



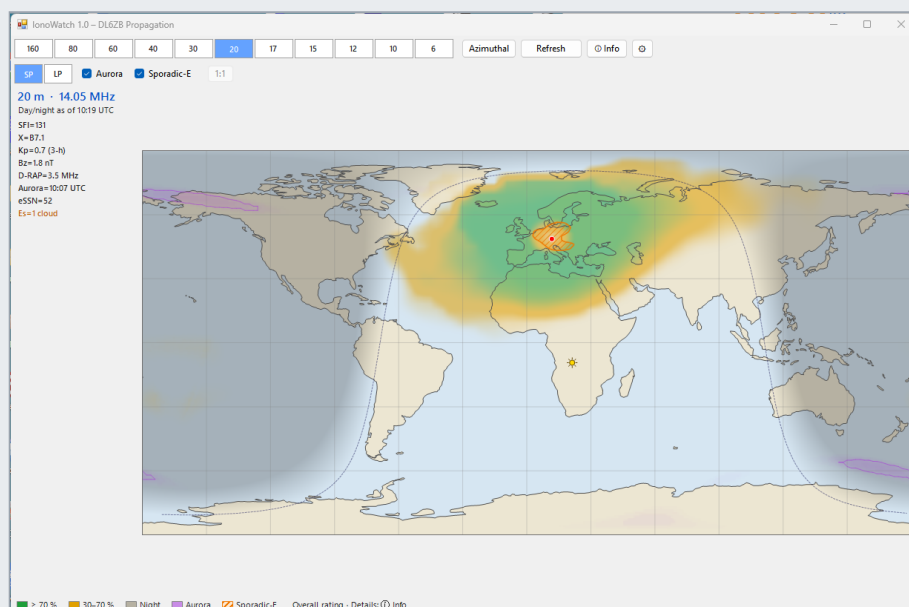
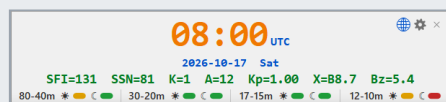
IonoWatch by DL6ZB

See where your signal goes.

USER MANUAL

UTC clock and worldwide HF propagation map (ITU-R P.533) for Windows

VERSION 1.0 • FREEWARE



DL6ZB

Rolf Heine

Status: October 2026
for IonoWatch 1.0
Windows freeware

Document information

Applies to	IonoWatch 1.0, package IonoWatch-1.0.zip
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Download	https://www.dl6zb.de/projects/ionowatch.html
License	Freeware for non-commercial use (chapter 6). Source code not included yet; it will be published later.
Credit	© 2026 Rolf Heine, DL6ZB – developed with the assistance of Grok Bot (AI)

All screenshots are real screenshots of IonoWatch 1.0 at DL6ZB on October 17, 2026; your map will look different. Map data: KC2G, NOAA SWPC and the other sources in chapter 6. Where this manual and LEGAL.txt differ, LEGAL.txt applies.

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1 Quick start

IonoWatch shows a UTC clock with solar data and a worldwide HF propagation map for your own station, based on ITU-R P.533 and calibrated with live data from the RBN, WSPR and PSK Reporter. Feedback and test reports to dl6zb@dl6zb.de are welcome.

Requirements	Windows 10/11 with .NET Framework 4.x, internet connection. No installation, no administrator rights.
Recommended	DXLab Suite (callsign, locator, frequency from Commander)
Optional	An own CW Skimmer can improve accuracy but is not required.

- 1 Unzip the **whole folder** to a writable location, e.g. C:\IonoWatch (not into C:\Program Files, not run from inside the ZIP).
- 2 Start IonoWatch.exe, read the short notice and click **Accept** (Figure 1). It appears only once.
- 3 Wait for the first start: IonoWatch downloads the ITU-R P.533 engine ITURHFProp with its data files from the official ITU-R GitHub and the country file cty.dat from country-files.com.
- 4 Click the globe icon in the clock window to open the map. Open the settings with the gear and check callsign and locator (taken from DXLab, or enter them), your power and the gain of **your** antenna (default 0 dBi).

