Data Analyzer

User Manual



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TTCyber Data Analyzer – User guide and data dictionary

Introduction

This guide explains how to run TTCyber Data Analyzer 2.5.7, what it writes to the output folder, how to explore results in dataPlotter, and what every output variable means. Variable definitions follow the analyzer's processing code.

Workflow

1. **Configure** the analysis in the Data Analyzer window: site, devices, dates, timezone, probe mode and output folder. Save the configuration to reuse it.

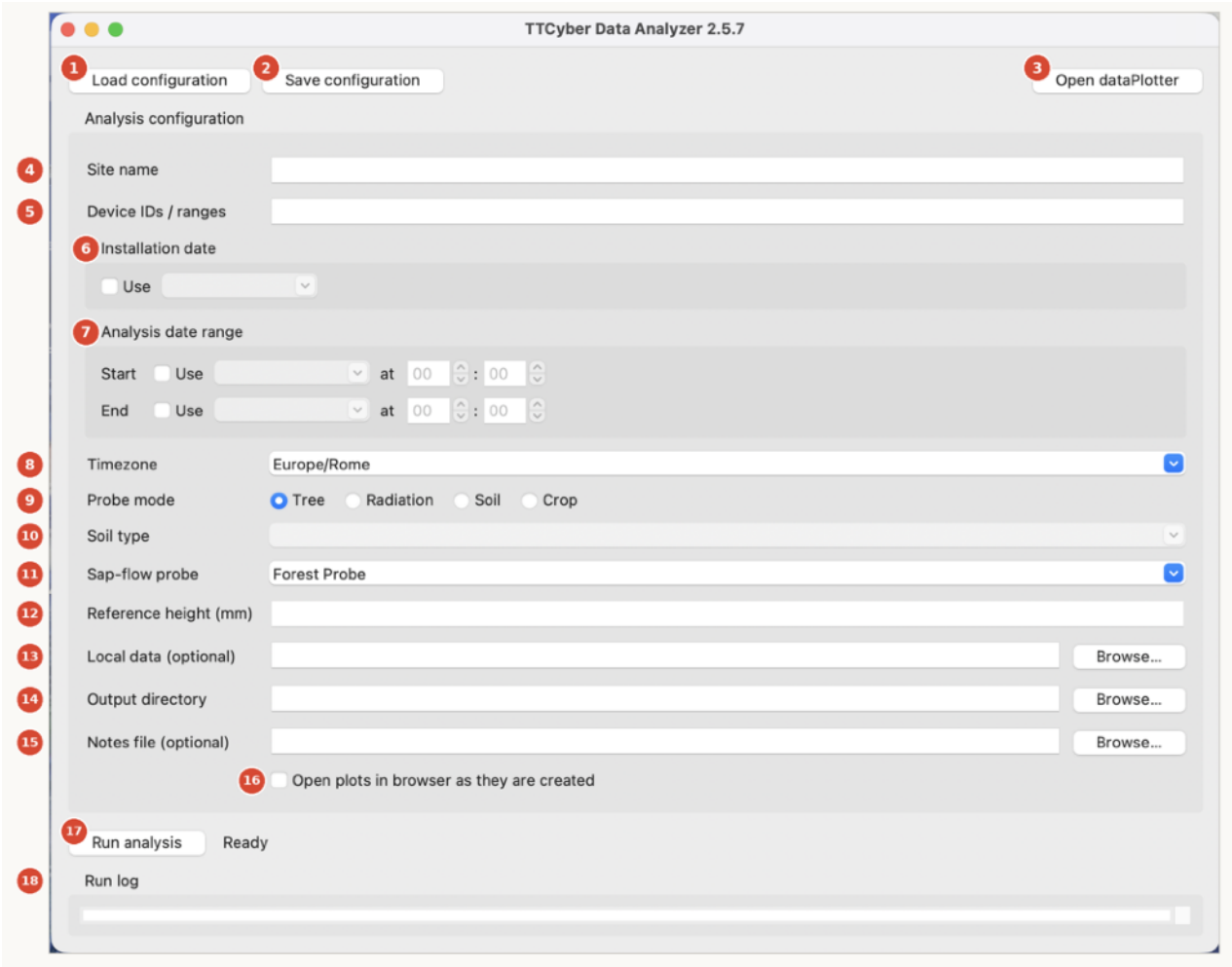
2. **Run analysis.**
   The analyzer downloads the data from the TTCyber cloud (and/or reads the local data folder), resolves timestamps, processes each subsystem and writes CSV ,HTML and log files to the output directory.

