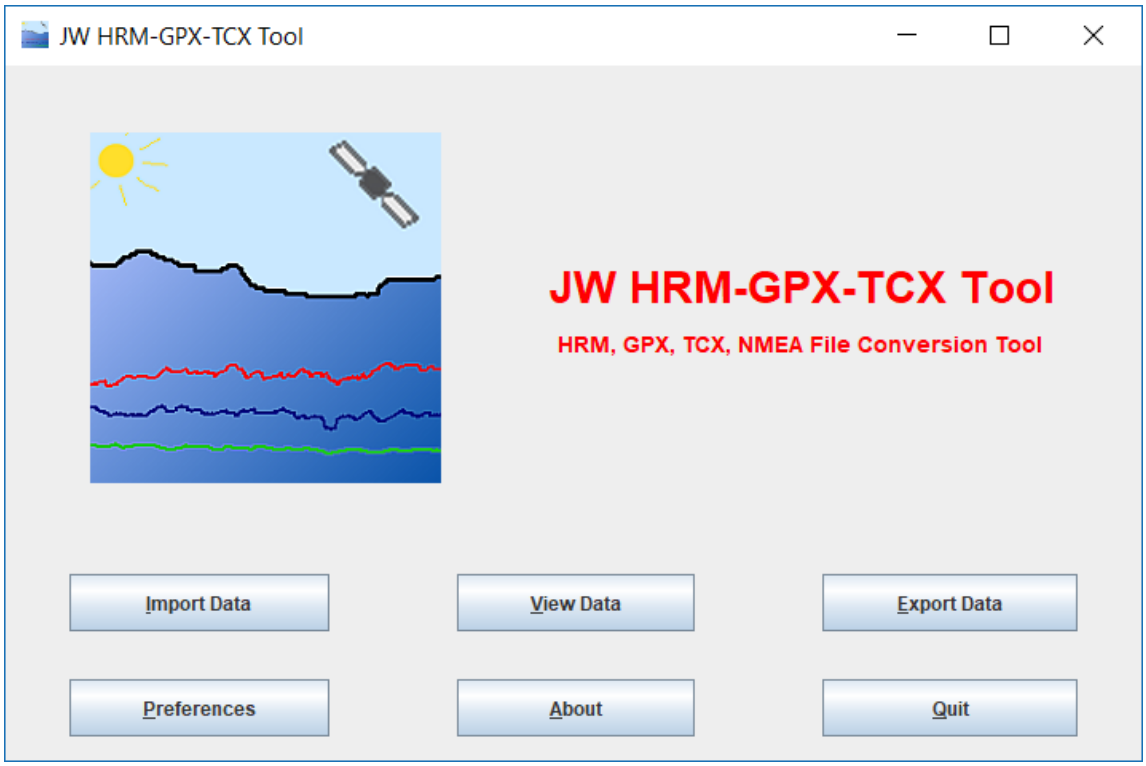
JW HRM-GPX-TCX Tool

User Manual



Application Version: 2.08

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1 Introduction

Many sports- and map-applications require activity information within a certain format (e.g. GPX, TCX or HRM). However, often heart rate monitor data and GPS data is recorded in a different format or even separate data files which must be merged into one (e.g. HRM and GPX files recorded in parallel).

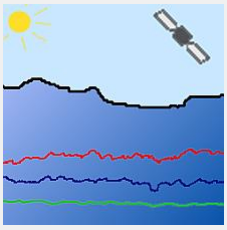
JW HRM-GPX-TCX Tool merges and converts HRM (Polar Heart Rate Monitor), TCX (Garmin Training Center), GPX and NMEA files with and into each other for further usage with such applications.

The application is optimized to its special purpose and offers more functionality and adjustment features than probably any other comparable application. It runs on multiple platforms like Windows, Mac or Linux given that Java Runtime Environment (JRE) is installed. No advertising, no registration, no user data collection, no internet used or even required.

JW HRM-GPX-TCX Tool is the successor of the JW HRM & GPX Tool with much advanced functionality and still is available completely for free. However, complimentary donations of any amount by those users who appreciate(d) my work are welcome. Users who donated at least once can download new versions usually much in advance.

2 Features

Main Features



- **Import data:** HRM-, GPX-, TCX- and NMEA- (.log and .nmea as used by some photo- and action- cams like those from Canon or Sony) files incl. header information, lap times/waypoints, track records. Support for many devices and applications like those of Polar (e.g. Polar ProTrainer and Polar Flow) and Garmin.
- **View data**: Header information, lap times/waypoints, track records, merged record data, calculated and basic statistics (e.g. distance, net training time, average speed).
- **Export data**: Header information, lap times/waypoints and track records to CSV-, GPX-, TCX- or HRM- files. Beside merged data also unmerged data can be exported if e.g. only certain information shall be removed from a GPX file or it shall be just converted into a different file format. Even HRM-only data can be exported to GPX- and TCX- files, or vice versa.
- **Complete Offline Solution**: No usage of internet at all. Means complete functionality also without internet access, no privacy-issues (e.g. uploading data to somewhere) and no security-concerns due to an internet connection.
- **Several preferences** for data im- and export (e.g. time zone settings, data field in-/exclusion settings) as well as **time adjustments** for synchronization and correction purposes.
- **GPS Adjustments**: Possibility to filter out or interpolate GPS Latitude/Longitude data resulting in unrealistic speed values in target applications.
- **Multiple merge modes (by time, distance, record)** incl. GPS stretching/shrinking functionality: e.g. for usage of external GPS information, or such of a different exercise, like done in **virtual trainings**.
- **Pause times recognition and removal:** Real performance data considering pause times during recording also in target applications (especially along with file formats like HRM).
- **Console mode and batch operations**: Execute conversions out of the command line interface without using the GUI. Possibility to process whole directories and sub-directories automatically.
- **File Repair**: Application might be able to import also files that are often rejected by other applications because they don’t meet strict (XML-) standards, are incomplete or corrupt.

3 Requirements

- Java compatible Operating System (e.g. MS Windows, Mac OS, Linux)
- Java Runtime Environment (JRE) or a Java JDK with at least Release version 8 (1.8) installed. Please see chapter 4.2 for further information.

4 Installation

4.1 Application

An installation for the application itself as such is not required. Just copy all files of this package to a directory of your choice on your hard disk.

For some features (e.g. saving preferences) it is necessary that write rights to the application directory exist. And wherever the exported files shall be saved.

This application does not make use of any OS specific registry settings or even internet access at all.

Following files should be included within the distribution:

- Manual as PDF file (this file)
- Application as Java JAR file

In case you recognize something different, it is not recommended to use this software. Please contact author first.

4.2 Java

This tool is a Java application which means on the one hand that the same files can be taken to run it on different platforms (e.g. Windows, macOS, Linux). And on the other hand that it is required to have additionally the platform specific **Java Runtime Environment** (JRE), or alternatively Java Development Kit (JDK) which includes the JRE, available on the device.

If you have already a Java runtime environment installed which fulfils the minimum criteria of the application you probably don’t need to install something else in addition. Unless requirements or installation instructions of an application mentions it.

You can **test whether Java is already properly installed** incl. version information:

Opening a console window (e.g. the “Command Prompt” in case of Windows), enter “`java -version`” and hit Return key.

If Java is installed correctly, as result a name and version information should be displayed. Otherwise an error message (e.g. that command java was not found) would appear.

4.2.1 Decision of which Java Runtime Environment to use

If an installation is necessary, it must be decided first **which Java environment** and implementation to use. Since meanwhile the “traditional” Oracle Java JRE/JDK isn’t free anymore (apart from specific purposes) it is probably a good idea to use an alternative option. There are thankfully multiple free and good ones available (even Oracle offers a free OpenJDK implementation).

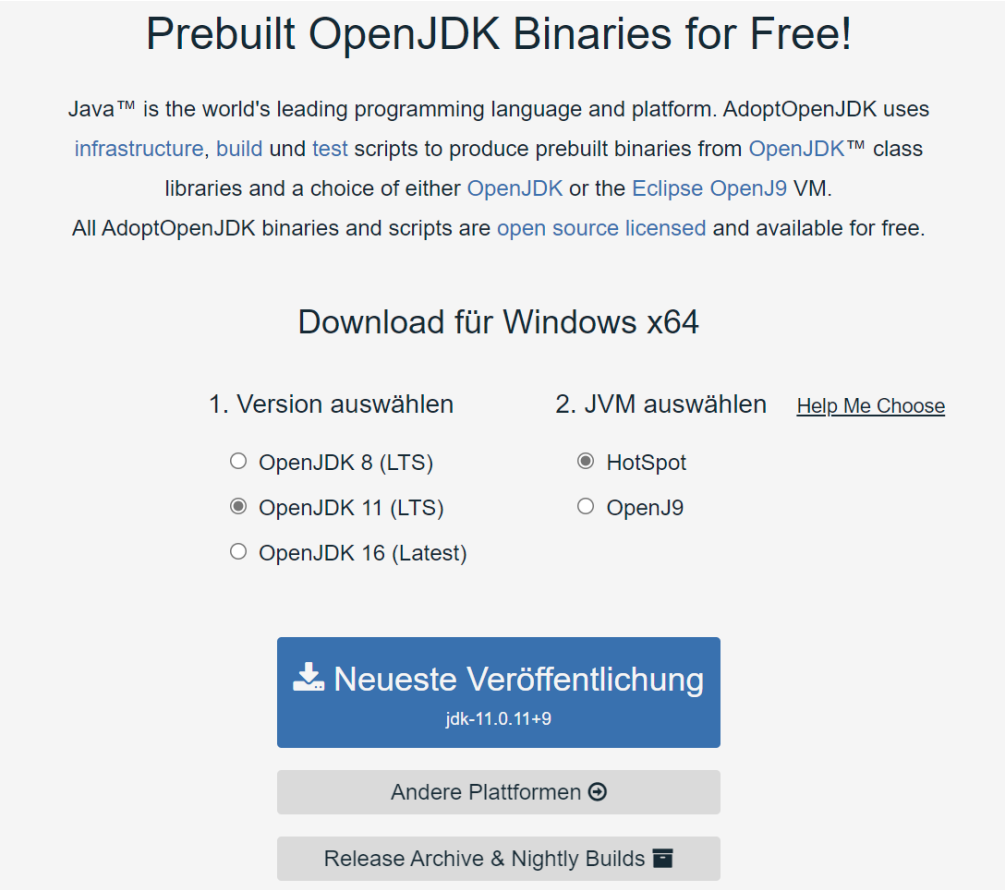
To make a long story short here:

If the purpose is just running standard Java applications like mine for personal non-production purposes, then probably any popular “Java SE” runtime implementation will do fine. My personal recommendation is however **AdoptOpenJDK**. It is free, provides an installer, offers an improved backwards compatibility and is supported by some major industry partners and communities. Furthermore, important updates are released comparable quickly and are also offered for older Java major releases than the most recent ones.

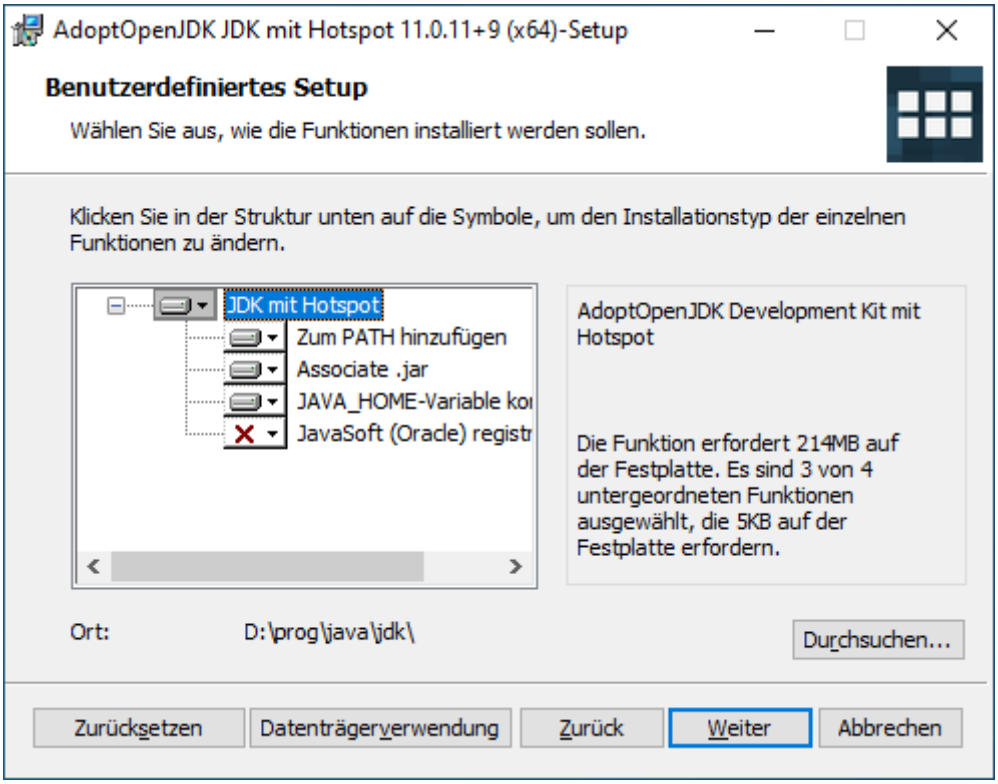
If your purposes and ambitions are different, want to use another Java runtime environment or do a manual Java installation (e.g. due to missing admin rights) it would go beyond the scope of this document. But you can find of course more than enough information about this in the internet. Regarding installation and usage most common Java environments are very similar to each other and even a manual installation is not so complicated. In most cases this requires basically only downloading/extracting/copying the files to a directory of your choice and setting about one or two system environment variables accordingly.

4.2.2 Installer Based Installation of AdoptOpenJDK

- Visit https://adoptopenjdk.net/
- The main web page offers directly a download possibility based on the information of your currently used device and certain adjustable settings:



- Recommendations for adjusting the settings:
  - Version: It makes usually much sense to select the latest “LTS” (Long-Term Support) version unless the applications you use have different requirements and/or compatibility issues.
  - JVM: Leave HotSpot simply selected for our purposes
- Download the installer file (e.g. for Windows `OpenJDK11U-jdk_x64_windows_hotspot_11.0.11_9.msi`). If you need to install Java on a different platform, or want a version without an installer for manual installation, choose “Other Platforms” and download from there.
- Execute the installer file. For our purposes the suggested default settings during installation process should work fine. Of course it is possible to adjust e.g. the installation directory if desired. Personally, I would activate in addition the option for setting the “JAVA_HOME” environment variable. But this is at least for my applications no requirement and could be done later on manually as well.



- Test whether the installation was successful as explained at beginning of chapter 4.2. If it doesn't work give it another try after re-booting the device.

5 Starting Application

Start application simply by double-clicking the *JWHrmGpx.jar* file (e.g. on operating systems like MS Windows with a standard Java installation and file type settings).

Or execute the file out of a console window similar to other Java applications. For example by using the command *"java -jar JWHrmGpx.jar"* from within the application directory.

As result, the application main window will open. For usage of the console mode, e.g. in order to make use of bulk features and quickly change settings for different conversion purposes, please read chapter 7.

6 Usage

6.1 Main Window

After starting the application, the main window will appear. From here you can get to different application parts and windows by clicking on the respective buttons. Closing opened additional windows will bring you back to the main window.

6.2 Import Data

Within this application you can import files of two different categories: On the one hand, rather heart rate monitor related files (HRM or TCX files) which typically at least regarding HRM files don't include GPS information. On the other hand rather GPS related ones (GPX or NMEA files) which in most cases don't include data like heart rate or cadence. Only one file per category can be imported at the same time and their data merged. Each file type is able to store or not store different kind of information.

