VGSync – Documentation V.3.24

Introduction

VGSync is a tool that synchronizes a video with a GPX (GPS) file for later upload to the Kinomap platform. The primary goal is to trim the start, end, and various stops (traffic lights, roundabouts, breaks) from the GPX so that the corresponding image in the video accurately reflects the exact location on the road map.

Modes

The program can be used in three different modes:

GPX Mode

This is the default setting, where a pre-cut video (edited outside of VGSync) and its corresponding GPX file are loaded. In this mode, only the GPX file is modified.

- The start of the GPX can be synchronized, and pauses can be cut.
- Various manipulations of individual points or sections are possible, such as modifying time, altitude, or gradient.
- Errors in waypoints or timestamps are detected upon loading and marked in the diagram. These can be removed via the "More (…)" menu.
- Multiple GPX files can be loaded and appended with a 1-second gap (e.g., multiple GoPro GPX files).
- It is also possible to edit a GPX file without a video if needed, for example, to merge multiple GoPro files. However, GoPro files should be recorded with a 1Hz resolution.
- There are various tools available to extract data from GoPro metadata and prepare it accordingly, such as:
  https://goprotelemetryextractor.com/free/#
  In this tool, select:
  - Frequency: 1Hz
  - Altitude: corrected
  - Save as: GPX or Virb

Video Mode

If the need arises to merge multiple video files (e.g., GoPro files) and optionally make some cuts, the "Edit Video" option in the menu can be selected.

- Loaded videos are automatically merged when saving, and any cuts are applied.
- The video is not re-rendered; instead, **LossLessCut** is used, meaning only copying occurs.
- As a result, cut points may create slightly abrupt transitions, but this is negligible compared to an uncut video where waiting at a traffic light is visible.
- For smoother transitions, an external video editor should be used.

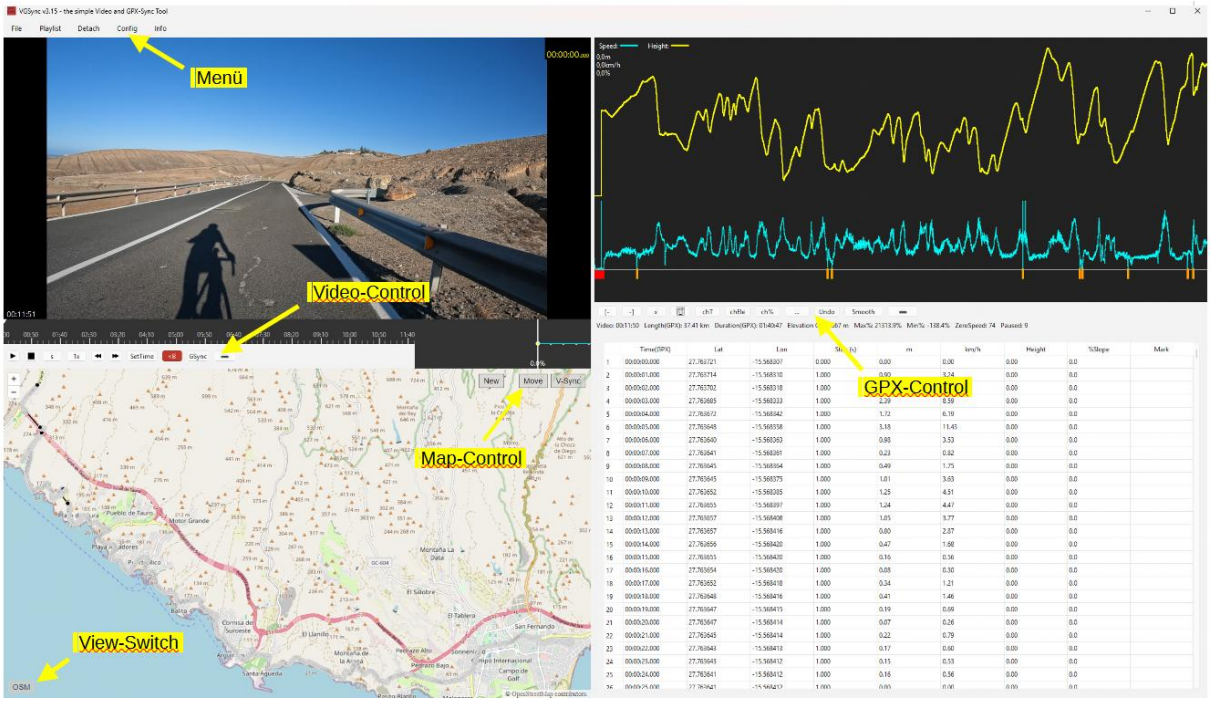
AutoCut Video + GPX Mode

This setting, also found in the "Config" menu, trims the video and simultaneously removes the corresponding sections from the GPX file (traffic lights, breaks, etc.). The video is then already synchronized.