3. **Open dataPlotter** to load the output folder, choose measurements and devices, and preview, save or export the plots.

4. **Read the results** using the data dictionary in the second part of this guide.

Data Analyzer: configuration window

Each number on the screenshot matches a row of the table.



#	Field	What to enter or do
1	Load configuration	Loads a previously saved configuration (site, devices, dates, options), so parameters do not have to be entered again.
2	Save configuration	Saves the current parameters to a JSON file that can be reloaded later. Keeping one file per site is recommended.
3	Open dataPlotter	Opens the plot viewer, either on the analysis just completed or on any previous output folder.
4	Site name	Name of the monitoring site. It identifies the analysis and the output files.
5	Device IDs / ranges	Device serial numbers only, separated by commas. For consecutive serials, enter the first and the last separated by a colon (first:last) to select the whole range.

#	Field	What to enter or do
6	Installation date	Tick “Use” and select the installation date. Device timestamps earlier than this date are treated as invalid and the server reception time is used instead.
7	Analysis date range	Optional. Tick “Use” for Start and/or End and set date and time (hh:mm) to limit the analysed period. If unticked, the whole record is used.
8	Timezone	Time zone of the site. All dates are converted to it, and it sets day, night, sunrise and sunset in the calculations.
9	Probe mode	Type of device: Tree = TreeT alker on the stem (environment, sap flow, fire risk, spectra); Radiation = radiation sensor (environment, spectra); Soil = TT Soil (soil moisture, spectra); Crop = TT Crop (environment, distance, spectra).
10	Soil type	Active only in Soil mode. Once Soil is selected, choose the calibration matching the soil type of the site; it is used to compute volumetric soil water content (SWC).
11	Sap-flow probe	Sap-flow probe model: Forest Probe (29 × 2 mm needles) or Mini Probe (8 × 1.5 mm). Default: Forest Probe.
12	Reference height (mm)	Used only for TT Crop: height of the crop, in millimetres.
13	Local data (optional)	Folder with manually downloaded raw .txt/.csv files (subfolders included). They are merged with the cloud data and duplicates are removed.
14	Output directory	Folder where processed data, plots and logs are saved. Required.
15	Notes file (optional)	T ext file of field notes, one per line: date and time, a space, then the note (e.g. 2026-06-10/12:00 Battery replaced). Notes appear as markers on the HTML plots.
16	Open plots in browser	If ticked, each plot opens in the browser as soon as it is created.
17	Run analysis	Starts the processing. The status (Ready, running, Complete) is shown next to the button, and a final message reports the number of files created and warnings.
18	Run log	Progress messages and any errors: check it at the end of the analysis.

