

Accuracy of 20Hz GPS units (GPEXE, Exelio srl) for measuring velocity in soccer specific sprints

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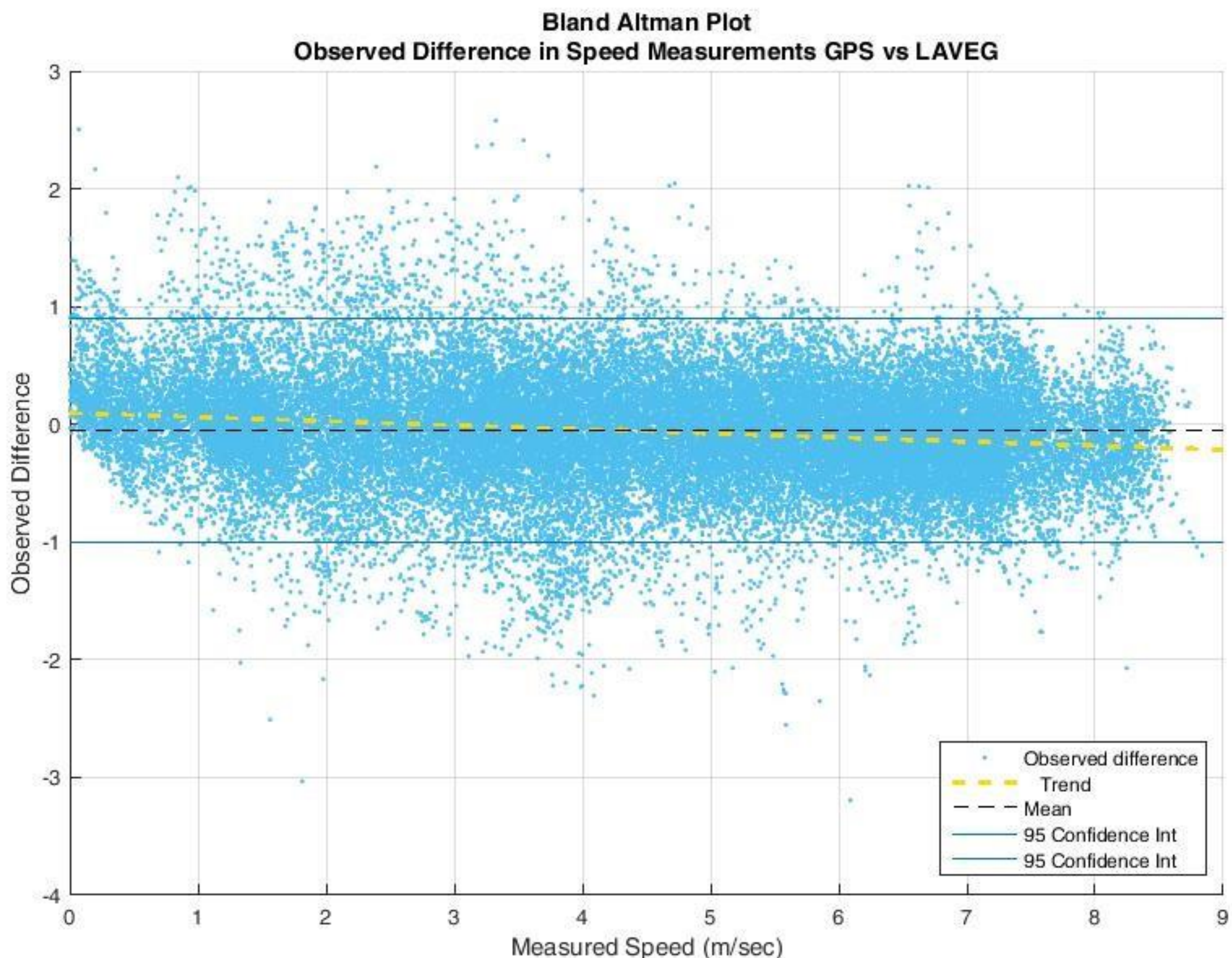
Purpose

This preliminary study aimed to analyze the accuracy of the GPEXE system by comparing the velocity profiles of soccer specific sprint tests obtained from both GPEXE units and a reference method (LAVEG Sport, 100Hz, Jenoptik, Jena, Germany).

Methods

Three semi-professional soccer players performed five different straight line sprint protocols (10m, 20m, 30m, 40m and a soccer specific sprint test¹). Measurements from the GPS units and LAVEG were synchronized post hoc via a least-squares-optimization algorithm. The observed differences are presented by means of the root mean square error (RMSE) and Pearson's product-moment correlation coefficient r .

