

CCO RADIOSPORT NEWS

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HF Propagation Part 3 - Improving Propagation Predictions

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Introduction

In my last article, HF Propagation Part 2 – Predicting Propagation, I covered the basics of predicting propagation using Sheldon C. Shallon, W6EL's, software program W6ELProp.

In this article I will show you how to improve your propagation predictions, by fine-tuning your model.

Improving your Propagation Predictions

There are a number of things you can do to improve your prediction model in W6ELProp.

The adjustments are:

- Antenna type and power output per band
- Angle of radiation of your antenna
- Noise Bandwidth
- Signal Level Suppression Threshold
- Man made noise levels

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HF Propagation—Part 3

Start the “W6ELProp” program. Once the program loads, select the “Options” item from the main menu, the “W6ELProp Options” screen is displayed, next click on the second tab “Frequencies and Constants”.

The “Frequencies and Constants” tab is where the prediction model can be adjusted for frequencies needed, your antenna type and power output.

W6ELProp is initially setup to calculate propagation on 3.6, 7.1, 14.1, 21.2, and 28.3 MHz but, you may change, delete, or add frequencies to any combination of up to ten frequencies between 3 and 30 MHz.

This means you can add the WARC bands or even shortwave broadcast bands if so required.

Specify each frequency

Next, you may specify for each frequency you have selected, the number of db, that corresponds to your antenna gain and power output as compared to W6ELProp’s built-in values of 100 watts for power output and a half-wave dipole for the antenna.

If you know the power output and antenna gain of the station you are calculating a path to, you would add this db gain to the constant as well.

Also, note that you can use negative values if power output is less than 100 watts or an antenna gain less than that of the assumed half-wave dipole.

Please read the Help pages for more information on how to use the Frequencies and Constants calculations.

Next, click on the “Prediction Parameters” tab.

You can now adjust for:

Angle of radiation of your antenna.

W6ELProp uses a default of 1.5 degrees, which is probably the lowest practical radiation angle an antenna can have.

This is the starting point for the program to calculate propagation for the minimum number of hops and the maximum signal strength possible on the path chosen path.

Noise Bandwidth.

W6ELProp uses a default of 1Hz. The larger the noise bandwidth the lower the signal to noise ratio will be, so be careful how you use this item.

Signal Level Suppression Threshold.

W6ELProp uses a default of -10db, which means signals below an “S0” will not be calculated. This will keep the calculation speed fast and usually we are not interested in predicting based on weak signals. You do however have the option to choose a level appropriate for your own needs.

Man made noise levels.

Select the best option for your own location.

I recommend that you use the default values until you get use to the program and when you do adjust these items, change them one item at a time to see the effect.

User Preferences

Next, select the “User Preferences” tab. W6ELProp will calculate propagation using either the solar flux number or the current number of sunspots.

However, I recommend that you use the solar flux number instead of the number of sunspots, because the sunspot number is calculated by counting the number of sunspot groups and the number of individual sunspots.

The “sunspot number” is then given by the sum of the number of individual sunspots and ten times the number of groups.

Since most sunspot groups have, on average, about ten spots, this formula

for counting sunspots gives reliable numbers even when the observing conditions that are less than ideal, as well small spots are hard to see.

This means daily sunspot numbers may vary considerable, but average out over time. Also, the Sun rotates every 27 days, which means the sunspots are constantly moving and will have a varying effect depending on whether the sunspot is actually pointed at the earth.

However, if you use the solar flux number, it is measured every day and is therefore a more reliable indicator of the solar energy reaching the earth.

Data Screens

I prefer that signal levels be displayed on the propagation prediction data screens first instead of Signal to Noise ratios. However you do have the option to toggle between the two on the propagation prediction data screens.

I always use UTC time. A three minute map auto updating feature works well for me. You can choose a time that suits your needs.

Select the “High (877 areas)”, you will need this later. Select the “Save My Settings and Exit” button, to save all the changes made.

Your propagation model is now complete and you can predict propagation using W6ELProp, very accurately, but most importantly, fast and easy.

Now the cool stuff

Calculate a propagation path to Japan (JA) using SF = 121 and a K = 4 on Jan 20, 2004. Next, on the propagation predict screen, select “Maps”, then, “Rectangular Map” from the menu.