Overview

To clarify the layout:

- At the top, as usual, there is the menu bar with options like File, Playlist, Config, etc., and their submenus.
- Between the video and the map, the video control buttons are located.
- In the map, the map control buttons are at the top right, and the switch for toggling between satellite view and terrain view is at the bottom left.
- Between the diagram and the GPX list, the GPX control buttons are placed.



Menu File

Open GPX

Loads a GPX file.
It will then be displayed on the map, in the diagram, the mini-diagram, and the GPX list.
If a file is already loaded and "Open GPX" is selected again, you will be given the choice to append it or load it as a new file.
If you choose to append it (which is useful for GoPro GPX files), the new file will be added to the previous one with a 1-second gap. This makes it easy to merge multiple GPX files of a route seamlessly.
If you choose "New," the old GPX file will be removed from the tool, and the new one will be loaded.

Open Video

Loads one or more video files.
If multiple videos are loaded, they will be played sequentially in the player, and a blue marker will be placed between them in the timeline to indicate separation visually.
The total duration of all loaded videos is displayed at the bottom left of the player, while the current video time is shown in the top right during playback.

New Project

Deletes the entire project, allowing you to start a new one.

Menu Playlist

Displays the loaded videos.
Videos can be removed by clicking on them.

Menu Detach

Video (detach)

The video window is detached from the tool and can be enlarged.
This is useful for comparing the exact gradient progression with the displayed video, as the mini chart (bottom right) always shows the elevation profile section corresponding to the current video position. It is especially recommended to check hilltops to ensure that the gradient change in the profile matches the video.

Detach (map)

The map can also be expanded!

Menu Config

Edit Video

To enable video editing, this option must be activated.
This will activate additional buttons in the video control area.

- When enabling it for the first time, you will be asked whether to index keyframes.
- The advantage of indexing is that cuts will be made exactly at keyframes.
- While indexing is not mandatory, it can help achieve cleaner cuts.
- Once enabled, the video window will display an overlay: Edit: On.

AutoCutVideo+GPX

To activate this option, Edit Video must be enabled first.
This is one of the most important features of the program!

- When this option is activated, selecting a section of the video for cutting (e.g., a stop at a traffic light or the start of the video) will automatically cut the GPX file as well!
- This allows you to remove breaks from both the video and GPX with minimal effort, ensuring the project remains synchronized.

Time: Global/Final

The timer at the top right of the video, which shows the current video time, can be switched between Global and Final mode.

What is the difference?

- Global time: The total duration of all videos before editing.
- Final time: The total duration after cuts have been applied.

For example, if a video originally lasts 10 minutes and you cut out 2 minutes, then:

- Global = 10 min
- Final = 8 min

Why is this useful?
If you're editing a long route with multiple stops and breaks, it's best to review all videos quickly in an external player and note down break times.

Example:

- The first video has a break at 4:31
- The second at 2:20 and 4:40
- The fifth at 7:10

When you load all videos and cut the first break, it becomes difficult to calculate the exact position of the next break.
Using Global time, the second break remains at (length of video 1) + 2:20, making it easier to locate without extra calculations.
This is especially useful for GoPro files, which usually have the same length (unless manually stopped).

FFMPEG / libmpv

These two menu options ensure compliance with the LGPL license requirements for FFmpeg and libmpv.

- Here, users can specify their own FFmpeg or libmpv files by entering the file paths.
- If the entered files are incorrect, the default LGPL-compliant version included with the software will be used automatically.

Chart Settings

Limit Speed
Adjusts the maximum peak in the speed curve.
It is not uncommon for a GPX point to show an unrealistic speed (e.g., 240 km/h) due to recording errors, signal loss, or faulty cuts. If the speed limit is not set (e.g., to 70 km/h), the curve would be flattened by extreme peaks.This setting ensures that speeds above the limit (e.g., 240 km/h) are capped at 70 km/h (or your chosen value).

