



AiM Webinar
“Understanding Track Slope”
4.21.20 Edited Q&A

- 1 **Q:**
Can GPS altitude be changed from meters to feet?

 A:
Yes it can, but it needs to be changed in the configuration of the data logger, not in analysis.

- 2 **Q:**
Why is the slope different at the same point at about 1800?

 A:
[Answered live]

- 3 **Q:**
How does the GPS measure the slope?

 A:
Rise over run, based on distance traveled in the vertical and horizontal axis.

- 4 **Q:**
Can GPS slope angle channel be shown as elevation instead?

 A:
There is a channel for altitude, in addition to the slope.

- 5 **Q:**
Can you add time bar to the presentation so we can see time lost?

 A:
[Answered live]

- 6 **Q:** How can the GPS slope be different at the same track

 A:
[Answered live]

- 7 **Q:**
Could you show the time gained one driver vs the other?

 A:
[Answered live]

- 8 **Q:**
Will GPS slope show different car setup?
- A:**
It can, but it isn't the only channel I would use for this. Like we were talking about, it also depends on whether you have everything in the same spot, etc.
- 9 **Q:**
I've found in some tests GPS data seems delayed against CAN and analog channels data. Like GPS speed is delayed compared to wheel speed. Why could that happen?
- A:**
There are many different situations that can contribute to this. It might best be handled by email or phone support where we can investigate the data which has the discrepancies. As always please feel free to reach out after the webinar. Support@aimsports.com or 800.718.9090
- 10 **Q:**
How often has some of this knowledge been gained from walking the track and observing?
- A:**
[Answered live]
- 11 **Q:**
Isn't the rise and fall of the curbing to be considered in the GPS slope and possibly responsible for the dramatic change in the slope?
- A:**
[Answered live]
- 12 **Q:**
Are you able to determine grip levels (loss) of off camber turns?
- A:**
[Answered live]
- 13 **Q:**
Why is there more grip going uphill? Does that grip advantage go away the longer the hill?
- A:**
The change in slope causes the vehicle's inertia to compress the suspension, thus giving more mechanical grip. The advantage will be greatest at the initial change in slope. It will become less the longer the hill as the direction of the inertia changes. However, the forward inertia coupled with gravitational downforce pushes the vehicle into the track which means the grip advantage won't go away completely.
- 14 **Q:**
Is "Slope Speed" a math channel?

A:

Yes, it is.

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Q:

So how can one differentiate between slope that is induced from riding the curb?

A:

Through practical application of data. Ride the curb and develop a baseline to then make judgments calls based on how you know the car to respond on curbing.

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Q1:

Is the GPS slope elevation based on the elevation at the start finish line?

A1:

No, it's computed on driven line at the exact point on track.

Q2:

So what is zero then?

A2:

Zero slope = flat, horizontal. Positive = uphill. Negative = downhill.

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Q:

I can see the benefit of using the added grip when the slope goes up, but what about negative slope, how can we adapt to that?

A:

[Answered live]

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Q:

Would plotting a lap on a Google Earth map of the track be useful to see position, or is there too much error in the GPS data and the Google Earth data?

A:

It's a great tool to use. We use the KML data export to overlay this frequently. It's especially useful when at a new track. The satellite view will be native in the forthcoming RS3 Analysis.

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Q:

James, so you would recommend shifting at the bottom of the hill at T15 on Road America instead of stretching RPM into hill but before the crest?

A:

[Answered live]

- 20 **Q:**
Please clarify - the GPS Slope plot is not a cross section, right? I.e. going from -1 to +1 degree is an 'acceleration' in the vertical and when the plot is 'flat' at +1 deg, it means it has stopped 'curving' (or accelerating) and is now a static climb.
- A:**
You are correct. If the data is static at 1 degree, it is a constant climb.
- 21 **Q:**
Is GPS Slope in degrees? You are mentioning the track "leveling off" or "plateauing" but the GPS Slope still indicates positive degrees.
- A:**
Leveling off indicates a reduction of slope but there is still positive elevation change happening and the car has not fully recovered.
- 22 **Q:**
Can you show GPS slope on your smarty cam?
- A:**
The slope is a calculated channel that is not available until the data is downloaded. It is not available to overlay while the camera is recording the video.
- 23 **Q:**
How do I change shading for each split on the plot settings?
- A:**
To change colors, it's the second icon from the right in the top bar icons.
- 24 **Q:**
GPS altitude shows me a 15m difference between two laps, same track, different days. GPS error?
- A:**
It can be GPS error.
- 25 **Q:**
So GPS slope is rate of change? 14400 to 14800 is continuous downhill?
- A:**
[Answered live]
- 26 **Q:**
Why are the slope speeds frequencies so different?

A1:

The data deviates from normal at that position. Lateral acceleration is a good indicator of the car balance and it shows in slope speed.

A2:

It depends on the frequency used for the math channel, and from some numeric 'noise' introduced by the derivative.

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Q:

Where would you use the gyro channels? both GPS and internal?

A:

[Answered live]

28

Q:

How does GPS relate to accelerometers regarding accuracy? For example; GPS Longitudinal Acceleration vs Inline Acceleration?

A:

This would be the same for the accelerometers as it was just explained for the gyro.

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Q:

Do the standard data loggers only have a 2 axes for acceleration? If you had the 3rd axis, "Z", you could start seeing roll/pitch along with loading and unloading due to rise and fall of the track.

A:

The current model hardware has a very impressive IMU. 3 axial gyro, 3 axial accelerometer.

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Q:

If your GPS is mounted on a flat gimbal will you still be able to get slope data?

A:

It's the slope of the driven line, not depending upon the vehicle attitude.

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Q:

Is it possible for James to make the article on shifting available to us?

A:

[Answered live]

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Q:

Is the data in a proprietary format? Or is it in a .csv / xml or similar?

A1:

We can export our proprietary file type to .csv within the software.

A2:

The format is proprietary, but we can export to MATLAB, .csv, .kml, or other formats. In case you're planning to code, there's a .dll allowing you to open our files from other software.