meteors the size of a grain of sand are striking the atmosphere continuously. Higher concentrations occur at various times of year, appearing to originate from different parts of the sky. For example the Leonids meteor shower peaks in late November, from the constellation of Leo. The meteors are heated by collision with air molecules and vaporize in a matter of a second or so. A trail of heated air and vaporized, metal (mostly iron) is left behind. The trail contains positive ions and negative electrons — which are highly conducting and capable of reflecting VHF radio waves.

Radio amateurs can make use of meteor scatter for long distance contacts on the 50 MHz and 144 MHz bands. The reflected signals are relatively weak, so power levels of 100 watts or more are required on 144 MHz, combined with directional antennas. Reflections are stronger on 50 MHz than at 144 MHz. Because of the short-lived trails, high speed CW techniques were originally employed, with best results during the major meteor showers. Nowadays, digital modes such as WSJT — specifically devised by Joe Taylor, K1JT for meteor-burst communication — are proving more popular. Meteor scatter is also used for commercial purposes, with systems relying on the continuous meteor trails formed in the mesosphere, rather than on the seasonal showers.

There is another ionization mechanism in the mesosphere that can influence radio waves. Ultraviolet radiation from hydrogen in the sun can strike a molecule of nitrogen oxide (NO), removing an electron and leaving a positive ion. This is the origin of the "D-layer", the lowest part of the ionosphere. As soon as the source of UV radiation disappears at night, the oppositely charged particles are attracted to each other, the charges of the ions are neutralized and the D-layer largely disappears.

The D-layer, around 30-50 miles high, does not reflect radio waves to any extent, but it does have an absorbing effect, mostly on frequencies below 10 MHz. This absorbing effect is caused by an interaction of the radio waves with free electrons, which then collide with other molecules. As a result, longer wavelengths are attenuated strongly during the day on their way up to the higher, reflecting layers of the ionosphere. This effect is especially noticeable for medium frequency



The D-Layer, present during daylight, absorbs frequencies below about 10 MHz.

emissions, including AM broadcast and the amateur 160 meter band. These transmissions can be reflected over great distances at night, but during the day, the sky-wave is strongly absorbed by the D-layer and long distance propagation disappears. Reception is then only possible by ground wave.

During periods of intense solar activity — which we are just beginning to experience again — there are additional mechanisms that can energize the D-Layer. Hard X-rays from the sun can ionize nitrogen (N_2) and oxygen (O_2) molecules. When a coronal mass ejection takes place from a solar flare, protons are ejected from the surface of the sun and if directed toward the earth, are guided by the earth's magnetic field into the polar regions. This increases ionization of the D-layer to an even greater extent, leading to intense absorption of radio waves over polar and high latitude paths. The result can be a blackout of HF communications lasting up to a day or two.

Top of the crop

The last layer of the earth's atmosphere we'll consider is known as the **thermosphere** and stretches from 50 miles to 300+ miles above the earth. Space vessels can be found within this wide range, including the Space Shuttle and the International Space Station (around 220 miles up). Note that geostationary satellites fly much higher — around 22,000 miles high.

There is significantly higher radiation from the sun at these heights, and the thin atmosphere begins to warm up once again with increasing height. The temperature can rise to 1500 deg C, depending on solar activity, but the atmosphere is so thin that it has hardly any warming effect on spacecraft and other objects.

Continuing our way up through the ionosphere, the next active area is known as the "E-layer", and is roughly 55-90 miles high, just above the stratopause. As well as warming up the thin air, at this height ultraviolet radiation and soft X-rays from the sun cause ionization of molecular oxygen (O_2) and nitrogen (N_2), knocking out an electron. Ionized species include O_2^+ and NO^+. This ionized layer is less dense than the D-layer, so when electrons are disturbed by an incoming radio wave, the number of collisions is less and absorption is much reduced. As an oblique radio wave enters an area of increasing electron density, the signal is refracted back toward the area of lower density. As a result, low angle waves can be bent back toward the earth instead of continuing out into space.

During daytime, there is still attenuation of the lower frequency waves by the D-layer, which has to be traversed twice for a wave reflected from the E-layer. The absorption is reduced as the radio frequency increases, so daytime DX is more likely at higher frequencies. However, the E-layer is most effective at reflecting frequencies below about 10 MHz, so higher frequencies will penetrate the E-layer and go onward and upward to the higher layers.

The E-layer depends on radiation from the sun, and so as soon as the radiation is removed, the ions begin to recombine. Because of this, the E-layer is significantly weaker at night when the solar radiation is blocked.