Output files

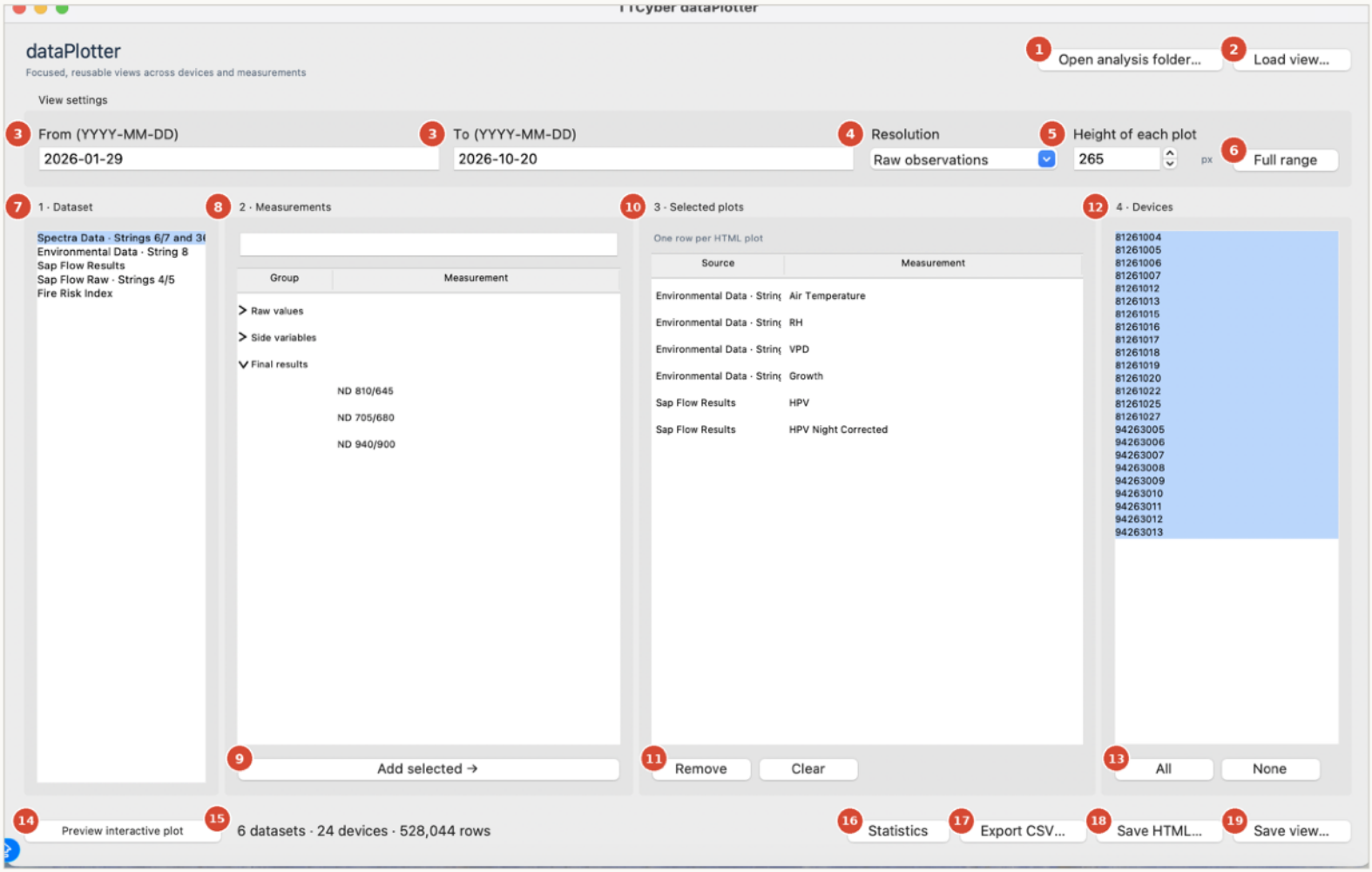
In Tree mode each run writes the files below to the output directory. Columns of every CSV are defined in the data dictionary.

File	Type	Content
analysis_manifest.json	Run record	Application and method versions, configuration, calibration and algorithm parameters, input fingerprint, source counts, column list, warnings and scientific status of each output.
Config_<site>.json	Configuration	File saved with Save configuration (only if saved there); reload it with Load configuration to repeat the analysis.
Data Load Audit.csv	Run record	One row per raw record: how its observation time was chosen (device or server timestamp) and why.
health.log	Run record	Per device: time span, last battery voltage, battery replacements (jump ≥ 50 mV) and transmission gaps longer than 90 min, each labelled as likely power loss or likely connectivity issue. New runs are appended.
Environmental Data.csv	Data	Microclimate (air temperature, RH, VPD), device movement and inclination, battery and stem growth.
Sap Heat Pulse Velocity.csv	Data	Concise sap-flow results: heat pulse velocity (HPV), night-corrected HPV and the main quality flags.
Sap Heat Pulse QC.csv	Data	Full sap-flow detail: needle temperatures, fit diagnostics, references, legacy comparisons and quality flags.
Spectra.csv	Data	Spectral bands of the two spectrometers and transmitted-light indices (ND 810/645, ND 705/680, ND 940/900).
Fire Risk Index.csv	Data	Daily fire-risk heuristic per device with its four components.
Environment and Encoder Summary.html	Plots	Interactive dashboard of environmental variables and stem growth.
Sap Heat Pulse Summary.html	Plots	Interactive dashboard of sap flow.
Spectral Summary.html	Plots	Interactive dashboard of spectral data and indices.
Fire Risk Summary.html	Plots	Interactive dashboard of the fire-risk index.

Other modes write their own files: SoilData.csv in Soil mode, Distances.csv and Crop Distance Summary.html in Crop mode.