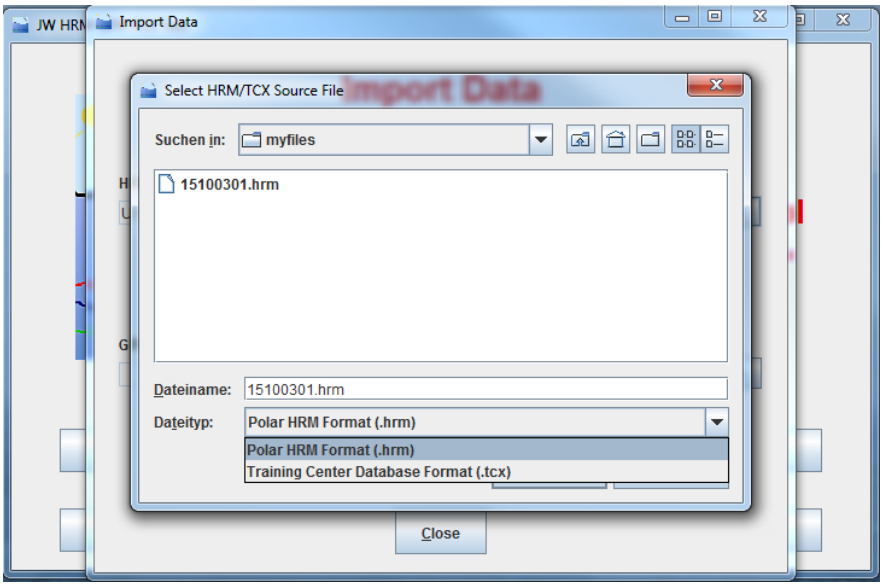
There is one setting in *Preferences* window you might want to check already in advance since it might lead to a time shift: The GPX import time zone. Please read chapter 6.5.2 for further details.

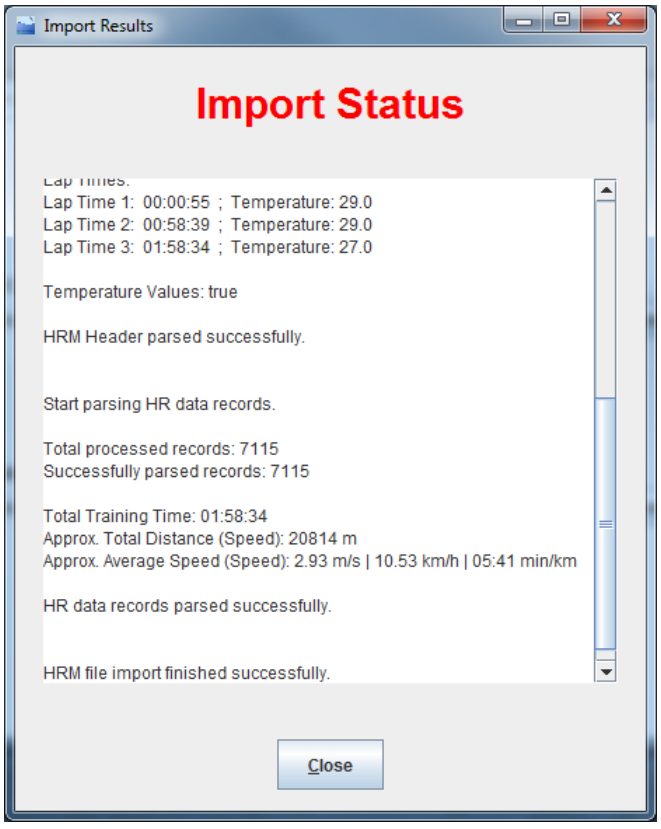
Within the *Import Data* window, choose HRM/TCX and/or GPX/NMEA import files and file types by using their specific selection requesters. Afterwards, start the import process by clicking the *Run* button for the respective file category. A status window appears showing information about the import progress and its results.

In case a warning message appears which says that no GPX or TCX end tag could be read, it might be that the import file is incomplete, corrupt or extremely big so the available import buffer might be not sufficient. The application will import data records in this case, but possibly not all of the original records. However, the buffer limit should be practically big enough to import files containing about at least 10 hours of one-second-interval-records along with all kind of already included information (like HR, speed, altitude, cadence, temperature).

In case import results say that one record less could be parsed successfully than being processed: some HRM files (especially on Mac systems) contain an “additional empty line” at the end. The application can't parse it into a meaningful HRM record, but practically no data is lost by not importing this line.

Furthermore, with some Polar devices, there are e.g. 2 records more included in the HRM than in the GPX file. If merging does not happen by timestamp this application assumes that the first HRM record belongs to the first GPX record in these cases.


JW HRM
Import Data
Select HRM/TCX Source File
Suchen in:
myfiles
15100301.hrm
Dateiname:
15100301.hrm
Dateityp:
Polar HRM Format (.hrm)
Polar HRM Format (.hrm)
Training Center Database Format (.tcx)
Close

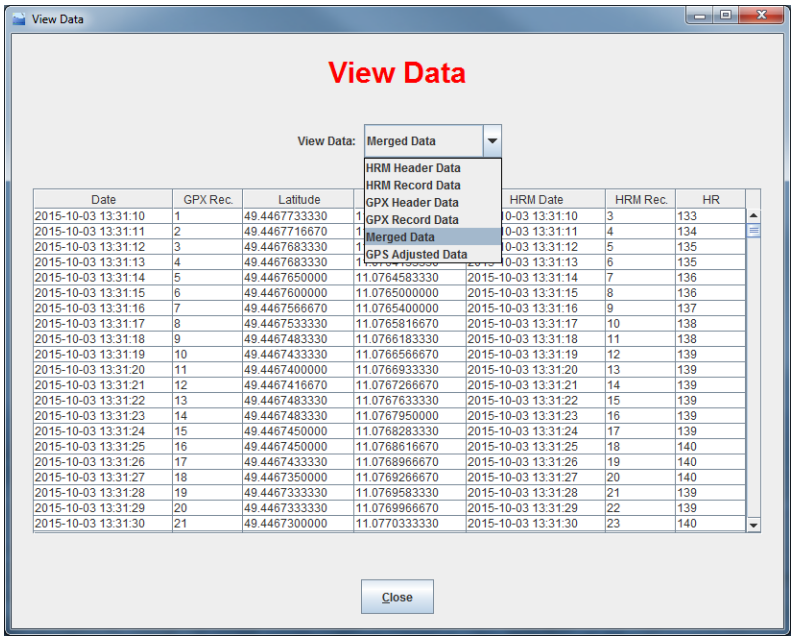

Import Results
Import Status
Lap Times:
Lap Time 1: 00:00:55 ; Temperature: 29.0
Lap Time 2: 00:58:39 ; Temperature: 29.0
Lap Time 3: 01:58:34 ; Temperature: 27.0
Temperature Values: true
HRM Header parsed successfully.
Start parsing HR data records.
Total processed records: 7115
Successfully parsed records: 7115
Total Training Time: 01:58:34
Approx. Total Distance (Speed): 20814 m
Approx. Average Speed (Speed): 2.93 m/s | 10.53 km/h | 05:41 min/km
HR data records parsed successfully.
HRM file import finished successfully.
Close

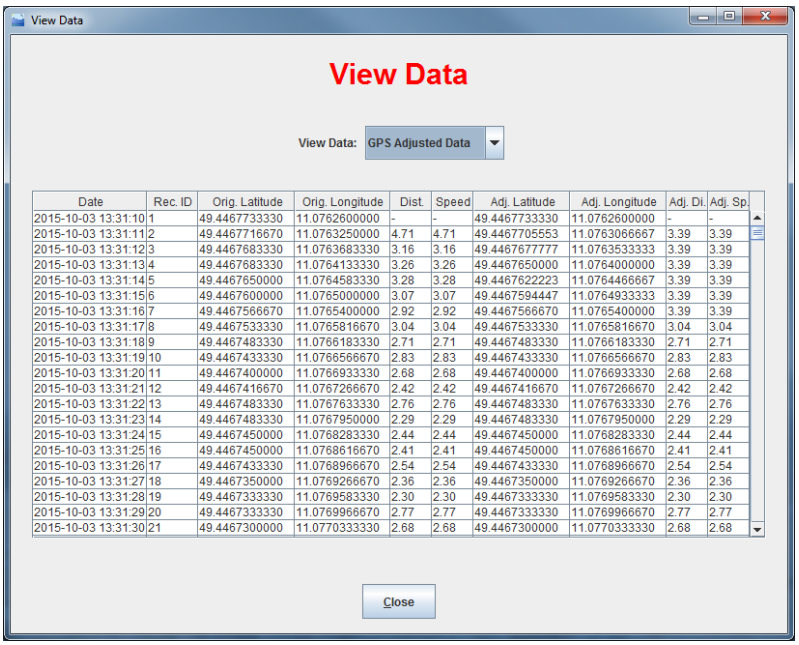
6.3 View Data

Depending on which file types (HRM/TCX, GPX/NMEA) had been imported before, there are several views on the imported record data and header information available within this window.

Use the selection box on top of the window in order to switch between the HRM/TCX record or header data, GPX/NMEA record or header data and merged data.

In case of at least one of the GPS Adjustment features was activated within *Preferences* window, there is an additional view available showing original vs. adjusted GPS values along with calculated approximate distance and speed values.





6.4 Export Data

Depending on which file types (HRM/TCX, GPX/NMEA) had been imported before, it is possible to export certain information (header data, unmerged record data, merged record data) into different file formats (CSV, GPX, TCX, HRM).

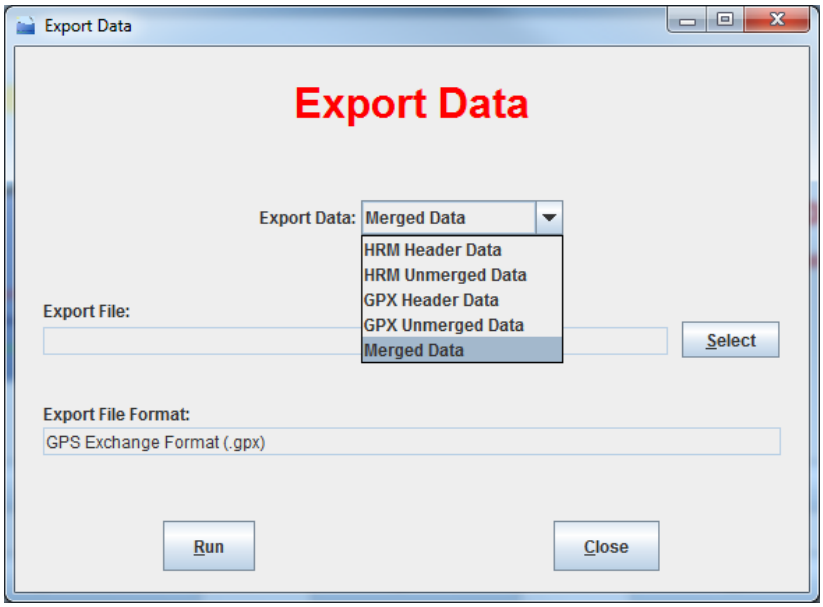
Within the *Export Data* window, select first the kind of source information to use for the export.

You can also export unmerged record data to the same file type. This is useful e.g. in case you just want to remove or adapt certain information without converting to a different file format.

Afterwards, choose output file and file type by using the selection requester and finally start the export process by clicking on *Run* button. After the export process, a confirmation message should appear.

Please note that only data supported by the respective file formats and this application gets imported and exported. Other possibly available data (e.g. metadata of certain applications or data that is saved in a different way) won't be transferred to the exported file. So always keep your original files!

Within *Preferences* window (see also below) a lot of settings can be done to customize the exported content accordingly to your specific needs.



6.5 Preferences

Within this window it is possible to adjust several settings in regards to the application features.

It is possible to save the preferences into a config file. As result, the settings will be the default ones right after start of the application (even in console mode!). By clicking the *Apply* button the settings are not saved into the config file and will only be used as long as the application is closed.

6.5.1 Import/Export Default Directory

In case valid directories are selected and saved, they will be the initial directories for import or export file choosers right after application start. When choosing different import directories during usage of the application, they are remembered until the application gets quit.

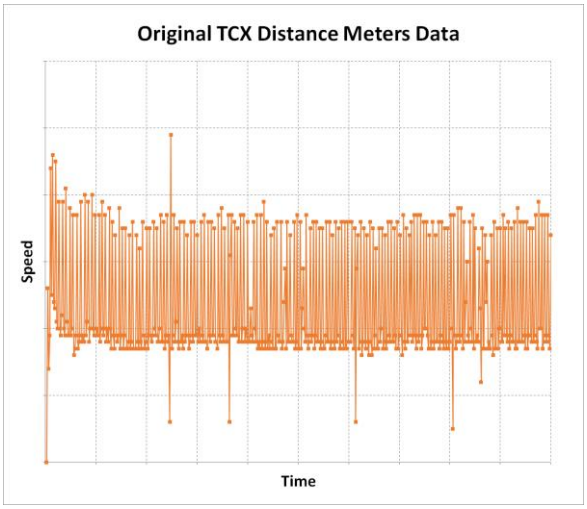
6.5.2 Import/Export Time Zone

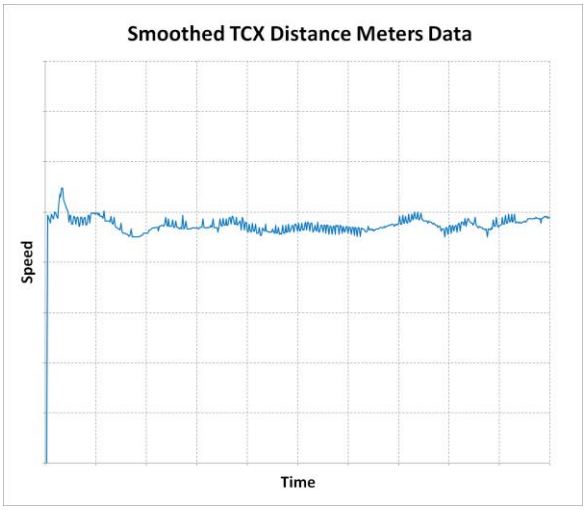
These settings define the time zone to be used for import or export. Regarding GPX file format, it should theoretically be UTC. However, some devices or applications don't distinguish between different time zones and values are saved and should be imported in the “local” time zone. Since this is typically also the case for Polar devices the default *import* time zone is *Local* though not following the standards. For TCX files an own setting is available (should always be UTC). In cases none of these settings result in the correct time values you can additionally specify time corrections in this application (see chapter 6.5.11). The default *export* time zone in this application is *UTC* accordingly to the standards.

6.5.3 TCX Distance Meters Smoothing

Distance Meters values of TCX files, which usually are the base of distance and speed calculations, can be very volatile. They are often calculated from fluctuating GPS positions.

As result, further analysis and visualization of this data can be pretty hard. This feature, if enabled, will smoothen the data.





6.5.4 Export Data In-/Exclusion

It is possible to define which kind of available data (e.g. timestamps, heart rate, speed, altitude, cadence) shall be included in the export file or not. For data that can be taken out of either HRM/TCX or GPX/NMEA files, you can individually select the preferred source of information. In cases the selected data is not available in the *preferred* source file, the data still will be taken and exported from the other source file as long as it's available there. If *no export* is selected the data is not exported in any case.

It is not recommended to remove timestamp information for TCX files as most applications require at least basic date/time information. In contrast to the GPX file format, a primary purpose of TCX files is to handle concrete exercises rather than just store location based information.

If there are already in the input file records without a date/time information you can prevent these from being exported by using the *No-Date Records* setting.

6.5.5 Pause Detection and Removal

Some target applications (or even file formats like HRM) don't consider pause times within a recorded exercise (even if in the recording device a pause feature was used). As typical result, unrealistic performance data (e.g. total exercise time, average speed) is shown.

With this tool it is possible to detect and remove such pause times based on the time difference of two track records:

In case of the time difference between two records exceeds a certain amount of seconds (value adjustable along with *Pause Detection Period* setting on *Import Settings* Tab) it is assumed that the period is a pause time without any activity.

During import and within *Data View* window information about the detected pause times and the net training time (along with calculations based on it) is shown.

In case of these pause times shall be removed when exporting, set additionally *Pause Removal* on *Export Settings* Tab to *Yes*. Otherwise, pause times are ignored and the file exported as is.

Please consider: in file formats with timestamps (such as GPX and TCX) the effect is that these will be changed to the time value as if no pause was done. Not reflecting the real time value at this point anymore. This then needs to be considered when using the output file also for purposes of merging data with other files or photos based on timestamps.