A map is then displayed that is centered horizontally on the longitude of your QTH (the default terminal) (see Figure 1). (Continued on page 4.)

VE3DZ 30 years of contesting

Editor's Note: Here's Yuri's e-mail report on his Region Two operation which marks his 30th year of contesting.

CQ Worldwide DX Contest, SSB

Call: VE2IM
 Operator(s): VE2QIP
 VE2XAA VE3FWA VE3DZ
 Station: VE2CSI/VE2IM
 Class: M/S HP
 QTH: Sept-Iles
 Operating Time (hrs): 47

Summary:

| Band | QSOs | Zones | Countries |
|--------|------|-------|-----------|
| 160: | 142 | 7 | 10 |
| 80: | 627 | 17 | 73 |
| 40: | 525 | 19 | 86 |
| 20: | 1964 | 38 | 134 |
| 15: | 2272 | 32 | 135 |
| 10: | 872 | 28 | 119 |
| Total: | 6402 | 141 | 557 |

Total Score = 11,235,008

Club: Contest Club Ontario

Great conditions! Nice to beat some "more serious" stations having limited hardware. Had few minor equipment failures during the contest.

Experienced a couple of short (5 to 10 min.) flares on Saturday resulted in sud-

den disappearing of pile-ups and then) almost all stations on the band. Lost at least 50% of multipliers heard (They did not hear us).

Still no serious antenna for 40 m. Our Zone 2 "newbie" Serge VE2QIP (UV3QIP) did a great job preparing antennas for multiplier station and some of the equipment. He was also of a great help searching for new multipliers.

We trust he's got a "CQ WW bug"... :-) Outstanding job was also done by another Zone 2 rookie - Ed, VE3FWA (RA2FZ).

He prepared all computer hardware, networking and software, which worked

flawlessly (we still have to learn a lot of N1MM's LOG features).

Also he was great at the run station, looks like RW2F team lost its valuable member. :-) Special thank you go to Alex VE2XAA (UX3UA) who made last minutes changes to his business schedule to be able to fill in for #4 in our team.

His technical expertise and help at the multiplier station were invaluable. Two of us made a 3000+ km drive, the other two - 2000 km drive.

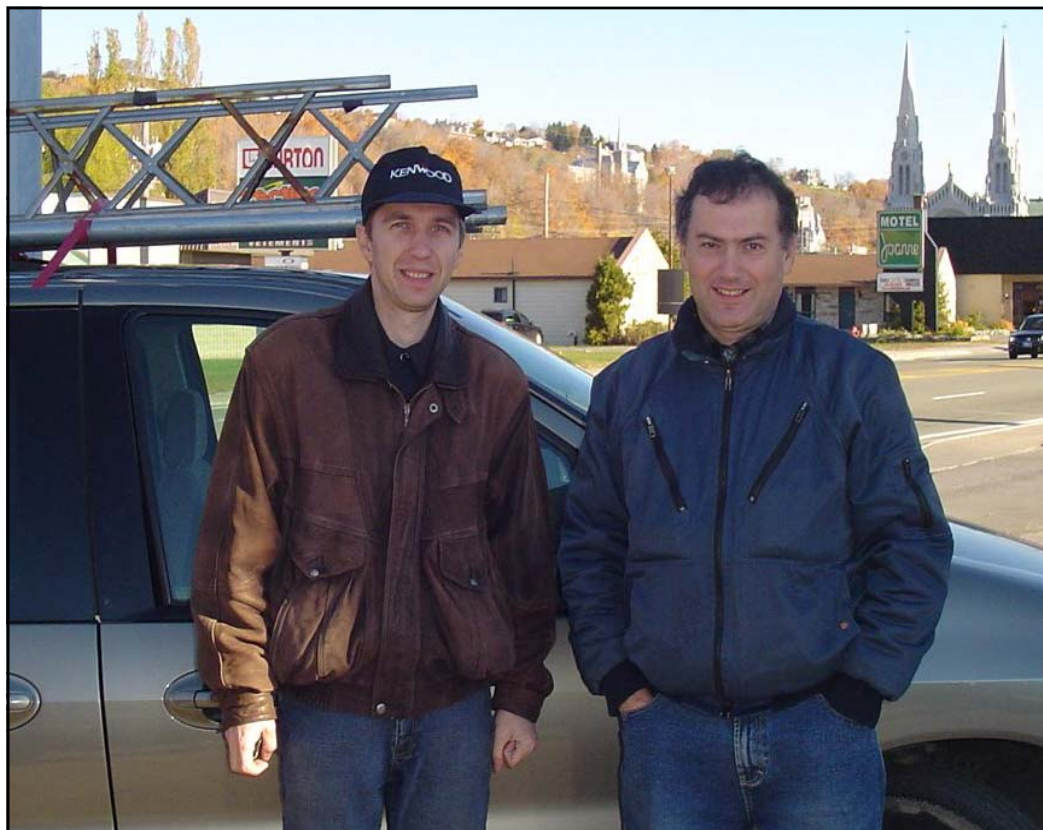
Ed and myself arrived home at 5:30 a.m. Tuesday after 1500 km non-stop drive.