DataPlotter

DataPlotter builds focused plots across devices and measurements from an analysis output folder. Work from left to right: dataset, measurements, selected plots, devices. All buttons at the bottom right act on the measurements in Selected plots (10) and the devices selected in Devices (12).



#	Control	Function
1	Open analysis folder...	Select the output directory of an analysis run. Its datasets and devices are loaded.
2	Load view...	Reloads a saved view (dates, measurements, devices), so the same plots can be reproduced.
3	From / T o (YYYY-MM-DD)	Start and end date of the period shown.
4	Resolution	Time step of the plotted data: Raw observations, 15 minutes, Hourly, Daily or Weekly (values aggregated over the step).
5	Height of each plot	Height of each plot panel, in pixels.
6	Full range	Resets From / T o to the full period available.

#	Control	Function
7	1 · Dataset	Data source: Spectra, Environmental Data, Sap Flow Results, Sap Flow Raw, Fire Risk Index.
8	2 · Measurements	Variables of the selected dataset, grouped into Raw values, Side variables and Final results. The box at the top filters the list by name. Quality flags and internal helper columns are not offered.
9	Add selected →	Adds the selected measurements to Selected plots.
10	3 · Selected plots	Plots that will be produced: one row per plot panel, showing source dataset and measurement.
11	Remove / Clear	Remove deletes the selected row; Clear empties the list.
12	4 · Devices	Devices (serial numbers) to include. All are selected at start; click to select or deselect.
13	All / None	Selects or deselects all devices.
14	Preview interactive plot	Plots the measurements in Selected plots (10) for the devices in Devices (12) and the period in From / T o (3), as an interactive page in the browser.
15	Summary bar	Number of datasets, devices and data rows loaded.
16	Statistics	Descriptive statistics per measurement and device: count, mean, median, standard deviation, minimum, maximum.
17	Export CSV…	Exports the plotted data (after period and resolution) to a semicolon-delimited CSV file.
18	Save HTML…	Saves the plots as one self-contained interactive HTML file.
19	Save view…	Saves Selected plots, the selected devices and the view settings as a JSON view, to reload with Load view (2).

Interactive preview

The measurements in Selected plots are plotted with Preview interactive plot. The page opens in the browser and shows the selected devices over the chosen period.



#	Element	Function
1	Plot height	Slider to change the height of every panel, also after the page is saved or shared.
2	One panel per selected plot	Each row of Selected plots becomes one panel, titled with dataset and measurement. Panels share the same time axis.
3	Devices legend	One colour per device, the same in every panel. Clicking a device hides or shows it in all panels at once.

Data dictionary

The following sections define every column of the CSV files written in Tree mode: conventions first, then one table per file.

Conventions

All CSV files are semicolon-delimited. An empty cell means the value was not transmitted, could not be computed, or failed a quality check; missing values are never synthesized.

Column	Unit	Definition
Date	datetime	Observation time in the site timezone. It is the device timestamp (ts) when valid, otherwise the server reception time (see Data Load Audit.csv). In Fire Risk Index.csv it is the local day.
ID	-	Device serial number.
source_message_type	-	TTCyber message string(s) the row was built from: 8 = environment, 4/5 = sap-flow heat pulse, 6/7 and 36/37 = spectrometer pairs, 91/92/93 = packed messages (Tree, Radiation, Soil).

Name suffixes carry meaning:

- _C, _kpa/ _kPa, _mm, _cm_h, _cm2_s, _deg, _s, _pct give the unit (°C, kPa, mm, cm/h, cm²/s, degrees, seconds, %).
- _experimental marks results that are not independently validated.
- V1_legacy_marks the previous tool's method, kept only for comparison.
- _check and_quality columns are quality flags; OK means the row passed.

Environmental Data.csv

One row per environmental message (string 8, or packed 91/92/93): microclimate, device movement, battery and stem growth from the encoder. Rows with air temperature outside -10 to 70 °C or RH outside 0–100 % are discarded.