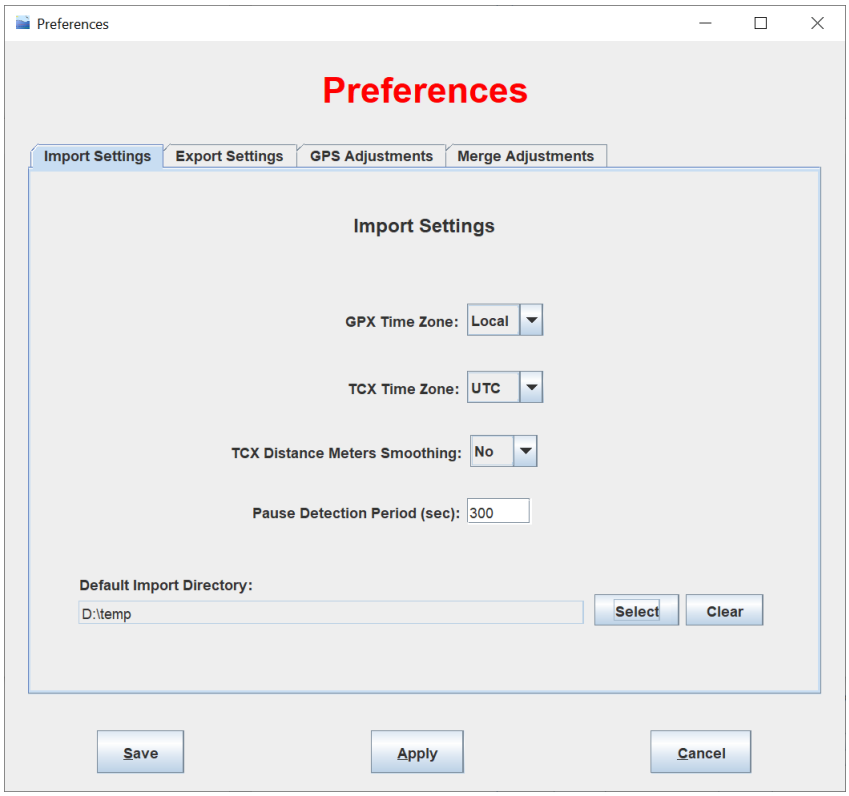
However, when exporting to HRM files (without timestamps), e.g. for importing exercise of newer devices into the Polar ProTrainer software, you might want to remove possibly existing pause periods since target applications won't be able to identify and exclude these anymore. And so wrong performance data is shown and calculated there.

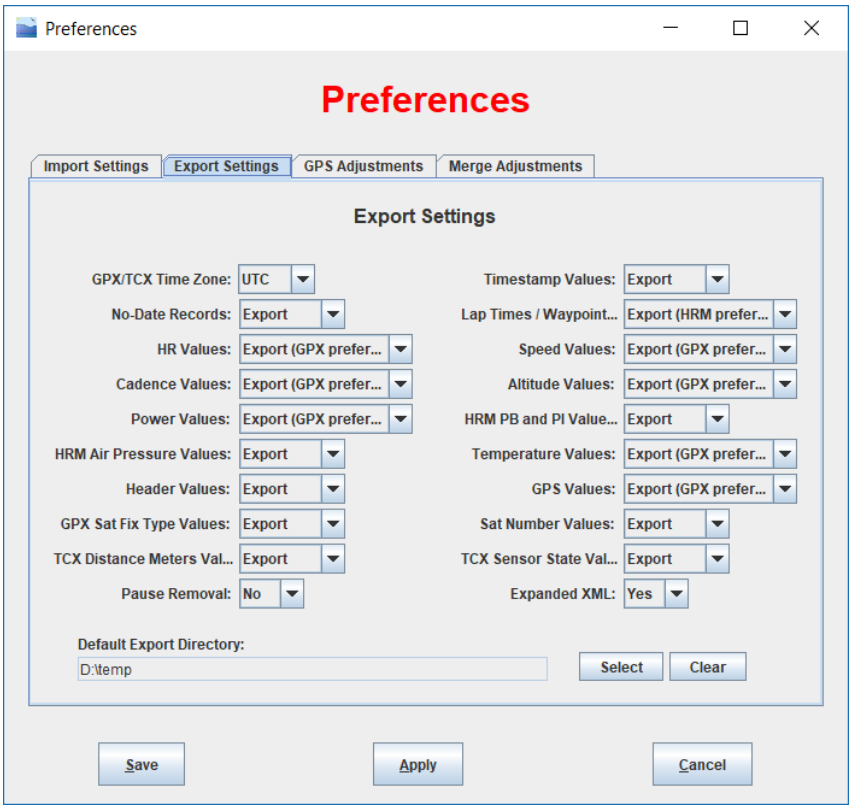
Background Information:

The "older" Polar devices (recording HRM file and GPX files at a time) handle pauses within an exercise basically in the same way (assuming no pause was made at all and adjusting time stamps accordingly). If you want to import beside the HRM file also a fitting GPX file into Polar ProTrainer, it is recommended to remove pause times with same settings from both files in order to keep them in sync and following the logic used there.

6.5.6 Expanded XML

Until application version 2.03, GPX- and TCX- files got exported with additional line break- and blank- characters to structure it for improved manual readability and editability. However, these characters are technically not required and increase file size significantly. That's why meanwhile these characters get not exported by default. In case you like this still to be done, set this setting to *Yes*.


Preferences
Preferences
Import Settings
Export Settings
GPS Adjustments
Merge Adjustments
Import Settings
GPX Time Zone: Local
TCX Time Zone: UTC
TCX Distance Meters Smoothing: No
Pause Detection Period (sec): 300
Default Import Directory:
D:\temp
Select
Clear
Save
Apply
Cancel


Preferences
Preferences
Import Settings
Export Settings
GPS Adjustments
Merge Adjustments
Export Settings
GPX/TCX Time Zone: UTC
No-Date Records: Export
HR Values: Export (GPX prefer...
Cadence Values: Export (GPX prefer...
Power Values: Export (GPX prefer...
HRM Air Pressure Values: Export
Header Values: Export
GPX Sat Fix Type Values: Export
TCX Distance Meters Val... Export
Pause Removal: No
Timestamp Values: Export
Lap Times / Waypoint... Export (HRM prefer...
Speed Values: Export (GPX prefer...
Altitude Values: Export (GPX prefer...
HRM PB and PI Value... Export
Temperature Values: Export (GPX prefer...
GPS Values: Export (GPX prefer...
Sat Number Values: Export
TCX Sensor State Val... Export
Expanded XML: Yes
Default Export Directory:
D:\temp
Select
Clear
Save
Apply
Cancel

6.5.7 GPS Adjustments of Zero Value Records

Some devices save GPS records with zeros as latitude and longitude values in case of a bad satellite connection. However, target applications often consider these as valid GPS coordinates (as they of course could also be valid if your position is really at this place) without doing any checks or corrections. As a result the track might be extended across half of the world and there might be “a little” deviation within statistical figures like distance or speed (see images on this page). By this setting such records can be either filtered out, exported as they are or exported with interpolated latitude/longitude values. The interpolation is done based on the last available and next available GPS coordinates not being zero values. Depending on the time frame of unavailable real GPS coordinates a simple linear interpolation is of course not super accurate. However, in contrast to filtering out the records completely (and along with that other additional information like e.g. heart rate as well) this method is often the better solution.

Data with GPS Zero Values

duration **01:05:31** distance **11202 km**

avg. speed **10258.8 km/h** max. speed **20143861.2 km/h**

Data without GPS Zero Values

duration **01:05:31** distance **10.82 km**

avg. speed **9.9 km/h** max. speed **22.2 km/h**

6.5.8 GPS Multi-Merged Records

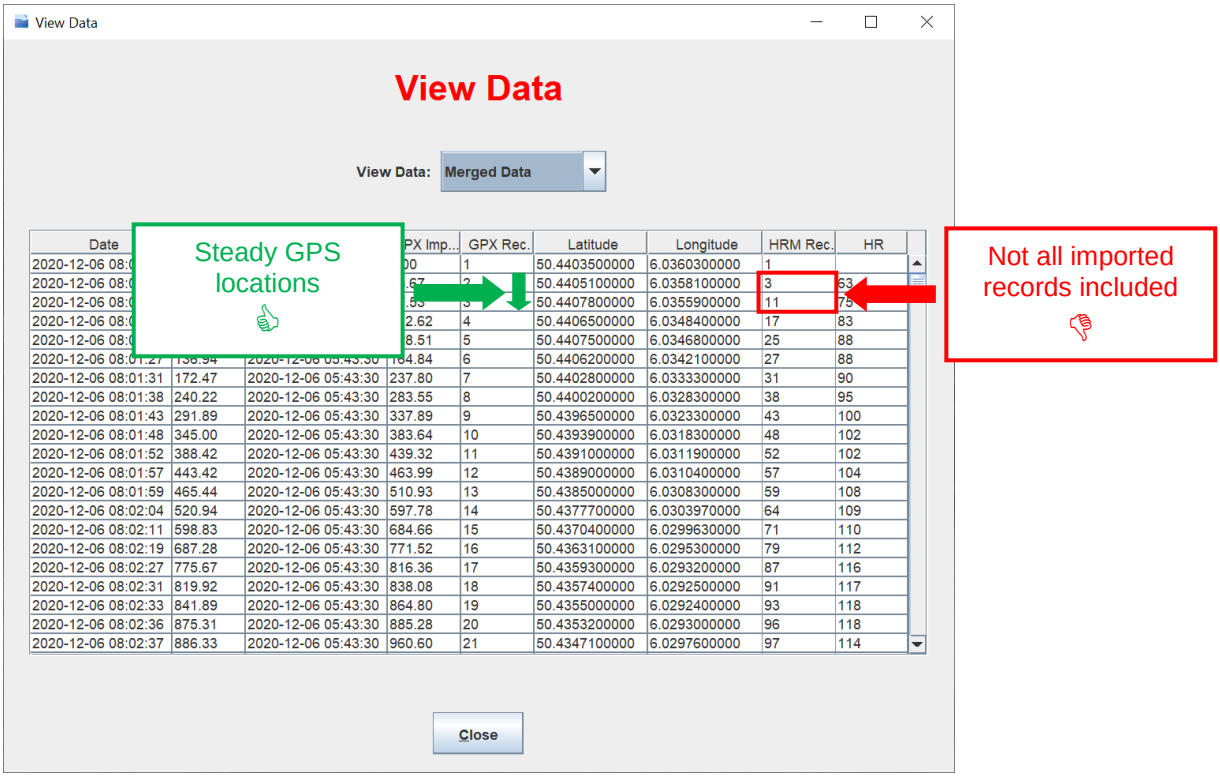
When merging information from two input files together, in specific situations (depending on whether the file GPS data is taken from has less records, merge mode and other settings) it might be that one input record with its GPS information would be merged to multiple different records of the output file.

Leaving the GPS coordinates the same for all those multiple output records would mean that basically you stay for the durance of these records on location 1 while suddenly, when next GPS record is used, jumping to the next location from one to the other record. When importing such data into applications/services which calculate speed values from GPS information this might lead to very unsteady speed information (additionally to the anyway not very accurate speed values when calculated from GPS data).

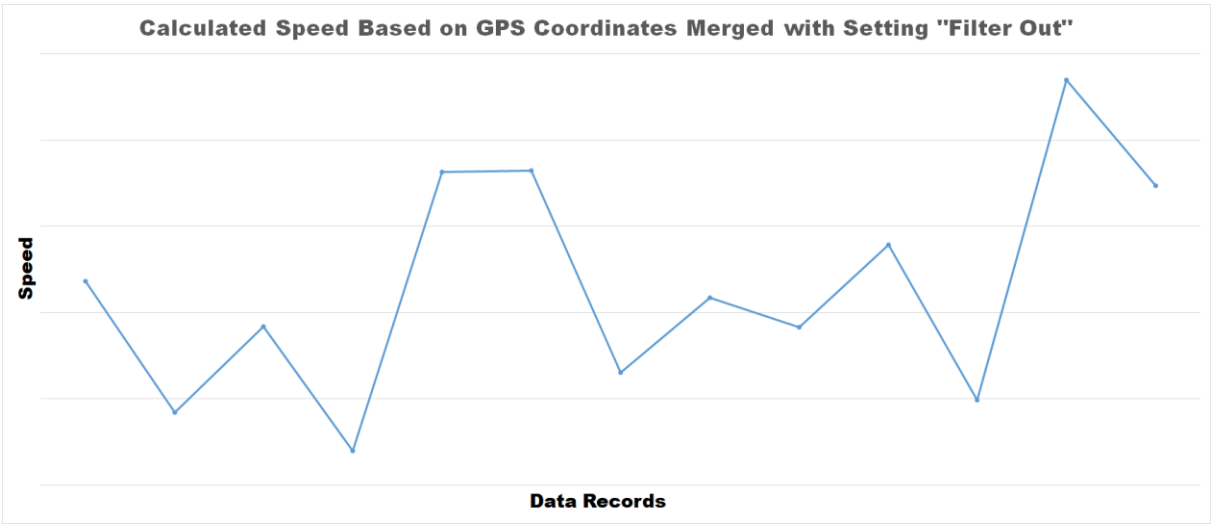
This setting offers, very similar to the adjustments of GPS zero values, three ways of merging and/or adjusting GPS information in these cases. Theoretically, the best choice is *Interpolate*, but if such “artificial” adjustments interfere with potentially done own improvement algorithms of a specific subsequent application/service, then it still could happen that a different setting might work better (especially the Filter out option, but with price of losing some information then).

a) *Filter out*:

- Each GPS input record is used only once for merging into the output data
- Potential additional records from the other input file are filtered out from the export and so *information of such records (e.g. heart rate) gets lost in merged output file*
- But since no GPS position is used multiple times during a move *no unsteady speed information* will occu