This is definitely not a Caribbean vacation tour. :-))

Hope we'll fix a video about this trip soon.

Run station: FT1000MP + MLA2500B(1kW). Ant: Mosley CL37 @ 55', Dipoles for 160, 80 and 40 m @50' Mult. station: FT1000MP + SB220(800 W). Ant: TA33 @ 30', AP8A and R7 on the ground.

Back-up: FT1000MP field, FT767GX, SB200. We also had some back-up antennas which we did not install. Thanks to Rodrigue, VE2NN and VE2CSI club for letting us use their premises. 73, Yuri VE3DZ / VE2IM (celebrating 30 years in contesting and 6th year in Zone 2)



VE3FWA (left) and VE3DZ

HF Propagation Part 3—Improving Propagation Predictions

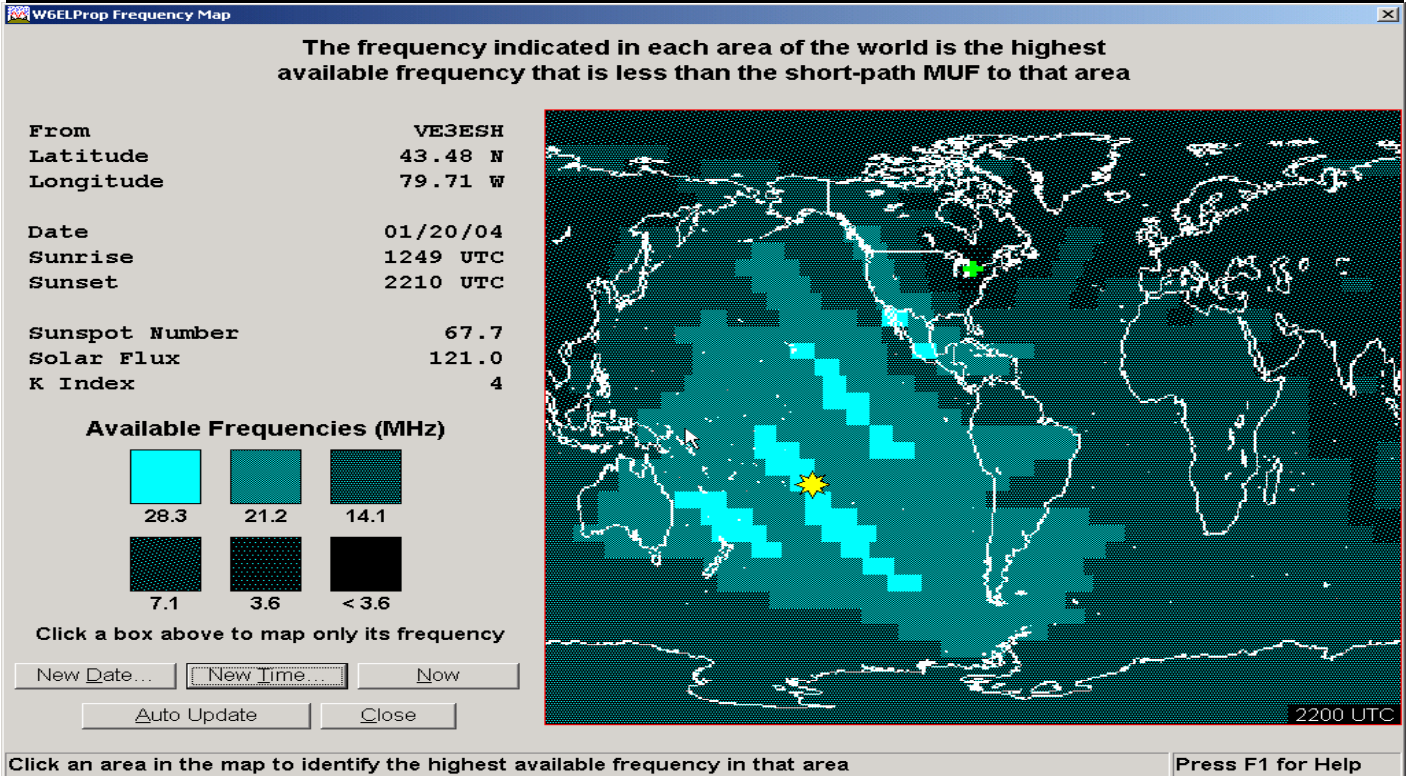


Figure 1—W6ELProp Rectangular Map

There are four main things you see on the Rectangular Map, and they are:

- All propagation data is shown for your calculation with the short path shown in “Red” and the long path shown in “Black”;
- The gray line or the terminator, which is a circle separating the sunlit side of the Earth from the dark side. Many great DX contacts can be made when both stations are located in the gray line zone. Therefore by looking at the map you can get a good idea where a path might exist based on the current time. Please note that this map is calculated based on your computer clock’s current time, so I changed the time to 2100 UTC to move the Gray-Line closer to my QTH in southern Ontario. You can move the gray line by changing the time or date for even more flexible propagation predictions. If you try 2200 UTC you will see that my path to Japan (at this time of year) lines up perfectly, indicating a very good possibility of making a contact;
- An eight-pointed solar star on the map indicates the halfway point on the earth where there is the same amount of daylight hours as darkness. You can see how this moves by changing the date;