Zero Speed

Marks GPX points with a downward orange line in the diagram when the speed drops below a set threshold. The default threshold is 1 km/h. If a GPX point falls below this speed, an orange marker is displayed. This helps quickly identify pauses in the GPX file.

Mark Stops
Another function for identifying breaks.GPX points with a time gap greater than the specified value (e.g., >1s) will be marked in the diagram.

Map Setup

Size & Color of Points:
The size of GPX points on the map can be adjusted.
This is useful when points are closely clustered together.

Directions:
If you have a Mapbox key/token set up, you can use the Directions function to draw a route that follows known roads and paths, just like a route planner. Two new buttons will be added to the map, allowing you to choose whether the route should be drawn for cars, bicycles, or pedestrians. Additionally, the "Close Gaps" function (see below) will also change accordingly.

Map Views

You can enter API keys for different tile providers (terrain maps).
Without a valid key, terrain maps cannot be displayed.
Most providers offer a large number of free tiles per month. At the time of this software's release, Mapbox provided 50,000 free tiles per month—a limit that most users will never exceed.

Reset Config
Resets all settings to factory defaults. App restart required!

Menu Config

Copyright
Displays copyright information and the installed version.

Third-Party Libraries
Lists and credits the external libraries used in the program.

Get Fingerprint
The program runs in demo mode, allowing testing but preventing video or GPX file saving.To obtain a

full version, you must send the developer (see Copyright) your computer's fingerprint. Before sending the fingerprint, you must accept the EULA. The fingerprint is a **unique identifier of your computer.** After licensing, you will receive a license file that must be placed in the same folder as VGSync.exe. The file is encrypted and contains your personal data and fingerprint.

Important:
Until the official Kinomap version is released, only 14-day trial licenses are available!

Video Control Buttons

Note: Depending on the mode, not all buttons are visible.
Some buttons only appear after Video Edit is enabled, while others change functionality when AutoCutVideo+GPX is activated.

Here are the two different views:

Edit Off:

Edit On:

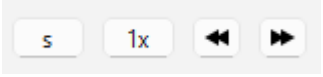
Video Control Buttons

The buttons from left to right:
Play/Pause – Stop – Step-Value – Multiplier Stepper – Step Left – Step Right – SetTime – MarkB – MarkE – Deselect [x] – Cut – CutBegin [<B] – CutEnd [>E] – Undo – GSync – Save

Play/Pause
Starts and pauses the video.

Stop
Stops the video and resets it to the beginning.

Stepper
The stepper consists of the following buttons: Step-Value – Multiplier – Step Left – Step Right



Stepper
With Step-Value, you can select the type of step: seconds (s), minutes (m), keyframes (k), or frames (f). Important: Keyframes can only be used if you selected "Yes" when asked about Indexing Keyframes.

The Multiplier determines the size of each step, e.g., 1 second (s 1x) or 8 minutes (m 8x).

Left (←) and Right (→) indicate the direction in which the step should move (forward or backward).

Important Note:
Jumping backward is often slightly less accurate than jumping forward.
When synchronizing and moving to an exact point, it is recommended to first jump a bit further back and then use the forward step button to fine-tune the position.

SetTime
Manually enter the exact time the player should display.

MarkB [-

Only available when Video Edit is ON!
Marks the beginning of a cut point in the video.

If AutoCutVideo+GPX is also activated:
Marks the beginning of a cut point in both the video and the GPX file.

MarkE -]

Only available when Video Edit is ON!
Marks the end of a cut point in the video.

If AutoCutVideo+GPX is also activated:
Marks the end of a cut point in both the video and the GPX file.

Deselect [x]
Clears the selection for MarkB and MarkE.

Cut

Deletes the marked section.
If Video Edit is ON: Only the selected section in the video is removed.
If AutoCutVideo+GPX is ON: The selected section in both the video and the GPX file is removed.

Note:
In the video, the removed section is black-marked and will be skipped during playback.
In the GPX file, the section is completely removed and no longer visible.

CutBegin <B

This button has two functions:

If AutoCutVideo+GPX is OFF:

We synchronize the start of the video with the GPX file. Only the GPX file will be cut.If the exact start of the video cannot be identified, you can align it with a distinctive point such as an intersection, pedestrian crossing, or roundabout that also appears in the GPX data. Important: There must be no break between this point and the actual video start! Example: If the video is set to 10 seconds, aligning with a distinctive point: Find the matching location in the map view. Select that point in the map. Press CutBegin <B, and the start of the GPX file will be trimmed. The first 10 seconds of the video remain intact for correct alignment.