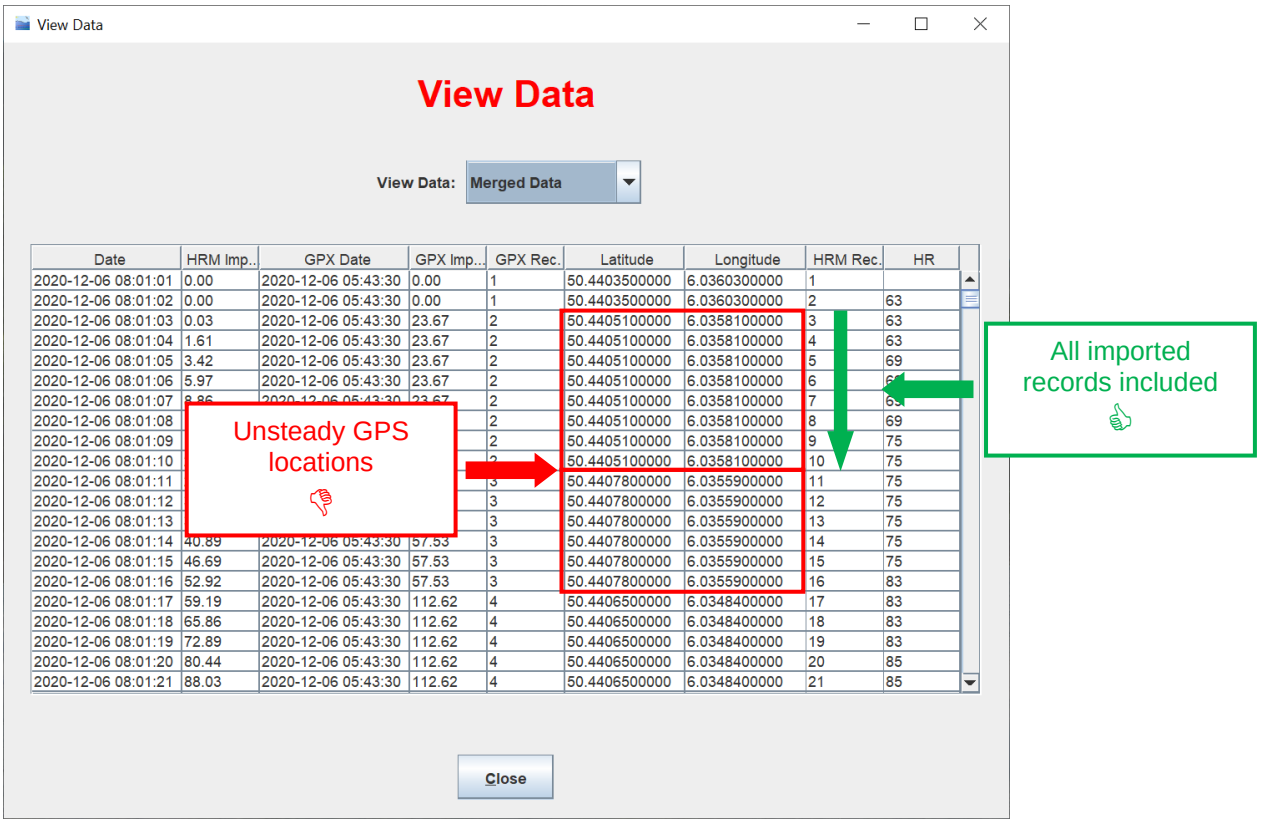


Date			PX Imp...	GPX Rec.	Latitude	Longitude	HRM Rec.	HR
2020-12-06 08:0			00	1	50.4403500000	6.0360300000	1	
2020-12-06 08:0			.67	3	50.4405100000	6.0358100000	3	63
2020-12-06 08:0			.53	3	50.4407800000	6.0355900000	11	75
2020-12-06 08:0			2.62	4	50.4406500000	6.0348400000	17	83
2020-12-06 08:0			8.51	5	50.4407500000	6.0346800000	25	88
2020-12-06 08:01:27	138.94	2020-12-06 05:43:30	164.84	6	50.4406200000	6.0342100000	27	88
2020-12-06 08:01:31	172.47	2020-12-06 05:43:30	237.80	7	50.4402800000	6.0333300000	31	90
2020-12-06 08:01:38	240.22	2020-12-06 05:43:30	283.55	8	50.4400200000	6.0328300000	38	95
2020-12-06 08:01:43	291.89	2020-12-06 05:43:30	337.89	9	50.4396500000	6.0323300000	43	100
2020-12-06 08:01:48	345.00	2020-12-06 05:43:30	383.64	10	50.4393900000	6.0318300000	48	102
2020-12-06 08:01:52	388.42	2020-12-06 05:43:30	439.32	11	50.4391000000	6.0311900000	52	102
2020-12-06 08:01:57	443.42	2020-12-06 05:43:30	463.99	12	50.4389000000	6.0310400000	57	104
2020-12-06 08:01:59	465.44	2020-12-06 05:43:30	510.93	13	50.4385000000	6.0308300000	59	108
2020-12-06 08:02:04	520.94	2020-12-06 05:43:30	597.78	14	50.4377700000	6.0303970000	64	109
2020-12-06 08:02:11	598.83	2020-12-06 05:43:30	684.66	15	50.4370400000	6.0299630000	71	110
2020-12-06 08:02:19	687.28	2020-12-06 05:43:30	771.52	16	50.4363100000	6.0295300000	79	112
2020-12-06 08:02:27	775.67	2020-12-06 05:43:30	816.36	17	50.4359300000	6.0293200000	87	116
2020-12-06 08:02:31	819.92	2020-12-06 05:43:30	838.08	18	50.4357400000	6.0292500000	91	117
2020-12-06 08:02:33	841.89	2020-12-06 05:43:30	864.80	19	50.4355000000	6.0292400000	93	118
2020-12-06 08:02:36	875.31	2020-12-06 05:43:30	885.28	20	50.4353200000	6.0293000000	96	118
2020-12-06 08:02:37	886.33	2020-12-06 05:43:30	960.60	21	50.4347100000	6.0297600000	97	114

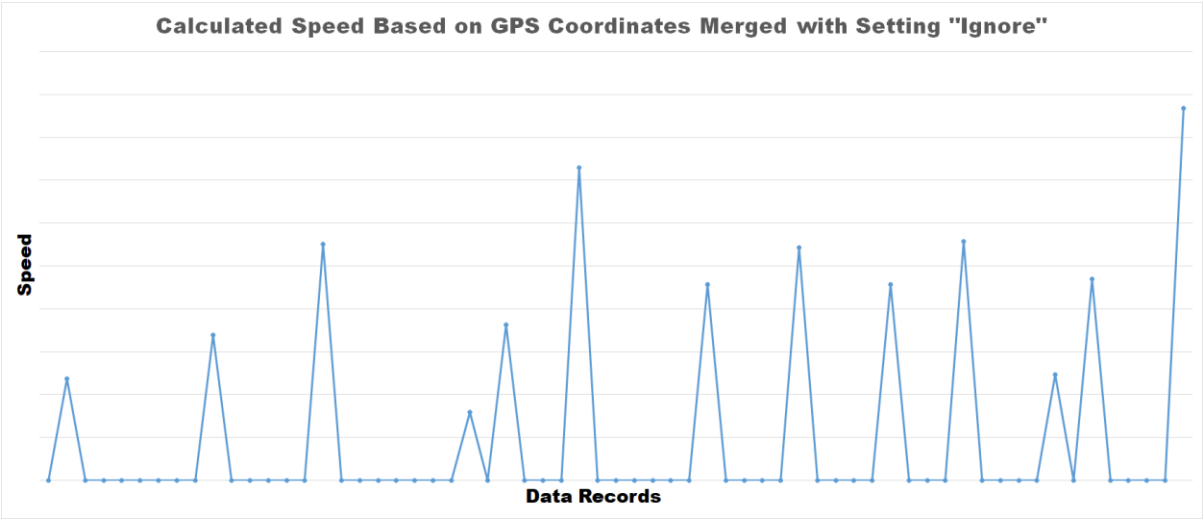


b) *Ignore*:

- Every input record gets exported
- GPS records are used multiple times if necessary
- GPS locations stay untouched and so unsteady GPS information can occur

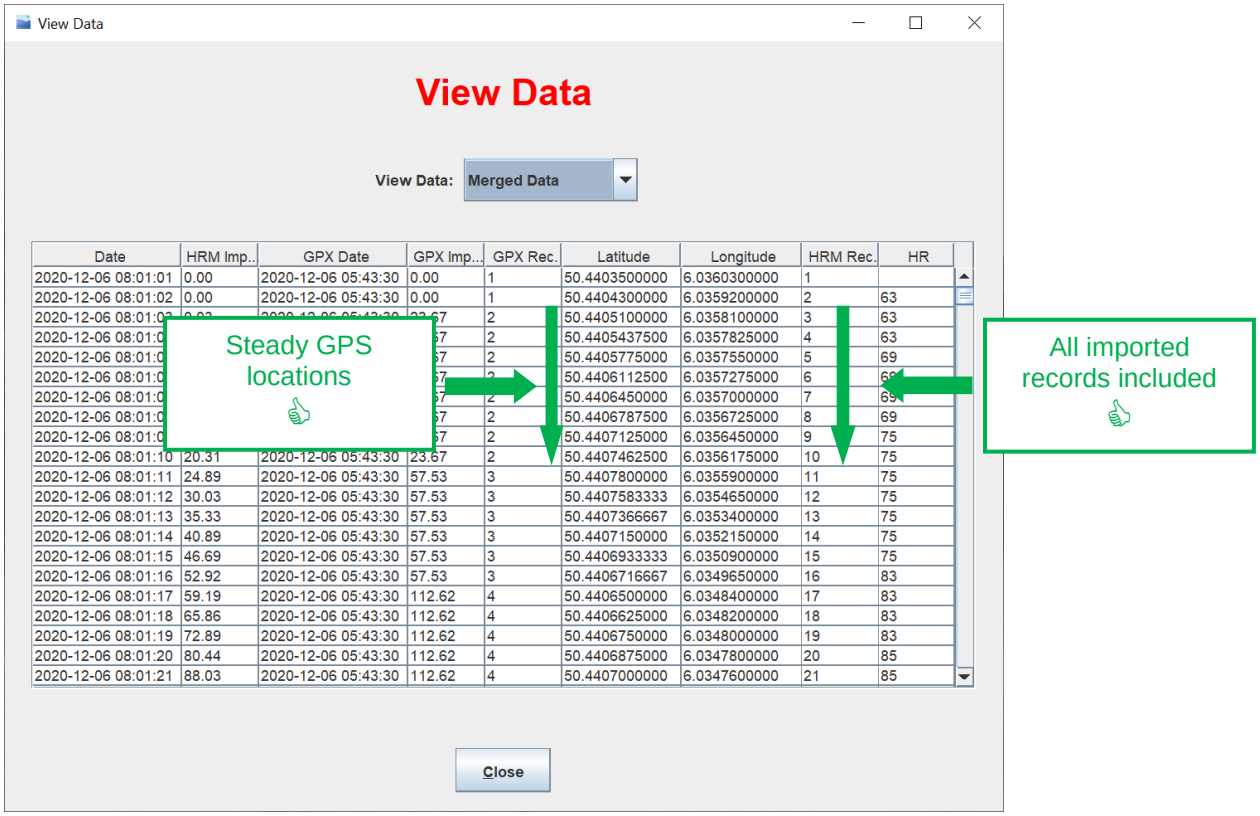


Date	HRM Imp..	GPX Date	GPX Imp...	GPX Rec.	Latitude	Longitude	HRM Rec.	HR
2020-12-06 08:01:01	0.00	2020-12-06 05:43:30	0.00	1	50.4403500000	6.0360300000	1	
2020-12-06 08:01:02	0.00	2020-12-06 05:43:30	0.00	1	50.4403500000	6.0360300000	2	63
2020-12-06 08:01:03	0.03	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	3	63
2020-12-06 08:01:04	1.61	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	4	63
2020-12-06 08:01:05	3.42	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	5	69
2020-12-06 08:01:06	5.97	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	6	69
2020-12-06 08:01:07	8.86	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	7	69
2020-12-06 08:01:08				2	50.4405100000	6.0358100000	8	69
2020-12-06 08:01:09				2	50.4405100000	6.0358100000	9	75
2020-12-06 08:01:10				2	50.4405100000	6.0358100000	10	75
2020-12-06 08:01:11				3	50.4407800000	6.0355900000	11	75
2020-12-06 08:01:12				3	50.4407800000	6.0355900000	12	75
2020-12-06 08:01:13				3	50.4407800000	6.0355900000	13	75
2020-12-06 08:01:14	40.89	2020-12-06 05:43:30	57.53	3	50.4407800000	6.0355900000	14	75
2020-12-06 08:01:15	46.69	2020-12-06 05:43:30	57.53	3	50.4407800000	6.0355900000	15	75
2020-12-06 08:01:16	52.92	2020-12-06 05:43:30	57.53	3	50.4407800000	6.0355900000	16	83
2020-12-06 08:01:17	59.19	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	17	83
2020-12-06 08:01:18	65.86	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	18	83
2020-12-06 08:01:19	72.89	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	19	83
2020-12-06 08:01:20	80.44	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	20	85
2020-12-06 08:01:21	88.03	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	21	85

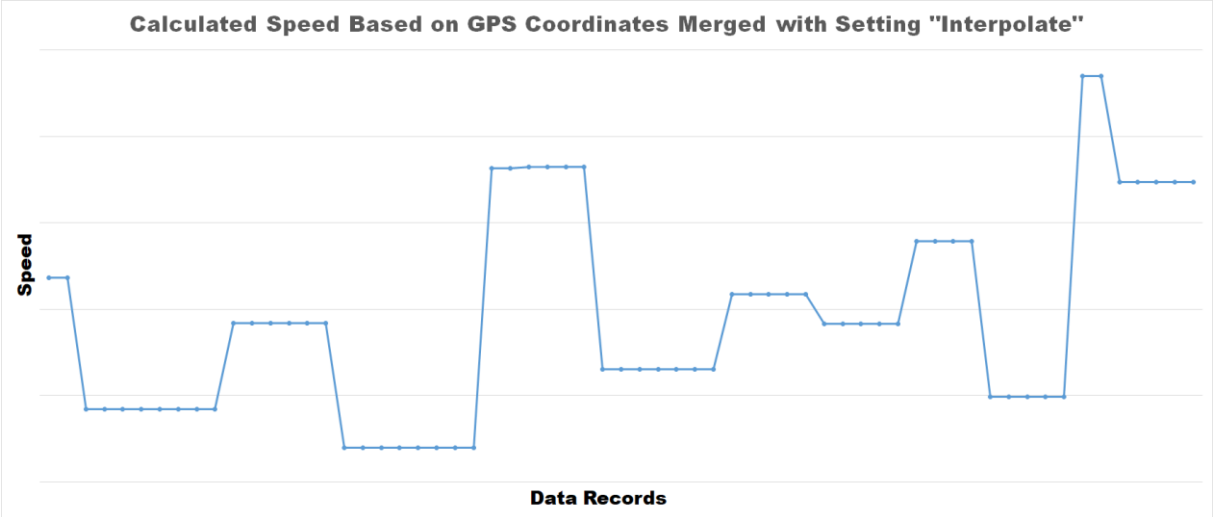


c) *Interpolate (default setting)*:

- Every input record gets exported
- GPS records are used multiple times if necessary
- GPS locations of same input records get interpolated in output data to avoid unsteady GPS information



Date	HRM Imp..	GPX Date	GPX Imp...	GPX Rec.	Latitude	Longitude	HRM Rec.	HR
2020-12-06 08:01:01	0.00	2020-12-06 05:43:30	0.00	1	50.4403500000	6.0360300000	1	
2020-12-06 08:01:02	0.00	2020-12-06 05:43:30	0.00	1	50.4404300000	6.0359200000	2	63
2020-12-06 08:01:03	0.03	2020-12-06 05:43:30	23.67	2	50.4405100000	6.0358100000	3	63
2020-12-06 08:01:04	0.03	2020-12-06 05:43:30	23.67	2	50.4405437500	6.0357825000	4	63
2020-12-06 08:01:05	0.03	2020-12-06 05:43:30	23.67	2	50.4405775000	6.0357550000	5	69
2020-12-06 08:01:06	0.03	2020-12-06 05:43:30	23.67	2	50.4406112500	6.0357275000	6	69
2020-12-06 08:01:07	0.03	2020-12-06 05:43:30	23.67	2	50.4406450000	6.0357000000	7	69
2020-12-06 08:01:08	0.03	2020-12-06 05:43:30	23.67	2	50.4406787500	6.0356725000	8	69
2020-12-06 08:01:09	0.03	2020-12-06 05:43:30	23.67	2	50.4407125000	6.0356450000	9	75
2020-12-06 08:01:10	20.31	2020-12-06 05:43:30	23.67	2	50.4407462500	6.0356175000	10	75
2020-12-06 08:01:11	24.89	2020-12-06 05:43:30	57.53	3	50.4407800000	6.0355900000	11	75
2020-12-06 08:01:12	30.03	2020-12-06 05:43:30	57.53	3	50.4407583333	6.0354650000	12	75
2020-12-06 08:01:13	35.33	2020-12-06 05:43:30	57.53	3	50.4407366667	6.0353400000	13	75
2020-12-06 08:01:14	40.89	2020-12-06 05:43:30	57.53	3	50.4407150000	6.0352150000	14	75
2020-12-06 08:01:15	46.69	2020-12-06 05:43:30	57.53	3	50.4406933333	6.0350900000	15	75
2020-12-06 08:01:16	52.92	2020-12-06 05:43:30	57.53	3	50.4406716667	6.0349650000	16	83
2020-12-06 08:01:17	59.19	2020-12-06 05:43:30	112.62	4	50.4406500000	6.0348400000	17	83
2020-12-06 08:01:18	65.86	2020-12-06 05:43:30	112.62	4	50.4406625000	6.0348200000	18	83
2020-12-06 08:01:19	72.89	2020-12-06 05:43:30	112.62	4	50.4406750000	6.0348000000	19	83
2020-12-06 08:01:20	80.44	2020-12-06 05:43:30	112.62	4	50.4406875000	6.0347800000	20	85
2020-12-06 08:01:21	88.03	2020-12-06 05:43:30	112.62	4	50.4407000000	6.0347600000	21	85



6.5.9 GPS Smoothing Adjustments

Bad satellite connection might not only lead to zero values for GPS latitude and longitude, but also to values that are “stuck” for a certain period within a small region and suddenly jump over to a rather distant position. In many target applications there is no check and correction done and as result there are unrealistic values (e.g. for max. speed) and charts with a curve scaling up to such a maximum value so that they show basically a flat line without any detailed differences of the values. The GPS Smoothing feature of this application can at least help to limit such extreme peaks.