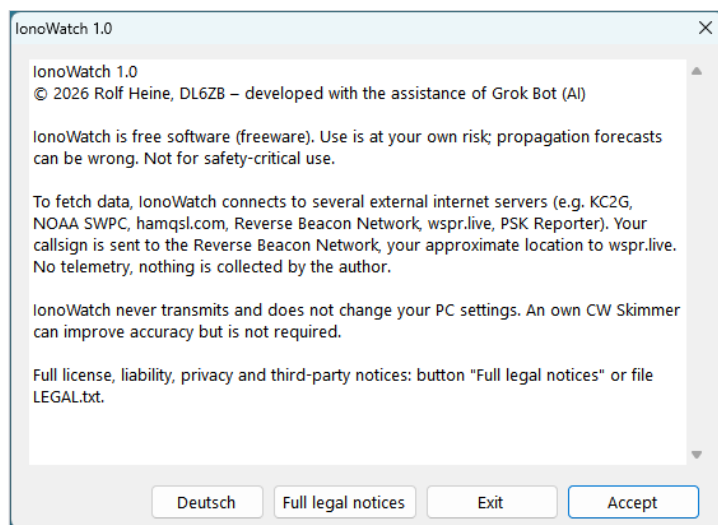


Figure 1: First-start notice. **Deutsch** switches the language, **Full legal notices** opens LEGAL.txt, **Exit** quits.



OWN RISK

Forecasts can be wrong; not for safety-critical use. IonoWatch never transmits and does not control the transceiver. It contacts several external servers; your callsign is sent to the RBN and your approximate location to wspr.live. Nothing is sent to the author (chapter 6).

Removal: delete the program folder – settings and caches are stored only there. IonoWatch.exe is not digitally signed; if Windows SmartScreen warns, check that the ZIP comes from the project page and compare its SHA256 checksum given there.

2 Clock window

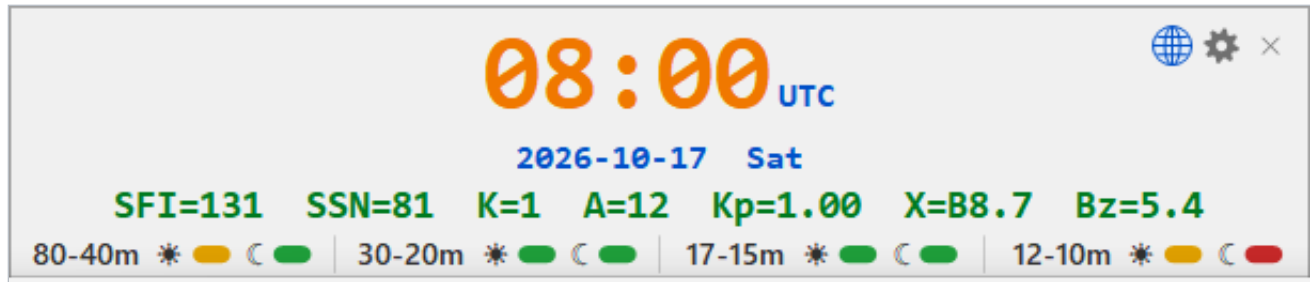


Figure 2: Large orange UTC time, date, solar data line (SFI, SSN, K, A, Kp, X-ray, Bz from hamqsl.com and NOAA SWPC) and band-condition pills for day * and night ☾ (green good, yellow fair, red poor; tooltip shows the text). Icons top right: globe = *Open propagation map*, gear = clock settings, x = close.