Column	Unit	Definition
x, y, z	raw units	Accelerometer reading on the X, Y and Z axis.
std-x, std-y, std-z	raw units	Standard deviation of the accelerometer reading on each axis during the measurement; higher values mean the device was moving (e.g. stem sway).
vbat	mV	Battery voltage.
v-stepup	mV	Output voltage of the step-up converter. Empty for packed messages.
airt	°C	Air temperature.
RH	%	Air relative humidity.
axis_change_from_initial_deg	degrees	Angle between the current acceleration vector and the reference vector (median of the first 30 observations). Shows whether the device has tilted or moved since installation. Values above 100° are left empty.
acceleration_variability_total	raw units	Total movement during the measurement: $\sqrt{(\text{std-x}^2 + \text{std-y}^2 + \text{std-z}^2)}$.
inclination_from_z_deg	degrees	Inclination of the device from its Z axis: $\text{atan2}(\sqrt{(x^2 + y^2)}, \lvert z \rvert)$.
inclination_x_unsigned_deg	degrees	Inclination of the X axis from the horizontal plane, without sign: $\text{atan2}(\lvert x \rvert, \sqrt{(y^2 + z^2)})$.
inclination_y_unsigned_deg	degrees	Inclination of the Y axis from the horizontal plane, without sign: $\text{atan2}(\lvert y \rvert, \sqrt{(x^2 + z^2)})$.

Column	Unit	Definition
es	kPa	Saturation vapour pressure at air temperature: 0.611 × exp(17.27 T / (T + 237.3)).
ea	kPa	Actual vapour pressure: es × RH / 100.
VPD	kPa	Vapour pressure deficit: es - ea.
encoder_dn_raw	DN	Raw magnetic encoder position (0–4095) within one 2 mm magnetic tile. Empty for devices without encoder.
encoder_dn_compensated	DN	Encoder position corrected for temperature and humidity: DN - (1.4153+ 0.041 × (RH - 58.8)) × (T - 19.8), limited to 5–4090.
encoder_delta_dn_accepted	DN	Change from the previous observation, kept only when the point is accepted; 0 otherwise.
encoder_increment_accepted_mm	mm	Accepted change converted to millimetres: -ΔDN × 2 / 4095. A decreasing DN is positive growth.
encoder_displacement_filtered_mm	mm	Cumulative sum of the accepted increments.
encoder_rate_candidate_mm_h	mm/h	Rate of change between two consecutive observations, before acceptance. Rates above 0.03 mm/h (absolute) are rejected as implausible.
encoder_point_accepted	TrueFale	Whether the observation contributes to growth.
encoder_quality	label	Status of the point: baseline (first point), accepted, rate_rejected (implausible jump, e.g. magnetic pole transition), transition_recovery (plausible point after a jump, not yet accepted), pole_reanchor (third plausible point: new baseline),gap_reanchor (gap longer than 6 h), timestamp_reanchor (invalid time step), missing_dn (no encoder value).

Sap Heat Pulse Velocity.csv and Sap Heat Pulse QC.csv

One row per heat pulse (strings 4 and 5 paired within 5 minutes, or a packed 91 message). Sap Heat Pulse QC.csv contains every column below; Sap Heat Pulse Velocity.csv is the concise result table and contains only the columns marked “yes”.

The probe has three needles: an upper one (downstream, Tu), a middle one with the heater (Tm) and a lower one (upstream, Tl). Each pulse records ten readings: 0 = baseline before the pulse, 1 = during heating, 2–9 = after the pulse. HPV uses readings 5–7, a fixed thermal diffusivity D = 0.0025 cm^2/s and the 0.75 cm needle spacing. Night is before sunrise or after sunset, computed for the most populous city in the selected timezone.