- The boundaries of the polar areas in which polar cap absorption (PCA) events occur are shown surrounding the north and south poles on both maps. When signals pass through these polar areas, increased absorption may greatly reduce received

signal levels during periods when a PCA event is occurring. Note that the path to Japan is actually a polar path and not through California, which means a PCA event will effect propagation to Japan.

One of the practical uses of the Rectangular Map is Gray-Line DXing. When a series of favorable events occur along the gray-line it is possible for stations on one side, to be able to contact stations on the other side, on virtually any of the HF bands. Gray-Line DXing really works because I know that if I am looking to contact Japan, usually as a multiplier in a contest, I always look for their signals on 10m and especially on 15m around supertime.

One of the best things about W6ELProp is you can actually see the Gray-Line zone, so that you know the correct time to try and make a contact. Remember the Gray-Line moves depending on the time of year, which makes the map extremely useful (more on Gray-Line DXing later). Select the “**Close**” button to return to your prediction data screen. Next, select the “**Graphs**” menu item and then the “**MUF**” and “**Signal Strength**” menu items. This will display a graph plotting either the MUF or Signal Strength. Try out these features. This a great reference while on the air and you are looking for a band to choose.

Next, from the main menu select the “Maps” item and then the “Frequency Map” item, this will display the W6ELProp Frequency Map (see Figure 2). (Continued on page 5)