Action	Effect
Drag with the left mouse button	Moves the clock
Right-click	Fit to free area (fits the clock above a SpectraVue window) · Refresh solar data · Always on top · Exit

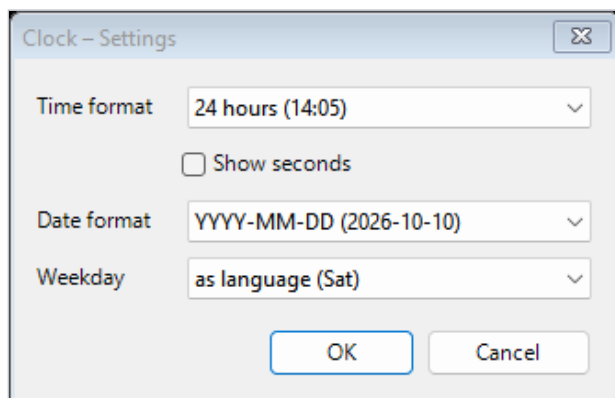


Figure 3: “Clock – Settings”: time format 24/12 h, show seconds, date format, weekday.

Position, size and clock settings are saved in `UtcClock.ini` in the program folder. IonoWatch runs as a single instance.

With DXLab Launcher, add the path to `IonoWatch.exe` as another program (window caption “IonoWatch”).