Column	Unit	In Velocity.csv	Definition
HPV_source	label	Yes	Origin of HPV: calculated_type_4_5_heat_ratio (computed by the analyzer from the pulse readings) or packed_type_91_firmware (computed by the device firmware).
HPV_packed_raw_cm_h	cm/h	Yes	Heat pulse velocity sent by the firmware in packed 91 messages. Empty for strings 4/5.
wood_temperature_C	°C	yes	Wood temperature from packed 91 messages.
ntc_flags	code	Yes	Thermistor status flags from packed 91 messages, as transmitted.
Tu0 … Tu9	°C	no	Upper (downstream) needle temperature at readings 0–9.
Tm0 … Tm9	°C	no	Middle (heater) needle temperature at readings 0–9.
Tl0 … Tl9	°C	no	Lower (upstream) needle temperature at readings 0–9.
DT_initial	°C	no	Difference between upper and lower needle at baseline (Tu0, Tl0). Above 0.8 °C the probe is not in thermal equilibrium (flag E_EQ).
DT_heat	°C	no	Largest rise of the middle needle above baseline at readings 2–5. Below 2 °C the heat pulse is too weak (flag E_HEAT).
heater_response_time_s	S	no	Time of reading 6 after the pulse.
heater_response_delta_C	°C	Yes	Rise of the middle needle at reading 6 (Tm6 -Tm0). Kept only if the reading falls 45–125 s after the pulse and the rise exceeds 0.02 °C.
heater_response_check	label	Yes	Quality of heater_response_delta_C: OK, E_TIME (reading outside 45–125 s), E_SIGNAL (rise ≤ 0.02 °C), E_NODATA, N/A_PACKED.
heater_response_night_reference_C	°C	No	Reference heater response: median of nightly medians over the current and previous 2 days (no future data). Nights with fewer than 2 valid pulses are skipped.
heater_response_reference_source	label	No	observed (the reference includes that day’s night), carried (taken from previous days),unavailable.
heater_response_reference_n	count	no	Number of pulses supporting the reference.
heater_response_ratio_experimental	ratio	yes	heater_response_delta_C / night reference. Experimental thermal-response ratio; not a calibrated stem water content.

Column	Unit	In Velocity.csv	Definition
heater_response_change_pct_experimental	%	yes	(ratio - 1) × 100: change of the heater response from its night reference.
VPD_kPa	kPa	No	VPD of the same device from Environmental Data.csv, nearest observation within 90 min.
D_pulse_cm2_s	cm^2/s	No	Thermal diffusivity fitted to the cooling curve of this pulse. Computed only for zero-flow candidates: 3 h before sunrise, probe_check OK, VPD ≤ 0.5 kPa.
D_pulse_fit_r2	-	No	R^2 of the diffusivity fit.
D_pulse_fit_rmse_C	°C	no	Root mean square error of the diffusivity fit.
D_pulse_at_bound	True/ False	No	True if the fitted D sits at the edge of the search range (0.0005–0.006 cm^2/s), so it is unreliable.
D_fit_used	True/ False	No	True if the fit is accepted: $R^2 \geq 0.90$, not at the bound, inside the range.
D_candidate_cm2_s	cm^2/s	Yes	Diffusivity candidate: median of nightly medians of accepted fits over the current and previous 2 days. Experimental.
D_candidate_source	label	Yes	observed, carried or unavailable, as for the heater reference.
D_candidate_support_n	count	Yes	Number of accepted fits supporting D_candidate_cm2_s.
D_candidate_fit_r2_median	-	No	Same trailing median applied to the fit R^2.
D_candidate_fit_rmse_median_C	°C	No	Same trailing median applied to the fit RMSE.
heat_signal_peak_C	°C	No	Strength of the heat signal: for each valid reading 5–7 the smaller of the downstream and upstream rises, then the largest of these.
heat_ratio_valid_samples	count	No	Readings 5–7 usable for HPV: 45–125 s after the pulse and both rises above 0.02 °C. Fewer than 2 gives flag E_SIGNAL.
heat_ratio	ratio	No	Downstream / upstream temperature rise: exp(heat_ratio_log).
heat_ratio_log	-	No	Median of ln (ΔT downstream / ΔT upstream) over the valid readings.
heat_ratio_log_mad	-	No	Median absolute deviation of the log ratios. Above 0.08 gives flag E_RATIO_UNSTABLE.
probe_check	label	Yes	Pulse quality: OK, or flags joined by ";":E_NODATA (string 4 or 5 missing), E_EQ,E_HEAT , E_SIGNAL, E_RATIO_UNSTABLE, E_OUTOFRANGE (HPV outside -20 to 50 cm/h). Packed 91: OK_PACKED.
HPV_fixed_D_raw_cm_h	cm/h	No	Heat pulse velocity of a single pulse: Vh = D / x × heat_ratio_ log × 3600. Only when probe_check is OK.
HPV_fixed_D_smoothed_cm_h	cm/h	No	Centred median of 3 consecutive HPV_fixed_D_raw_cm_h values.
HPV	cm/h	Yes	Final heat pulse velocity: HPV_fixed_D_smoothed_cm_ h (strings 4/5) or the firmware value (packed 91). It is a velocity, not volumetric sap flow.

