Do we need to learn about Propagation?

By Marcel H. De Canck, ON5AU

INTRODUCTION

Is a profound knowledge about propagation properties a benefit to you? The answer is ***yes*** or ***no***, depending on what kind of communication you make and depending on your eagerness to know ***why*** and ***how*** certain contacts are made via the wireless medium that radio is after all. The eagerness or the urge to know the ***why***'s and ***how's*** depends entirely on your personality. Nothing wrong if your answer is no at the above question. I do know a lot of PC users, for example, who do know absolutely nothing about how such an apparatus functions or even how to program it. Nevertheless, they obtain a lot of joy with their PCs and do a lot of creative work.

The same people you find among the amateur radio community. Some have sophisticated transceivers and a lot more, make many radio contacts, but do not put questions like ***why***, ***when*** and ***how*** this wireless magic happens. Also nothing wrong with that. But If you are a real DX'er or contester, or your intention is to become one, and chase the radio spectrum to achieve a high score DXCC quota on most ham-bands, then you are better off with a profound knowledge of propagation properties and characteristics. Ask this of any heart-and-soul DX'er with long experience, and he will confirm it.

Not every place on earth is contactable at any time or with any frequency band. Radio wave propagation depends on a huge number of factors. Some are quite predictable and common knowledge, such as the low frequency bands-160 and 80 meters-are only usable for DX from sunset till sunrise. In contrast, the higher frequency bands are often totally closed at nighttimes. But what heading to beam during what season at what time of the day on which frequency, long path or short path, what signal take off angle is preferable to have the best chance of making contact: all of this is not so well known. Even daily the propagation conditions are not the same, with minor to major differences often noticed.

Many propagation properties are already explained and published in my monthly column at *antenneX* and it is still a continuing series. How to use propagation prediction programs to be rather well informed about what the band conditions can be has also been a column subject. But there are other options available to be informed and to discover the real time propagation conditions. Yes indeed, we can use beacons around the world.

The NCDXF/IARU worldwide beacon project from the Northern California DX Foundation is an extremely good and well-designed initiative, started three decades ago. This project was the answer to the following statement. "There are at least two possible explanations for an apparently dead band: (1) the propagation is poor, or (2) no one is transmitting." The second statement is out of the question; it is insured by those beacons, that there are always reliable signals on the air, around the clock from fixed stations worldwide. With three minutes of listening, one can find out either where a particular band is open or on which band we have the best propagation to a particular part of the world.

Later when the PC did become part of the amateur station equipment, beacon-monitoring programs became available to monitor these 18 worldwide beacons continuously and automatically. About two years ago I started at my home QTH to monitor the beacons and made the logging results available to everyone on the Internet via my homepage. From the start I used the program BeaconSee from M.Ewen-Smith COAA, which is a well-designed program and at that time one of the best on the market. This year in May, another beacon monitoring program FAROS became available, which gives a better general overview by displaying the results for a complete 24-hour day

In the July and August 2006 issues of *antenneX* I wrote a review of the NCDXF/IARU beacon monitoring program form the author Alex Shovkoplyas, VE3NEA. This program, FAROS is an excellent program to monitor propagation conditions for the five high frequency ham-band 20, 17, 15, 12 and 10 meters.

Today, there are four radio hams that monitor the beacons in real time with the Faros program and publish it on Internet. One in Japan (JA0XZD) and three in Europe (Sweden - SM5AJV, The Netherlands – PA8AD and Belgium – ON5AU). I have been informed of an upcoming station in

Germany. Where are the other continents? Would you like to join this list and contribute to the radioham community? It would be great to have at least a few on each continent and even greater if monitoring occurred in most countries. This would be real on-the-spot propagation information that is surely possible with the beacon network from the NCDXF/IARU. Why not use this excellent network throughout to have worldwide propagation information. This was the intention of the beacon program from the start and today's technology of the World Wide Web can add even more.

What do you need?