Intense clouds of ionization can sometimes form in the area of the E-layer, sufficiently strong to reflect frequencies in the VHF region up to around 110 MHz. This is described as "Sporadic E" or E_s propagation. The clouds of ionization can affect the amateur 10 meter and 6 meter bands plus the VHF-FM broadcast band at 88-108 MHz. Sporadic-E also affects propagation in the lower VHF television band, but this is little used in these days of digital TV. Sporadic-E happens mostly in the summer months and there are several theories to explain the cause — including UV radiation, thunderstorms and wind-shear of the ionized layer.

F is for foremost

The most important area of the ionosphere for HF propagation lies above the E-layer in the region between 90 and 240 miles high. This is known as the "F-layer", and it has the strongest electron density of any part of the ionosphere.

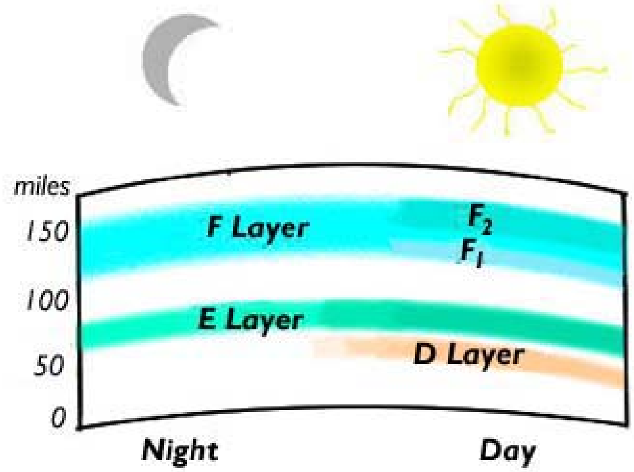
In this part of the atmosphere, pressure is extremely low and oxygen can exist as individual atoms. Ionization is caused by short wavelength ultraviolet radiation from the sun, which ejects an electron from the atoms of oxygen leaving an O^+ ion.

During daytime, the F layer splits into a lower-

UV radiation from the sun ejects an electron from an oxygen atom, leaving a positively charged oxygen ion.

level F_1 layer and an upper-level F_2 layer. The height of these layers depends on the season and the solar cycle. At night, the two levels combine. Because of the low density of the atmosphere, recombination of the ions is slow, so the F layer is still present at night.

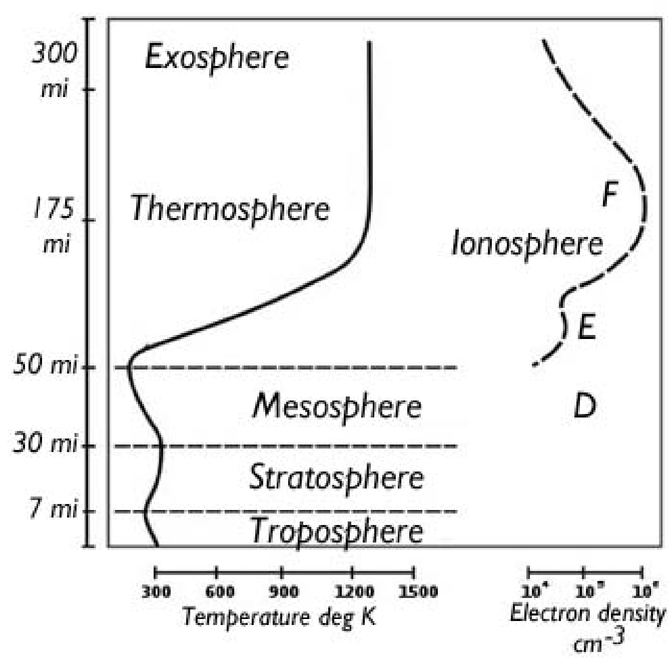
Radio waves which pass through the D and E-layers will reach the F layer. During the daytime, the lower frequency waves will be refracted by the F_1 layer and effectively reflected back toward the Earth. Higher frequency waves will travel through the F_1 layer and be



Solar radiation is blocked at night, resulting in changes to the ionosphere between night and day.

reflected by the F_2 layer. Because of the greater height of the F_2 layer, distances achieved by reflection of these higher frequency waves will be longer.

A single reflection from the F_2 layer can result in a maximum single-hop of 3000 miles. Longer distance contacts are the result of multiple-reflection propagation where the radio wave bounces back up from the earth's surface.



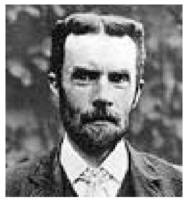
Atmosphere layers at left with graph of temperature. Ionosphere layers at right with graph of electron density.

All together now

Taken together, the ionized layers of the atmosphere are called the **ionosphere**. Knowledge of these higher parts of our "ocean of air" was only gained during the 20th century following the practical use of radio waves and investigation of radio propagation by scientists.

It became evident to Marconi and his staff that radio waves could travel much farther than line-of-sight paths — for example, they could maintain contact with ships that had sailed well beyond the visible horizon. The peak of these DX achievements came with Marconi's reception of transatlantic spark transmissions from Cornwall to Newfoundland in 1901.