HF Proagation Part 3—Improving Propagation Predictions

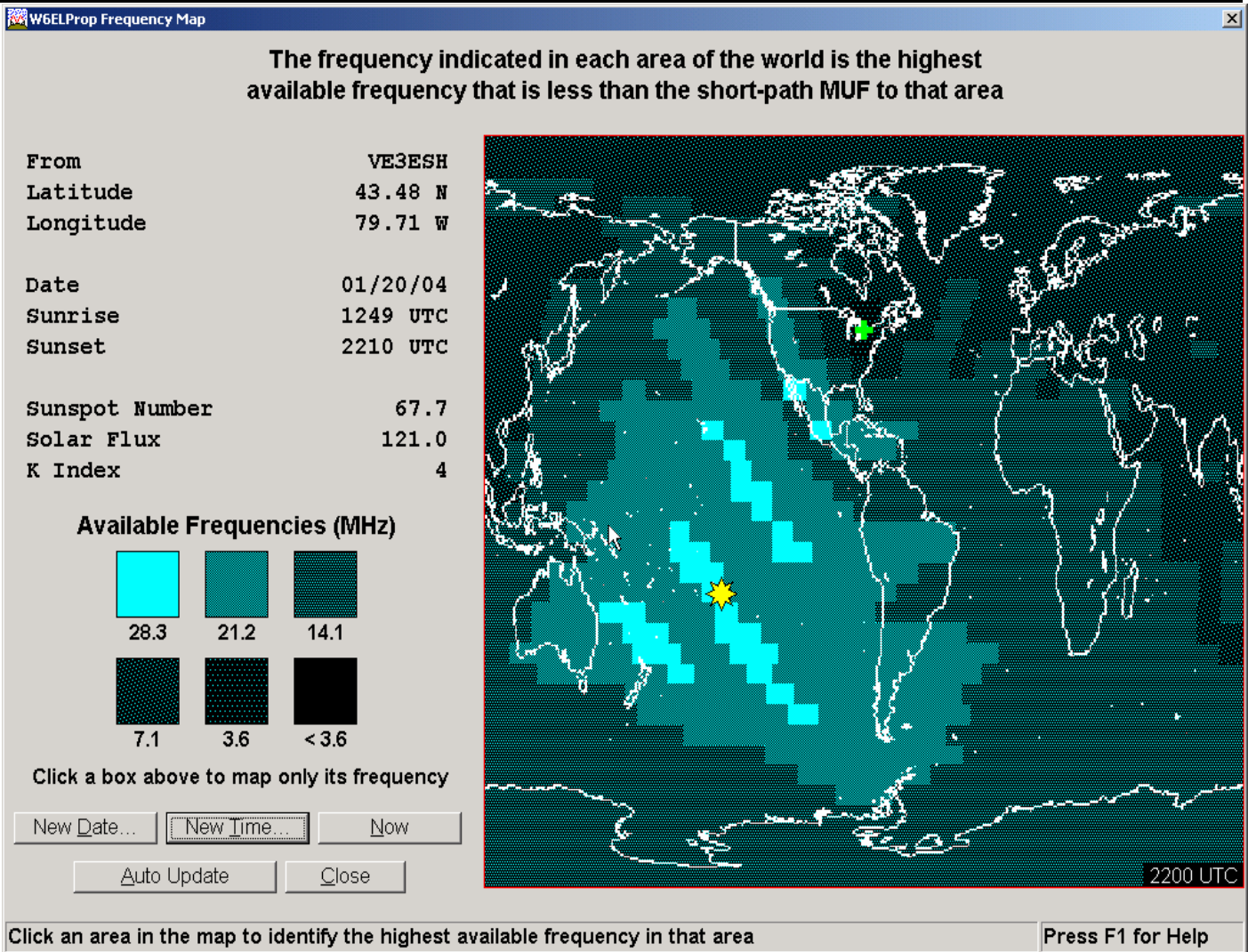


Figure 2—W6ELProp Frequency Map 1

The Frequency Map

The Frequency Map shows which of your prediction frequencies is most likely to be useable at any time of day to communicate from your QTH to any area in the world.

If your frequency map does not look like the one above, then return to the option menu and select the “User Preferences” tab, and click on the “High (877 areas)” radio button.

The Best Frequency

The indicated frequency in each

area is usually the best frequency to use at the specified time because signals at higher frequencies have a lower probability of propagating, and absorption loss will be greater for signals at lower frequencies.

Now, if you want the map to display only the areas to which one of your prediction frequencies is shown, click on the box for that frequency on the left side of the screen.

Click on the 21.1 MHz area to see where 15 m is available (see Figure 3). (Continued on page 6.)

Join CCO

Contest Club Ontario is Ontario’s entry into international club competition in the 21st Century. It brings together the talents of a large number of Amateur Radio operators who may now focus on a common goal, in addition to traditional individual competition.