Preferably a spare receiver or tranceiver with CAT control, also preferably a spare PC with clock frequency of 1 Giga or higher and with a sound card installed. Two interface cables: an RS232 CAT cable and a standard audio cable. These can be found rather cheap at a hamfest. Next, get a direct fast Internet connection with 1 Mbits/sec or faster download speed. Further a five-band ground plane or a five band vertical dipole, such as the one that I use. It is quite easy to construct and install such a simple but good receive antenna with little cost, (in a forthcoming article at *antenneX* I will describe such a homebrew antenna, which is also a good transmitting antenna). The needed hardware consumes electric power. I have measured that this is about 2.5 kilowatt/day; this is yearly a bit more then 900 kilowatt. Perhaps you are thinking that the hardware, software and the electric bill together is rather costly and too high for your hobby budget. A hint: perhaps your local club might sponsor your initiative.

You will need some web space at a provider or probably you have already your own website. A bit of experience of how to upload files to the web space and building a webpage is desirable. But I can and will help with providing a ready to use webpage for this purpose to those who like to start live beacon monitoring on Internet. You can have an idea of this ***"Ready to use page"*** here. It's the ***Archive/Browse*** option. I made also a few programs for periodically uploading of the monitored results from the Faros program to the webpage. These programs have a built-in FTP algorithm; they do not need any other FTP program and upload extremely fast. These programs have to be initialized in your Planned Task folder. I made a complete manual "How to do". If interested, please do not hesitate to contact me. I can provide these files at no cost, its freeware.

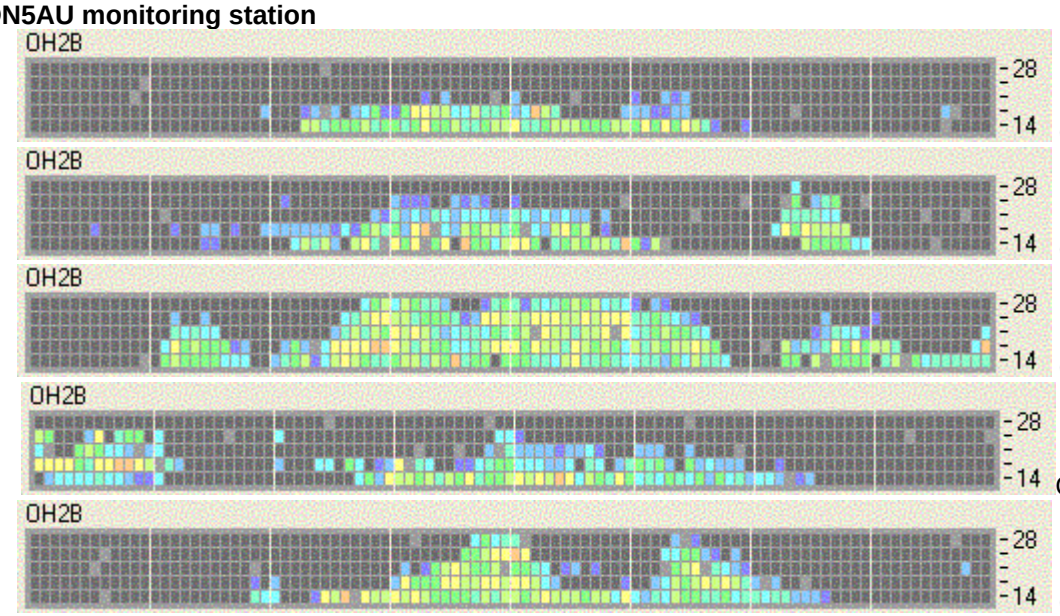
What can we learn from beacon monitoring?

Here are some examples of monitoring done by PA8AD and ON5AU during the period October 20 and October 24, five successive days.