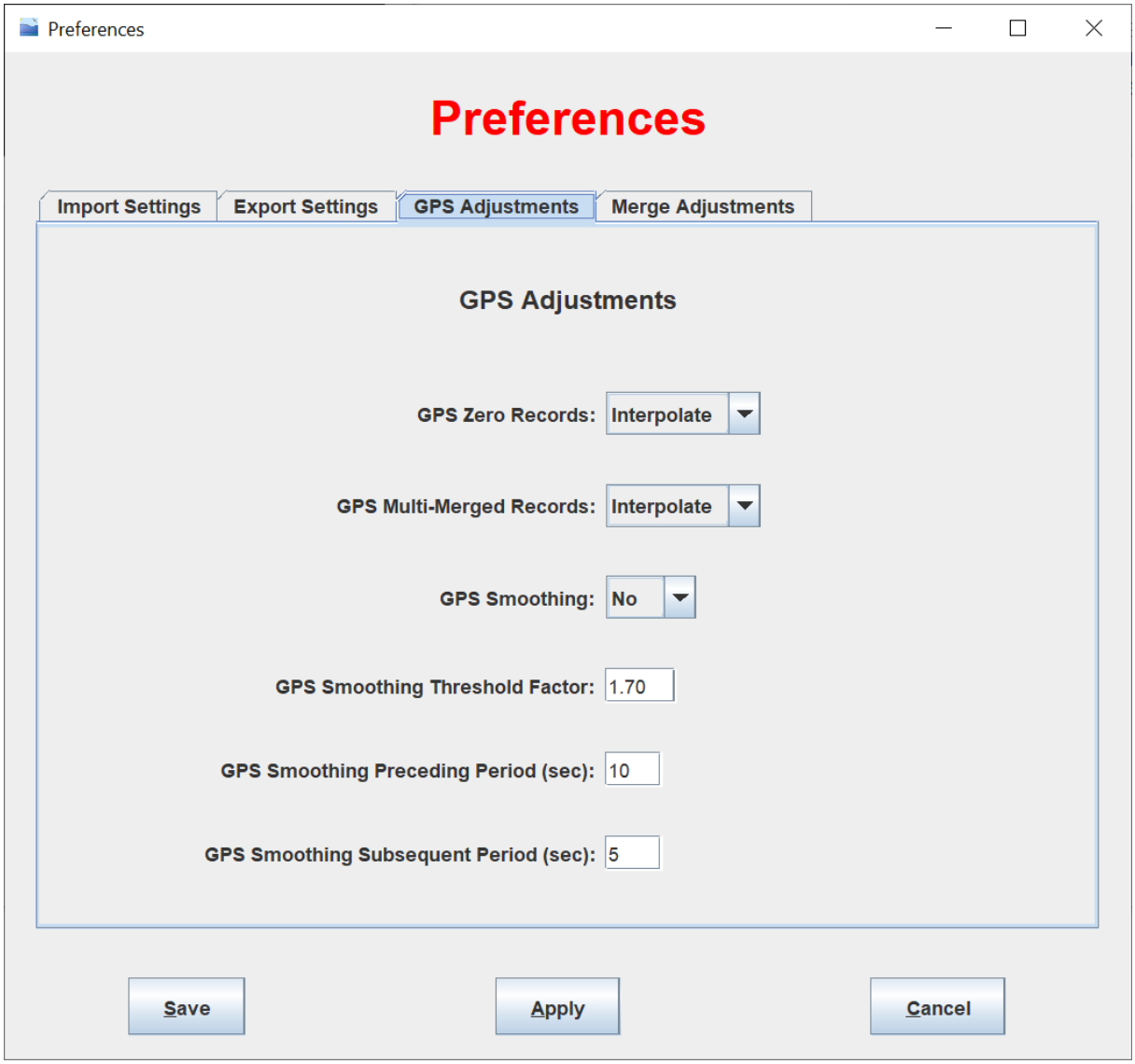
The maximum realistic speed value of course depends on the individual exercise characteristics. For instance, realistic speed values are different between a cycling and a walking exercise. Therefore, the definition of such a maximum realistic speed is not done by an absolute number, but as a *Threshold Factor* based on the calculated average speed of the exercise. For example, in case the calculated average speed (based on GPS values) of the exercise is 2 m/s, a *Threshold Factor* of 3 results in an acceptable top speed value of 6 m/s. In case this speed value is exceeded, the GPS coordinates within a certain time range before and after get interpolated on base of the GPS location of the record before and after that time range. Especially in cases of extreme speed differences (e.g. cycling in mountains) this value must be carefully set so neither too much or too less is adjusted.

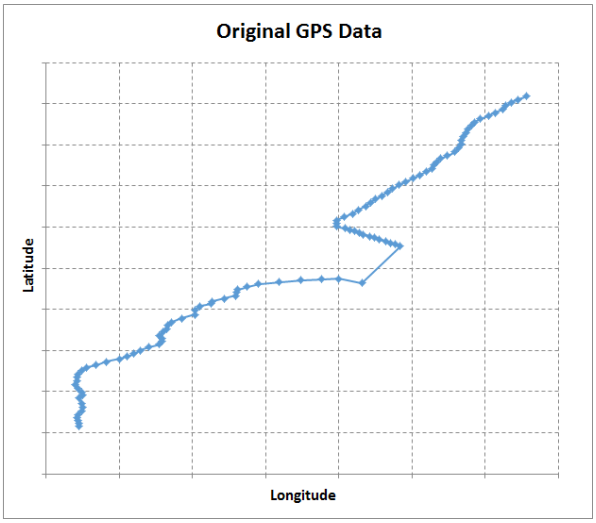
The *Preceding Period* and *Subsequent Period* settings define how many seconds before and after the exceeding value the interpolation range starts or ends. This implies the assumption that a certain time before, and even after (though typically less time), the GPS location is not precise enough. The number of seconds shall be on the one hand selected as high as required to cover the whole period of at least very inaccurate GPS information. On the other hand, it should be selected as short as possible in order to avoid the loss of too much real detailed information.

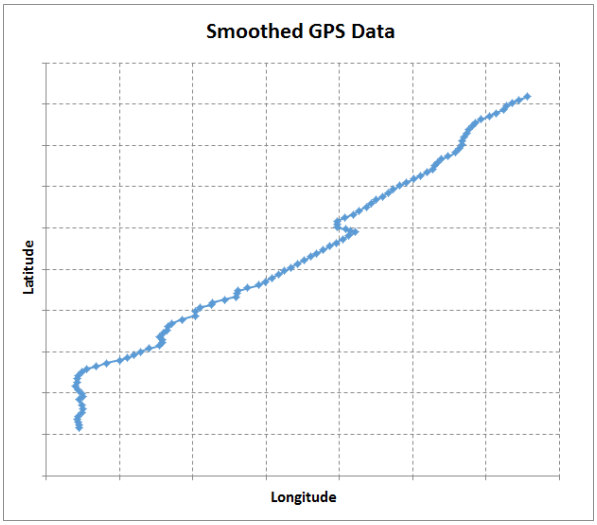
It will be not always possible setting up all the parameters in order to get a 100% perfect result across the whole exercise. For example, at certain places a sudden significant peak might be valid in case of overtaking a person or a short downhill section. However, with a good selection the results should be at least much better as leaving completely wrong extreme values within the data.

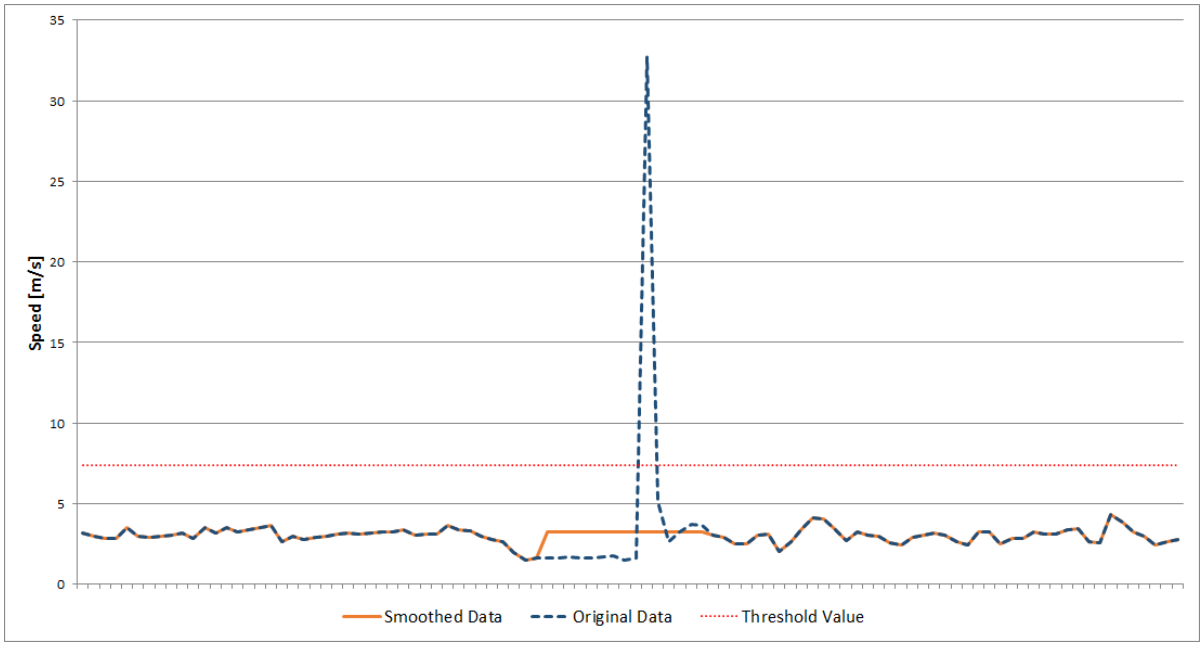
Though the GPS location of a record is possibly altered multiple times (depending whether the record is within the time range of another record exceeding the threshold value) the check for validity is done only once per record. Therefore, it is not ensured that at the end no single value exceeds the threshold value. However, along with increasing period values this gets more and more unlikely. And at least very extreme values are limited to an acceptable deviation.

In general, the default values of this application are good ones to start with, but you might want to adjust them in detail to get more optimized results accordingly to the specific exercise characteristics.









It is possible to combine *GPS Adjustments of Zero Value Records* and *GPS Smoothing Adjustments*. In this case the *GPS Adjustments of Zero Value Records* are done first. This allows e.g. to filter out GPS zero records before including them into the *GPS Smoothing Adjustments* interpolation calculations.

The effects of the GPS adjustments in total can be seen within the *Data View* window first before exporting the exercise to a file. Cells with adjusted GPS values get highlighted with a Yellow background.

6.5.10Merge Modes

The Merge Mode defines accordingly to which criteria HRM/TCX data records and GPX/NMEA data records are matched together.

Usually and ideally this would be done by time information of the single records.

However, there are situations where different approaches have to be taken. For example, regarding virtual trainings or if activity recording was done without GPS information in general. Then, often GPS track information shall be merged that include no fitting time stamp information (e.g. GPS file from a from a different exercise: even if track is the same and session begin date/time is adjusted, still during the session the speed would not be always exactly the same and so track points are reached at a different point of time relatively to session begin) or even don't include any (valid) time stamps at all.

In such cases it is required to either merge by distance information (if available in both files) or as last option by only record order/number directly. The application offers therefore following Merge Modes:

a) *Timestamp* (default setting):

HRM/TCX and GPX/NMEA records are combined accordingly to the time value of both records as imported in connection with the import time zone. Additionally, HRM/TCX and GPX/NMEA time adjustments (see chapter 6.5.11) get considered.

b) *Record Number (no GPS Stretching/Shrinking)*:

By using this setting, HRM/TCX data is simply added to the GPX/NMEA data record-by-record, not considering any time- or distance- values. This might be useful in sense of "last option" if neither time nor speed/distance information is available in both files. And also for any reason the option *Record Number (with GPS Stretching/Shrinking)* can't be used instead.

c) *Record Number (with GPS Stretching/Shrinking)*:

In contrast to the previous merge modes, the HRM/TCX time values get the "leading" time information and GPX/NMEA date/time values are more or less ignored.

In case of both input files have the same amount of records, merging would happen pretty similar to the merge mode *Record Number (no GPS Stretching/Shrinking)*. Otherwise, depending on whether there are more or less GPX/NMEA data records, some of these might be ignored (filtered out) or used multiple times.

d) *Import Distance*:

If both input files contain either distance-, speed- or GPS- information, this merge option will be able to merge records by distance information. Dependent on input file types and available information (typically regarding HRM files speed values, regarding GPX files GPS information) for each record the so far covered distance is calculated. And finally records are merged accordingly to it.

“Import” means here that the distance is taken or calculated always as stored in the input files. If after import within application e.g. GPS adjustments are done, the distance values won’t be adjusted anymore (and so also will not cause another merge cycle(s) incl. adjustments in a kind of feedback loop).

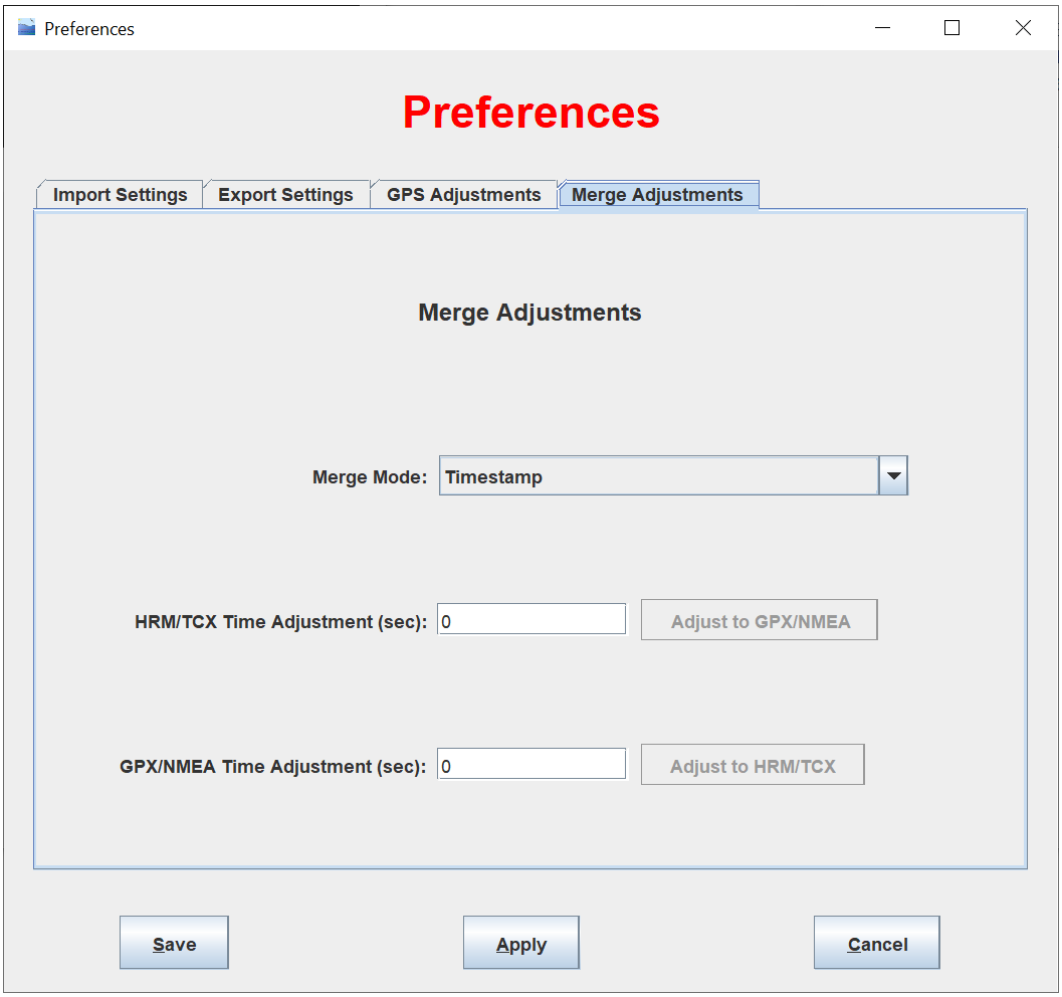
Similar than method *Record Number (with GPS Stretching/Shrinking)* the HRM/TCX time values are leading. Main advantage to it however is that the merge process can consider the distance/speed as it really was within the specific training session at the specific places. And records are not only merged based on the assumption of an overall evenly average speed.

Theoretically the accuracy of this method could be on a comparable level than merging by time stamps. Practically however, due to lacking precision of measurements, especially if distance is calculated from GPS values only, the results of this method won’t be such exact.

6.5.11 Time Adjustments

It is possible to define adjustments to the HRM/TCX and GPX/NMEA time stamp values. This has an effect on merging the records as well as viewing and exporting time information. Enter a positive number value to increase the time values by the respective amount of seconds. Or a negative value to decrease the time values.