Membership is growing steadily. CCO participates in a over a dozen events during the year, many involving two or three contests. Most use HF CW and phone but RTTY and VHF are also featured. <http://www.qsl.net/cco/>

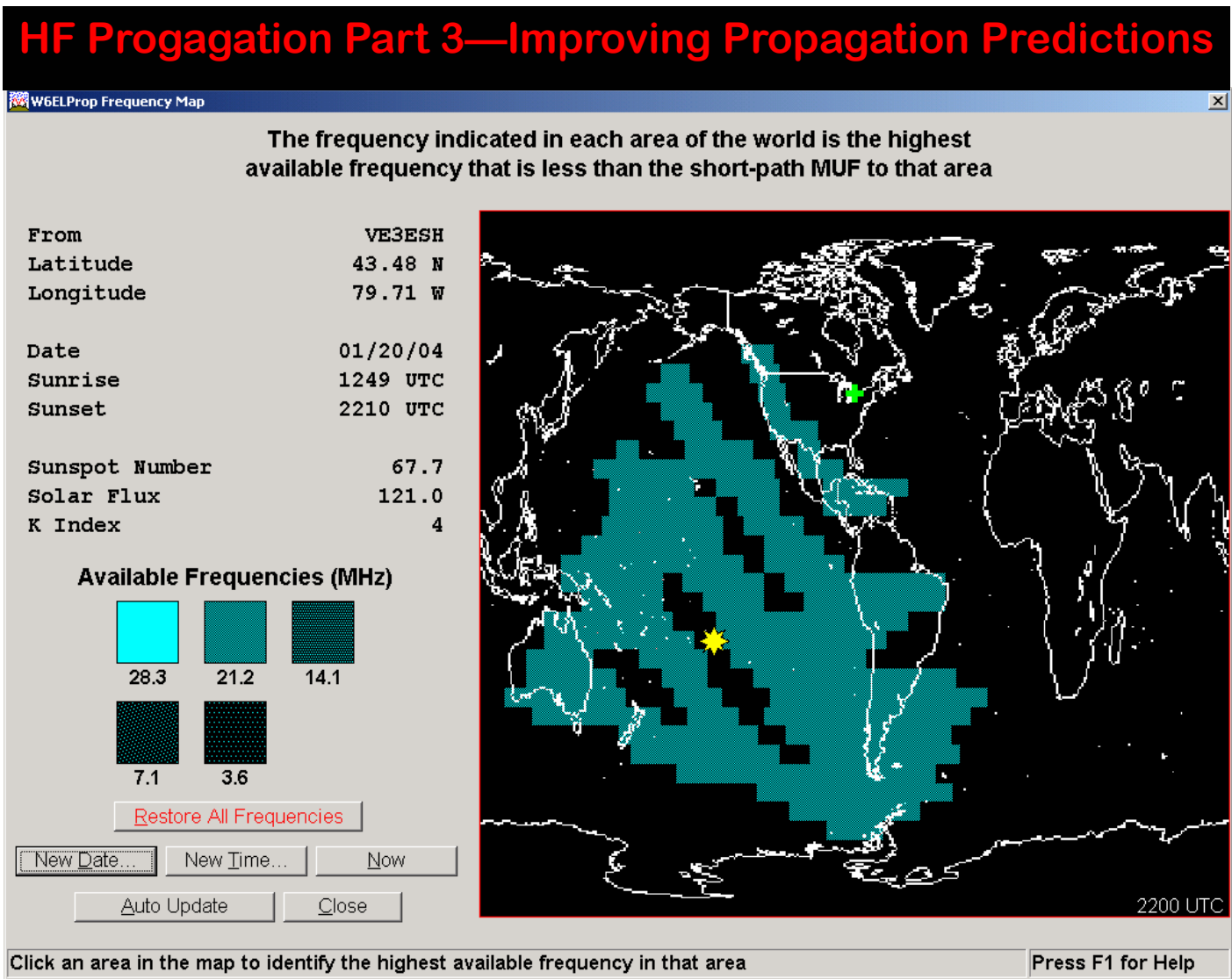


Figure 3—W6ELProp Frequency Map 2

You can see the areas that 15 meters is the highest available frequency. By using the high resolution (877 areas), the Frequency Map shows multiple skip zones in rings around your QTH (the green plus sign).

The first skip zone ring is usually very accurate, but the other rings may not appear in practice because the actual ionosphere contains many irregularities, and W6ELProp does not calculate these in its ionospheric models.

However, propagation may occur at or near these outer rings, depending on what activity is occurring in the ionosphere. If the geomagnetic activity has been quiet for several days, the chance that a propagation path will

occur in these outer rings increases.

Please note that the frequency map shows that a contact to Japan on 15m is not probable at this time, but if you look at Figure 2, a path on 20m does.

I have discussed many of the features of W6ELProp program to get you started on predicting propagation easily. However, there are many more program features that you should explore that will help make your predictions better.