If AutoCutVideo+GPX is ON:

Same marking process as above, but now both the video and the GPX file will be trimmed at the exact point. In the example, the first 10 seconds of the video would also be cut, and the GPX file would now start exactly at the marked point.

CutEnd >E
Only available when Video Edit is ON!

If AutoCutVideo+GPX is OFF:
Since finding the exact end of a video can be difficult due to invisible frames at the end, this button ensures a precise cut. Steps: First, place a MarkB at the desired cut point. Press CutEnd >E to set the end. Use Cut to remove the section.

If AutoCutVideo+GPX is ON:
The GPX file is also trimmed at the same point.

Undo
Reverts the last action. Usually only affects the video. If AutoCutVideo+GPX is ON, it also affects the GPX file.

GSync
Displays the corresponding GPX point for the current video position. This is useful for checking synchronization after making a cut. Set the video to a distinctive point (e.g., after a cut) and press GSync. The matching GPX point will be highlighted, allowing you to compare them. Recommendation: Check multiple points throughout the video to ensure that no pauses were missed during synchronization.

Save
Saves the video with all cuts applied using the LossLessCut method.

Map Control Buttons

New:
Adds a new GPX point on the map, either at the beginning or end of a route. Alternatively, you can place it precisely on the line between two existing points.

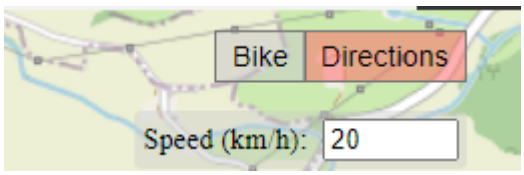
- The route will automatically be extended by 1 second.
- Before adding the new point, you must select the point where it should be connected.

Move
Activates the "Move GPX Point" mode. This allows you to freely move a GPX point on the map. Useful for adjusting the route to align with roads if the recorded path is incorrect.

V-Sync
Displays the video frame corresponding to the selected GPX point. For example, if the GPX position is at 10 seconds, pressing V-Sync will show the frame at 10 seconds in the video. It is recommended to press the button multiple times to ensure the correct frame is displayed, as system performance may cause delays. Keep in mind that not every exact frame can be displayed—only the nearest displayable frame. There might be a slight millisecond discrepancy, as some frames are not directly accessible due to GOP (Group of Pictures) encoding.

View-Switch
Toggles between different map display modes: OSM (OpenStreetMap) - Various satellite views
Note: If no API key is entered for services like MapBox, only OSM will be displayed. To access terrain maps, you must request an API key from the respective service provider.

Directions-Control-Buttons:



For Experts ONLY!
The "Bike" button toggles between Bike, Car, and Foot. Depending on the selected mode, the route will be requested and calculated accordingly via Mapbox.

Function:
First, you need to select either the first or the last point of the route by clicking on it. Then, activate

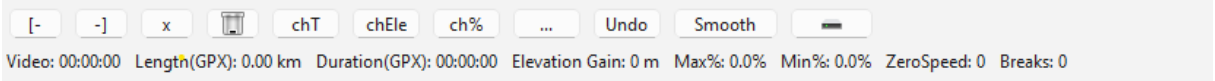
the Directions function (its color will change). Using "Speed," you can define the spacing between points, and with the crosshair, you can set the target point where the route should lead. This can only be done at the beginning or end of a route!

It is crucial not to select excessively large "steps" but to create the new route in small increments instead. Additionally, always verify the connection to the existing route, as the "old" point often needs to.

If you want to recalculate a section of an existing route—for example, if your GPS device did not record anything due to a lost signal or any other reason—you can use the **Close Gaps** function while Directions is active.

The functionality is the same as **Close Gaps**, but instead of drawing a direct path, the route will be adjusted to follow the road.

GPX Control Buttons



The buttons from left to right:
markB – markE – Deselect [x] – Delete – chTime – chElevation – chSlope – More (…) – Undo – Smooth – Save

markB
Marks the beginning of a cut in the GPX list. The marked section will be highlighted in red in both the GPX list and the map. The button turns red when activated.To delete a single point, simply mark it with markB.

markE
Marks the end of a cut in the GPX list. The entire section between markB and markE will be highlighted in red in both the GPX list and the map.