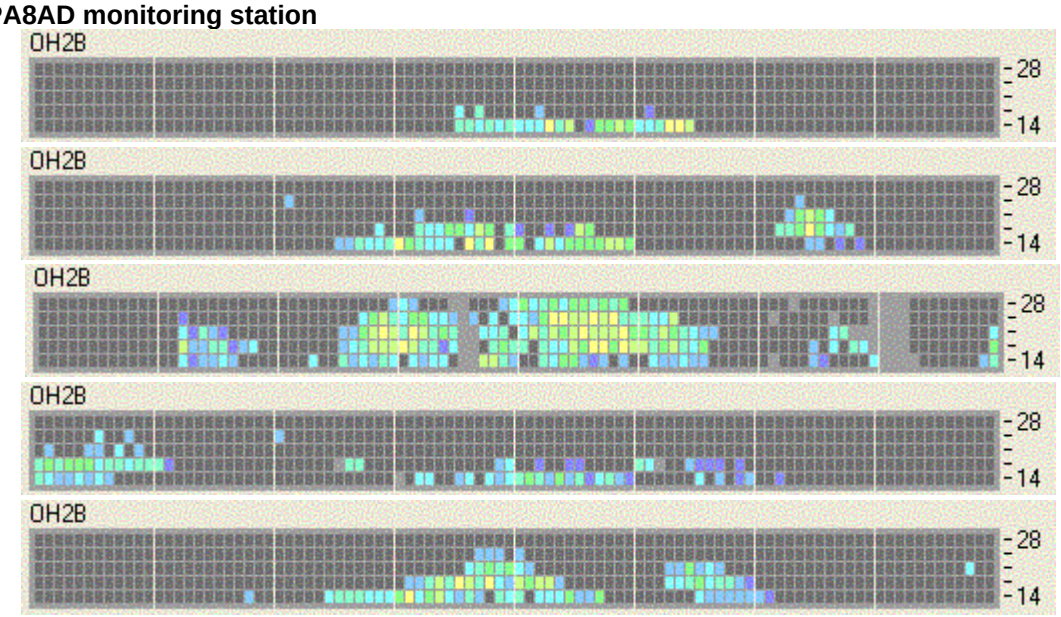
The OH2B Beacon

The path distances are for PA8AD 1 556 km and for ON5AU 1 660 km, PA8AD is only 104 km closer to the beacon location. A significant difference in signal strength is noticed but that might be due to the antenna used, its surroundings, its installed height, and probably feeder losses. October 20, seems to be a normal 1F2 hop day, but the next four days display Sporadic-E activity, really outstanding on October 22. Radio hams in the surrounding countries can learn and benefit form these logging stations. The Es cloud must be practically halfway in the circuit path. VHF DX'ers, especially, are informed that they probably can make long distance communications on the 6-meter band and who knows, perhaps on the 2 meters as well. When the 10-meter signals get through, it is often an indication of high Es ionization.