Conclusion

Now that you have got an accurate propagation model for you station you can see how fast you can predict

propagation from your QTH to any location in the world. Also, you are now able to work with Gray-Line DXing and you can determine the best possible frequency to use to make the contact you want to try for. In my next article, HF Propagation Part 4 – The Ionosphere and Gray-Line DXing, I will discuss how the various layers of the ionosphere function, Gray-Line DXing, and some other propagation concepts.

Acknowledgements

Once again, I would like to thanks Sheldon C. Shallon, W6EL, for writing W6ELProp and making it available to the Amateur Radio community.

sCCOre Update

The results continue to be compiled for the 2004 contests. They are presented on the web in chronological order as much as possible with those reaching the 5M plaque level indicated when that is attained.

The list of those eligible is the membership roster as shown on our web as of the time when the contest results are shown in the sCCOre listing. Make sure you are on the roster.

In 2003, there were 118 of our members involved in the sCCOre-eligible contests.

The way the plaques were won differed greatly from individual to individual.

Ron, VE3AT took home #1 by winning 7 contests outright, entering in only 10! VE3KZ took the opposite approach, winning only 3 but participating in 26 contests. (Must have taken every second weekend off!) John, VE3EJ won 4 contests, participating in 17.

Yuri, VE3DZ, won 3, participating in 18 and Chris, VA3NR, won a single contest, the NCJ Sprint group, but participated in 19, actually more, considering that there were 6 possible Sprint weekends totaled together! Those partials add up!

Other contest winners in these contests include VE3OIL, VE3NPB, VE3PN,

VE3AGC, VE3XD, and VA3DX. As far as number of contests were concerned, the top "Iron Men" were VE3KZ (26), VE3XD (21), VA3XRZ (20), VA3NR (19), VE3RCN (19), VE3NE (18), VA3IX (18), VE3EJ (17), VE3AGC (16), VE3IAY (15) and VE3CR (15).

Looking forward through 2004, along with the present recipients, there are 13 more members with scores in excess of 2M at the end of the 2003 results. There are 16 between 1M and 2M. Good luck to all in 2005!

73 Bob VE3KZ

QRT by VE3HG

Why do we do it? Why do we try to stay up all Friday night listening to the static crashes in the headphones? Then we get four hours sleep so we can work all day Saturday so we can stay up again until dawn.

Of course, the answer is "it's called contesting!"

And contesting is the reason so many of us get on ham radio at all. It's the thrill of winning your category whether it be at 5 watts or 1.5 KWs.

Part of the fun for me is working multi-op single transmitter class. It lets me get some sleep and provides sufficient man-

power to help erect antennas, cook some food (Thanks to Paul VA3PC for the Saturday night chilli.) and win a contest or two.

But the most fun, I think is the ability to operate some pretty fantastic stations. Have a look at the antenna farm at VA3SK.

There's a particular rush one gets as the three-element 40 beam rotates towards Europe and signals from across the pond peak at 40db over S9. Don't get that at home with the dipole!

Ken's station is 30 miles or so south of North Bay. Sometimes the aurora can kick us off the band at night (But the heavenly display is amazing.) but there's not a TV within half a mile and the noise floor sometimes is non-existent.

These photos are all from this year's CQ WW DX SSB contest. The same crew has worked together for four or



We didn't think about the consequences of everyone eating the same "all-you-can-eat" fishry on Friday night. Greg, VA3GGF (left) and Mike, VA3MW survived.

five years now and I'd miss it if I wasn't invited back (hint).

It's probably the same for groups across the province. We keep trying to get better. We repair the stuff that breaks and enhance the stuff that survives. I think my wife is enjoying the days when I disappear up north for the weekend. So this contesting thing is getting to be a win-win for everyone.

See you in the pileup and season's greetings.—Peter VE3HG



The antenna farm at VA3SK's in North Bay includes (from left to right) a High-gain Explorer with 40 meter extensions at 56'; a six meter beam affixed to the operating stable (it's a long story); the homemade full-size 3-element 40 meter beam at 110' with an 80 meter single-element dipole and 15-meter beam fixed on Europe; finally a TH-7 at 56' with another 15-meter fixed beam.

Customs and Travel

Part I by Travis VE3WO

If you're going to the U.S. for a trip of any kind and plan to bring your amateur radio gear with you, the Y38 "Identification of Articles for Temporary Exportation" is the only form you'll need.

Whether you're going on a two-hour shopping trip, a weekend at the Dayton Ham-Fest, or for six months in Florida, the Y38 will allow you to re-enter Canada with an absolute minimum of trouble, no-cost to you.

This form is really easy to use. When you decide you're going to take a trip to the U.S., follow this procedure:

Make a list of everything you're taking; be sure include the Make, Model, and Serial Number of the individual components.

To locate the Canada Customs office nearest you, call the ACIS (Automated Customs Information Service) at 1-800-461-9999.

Using the information you obtain, call your nearest Customs office and tell them you want to complete a Form Y38. Visit your nearest Customs office, and bring all of the gear with you.

They will examine the gear, complete the Y38 (sample attached), and stamp the green card. They'll give it to you. Keep this form with you at all times; in your wallet, purse or glovebox.

It should always accompany the gear, wherever you go. It's your ticket back into

Canada. Go away, have fun in the States, send me a postcard.

U.S. Customs will allow you to declare whatever you have installed in your vehicle (ie. mobile rig(s), tuner, whip, etc.) without (in most cases) having to pay anything or fill out any forms.

Just tell the U.S. Bridge Officer what you've got in the car. DO NOT LIE, DO NOT UNDERSTATE, and DO NOT OMIT any items.

Your luck is that you'll run into the biggest goof of an officer on the day his dog got run over, and he'll bust your butt. Customs officers can occasionally be drunk with their own power, and they're just waiting for some joker like you to lie to them. Makes them feel good.

If you're bringing additional ham gear with you for purposes of trade, swap or sale, and it's valued over USD 200.00, U.S. Customs considers them Commercial Goods (as opposed to Personal Goods), and you may have to pay duty on them (if they're dutiable).

The reasoning is that they're not for your personal use, but rather for sale to make a profit (or trade to upgrade your gear). If the total value of what you're bringing exceeds USD 1200.00, you'll have to use the services of a U.S. Customs Broker.

If this is the case, CALL ME (my numbers are at the bottom of this page). This gets tricky, and requires as much

lead time as possible to arrange.

Once cleared by U.S. Customs, you're free to begin your U.S. trip.

Returning to Canada after your trip is the easy part. Ignore U.S. Customs. You don't need to report to them, you don't need to talk to them.

When you get to the Canadian side of the Bridge, tell the Canadian Customs Officer that you're bringing back your equipment.

Whip out the Green Card Y38, hand it to the officer, and grin broadly.

Gritting his teeth in frustration at your preparedness, he'll most likely, albeit reluctantly, wave you through. If they pull you over, don't panic. You've done everything right, and you and your gear will emerge unscathed.

Personal exemptions:

Any resident of Canada returning from a trip abroad may qualify for a Personal Exemption and therefore be able to bring into Canada goods up to a certain value - free of duty and taxes.

Limitations are as follows:

Twenty-four to 48 hours absence - any number of times per year, you may bring in goods to the value of \$50 (excluding tobacco products and alcoholic beverages). Only an oral declaration is required.

After 48 hours absence or more - any number of times a year, you may bring in

goods to the value of \$200. A written declaration may be required.

After seven days absence or more - once every calendar year, you may bring in goods to the value of \$750. A written declaration will be required.

Please note:

If you are over 19 years old, Tobacco Products (200 cigarettes and 50 cigars and 2 pounds of tobacco) and if you meet the age requirement, Alcoholic Beverages (40 oz. of wine / liquor /24 x 12 oz. cans or bottles or equivalent of beer or ale) are free of duty and taxes, if you are eligible for the \$200.00 (anytime) or \$750.00 (yearly) exemption.

That's it. Easy, right? Not really, and that's just the way it is.

If you have any questions, and you should, you can call me during the day at 560-2400, or at home on 693-7014. Here are some pertinent numbers for use when preparing your trip:

Travis VE3WO -705-693-7014, or Work 560-2400 (George A. Gray Customs Brokers Ltd.)

Canada Customs -1-800-461-9999 (Automated Customs Information Line)

U.S. Customs - 716-646-3400 (Buffalo, NY Office)

FedEx Trade Networks -716-874-1300 (U.S. Customs Broker, should you require one)