Deselect [x]
Deselects a marked section or a single selection.

Delete
Deletes a single GPX point or an entire marked section. To prevent a gap, the time between the two surrounding points is adjusted to 1 second.

chT (chTime)
Modifies the time or step of a single point or all points in a marked section. Useful for fine-tuning synchronization.

chEle (chElevation) Changes the elevation of a single point or an entire marked section. This is useful when there is a sudden elevation shift due to a GPS restart after a break. If the GPS records a different elevation after restarting, the entire section can be shifted so that: The first point after the restart has the same elevation as the last point before the restart.

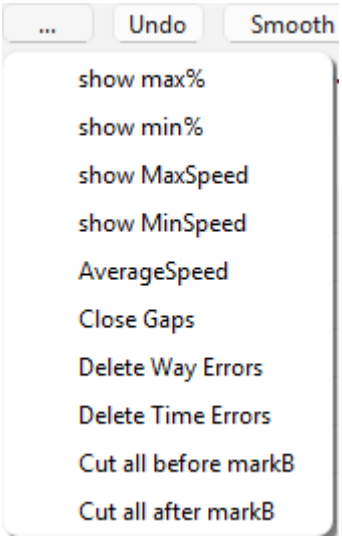
ch% (chSlope)
Adjusts the slope (gradient) of a single point or a marked section. Used to correct elevation recording errors or smooth transitions after a cut.

Undo
Reverts the last action.

Smooth
Opens a smoothing settings window, where adjustments can be made to smooth the elevation profile. Default settings usually provide a good result.If the result is not satisfactory, the options can be adjusted: Box-Smoothing: Number of GPX points included in the smoothing process. Flatten-Value: Maximum slope difference between points.

Save
Saves the GPX file with all applied changes.

More-Menü […]:



Check the following values to ensure your GPX file has no unusual peaks:

show max%: Displays the GPX point with the highest slope.
show min%: Displays the GPX point with the lowest slope.
showMaxSpeed: Displays the GPX point with the highest speed.
showMinSpeed: Displays the GPX point with the lowest speed.

Average Speed
Calculates the average speed of a selected section. This can be helpful if a speed peak cannot be corrected in another way.

Close Gaps / Close Gaps (Directions)
Fills in missing GPX points. Example: You drive through a tunnel or an area without GPS coverage.The GPX file shows an unusually large time step, and the chart displays it as a pause (since the step is greater than 1s). Cause: GPS signal failure. **Solution:** Using Close Gaps, the missing section is filled with GPX points at 1-second intervals. No changes are made to time or distance—it simply looks better in the visualization. If necessary, the new points can be adjusted to match the road.

Important: markB must be set before the gap. markE must be set after the gap.

Close Gaps (Directions):
When Directions is activated, GPX points are no longer simply connected in a straight line from markB to markE. Instead, you can let Mapbox draw the route along the road.

Delete WayErrors
When loading a GPX file, you will receive a warning if WayErrors are found. These errors are also highlighted in red in the chart. This button fixes these errors automatically. What are WayErrors? These are GPX points that have identical latitude/longitude but a 1s time step—a recording error.

Fixing the error recalculates the second point: It is moved to the middle between the previous and next point while keeping the same latitude/longitude.

This should always be executed!

Delete Time Errors
This issue is rare, but some GPX points might have a 0s time step.These points are simply deleted.

This should always be executed!

Cut all before markB
Deletes all GPX points before and including the markB point.

Cut all after markB
Deletes all GPX points after and including the markB point.

SetGPX2VideoTime
For Experts Only!

Synchronizes the GPX time (range) with the video time (range).
This function aligns a marked time range in the GPX list with the corresponding marked time in the video editor.