3 Propagation map

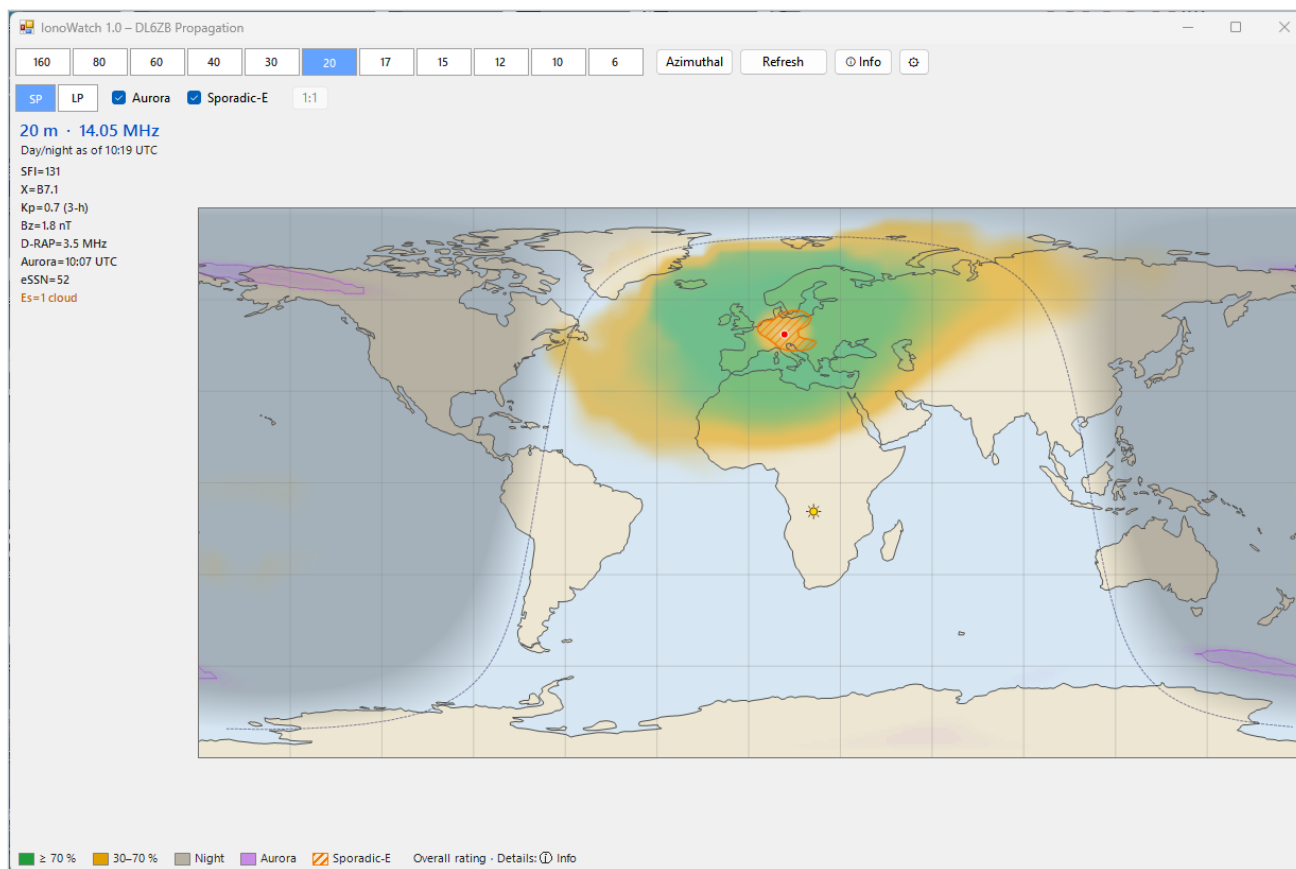


Figure 4: 20 m, short path, world map with **Aurora** (violet oval) and **Sporadic-E** (hatched orange) overlay. Green ≥ 70 % reliability, yellow 30–70 %, no colour below 30 % or no data; grey = night side. Red dot = own QTH, yellow sun = sub-solar point. Top left: values in use (SFI, X-ray, Kp, Bz, D-RAP, aurora time, eSSN, Es clouds). Data: KC2G, NOAA SWPC.

Control	Function
160 ... 6	Band 160–6 m. With DXLab Commander the band follows the transceiver; a band chosen by hand stays until the transceiver changes band.
SP / LP	Rate the short or long great-circle path. LP and paths beyond 9000 km are rated very cautiously.
Azimuthal / World map	Azimuthal map centred on your QTH (Figure 5) or world map.
Refresh · Info · gear	Update · all details of the rating (with Help , About IonoWatch , Kopieren / Copy) · settings (chapter 4)
Mouse	Wheel = zoom, drag = pan, double-click or 1:1 = reset; tooltip shows SNR, distance and bearing.
Coloured dots	RBN skimmers that heard your CQ: violet > 30 dB, red ≥ 20, yellow ≥ 10, green < 10 dB.
Blue dot with call	Station clicked in SpotCollector, bandmap or CW Skimmer (via WinWarbler), with SP (solid) and LP (dashed) paths.