By clicking on the *Adjust to GPX/NMEA* (*Adjust to HRM/TCX*) button, the *HRM/TCX* (*GPX/NMEA*) *Time Adjustment* value is calculated automatically so that the start times of both imported files match. A previously entered GPX/NMEA (HRM/TCX) time adjustment value gets considered as well for this calculation.



6.6 About

This window shows some basic application, author and version information.

6.7 Quit

Click on *Quit* button in order to exit application.

7 Console Mode

Beside the graphical user interface (GUI) the application offers as well a console mode.

It allows the execution of file conversions out of the command-line interface and is especially useful in cases a lot of files shall be processed at a time or merging happens often with a lot of changing settings. As result, it is possible to have at least a kind of semi automation for tasks that would require several manual steps by using the GUI (e.g. file selection, file types).

Additionally to single-file-operations it is also possible to process all relevant files within a certain directory (and even their sub-directories if desired) automatically.

Nearly all of the relevant application settings can be specified by parameters as well.

For usage of the application in console mode, run the application JAR file with the usual java command and add "-con" as argument. If you add no further arguments than "-con", or use the "-help" argument, you will get a list of all available arguments and parameters.

Example:

java -jar JWHGT.jar -con -exsd mrec -ifhrm "myexercise.hrm" -ifgpx "myexercise.gpx" -of "myexercise_merged.gpx"

The file names will require the full path included if they are not referring to files within the same directory.

Directory Mode:

Instead of specifying single input/output files it is possible to process all relevant files within a specified directory (and if desired its sub-directories) automatically.

This is done by using the *-idir* argument along with the directory name (similar like input/output files including full path if not within the same directory).

Depending on the source data type (header data, unmerged record data, merged record data) the application will search for existing HRM/TCX, GPX/NMEA or both files (one from each category in order to merge). The file names need to have depending from the specified HRM/TCX and GPX/NMEA input file formats an *.hrm*, *.tcx*, *.gpx*, *.log* or *.nmea* suffix (not case sensitive). In case two files are required, the

file names without the suffix must be identical (e.g. *myexercise.hrm* and *myexercise.gpx*) in order they can be matched together.

By default, only the specified directory will be processed. If also sub-directories (and their sub-directories etc...) shall be processed, use additionally the *-subdir* argument.

Some additional remarks:

- Most of the settings are identical with those available via the GUI. Please see also the respective chapters within this manual for further information.
- For arguments that belong to the user preferences: also in console mode user preferences from the application's config file are loaded and used as default values if nothing else is specified via the arguments. That means, if you previously had saved your preferences via the GUI, you'd only need to specify those preferences arguments that shall be different for the respective operation.
- The user preferences parameters have following meaning: *no* = no export ; *ex* = export ; *exhrm* = export (HRM/TCX value preferred) ; *exgpx* = export (GPX/NMEA value preferred)
- Overwrite Output Files: By default, the application will not overwrite any already existing output files. Please use the *-overwrite* argument in order to enforce overwriting existing output files.
- Input/Output file format: file extension of the file format to use
- Source Data Type:
  - ⇒ *hhd*: HRM/TCX header data
  - ⇒ *hrec*: HRM/TCX unmerged record data
  - ⇒ *ghd*: GPX/NMEA header data
  - ⇒ *grec*: GPX/NMEA unmerged record data
  - ⇒ *mrec*: Merged record data
- Merge Mode: The parameters have following meaning: *ts* = Timestamp ; *rnogst* = Record Number (no GPS Stretching/Shrinking) ; *rgst* = Record Number (with GPS Stretching/Shrinking)

Current available arguments and parameters:

[-h] or [-help] or [?]: Help

-con: Run application in console mode in order to execute an operation without using GUI.

[-ifhf {hrm | tcx}]: HRM/TCX import file format.

[-ifhrm "<hrminputfilename>"]: HRM/TCX import file. <hrminputfilename> is the HRM/TCX file name including path. Argument required for certain export types. It is ignored in directory mode.

[-ifgf {gpx | log | nmea}]: GPX/NMEA import file format.

[-ifgpx "<gpxinputfilename>"]: GPX/NMEA import file. <gpxinputfilename> is the GPX/NMEA file name including path. Argument required for certain export types. It is ignored in directory mode.

[-idir "<inputdirectoryname>"]: Application works in directory mode instead of importing just single files one-by-one. <inputdirectoryname> is the directory path.

[-subdir]: If set in directory mode, also sub-directories of the input directory (and their sub-directories etc...) will be processed.

[-exsd {hhd | hrec | ghd | grec | mrec}]: Source data type.

[-off {csv | gpx | tcx | hrm}]: Output file format.

-of "<outputfile>": Output file. <outputfile> is the file name including path. Argument is ignored in directory mode.

[-overwrite]: By default the application will stop the export if the specified output file already exists. The -overwrite argument enforces the export and the existing output file is overwritten.

[-imgtz {Local | UTC}]: GPX import time zone.

[-imttz {Local | UTC}]: TCX import time zone.

[-imtdms {no | yes}]: Use Import TCX Distance Meters Smoothing.

[-exgtz {Local | UTC}]: GPX/TCX export time zone.

[-exts {no | ex}]: Export of timestamp values.

[-exnd {no | ex}]: Export of No-Date records.

[-exwp {no | exhrm | exgpx}]: Export of (preferred) lap times / waypoints.

[-exhr {no | exhrm | exgpx}]: Export of (preferred) HR values.

[-exsp {no | exhrm | exgpx}]: Export of (preferred) speed values.

[-exca {no | exhrm | exgpx}]: Export of (preferred) cadence values.

[-exal {no | exhrm | exgpx}]: Export of (preferred) altitude values.

[-expo {no | exhrm | exgpx}]: Export of (preferred) power values.

[-expp {no | ex}]: Export of HRM PB and PI values.

[-exap {no | ex}]: Export of HRM air pressure values.

[-exte {no | exhrm | exgpx}]: Export of (preferred) temperature values.

[-exhd {no | ex}]: Export of HRM/GPX/TCX header values.

[-exgp {no | exhrm | exgpx}]: Export of (preferred) GPS values.

[-exsf {no | ex}]: Export of GPX sat fix type values.

[-exsn {no | ex}]: Export of sat number values.

[-exdm {no | ex}]: Export of TCX distance meters values.

[-exss {no | ex}]: Export of sensor state values.

[-expru {no | yes}]: Use Pause Removal.

[-impdp <numberofseconds>]: Pause Removal minimum period. <numberofseconds> is an integer value from 30 to 999999999.

[-exexx {no | yes}]: Export expanded XML (GPX, TCX) files.

[-gazero {filter | ignore | ipol}]: GPS adjustments of records with GPS zero values.

[-gamulti {filter | ignore | ipol}]: GPS adjustments of multi-merged records with same GPS position.

[-gasmu {no | yes}]: Use GPS Smoothing.

[-gasmt <decimalvalue>]: GPS smoothing threshold factor. <decimalvalue> is a decimal value with decimal character "." from 1.01 to 9.99.

[-gasmpp <numberofseconds>]: GPS smoothing preceding period. <numberofseconds> is an integer value from 1 to 120.

[-gasmsp <numberofseconds>]: GPS smoothing subsequent period. <numberofseconds> is an integer value from 0 to 120.

[-mmode {ts | rnogst | rgst | dist}]: Merge mode.

[-tahrm <numberofseconds>]: HRM/TCX time adjustment. <numberofseconds> is a positive or negative integer number from -99999999 to 999999999.

[-tagpx <numberofseconds>]: GPX/NMEA time adjustment. <numberofseconds> is a positive or negative integer number from -99999999 to 999999999.

8 Hints and Background Information

8.1 Keep Your Original Files!

In any case keep your original files even after having im- and exported them!

This application only works with parts of the information available within these files and not all output file types support all kind of information of a different input file type. So data could get lost storing only the exported files of this application.

8.2 Compatibility

GPX and TCX files created by this tool should basically be compatible to all common target applications making use of such files. And vice versa this application should also be able to import their files. However, in case something does not work as expected, following remarks might be interesting.

Regarding the GPX file format, there is currently no official standard in terms of how other exercise data than altitude (e.g. heart rate, speed, cadence, temperature) is integrated. This application makes use of the Garmin Trackpoint Extension format (at least a kind of de facto standard for this purpose) when im- and exporting these data. Regarding Power values, there is not even such an extension available and the strava.com specific extension is used (there are currently anyway nearly no other common applications loading this data out of GPX files).

Regarding the TCX file format, the additional Garmin TCX extensions for Speed and Power values are supported as well.

Though those mentioned above are the de facto standards, it might still be that other applications don’t support these GPX/TCX extensions or even don't import or export such data at all. Even speed values are often ignored in GPS related applications and calculated by themselves based on GPS coordinates.

Furthermore, some applications seem to be very demanding in terms of data values.

A common sports tracking portal for example won’t accept a file with heart rate values of 0 within. And will also only accept files with other extension fields (e.g. heart rate, speed, cadence, temperature) if heart rate is included.

Therefore, within *Preferences* window you can select for each data type whether it should be exported at all. And for some data additionally perform adaptions to the data values (e.g. time and GPS adjustments).

If your application still has problems with certain data values of the file it might help as last option doing some manual “search & replace” operations within a text editor.

For example replacing the expression "<*gpxtpx:hr*>0</gpxtpx:hr>" with "<*gpxtpx:hr*>*90*</*gpxtpx:hr*>" for replacing heart rate values of 0 with a different one. Or something like "*.0*</*gpxtpx:atemp*>" to "</*gpxtpx:atemp*>" in case of only integer values are supported.

8.3 Time Synchronization and Different Recording Devices

When importing HRM/TCX and GPX/NMEA files from different devices or applications, there might be time differences between the records of the two files. These might result from different time zone or clock settings, a different start time, recording breaks or other reasons. It is recommended to use as far as possible the same settings and start times (best down to second level) though time adjustments are possible within this application to a certain degree (see also *Preferences* Window).

However, especially as HRM files don't record a time stamp for each record, but only for the start time, it is crucial that the different devices don't get out of synchronization. This might happen e.g. if one device is paused (e.g. Polar devices "auto start-stop" function is activated!) while the other device continues to record. Otherwise, it is not possible anymore to assign the right HRM/TCX values to their corresponding GPX/NMEA records! By using only one recording device (e.g. only the heart rate monitor records values although an external GPS receiver is used), usually HRM and GPX recording is started and stopped at the same time and stay synchronized. However, even then as result the exported GPX or TCX files might not include real time stamps (not counting seconds up during a pause while of course real time moves ahead) and statistics get distorted.

So it is strongly recommended that there are no recording breaks and the “auto start-stop” function is inactivated. If you still pause recordings please take a look at the meanwhile available *Pause Removal* functionality of this application!

8.4 Different Units

Different file types might use different units for the values than defined for GPX or TCX files (e.g. regarding speed knots, km/h or mph instead of m/s).

In case of HRM files it might even be different by file whether they contain values either in "Euro" units (km, km/h, m, °C) or in "US" units (miles, mph, ft, °F) depending on the setting of the recording device. And values like speed are not even stored in a common unit at all.

This application converts values of different units into those being the standard for GPX and TCX files (e.g. m/s, m, degree Celsius) right along with the import.

8.5 Glitches and Strange Effects in User Interface

Along with specific environments (e.g. Windows 10 with newer Java versions and specific graphic cards and drivers) many Java applications with user interface show strange glitches and effects that sometimes even make it hard to work with.

I had myself such an issue with my applications on one of my computers while they worked on others without any troubles. Accordingly to some information I found in internet there might be different reasons and solution strategies. Unfortunately there is currently not much that can be done from application side as it is more an issue of the play-together between Java, operating system and the hardware “outside the (sand-)box”.

What helped in my case, and is still a comparable easy solution, was to use a specific java/javaw parameter at application start with the effect that hardware graphic acceleration gets disabled (for this application only of course, rest of the system stays untouched). Following is an example that worked in my case:

“java -Dsun.java2d.d3d=false -jar JWHrmGpx.jar”

8.6 Tutorial: Merge and Transfer Polar ProTrainer 5 Exercise Data (HRM + GPX) to Another Application (e.g. Sports Web Portal)

Meanwhile Polar ProTrainer 5 offers the possibility to upload exercises directly to the new Polar Flow web service. However, in case of exercise data shall be uploaded to other applications and web services it is in most cases necessary to convert the information into a different file format.

Typically that means that information from the heart rate monitor (heart rate and other sensor data of the Polar device which is saved in a proprietary HRM file) and GPS data (by either a Polar or other GPS sensor which is saved or can usually be exported into a separate GPS file) must be merged together into one data file which is supported by the target application (in most cases a GPX or TCX file).

This example shows (just) the base procedure without making use of all kinds of additional features of JW HRM-GPX-TCX Tool which are explained in detail in the manual.

8.6.1 Import PPT 5 Heart Rate Monitor Data (HRM File) and GPS Data (GPX File)

PPT 5 saves all its exercise data that was transferred from a device into a specific directory. The directory can be set up in the application individually. Typically it will be stored in a directory with your name, and in a sub-folder for the respective year. E.g. "…\Bob Foo\2017".

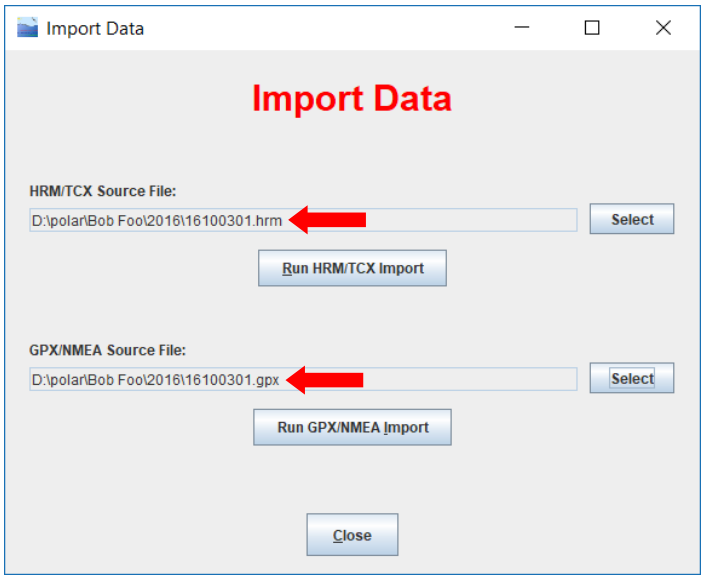
Within this folder you should find at least one ".HRM" file for each exercise (some devices save an additional HRM file per exercise but which can't be used for this specific purpose). In order you find the right file you need to analyse the file name.

First two digits: year of exercise (e.g. "17" for 2017), next two digits month of exercise (e.g. "04"), next two digits day of exercise (e.g. "02"). The last 2 letters is, a little bit simplified for this purpose, the number of the next free HRM file on this location. If your current exercise is the first one on that day the number will be "01".

In case you used directly a Polar GPS sensor, you will find within the same directory the fitting GPS data file which has the same file name but the suffix ".GPX". In case you recorded the exercise with a different GPS sensor you need to export the data into a GPX file first.

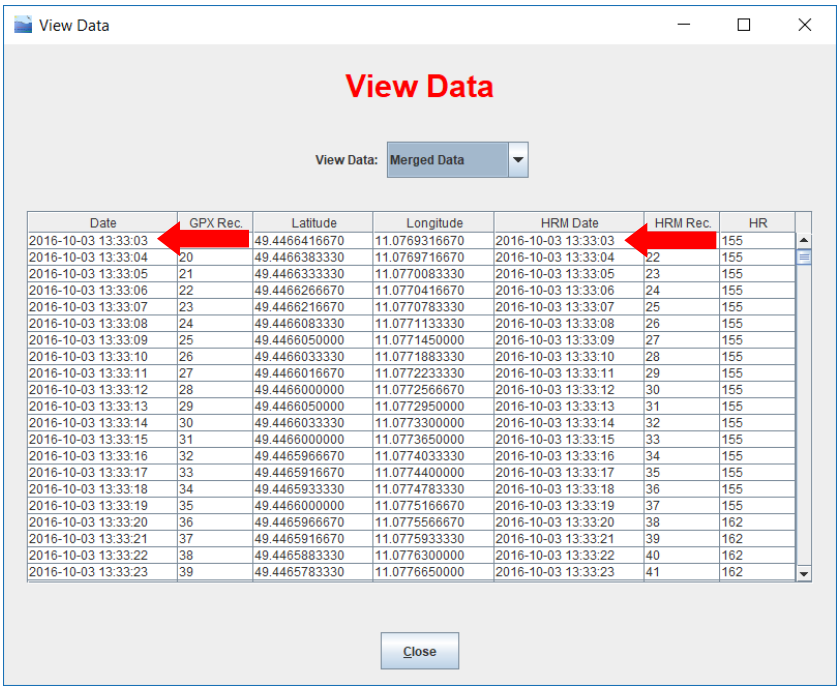
Before importing the GPX file, please check in Preferences whether the *import time zone for GPX files* is set to "Local" if a Polar GPS sensor was used. And else UTC.

Afterwards import both input files. It is also possible to just export HRM file data without merging the data in the next steps.



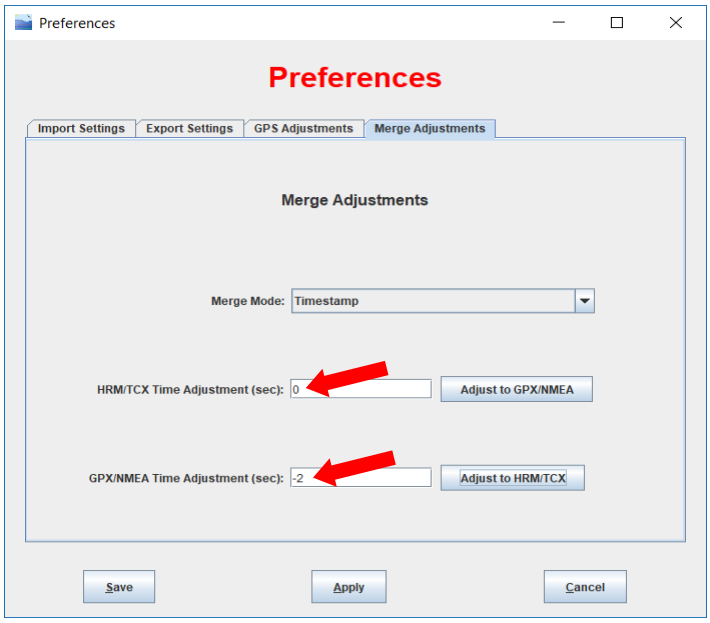
8.6.2 Check Record Match and Synchronicity

After successful import you can see in View Data Window how the data records are matched. Ideally, for each GPX record an HRM record can be assigned. If this is not the case, please check whether both files have correct timestamps and are in sync:



Date	GPX Rec.	Latitude	Longitude	HRM Date	HRM Rec.	HR
2016-10-03 13:33:03		49.4466416670	11.0769316670	2016-10-03 13:33:03		155
2016-10-03 13:33:04	20	49.4466383330	11.0769716670	2016-10-03 13:33:04	22	155
2016-10-03 13:33:05	21	49.4466333330	11.0770083330	2016-10-03 13:33:05	23	155
2016-10-03 13:33:06	22	49.4466266670	11.0770416670	2016-10-03 13:33:06	24	155
2016-10-03 13:33:07	23	49.4466216670	11.0770783330	2016-10-03 13:33:07	25	155
2016-10-03 13:33:08	24	49.4466083330	11.0771133330	2016-10-03 13:33:08	26	155
2016-10-03 13:33:09	25	49.4466050000	11.0771450000	2016-10-03 13:33:09	27	155
2016-10-03 13:33:10	26	49.4466033330	11.0771883330	2016-10-03 13:33:10	28	155
2016-10-03 13:33:11	27	49.4466016670	11.0772233330	2016-10-03 13:33:11	29	155
2016-10-03 13:33:12	28	49.4466000000	11.0772566670	2016-10-03 13:33:12	30	155
2016-10-03 13:33:13	29	49.4466050000	11.0772950000	2016-10-03 13:33:13	31	155
2016-10-03 13:33:14	30	49.4466033330	11.0773300000	2016-10-03 13:33:14	32	155
2016-10-03 13:33:15	31	49.4466000000	11.0773650000	2016-10-03 13:33:15	33	155
2016-10-03 13:33:16	32	49.4465966670	11.0774033330	2016-10-03 13:33:16	34	155
2016-10-03 13:33:17	33	49.4465916670	11.0774400000	2016-10-03 13:33:17	35	155
2016-10-03 13:33:18	34	49.4465933330	11.0774783330	2016-10-03 13:33:18	36	155
2016-10-03 13:33:19	35	49.4466000000	11.0775166670	2016-10-03 13:33:19	37	155
2016-10-03 13:33:20	36	49.4465966670	11.0775566670	2016-10-03 13:33:20	38	162
2016-10-03 13:33:21	37	49.4465916670	11.0775933330	2016-10-03 13:33:21	39	162
2016-10-03 13:33:22	38	49.4465883330	11.0776300000	2016-10-03 13:33:22	40	162
2016-10-03 13:33:23	39	49.4465783330	11.0776650000	2016-10-03 13:33:23	41	162

In case HRM and/or GPX time is not absolutely correct by second, you can adjust the values within the Merge Preferences:

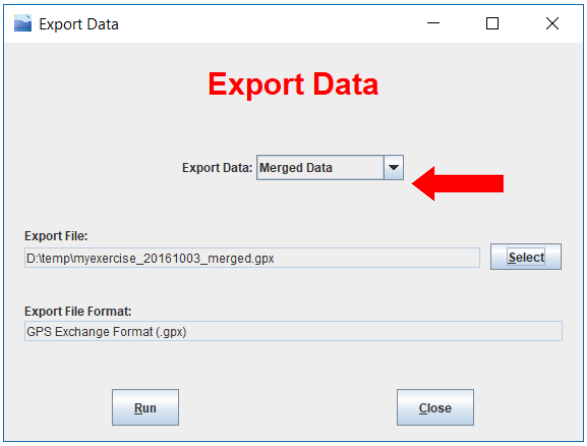


Once matching of the data records is correct you can export the data by using the Export Window.

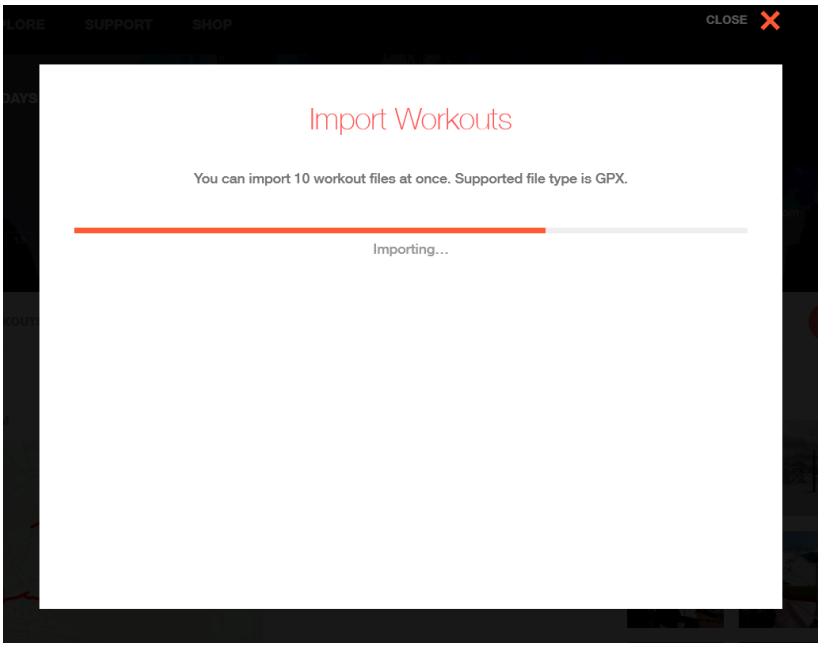
8.6.3 Export Output File and Import to Target Application

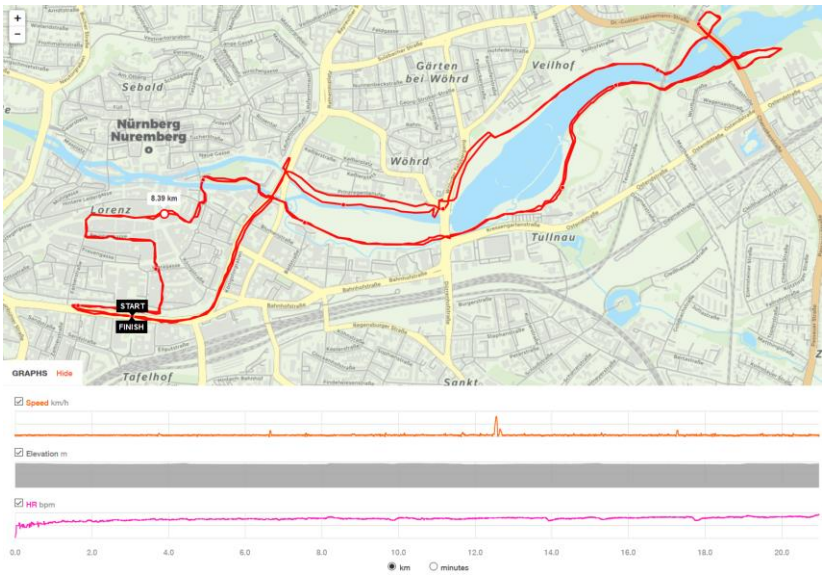
Select “Merged Data” as data source so the merged information of both files is taken.

When selecting the output file alongwith the file requester, also choose the target file type (in most cases GPX or TCX is required).



Start the export with “Run” button. As result there should be a file that can be imported into your target application (example pictures show sports-tracker.com).





8.7 Tutorial: Transfer Polar Flow (TCX) Data to Polar ProTrainer 5 (HRM)

Polar offers along with their new devices an upload to their web services. With latest ProTrainer releases it is also possible to upload the exercises to it. However, it isn't possible to download the data from the new devices into your local PolarTrainer software and using it further as your sports tracking tool working on your local computer.

With JWHGT tool this will be possible. However, there are quite a few tricks that are helpful to know and which I will describe here.

8.7.1 Export Excercise Data from Polar Flow

On the Exercise Details page of Polar Flow service, use the "Export Session" button, choose to export as TCX format and save the file in a directory of your choice.

No.	Duration [hh:mm:ss]	Distance [km]	HR avg [bpm]	Pace avg [min/km]	Pace max [min/km]	HR max
1	00:12:06.1	1.98	150	06:06	05:33	162
2	00:12:16.0	2.05	160	06:00	04:26	166
3	00:09:29.7	1.60	163	05:56	03:53	168
4	00:13:15.7	2.28	167	05:49	05:13	174
5	00:13:40.8	2.29	154	05:59	05:13	174
6	00:14:43.9	2.46	166	05:59	05:16	169

8.7.2 Import Excercise Data to JWHGT Tool

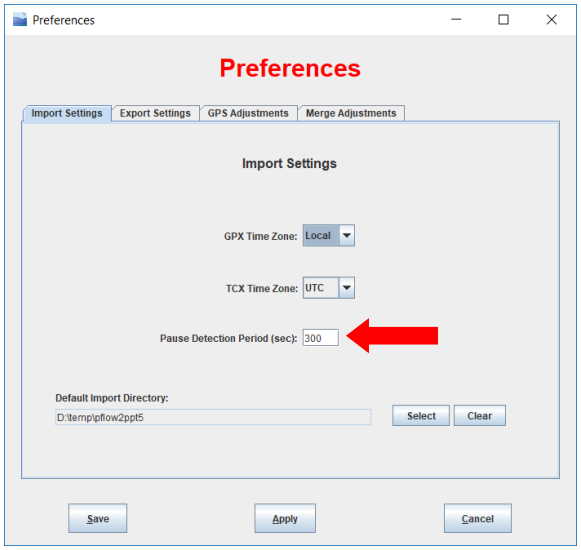
Import the file into the JWHGT Tool, make sure in preferences UTC timezone is set for importing TCX files.

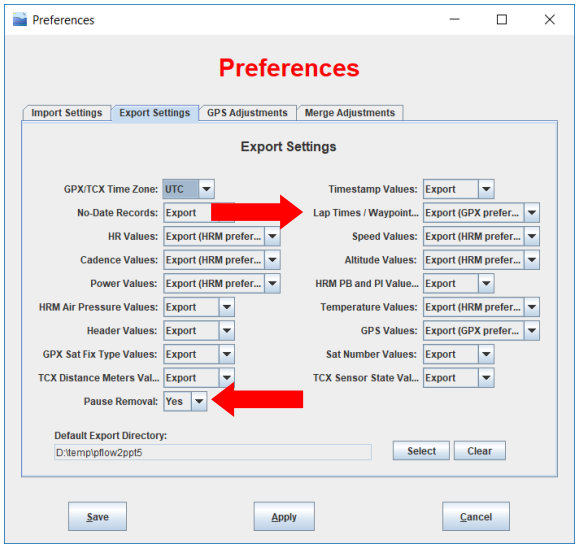
8.7.3 Adjust Preferences and Export HRM File Data

Before exporting the data to the HRM format, you might want to ensure you have certain preferences set up.

In case you made breaks during recording the exercise you might want make use of the Pause Removal feature (see also chapter 6.5.5).

In case you want to export recorded laps as lap times, go sure that the preference is not set to not export lap times.



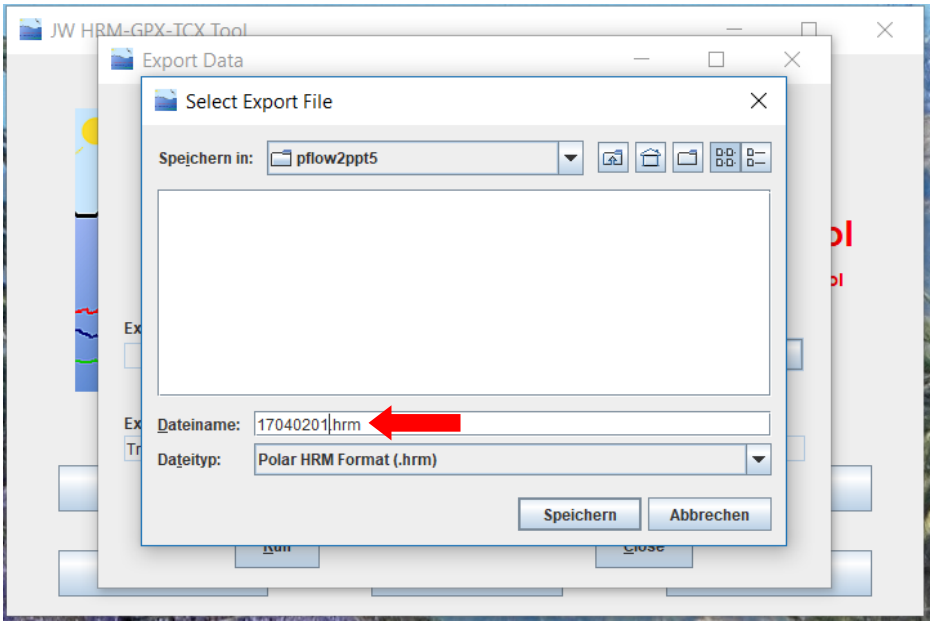


Finally, export the HRM file.

Important:

Polar ProTrainer needs files to be saved in a certain directory and using a special naming convention.