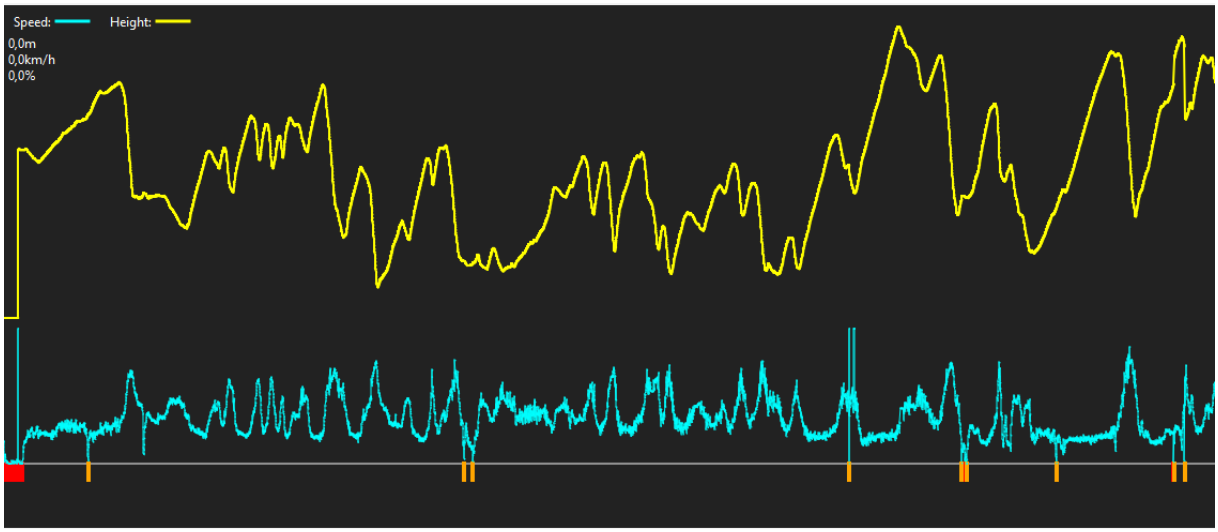
Requirements:

- Video Edit = ON
- AutoCutVideo & GPX = OFF

Instructions:

1. Set the start point markB in Video_Control using markB.
2. Use GSync to select the corresponding GPX point with markB in GPX_Control.
3. Navigate the video to a second clearly identifiable point and mark it with markE.
    - This range will now be highlighted in yellow.
4. Find the corresponding point on the map and mark it with markE.
    - Now, both the video and the GPX list have a marked range.
5. Click SetGPX2VideoTime to adjust the GPX time range to match the video time range.
    - Every point in the GPX section will be recalculated.
    - The marked section in the video will now have the same duration as the marked section in the GPX list.

The Chart:



you will see:

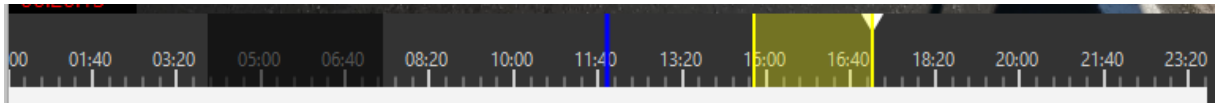
- The elevation profile at the top.
- The speed profile at the bottom.

Below the speed profile, you will notice red and orange markers.
These indicate errors in the GPX data, as explained earlier.

Navigation Controls:

- Zoom: Use CTRL + Mouse Wheel.
- Pan: Hold the right mouse button and drag to move the chart.

Timeline:



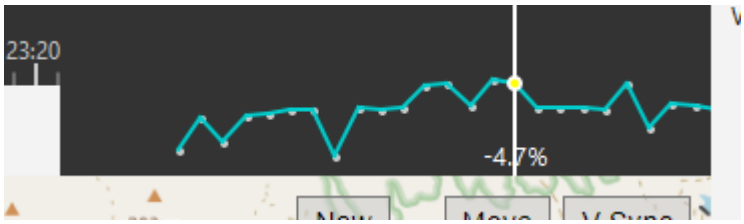
Visual Representation of Video Time

- Blue Marker: Indicates the separation between two videos.
- Black Area: Represents an already deleted section.
- Yellow Area: Marks a selected section.

Controls:

- Zooming: Use CTRL + Mouse Wheel.
- Panning: Hold the right mouse button and drag to move the timeline.
- Clicking on the timeline: Moves the white marker (which indicates the current time) to that position and updates the video accordingly.
- Scrubbing: The white marker can also be dragged to scrub through the video.

Mini-Chart:



The mini-chart, located at the bottom right under the video, is used to check the gradient at locations such as hilltops.

After smoothing, this chart provides a clear visualization of whether the video aligns correctly with the gradient changes.

This helps ensure that elevation changes in the GPX file match what is visible in the video.

Youtube-Tutorials: