Lindecker Patrick (F6CTE) the 1st of July 2024

Use of Multipsk to determine the present radio propagation, thanks to the NCDXF beacons

Principle

The NCDXF beacons are used by radio amateurs to determine, at any time, the propagation over the world on 5 bands (14, 18, 21, 24 and 28 MHz). For this, 18 beacons spread over the world transmit in turn, first on 14100 KHz in CW (at 22 wpm) then on 18110, 21150, 24930 and 28200 KHz, so in the high HF range. Each beacon transmitting for 10 seconds, 3 minutes are necessary for the 18 beacons to all transmit on a given band (14100 KHz for example). In other words, in 3 minutes the propagation state is known on a given band, and in a bit more than 15 minutes, the propagation is known for the 5 HF bands. Of course, for a good estimate of the propagation, it would better to use, in reception, an omnidirectional antenna as a vertical one.

The pieces of information transmitted by the beacons are the following: the station callsign ("4U1UN" for example), followed by 4 one second dashes transmitted respectively at 100 W, 10 W, 1 W and 0,1 W. Multipsk does only manage the beacon callsigns. According to the number of decoding errors, it is given a mark between S0 (signal not received) and S9 (best signal strength). The different marks are then averaged over one hour, for the sake of accuracy.

As the NCDXF beacons transmissions are done at scheduled times, it is necessary that the PC time be accurate, with a deviation compared to the official time less than one second. It should be noted that on modern PCs (Windows 10...), the time setting is done automatically. For the other PCs, the PC clock can be set to the right time by starting the Clock program and pushing the “Internet time” button. Then, with the “time-b.timefreq.bldrdoc.gov” time server selected, click on the “Connection” button to synchronize your PC.

The Multipsk CW decoder is not as good as a human being who is able to decode Morse at very weak signal-to-noise ratios.
So if the Multipsk CW decoder is able to decode the beacon callsign, a human being (trained in CW) is obviously able to decode it. In that case, by extension it can be considered that all the radio communications are then possible with the region from which the beacon is transmitting.

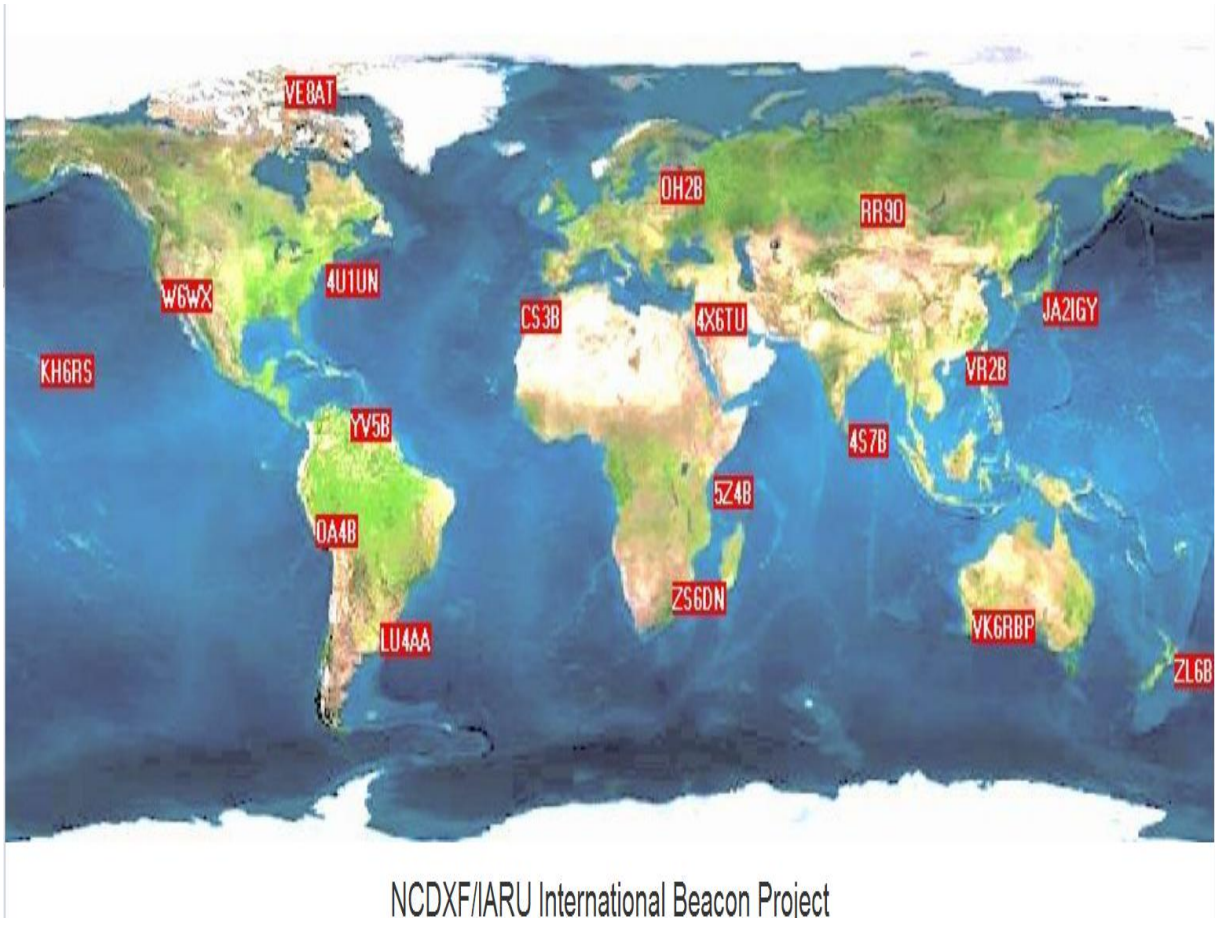
For more details, see https://www.ncdxf.org/beacon/intro.html

The NCDXF beacons are associated to a Locator and a QRA. All the data about these beacons is given in the "NCDXF_Beacons.TXT" text file. So in case of beacon change, it is enough to modify the text of this file.

Minimum instructions to monitor the sole 20 m band, for example

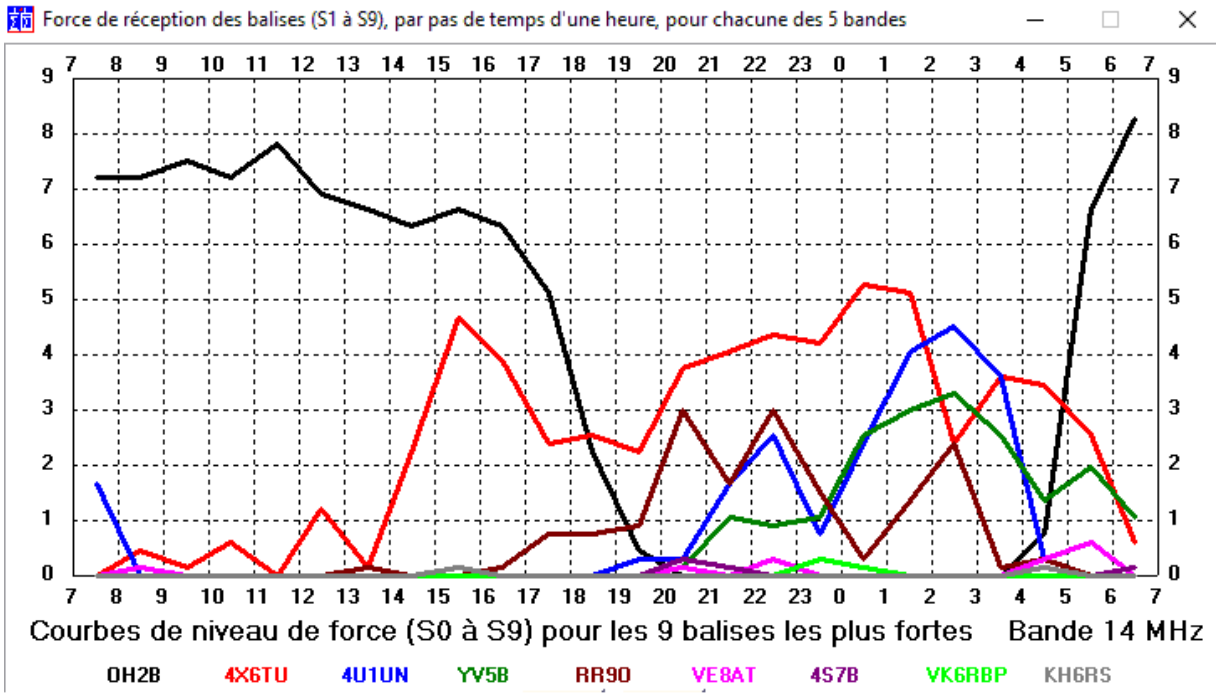
- Tune your receiver in USB to 14099.3 KHz.
- Click on the “CW/NDB/NDCXF” mode yellow button.
- Then click on the yellow button “NCDXF” to be in NCDXF monitoring.
- Click on the “Beacons state” button.
- You can also start OMMap and then click on the “**OMMap**” button, this to see the decoded beacons displayed on the world map.
- Leave Multipsk monitoring the band for several hours (ideally 24 hours), then see the results with the arrow buttons associated with the options « **History by hour** », « **History by beacon** » or « **History by band** ».
- For the manual and particularly for the precise instructions, click right over the ”**NCDXF**” button and, in the manual, look for the “**Specific NCDXF functions**” title, then « **Instructions** **»**.

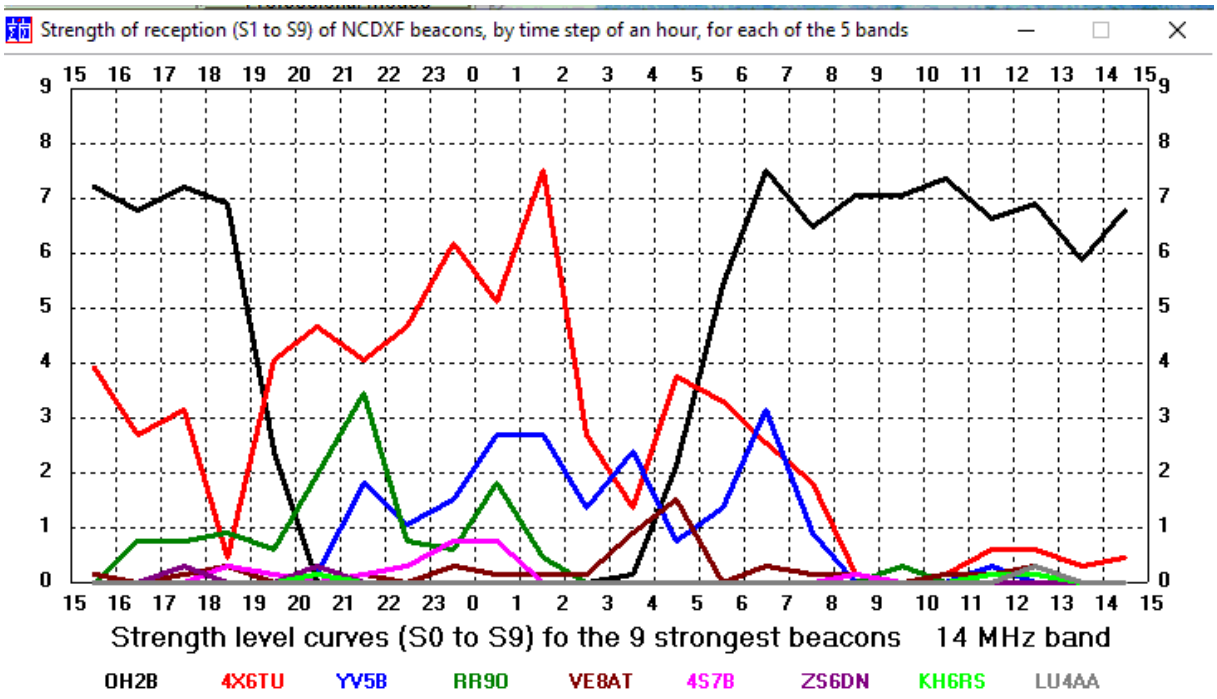
Location of NCDXF beacons (from https://www.ncdxf.org/beacon/intro.html)



Examples of propagation over 24 hours (in French) then on the approximate 24 following hours (in English), from the Twente WEBSDR in Netherlands (“History by beacon” option)

It can be seen that the propagation from a day to another is similar for the OH2B, 4X6TU, YV5B and RR9O beacons.





Example of propagation over 24 hours by scanning the 5 bands, from Maisons-Alfort (near Paris), the antenna being a vertical one (“History by band” option)

It appears that Venezuela (YV5N beacon) can be reached during the night, on the 14 and 18 MHz bands.