In 1902, English electrical engineer Oliver Heaviside proposed the existence of a reflecting layer to explain the propagation of radio signals around the earth's curvature. The American engineer Arthur Kennelly made a similar prediction, and the phenomenon became known as the Kennelly-Heaviside layer.



Oliver Heaviside

Edward Appleton

The existence of the layer was proved in 1924 by the English physicist Edward Appleton, who showed that reflected signals from the BBC transmitter in Bournemouth were coming from a conducting layer 55 miles above the Earth (E-layer). Appleton went on to determine that the reflections were being caused by free electrons resulting from ionization. Later he discovered the existence of the much higher F-layer ("Appleton layer"), and explained daytime absorption by the D-layer. Work by Appleton with the ionosonde, probing the ionosphere, led to the development of pulse radar techniques used in World War II.

Edward Appleton and R. Naismith set up an ionosonde at Tromso, Norway to probe the ionsosphere in 1932.

[Sources include: *"Your Guide to Propagation"* by Ian Poole, G3YWX, RSGB]

- NM9J

Hudson Division newsletter

The ARRL Hudson Division newsletter, previously edited by former Division Director Frank Fallon was circulated by e-mail. Following the retirement of N2FF, the *Hudson Division Beacon* is now being published as a PDF by Frank's successor Joyce Birmingham KA2ANF.

Publishing the *Beacon* in PDF format will allow inclusion of photos and other graphic elements each month. The February 2011 Beacon is now available on the ARRL Hudson Division Website. Here's the direct link: http://www.hudson.arrl.org/beacon/2011/201102hudsonbeacon.pdf

All prior newsletters are still available on the ARRL Hudson Division Website — http://www.hudson.arrl.org

Highlights for February:

- Frank Fallon, N2FF resigns as Hudson Division Director
- Bill Hudzik, W2UDT appointed Vice Director
- Section News from NLI, ENY, and NNJ
- Hamfest Listings

If you have news and photos about events or activities from the Hudson Division, email them to the new Director at ka2anf 'at'arrl.org

Joyce Birmingham, KA2ANF
ARRL Director, Hudson Division
ka2anf 'at' arrl.org

If you wish to receive e-mail alerts from the Hudson Division, you will need to access the ARRL web site and supply your email address. Once you are logged into the Web site you click "Edit your Profile" and then select "Edit Email Subscriptions" to get to the checklist with "News and information from your Division Director and Section Manager." Make sure this item is checked, then click on "Save", and the job's done!

Peekskill / Cortlandt Amateur Radio Association

Mail: PCARA, PO Box 146, Crompond, NY 10517
E-Mail: w2nyw@arrl.net
Web site: http://www.pcara.org

PCARA Update Editor: Malcolm Pritchard, NM9J
E-mail: NM9J @ arrl.net
Newsletter contributions are always very welcome!
Archive: http://home.computer.net/~pcara/newslett.htm

PCARA Information
PCARA is a **Non-Profit Community Service Organization.** PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of the Hudson Valley Hospital Center, Route 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays.

PCARA Repeaters

W2NYW:	146.67 MHz -0.6, PL 156.7Hz
KB2CQE:	449.925MHz -5.0, PL 179.9Hz (IRLP node: **4214)**
N2CBH:	448.725MHz -5.0, PL 107.2Hz

PCARA Calendar
Sun Mar 6: PCARA monthly meeting, Hudson Valley Hospital Center, 3:00 p.m.

Hamfests
Sun Mar 20: Southington ARA Flea Market, Southington High School, 720 Pleasant Street, Southington, CT. 8:00 a.m.
Sat Mar 26: Orange County ARC Spring Hamfest, Town of Wallkill Community Center. 2 Wes Warren Drive, Middletown, NY. 8:00 a.m. **Club Table.**
Sun Apr 3: Splitrock ARA North Jersey Hamfest, Roxbury Senior Center, 72 Eyland Ave, Succasunna NJ.
Sun Apr 10: Mt Beacon ARC Hamfest, Tymor Park, LaGrangeville, NY. 8:00 a.m.

VE Test Sessions
Mar 6: Yonkers ARC, Yonkers PD, Grassy Sprain Rd, Yonkers, NY. 8:30 a.m. Contact Daniel Calabrese, 914 667-0587.
Mar 10: WECA, Westchester Co Fire Trg Center, 4 Dana Rd., Valhalla, NY. 7:00 p.m. Contact Stanley Rothman, 914 831-3258.
Mar 21: Columbia Univ VE Team, 2960 Broadway, 115 Havemeyer Hall, New York NY. 6:30 p.m. Contact Alan Croswell, (212) 854-3754.

Peekskill / Cortlandt Amateur Radio Association Inc.
PO Box 146
Crompond, NY 10517