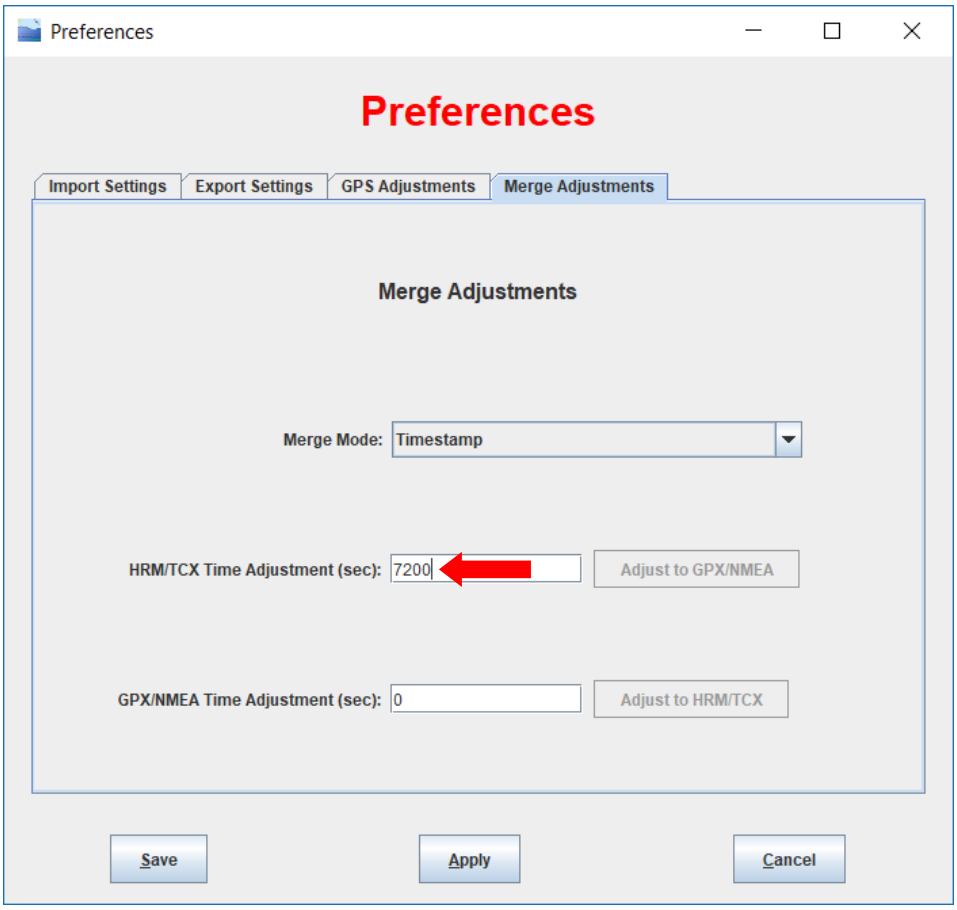
- *File location:* this is the directory where all imported HRM files get imported. The directory can be set up in the application individually. Typically it will be stored in a directory with your name, and in a sub-folder for the respective year. E.g. "…\Bob Foo\2017".
- *File Name:* The HRM file must be named exactly like this: first two digits: year of exercise (e.g. "17" for 2017), next two digits month of exercise (e.g. "04"), next two digits day of exercise (e.g. "02"). The last 2 letters is, a little bit simplified for this purpose, the number of the next free HRM file on this location. If your current exercise is the first one on that day the number will be "01". In case already other HRM files got imported, look for the next free file number. If there is already a file "17040202.HRM" then choose "17040203.HRM".



8.7.4 Adjust Preferences and Export GPX File Data

In case you want also to transfer a fitting GPX file to Polar ProTrainer (optional), several settings must be used.

- Use the same Pause Removal settings as used for HRM file export.
- Polar doesn't save other data into GPX files than timestamps and locations. So you could remove basically everything else (e.g. heart rate) from export. But usually these data won't disturb. However, I recommend to disable *Waypoint export* here since it seems ProTrainer will create then a kind of additional path then.
- Polar ProTrainer will use the local time zone for converting the GPX file timestamps, although the standard is UTC and also timestamps to be marked as if they would be UTC timestamps. Therefore, you still need to have the export *time zone "UTC"* set up in Export Preferences! But in order the time values will fit to those of the HRM file, you will need to use time adjustments in case the local time zone is different to UTC. Enter the time difference in seconds to the UTC time zone as positive or negative number as Time Adjustment in Merge Preferences (e.g. 7200 for 2 hours in case of Central European Summer Time).



- File Location and File Name (appart from the different ".GPX" instead of ".HRM" file name suffix) must be identical to the HRM file!

8.7.5 Import Data to Polar ProTrainer 5

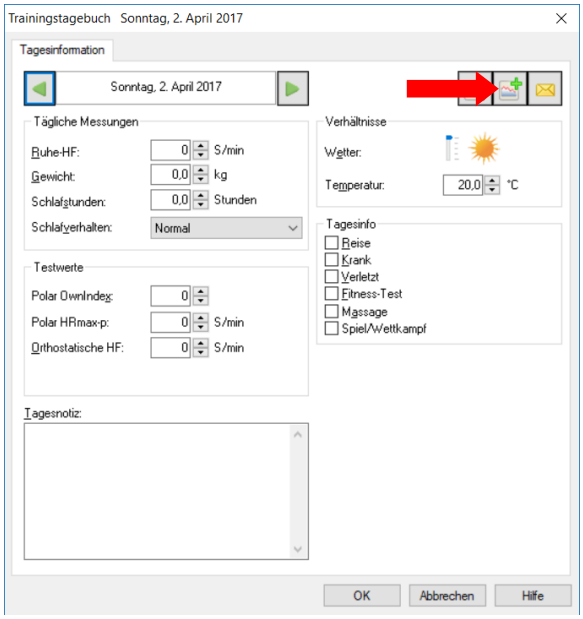
Once you saved your file(s) with the correct names at the right location, you will be able to import the exercise data into Polar Trainer 5.

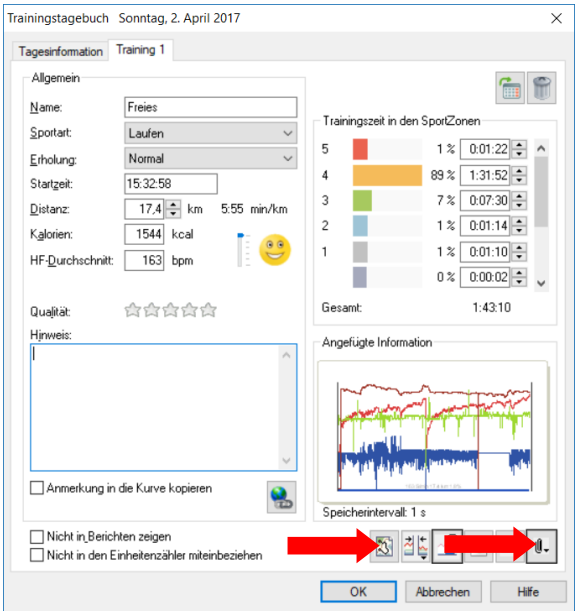
On the calendar, double-click the day of the exercise. On the opening window use the respective icon to add a new exercise.

There, you can use the icon to attach exercise and select the HRM file you exported before.

As a result, all kinds of information is loaded into the input fields and you can go on with editing and saving the data.

In case you created a GPX file in addition and everything worked out correctly with the special settings done before, the symbol for GPS track information should be shown automatically.





8.7.6 Optional: Import Running Index and RR-Data (Heart Rate Variability)

In case a Running Index was calculated and/or Heart Rate Variability data can be downloaded for your session you might want to transfer that data as well.

This has to be done after before mentioned steps and I have developed two dedicated mini-tools just for that specific purpose as the required steps are a bit cumbersome doing it all manually and they also wouldn't fit well into the JWHGT application workflow and design:

- For updating Running Index: JWUpdateRunIndex
- For creating RR information: JWCreateRrHrm

Please have a look at my homepage for further information about these tools.

9 Application Related Notes

JW HRM-GPX-TCX Tool is the successor of the JW HRM & GPX Tool with much advanced functionality and still available completely for free.

You can download latest versions of this tool and donate on the JW HRM-GPX-TCX Tool page of my homepage:

http://jwhgt.worldwidehome.de

It can be easily done anonymously via PayPal without any registration needs on my side. You can get there the download details without me having to know any of your personal data.

Please consider that software development and support takes a lot of (leisure- / family-) time. This is especially true in case of an application shall not only fulfill own needs and shall ensure high quality under any kind of circumstances.

Those users who appreciate(d) my work by making at least once a donation, can download new versions much earlier as complimentary present.

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10 Contact

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E-Mail: software@worldwidehome.de

Feel free to contact me for reports, feedback, bugs or any other nice reasons. Download also new versions or find other software there.

Last, but not least, many thanks to all those who helped so far with e.g. giving feedback, interesting ideas, testing beta versions and last but not least donated!

11 History

V0.07 (2011-06-12)

Experimental HRM and GPX merge in View Data Window.

V0.08 (2011-06-24)

- HRM and GPX time adjustments
- Merged CSV and Merged GPX export incl. unit conversions (e.g. k/mh or mph to m/s ; ft to m)
- Data View Layout optimizations
- General enhancements

V0.09 (2011-07-02)

- Export of GPX start date metadata
- HRM Lap Times and GPX Waypoint import and data view
- GPX Waypoint export out of HRM Lap Times or GPX import file waypoints
- HRM Temperature value support
- HRM import improvements
- HRM and GPX Time Adjustment Preferences now have also an effect on viewing and exporting unmerged HRM (respectively GPX) data
- General enhancements

V0.10

- Application was renamed to "JW HRM & GPX Tool"
- Multiple merge modes are now available. E.g. for including GPS information of a different excercise when same track, but no GPS device, was used
- Merge, view and export functionalities were re-coded in major parts
- Included compatibility for older HRM file versions like 1.02 and 1.05
- HRM import compatibility to other systems than MS Windows improved
- Added TCX export
- Some minor improvements

V0.11 (2012-10-05)

- GPX files with no XML declaration are now accepted for import.
- Fixed bug preventing import of GPX files with an XML declaration not including version or encoding information.
- Merged Data is now the default view and Merged Data GPX the default export type if both, HRM and GPX data, is available.
- GPX altitude is now shown and exported with decimal number accuracy (HRM altitude however is defined as integer numbers by Polar and their devices).
- Import and Export Windows won't dispose anymore when closing and retain their settings (e.g. the selected directory and file).
- It is now possible to save the preferences so they will be the default settings when starting the application.
- Java 2 Runtime Environment (JRE) Release 5 or newer is now required.

V1.00 (2013-01-18)

- Creation of PDF manual
- Upgraded version to 1.00 since now includes all planned features and seems to run very stable

V1.01 (2013-10-09)

- Improved TCX file export (e.g. files are now compatible with Strava.com)
- Import Heart Rate-, Speed-, Cadence- and Temperature- data also out of GPX files. Possibility to export these instead of the HRM file values.
- Possibility to export unmerged GPX file data into GPX or TCX files (e.g. to just remove certain information from GPX files like Timestamps, Heart Rate, ...)
- Possibility to export data without timestamp information

V1.02 (2014-04-14)

- Console Mode and batch operations: execute conversions out of the command line interface without using the GUI.
- View Data window now also shows columns for GPX HR, Speed, Cadence and Temperature if data is included in the GPX input file.
- Enhanced GPX file import: speed, special character handling, improved tolerance for non-compliant or even corrupt XML/GPX file contents
- GPX Header CSV export includes now also exercise name, description and author name.
- General changes in application design for improved separation of application logic and GUI.

V1.03 (2014-07-06)

- Import/Export Power values from/to GPX files. However, since there is no official GPX tag or a common GPX extension for power data, the compatibility is limited. The tag used is compatible with Strava uploads.
- Export of Speed and Power values to TCX files by usage of Garmin TCX extensions.
- Added “Adjust to GPX” and “Adjust to HRM” buttons for automatic calculation of the time adjustment value so that the HRM (GPX) start time matches the GPX (HRM) start time.

V1.04 (2014-10-10)

- Improved GPX input file special character import.
- Possibility to filter out or interpolate GPS records/values in case of latitude and longitude is zero.
- Possibility to define default import- and export- directories within Preferences.
- Bugfix: under certain circumstances some GPX file header metadata contents could get loaded out of the wrong GPX metadata tag in case the tag’s name was similar (and e.g. belonged to a different mother tag)
- Enhanced GPX file size limit which allows now to import about at least 10 hours of one-second-interval-records along with full trackpoint information. A warning message will appear in case of no GPX end tag could get read and something possibly is incomplete.

V1.05 (2015-09-05)

- Default Export GPX Time Zone is now UTC accordingly to GPX standard. However, default Import GPX Time Zone stays “Local” as this is the correct setting for Polar files though not following the standard. In case of GPX files are taken from a different source it’s likely the Import GPX Time Zone needs to be switched to “UTC”.

V1.06 (2015-12-08)

- New “GPS Smoothing”: in case of GPS location values “hang” (e.g. in case of bad satellite connection), and later on suddenly jump over to a big distance position, some applications don’t correct such values good enough and so huge unrealistic Maximum Speed values are calculated along with charts showing a curve with huge peaks and otherwise only small value differences. The new feature can smooth such cases along with individually configurable parameters for speed threshold and time range to consider.
- In case of GPS adjustments are used, resulting values are shown in a special view within Data View window, and compared to the original values, rather than being just exported.
- Approximate Total Distance and Average Speed (along with Total Training Time) are calculated for GPX files (based on GPS Latitude/Longitude values) and HRM files (in case of HRM speed values are available) and shown in Import Status and Data View windows.
- In Import Window there are now two separate file requesters and Run buttons for HRM and GPX import files.
- TCX export: calculation of Distance Meters information now based on GPS Latitude/Longitude values (since available more often and usually more precise than based on speed values).
- GPX export: Improved match methods and export of waypoints from HRM or GPX input files, especially in case of GPS adjustments done.
- Major internal code overwork and clean-up.
- Several minor improvements.

V1.07 (2016-01-10)

- Import, display and export of GPX (file) header date.
- Improved handling of records without date/time information and new export No-Date Records setting.
- Export of certain numeric data fields (e.g. altitude) is no longer done with thousands separators which lead to compatibility issues with some target applications.
- Several minor improvements.

V2.00 (2016-04-23)

First release of **JW HRM-GPX-TCX Tool** as a major enhancement of the previous JW HRM & GPX Tool.

- TCX file import: support for many additional heart rate monitors and fitness trackers (e.g. Garmin, latest Polar devices)
- NMEA (.log, .nmea) file import: support for GPS featured photo and action cams (e.g. Canon, Sony)
- Export of unmerged file data to all output formats (e.g. HRM-only data to GPX or TCX)
- Import, view and export additional data (e.g. TCX exercise header information)
- Additional preferences
- Further improvements and goodies (e.g. performance, distance/speed calculation, track-/waypoint- matching)

V2.01 (2016-04-30)

- Usage of JWHGT naming for classes and other cases.

V2.02 (2017-04-28)

- HRM Export
- Pause time recognition and removal feature and speed calculation also based on “net” time without pauses
- Extended TCX functionality (e.g. lap support, extended header data)

- General lap handling/conversion improvements (e.g. convert and consider different logic between HRM and TCX files: lap time stamp belongs either to previous or next lap)
- Several small improvements and adjustments

V2.03 (2017-12-28)

- Possibility to use GPS- adjustments also for TCX files
- In Data View window, cells with an adjusted GPS value get now highlighted in Yellow
- GPX- and TCX- files get now exported without unnecessary line break- and blank- characters and so file size is reduced significantly. There is a new preference for switching this on again (see “Expand XML” setting) in case required.
- Bugfix: The help in console mode showed a wrong name for parameter "-impdp".
- A few small improvements and adjustments

V2.04 (2018-05-19)

- Improved compatibility for HRM exports (e.g. PPT5 when including Power values, HRM Profil)
- Minor improvement when loading power values out of HRM files: not necessarily additional data respectively column for Power LR Balance- and Power Pedalling Index values get created in case power values are available only.
- Updated file name extension of batch generated output files, reflecting the meanwhile changed application name.
- A few internal adaptions due to meanwhile depreciated Java API.
- Applications requires now at least Java 2 Runtime Environment (JRE) Release 6 (1.6) or higher installed.

V2.05 (2021-03-21)

- New *Merge Mode “Import Distance”*: allows much more accurate merging e.g. regarding virtual trainings or if activity recording was done without GPS information in general. In such cases, the GPS input files often have not fitting or even no valid time stamps at all.

- New *GPS Multi-Merged Records* adjustment setting along with interpolation feature: Allows e.g. to export all input data records while avoiding unsteady GPS locations. And therefore can lead to better speed values in target applications/web portals.
- Minor bug fix in GPX export: GPX description was sometimes not exported (if taken from HRM/TCX Header Activity Notes and a Non-Expanded-XML export format was set up).

V2.06 Beta (2021-05-23)

- Progress bars shown when exporting or opening Data View window (meanwhile with added features depending on selected adjustments, length of exercise and computer performance meanwhile some calculations may take some time)
- Very minor GUI improvements

V2.07 (2024-02-01)

- New feature TCX Import Distance Meters smoothing.

V2.08 (2024-10-06)

- Increased TCX/GPX buffer from 15 MB to 50 MB. And implemented more detailed error message in case input file size exceeds maximum.
- Allows now to export HRM files even if no HR values at all had been imported. Shows a warning message to the user and exports with 0 values in such a case.