ON5AU monitoring station



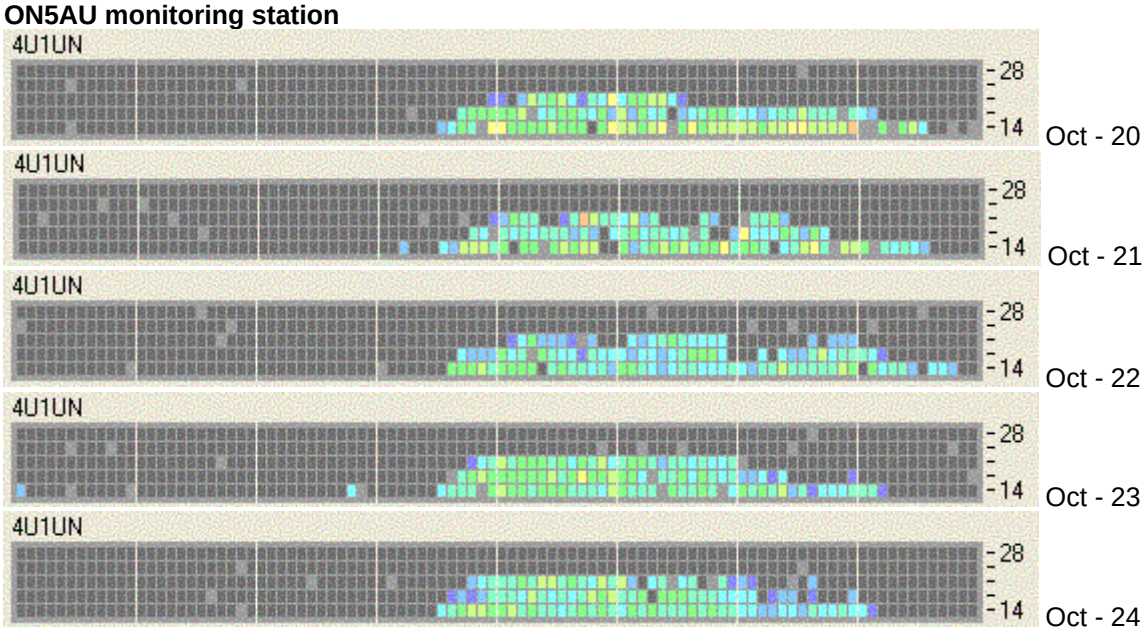
PA8AD monitoring station



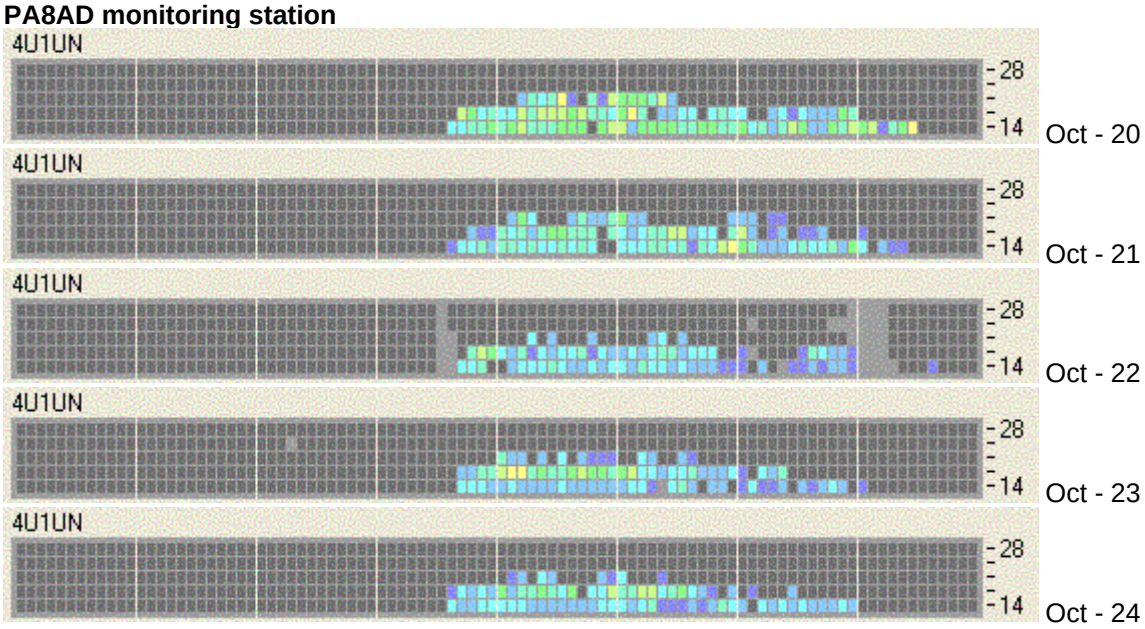
The 4U1UN Beacon

The circuits from the 4U1UN beacon appear below. The path distances are for PA8AD 5 861 km and for ON5AU 5 839 km, very similar path distances and also very similar logging times. From the northeast America contacts to West Europe will be possible. The monitoring station in Sweden confirms this as well but during a shorter period.