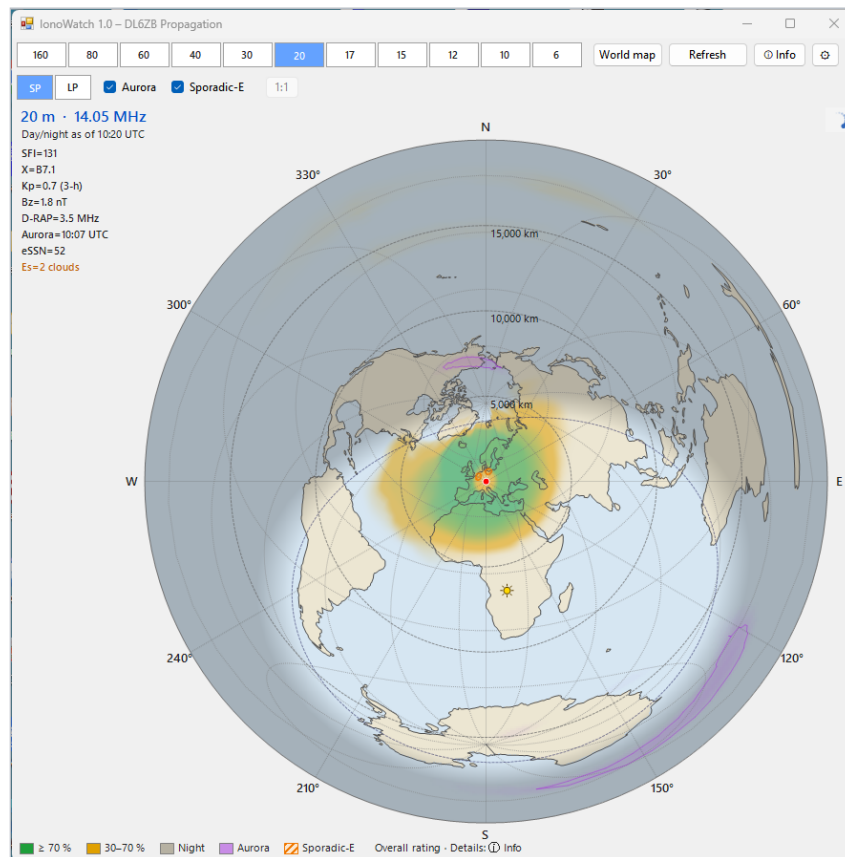


Figure 5: Azimuthal view centred on JN58 with bearings and distance rings, 20 m. Data: KC2G, NOAA SWPC.

If a data source cannot be reached, a red notice appears below the gear. Clicking it shows the status of each source in “Connections”, with **More info** and **Copy error**. IonoWatch then keeps showing the last data.

4 Settings and data sources

Figure 6: Map settings (gear button).

Callsign, Locator	take from DXLab or enter (locator 4, 6 or 8 characters)
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Power	5, 20, 100, 750 or 1500 W
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Antenna	Gain of your antenna in all directions: –6, 0, 3, 5 or 8 dBi
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Accuracy	P.533 grid: Fast (15°, default) shows the current band after about 1–2 s; Normal 10°, Accurate 5° (about 1–2 min), Maximum 3° (several minutes)
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Skimmer display	5–60 min; option to show skimmers closer than 2000 km only when zoomed in
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Sprache / Language	Deutsch or English
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4.1 How the map is calibrated

The base is the hourly ITU-R P.533 forecast (ITURHFProp) for SP and LP, combined with NOAA SWPC space weather (Kp, Bz, X-ray, D-RAP, OVATION aurora) and the KC2G effective sunspot number. Live data then correct it: FT8 reports from PSK Reporter, WSPR spots from wspr.live and CW spots from the Reverse Beacon Network; spots of your own callsign count most. Principle: cautious rather than euphoric – uncertain paths are shown yellow at most. All rules and numbers are in the ⓘ Info window. 6 m has no P.533 model (colour only from FT8/WSPR); on 160 m the model is extrapolated.

4.2 DXLab and own CW Skimmer

IonoWatch takes callsign and locator from DXLab and reads the frequency from DXLab Commander (TCP 52002, queries only, never a set command). It never transmits and does not control the transceiver. An own CW Skimmer can improve accuracy but is not required; set its telnet server in `UtcClockMap.ini` while IonoWatch is closed:

```
SkimmerHost=127.0.0.1
SkimmerPort=7300
```

5 Troubleshooting

Problem	Remedy
Map shows “Please wait ...” for a long time	First start downloads and calculates – wait; check the internet connection; set Accuracy to <i>Fast</i> .
Red notice below the gear	A source is unreachable (network, firewall, server, TLS). Click it, read the reason, use More info .
No live FT8 or RBN data	Allow outgoing connections to port 1883 (PSK Reporter MQTT) and 7000 (RBN telnet).
“No locator found ...”	Enter the locator in the settings.
“Commander not reachable”	Start DXLab Commander, or choose the band by hand.
No skimmer dots	Set your callsign; dots appear only after a CW CQ within the display period; zoom in for nearby skimmers.
“SpectraVue window not found.”	<i>Fit to free area</i> needs a SpectraVue window; otherwise move the clock by dragging.
Settings are not saved	Unpack into a writable folder.

Bug reports and test results are welcome: please send a description and the text from **Copy error** or the Info window to dl6zb@dl6zb.de.

6 Legal notices

Summary of LEGAL.txt (sections 4–9), which is included in the package and is authoritative. For users in Germany the German version (LEGAL.txt sections 1–3, German edition of this manual) prevails in case of doubt.