Column	Unit	In Velocity.csv	Definition
meanNightHPV	cm/h	yes	Mean of the night HPV values of that local day.
HPV_baseline	cm/h	yes	Centred 3-day mean of meanNightHPV (filled at the start and end of the period).
HPV_nightCorr	cm/h	yes	Night-corrected velocity: HPV - HPV_baseline. Uses the following day too, so it is for post-analysis only.
variable_D_check	label	yes	Quality of the variable-D estimate: OK_OBSERVED_D, OK_CARRIED_D,E_NO_D_CANDIDATE, E _OUTOFRANGE, the probe_check flags, or N/ A_PACKED.
HPV_variable_D_raw_cm_h_experimental	cm/h	yes	Heat pulse velocity computed with D_candidate_cm2_s instead of the fixed D. Experimental.
HPV_variable_D_smoothed_cm_h_experimental	cm/h	yes	Centred median of 3 consecutive variable-D values.Experimental.
V1_legacy_fixed_D_raw_cm_h	cm/h	No	HPV_fixed_D_raw_cm_h × legacy wound factor (1.9216 Forest Probe, 1.7283 Mini Probe). For comparison only.
V1_legacy_fixed_D_corrected_cm_h	cm/h	yes	V1 legacy value minus its centred 3-day night baseline. For comparison only.
V1_legacy_variable_D_raw_cm_h_experimental	cm/h	No	Variable-D velocity × legacy wound factor. For comparison only.
V1_legacy_variable_D_corrected_cm_h_ experimetal	cm/h	Yes	V1 legacy variable-D value minus its night baseline. For comparison only.

Spectra.csv

One row per spectral measurement of the light reaching the device, from two spectrometers: an 18-channel sensor (AS7265x family, “tri”) and an 8-channel sensor (AS7341 family,“single”). Their two messages are paired within 5 minutes.

Each band Bxxx is the calibrated response at a nominal wavelength of xxx nm: raw DN /(gain factor × integration time) × channel coefficient. Integration time is 0.278 s for strings 6/7, and it_level × 2.78 ms for strings 36/37. Packed 91/92/93 bands stay as raw DN (uncalibrated).

Column	Unit	Definition
spectrometer_generation	label	Message family: legacy_6_7, integrated_36_37, or packed_91 / packed_92 / packed_93.
spectral_value_basis	label	calibrated_response (strings 6/7, 36/37) or raw_DN_uncalibrated (packed messages).
gain_tri	code	Gain code of the 18-channel sensor. Factors: 0 = ×1, 1 = ×3.7, 2 = ×16, 3 = ×64.
gain_single	code	Gain code of the 8-channel sensor. Factors: 0 = ×0.5, then doubling up to 10 = ×512.
B410	calibrated response	18-channel sensor, 410 nm (violet).
B435	calibrated response	8-channel sensor, 435 nm (blue).
B460	calibrated response	18-channel sensor, 460 nm (blue).
B485	calibrated response	18-channel sensor, 485 nm (blue).
B510	calibrated response	18-channel sensor, 510 nm (green).
B535	calibrated response	18-channel sensor, 535 nm (green).
B560	calibrated response	18-channel sensor, 560 nm (green).
B585	calibrated response	18-channel sensor, 585 nm (yellow).
B610	calibrated response	18-channel sensor, 610 nm (orange).
B645	calibrated response	18-channel sensor, 645 nm (red).
B680-a	calibrated response	18-channel sensor, 680 nm (red).
B705	calibrated response	18-channel sensor, 705 nm (red edge).