ON5AU monitoring station



PA8AD monitoring station



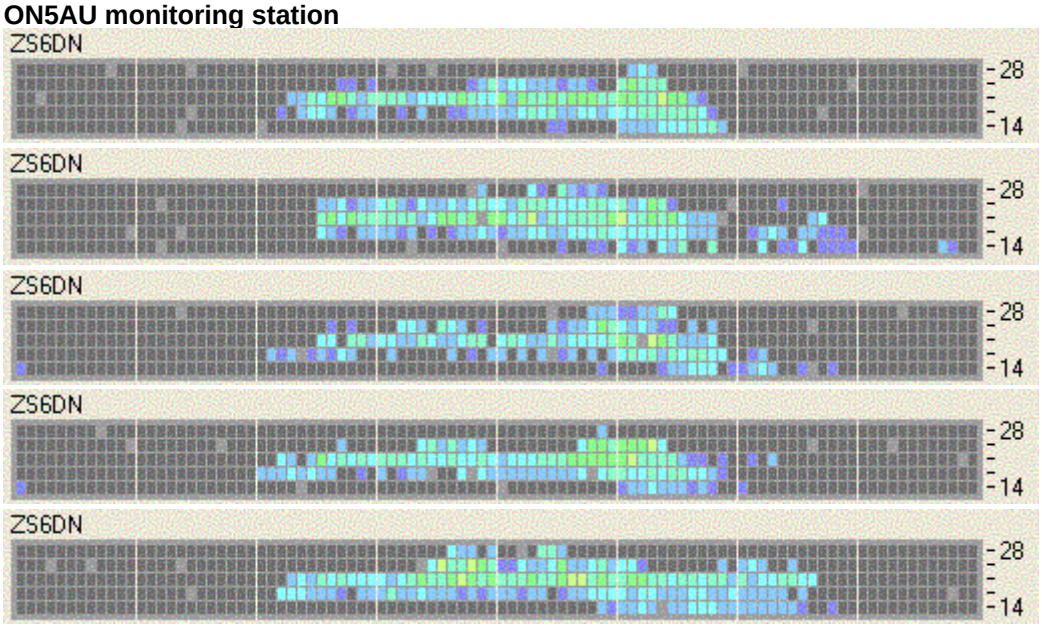
SM5AJV monitoring station

Oct - 21

The ZS6DN Beacon

The circuits from the ZS6DN beacon are next. The path distances are for PA8AD 8 934 km and for ON5AU 8 873 km, practically equal path distances.