6.1 License (freeware)

IonoWatch (program, help texts, language files) is protected by copyright; rights holder Rolf Heine, DL6ZB. It is freeware under the Software License at [www.dl6zb.de \(legal-notice.html\)](http://www.dl6zb.de/legal-notice.html):

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5. Source code is not part of this release; a later open-source release is intended but not promised. Third-party components and data are governed solely by their owners' terms.

6.2 Warranty and liability

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The software may contain errors; not for safety-critical, emergency-communication or life-relevant use. Forecasts and data may be wrong. The author is not responsible for data of external services.

6.3 Privacy and servers contacted

The author does not collect, store or receive any data about you – no telemetry, no ads, no usage statistics. The servers below necessarily receive your IP address, the time and the program identifier "IonoWatch/1.0". In addition the RBN receives your callsign (telnet login and query for spots of your own signal, only if a callsign is set) and wspr.live a coarse search area around your location (approx. $\pm 10^\circ$ latitude). No other request contains personal or location data. Each operator is responsible for its own processing under its privacy policy (GDPR); several services are operated outside the EU (e.g. USA). Only settings and caches are stored locally in the program folder. Local, optional, read-only connections: CW Skimmer telnet (127.0.0.1:7300, callsign as login), DXLab Commander (127.0.0.1:52002), WinWarbler window, DXLab registry entries.

Server	Purpose
<code>prop.kc2g.com</code>	MUF/foF2 map, ionosondes, effective SSN (KC2G, GIRO data, IRI-2020)
<code>services.swpc.noaa.gov</code>	Kp, X-ray, solar wind/Bz, alerts, D-RAP, OVATION aurora (NOAA SWPC)
<code>www.hamqsl.com</code>	SFI, SSN, A/K, band conditions (NONBH)
<code>db1.wspr.live</code>	WSPR spots (wspr.live / WSPRnet) – receives approximate location
<code>mqtt.pskreporter.info:1883</code>	Live FT8 reports, receive only (PSK Reporter, N1DQ)
<code>telnet.reversebeacon.net:7000</code> , <code>beta.reversebeacon.net</code>	CW skimmer spots (Reverse Beacon Network) – receives your callsign

Server	Purpose
www.country-files.com	cty.dat country file (AD1C)
raw.githubusercontent.com	ITU-R files on first use (github.com/ITU-R-Study-Group-3/ITU-R-HF)

6.4 Third-party notices

IonoWatch contains only its own code. Included: Natural Earth 1:110m land polygons, public domain (“Made with Natural Earth”). Downloaded on first use, not included: ITURHFProp, P533.dll, P372.dll (v14.3) and ITU-R P.533/P.372/P.1239 data by ITU-R Study Group 3, © International Telecommunication Union, used unmodified as an external program; cty.dat by Jim Reisert, AD1C. Data courtesy of KC2G (prop.kc2g.com) and GIRO, NOAA SWPC (no endorsement implied), HAMQSL.com (N0NBH), wspr.live / WSPRnet, PSK Reporter (pskreporter.info) and the Reverse Beacon Network (reversebeacon.net). None of these providers is affiliated with or endorses IonoWatch; their data is shown only inside the program and not redistributed. Full list: THIRD-PARTY-NOTICES.txt.

6.5 Amateur radio, export, trademarks, law

IonoWatch is a receive/display tool; compliance with your licence conditions and band plans is your responsibility. It contains no cryptography of its own (HTTPS uses the standard functions of Windows/.NET); to the author's understanding it is publicly available mass-market software (comparable to EAR99); users are responsible for compliance with export and sanctions law. DXLab, Commander, WinWarbler, SpotCollector, CW Skimmer, SpectraVue, Reverse Beacon Network, PSK Reporter, WSPR, Windows, .NET and all other names are trademarks or names of their owners, used only to describe compatibility or data sources; no affiliation or endorsement. German law applies, excluding the CISG; mandatory consumer protection laws of your country remain unaffected. If any provision is invalid, the remainder stays in effect.

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