Column	Unit	Definition
B730	calibrated response	18-channel sensor, 730 nm (red edge).
B760	calibrated response	18-channel sensor, 760 nm (near infrared).
B810	calibrated response	18-channel sensor, 810 nm (near infrared).
B860	calibrated response	18-channel sensor, 860 nm (near infrared).
B900	calibrated response	18-channel sensor, 900 nm (near infrared).
B940	calibrated response	18-channel sensor, 940 nm (near infrared, water absorption).
B415	calibrated response	8-channel sensor, 415 nm (violet).
B445	calibrated response	8-channel sensor, 445 nm (blue).
B480	calibrated response	8-channel sensor, 480 nm (blue).
B515	calibrated response	8-channel sensor, 515 nm (green).
B555	calibrated response	8-channel sensor, 555 nm (green).
B590	calibrated response	8-channel sensor, 590 nm (yellow).
B630	calibrated response	8-channel sensor, 630 nm (orange-red).
B680-b	calibrated response	8-channel sensor, 680 nm (red).
CLEAR_DN	DN	Broadband (clear) channel of the 8-channel sensor, raw and uncalibrated.
NIR_DN	DN	Near-infrared channel of the 8-channel sensor, raw and uncalibrated.
ND_810_645_ transmitted	-1 to 1	Normalized difference (B810 - B645) / (B810 + B645), as a rolling median of 5 observations. NDVI-like, but on transmitted light, so it is not reflectance NDVI.
ND_705_680_ transmitted	-1 to 1	Normalized difference (B705 - B680-a) / (B705 + B680-a), rolling median of 5. Red- edge index on transmitted light. Empty for packed messages.
ND_940_900_ transmitted	-1 to 1	Normalized difference (B940 - B900) / (B940 + B900), rolling median of 5. Uses the 940 nm water absorption band; not reflectance NDWI.

With strings 36/37 or packed messages the file also holds gain_packed, it_level_tri, it_level_single, as7341_it_level and as7265_it_level: the gain code and integration-time levels of those messages.

Fire Risk Index.csv

One row per device and local day. The index is a relative heuristic, to compare days of the same device; it is not calibrated and is not the Canadian Fire Weather Index.

$$FRI = 2.5 \times \left(\frac{VPD_{max}}{2\,kPa} + \frac{T_{air,max} + 273.15}{318.15} + \frac{P_{ref}}{P_{min}} + \frac{T_{trunk,max} + 273.15}{318.15} \right)$$

Column	Unit	Definition
fire_risk_index	-	Daily fire risk index: 2.5 × sum of the four components. Empty when fire_risk_quality is not OK.
fire_risk_quality	label	OK; LOW_DATA (fewer than 6 validobservations of any input that day); MISSING_DATA (an input is missing); INVALID_STEM_PROXY (stem proxy ≤ 0).
vpd_max_kpa	kPa	Daily maximum VPD.
air_temperature_max_c	°C	Daily maximum air temperature.
stem_humidity_proxy_reference	1/°C	Device reference of the stem proxy: mean of its first 30 valid values in the analysis period (at least 6 needed). The proxy is 1 / heater_response_delta_C, a thermal response, not a measured stem humidity.
stem_humidity_proxy_daily_min	1/°C	Daily minimum of the stem proxy.
trunk_temperature_max_c	°C	Daily maximum trunk temperature; trunk temperature is the mean of the three baseline needle temperatures (Tu0, Tm0, Tl0).
vpd_component	-	vpd_max_kpa / 2.
air_temperature_component	-	Daily maximum air temperature in K / 318.15 K (45 °C).
stem_humidity_component	-	stem_humidity_proxy_reference / stem_humidity_proxy_daily_min; rises when the stem thermal response suggests a drier stem.
trunk_temperature_component	-	Daily maximum trunk temperature in K / 318.15 K.
vpd_samples	count	Valid VPD observations that day.
air_temperature_samples	count	Valid air temperature observations that day.
stem_proxy_samples	count	Valid stem proxy observations that day.
trunk_temperature_samples	count	Valid trunk temperature observations that day.
stem_reference_samples	count	Observations used for stem_humidity_proxy_ reference (maximum 30).

Data Load Audit.csv

One row per raw record loaded, showing how its observation time was chosen. The device timestamp is used when it is a plausible date (2000–2100) and not before the installation date; otherwise the server time is used.

Column	Unit	Definition
date	datetime	Observation time finally assigned to the record.
ID	-	Device serial number.
string	-	Message type of the record (e.g. 4, 5, 6, 7, 8, 91).
ts	as received	Raw device timestamp field. Small values are uptime counters, not dates.
src	label	Where the record came from: server (cloud download) or local (Local data folder).
server_datetime	datetime	Time the server received the record.
datetime_source	label	Source of date: device_ts, server_datetime, or invalid (record rejected).
device_timestamp_unit	label	Unit detected in ts when valid: s, ms, us, ns or iso8601.
device_timestamp_rejection	label	Why ts was not used: invalid_or_counter (not a plausible date) or before_installation. Empty when ts was used.