ON5AU monitoring station



Oct - 20

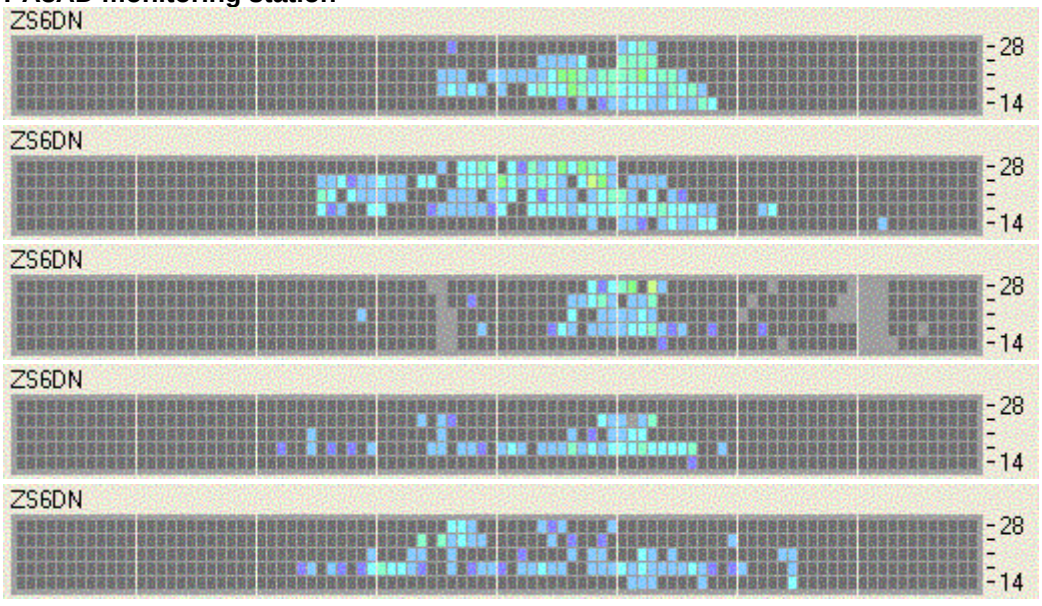
Oct - 21

Oct - 22

Oct - 23

Oct - 24

PA8AD monitoring station



Oct - 20

Oct - 21

Oct - 22

Oct - 23

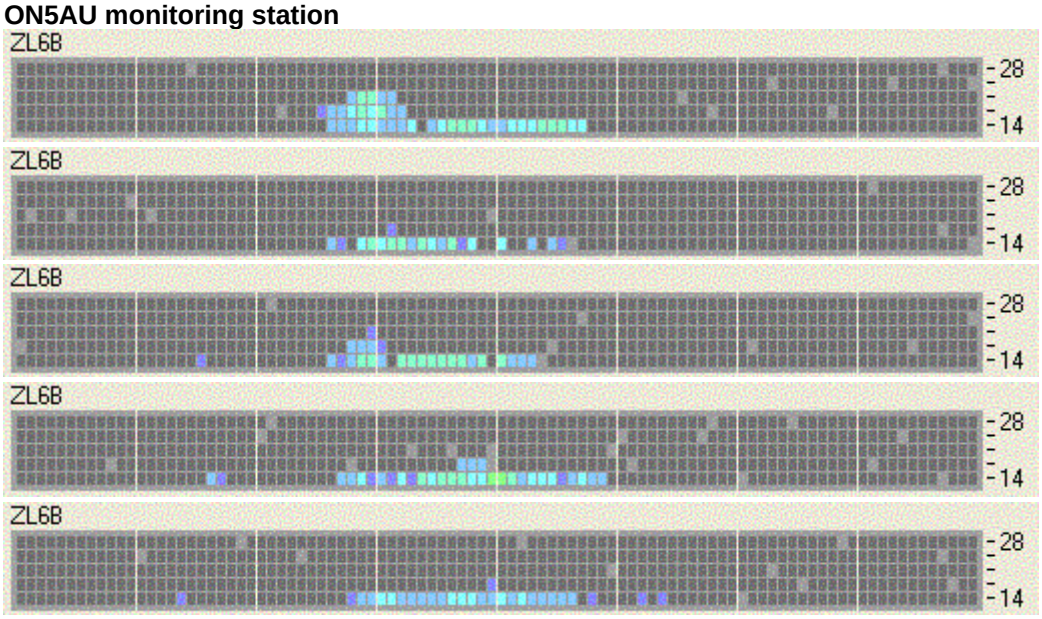
Oct - 24

I often experienced this different propagation behavior at certain times, even with such a small path-length difference, during my QSO's to southern Africa. It is not unusual that I hear stations from nearby my QTH working ZS and that I could hardly hear that ZS station. Also the opposite was noticed. But I noticed also that stations located more south of me had a greater chance. This difference in good or bad skip distance in my opinion depends on the F2 layer height that can vary quit a bit on a daily base. The foF2 and the MUF display only slight variations.

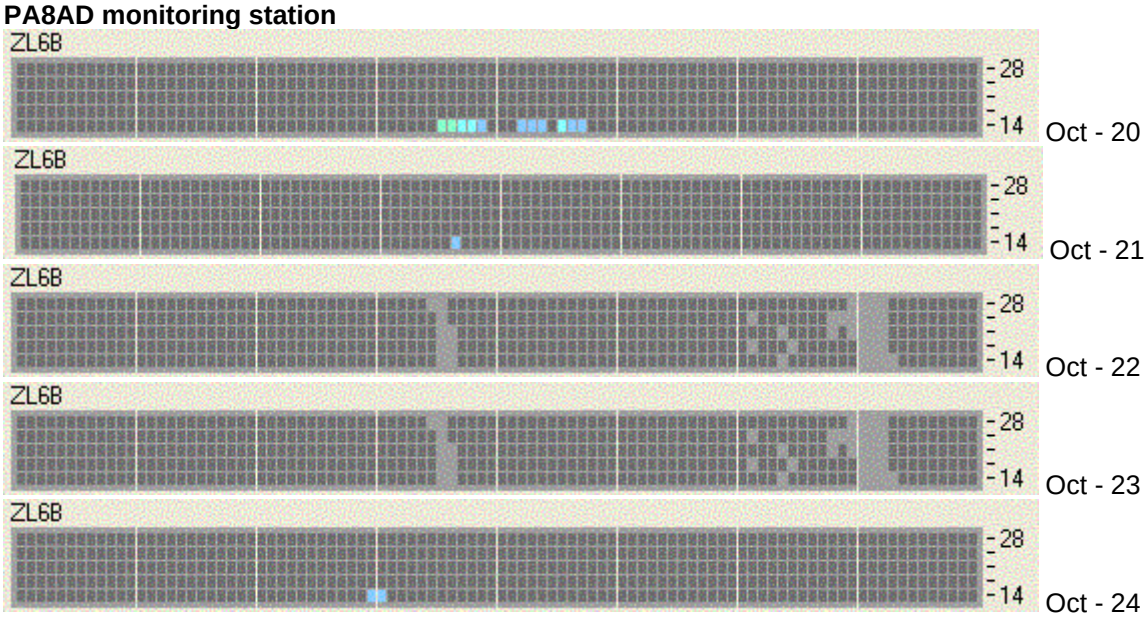
The ZL6B Beacon

The circuits from the ZL6B beacon are interesting. The path distances are for PA8AD 18 594 km short path and 21 409 km long path. For ON5AU 18 700 short path and 21 303 km long path, also practically equal path distances.

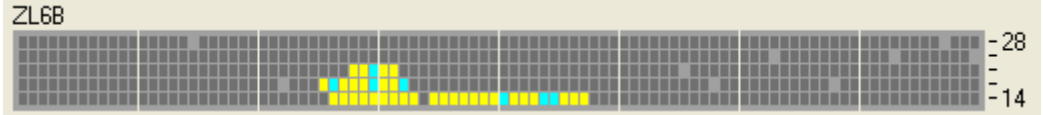
ON5AU monitoring station



PA8AD monitoring station



ON5AU long path / short path registrations



PA8AD long path / short path registrations

Even when the path distance difference is very little, the propagation characteristics are quite different. New Zealand is near the antipode for both monitoring stations and my experience is that the circuit is mostly via long path, which is confirmed by my beacon logging. It is also my experience in practice that for such long distance and long-path circuits, it is not a rarity to find out that stations only 100 km from you have different levels of difficulty in making contact. Very often fading and gallery whispering echo is noticed; they indicate ducting and strong varying ionospheric properties.

Conclusions

A lot can be studied and learned by monitoring beacons in general. The NCDXF/IARU beacon project is an excellent tool to study propagation on our five highest HF bands. A worldwide on-the-spot monitoring project can contribute a lot. It is my hope and dream that other radio hams or clubs may fulfill my dream by starting to monitor these beacons as well and make the results instantly available via Internet. Many other hams will also be most thankful. Learning propagation can only become more profound by having correct and real-time data. **–30-**

BRIEF BIOGRAPHY OF THE AUTHOR

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