Results: Bland Altman Plot



Comparative presentation of measuring methods (GPS and LAVEG). The diagram shows that the GPS systems tends to overestimate velocities at low speeds, whereas velocities at higher speeds are slightly underestimated.

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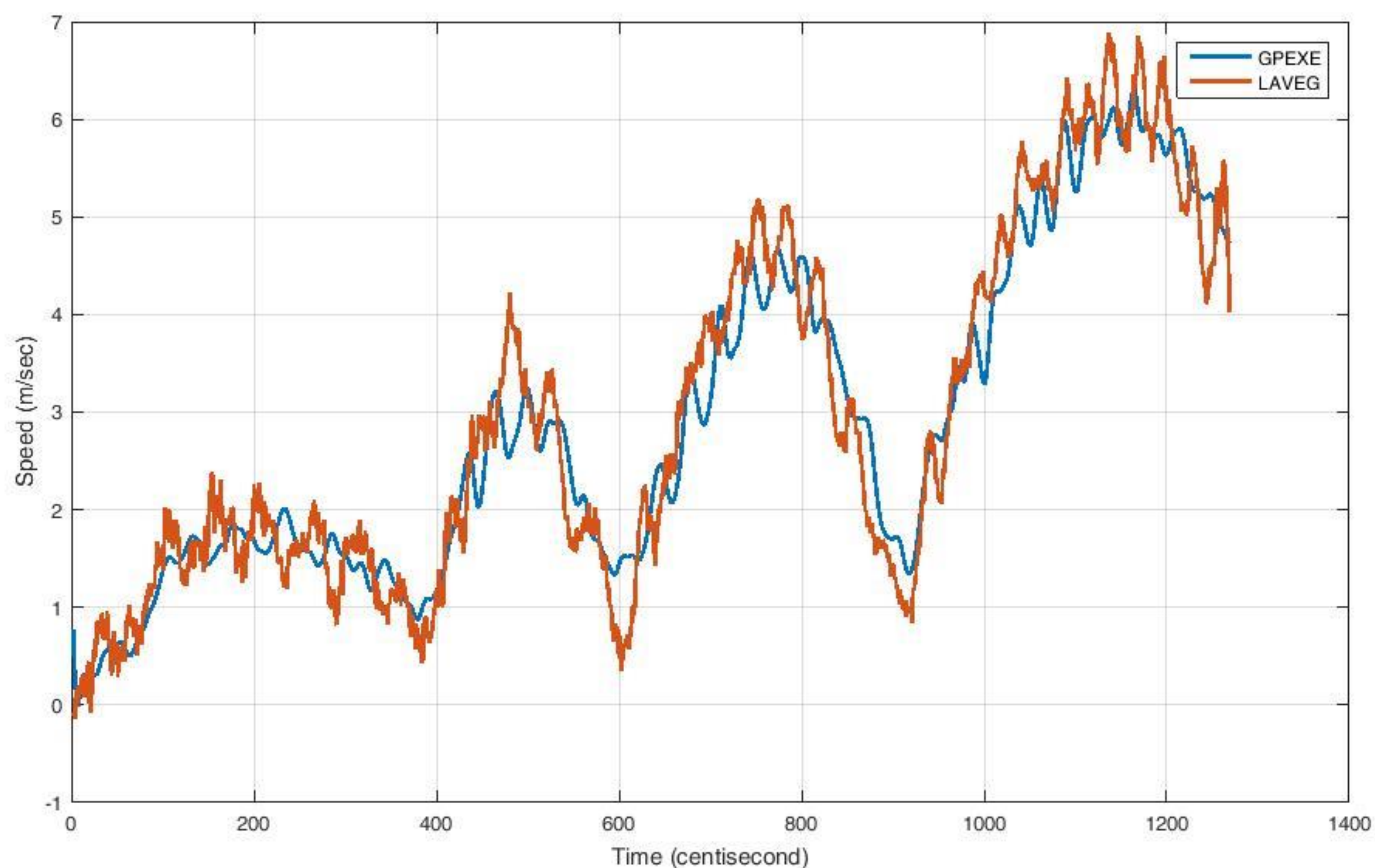
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Results: Correlations & RMSE

Speed Zone	Correlation	Root mean square error (RMSE)
0-2 m/sec	0,77	0,50
2-4 m/sec	0,71	0,56
4-6 m/sec	0,80	0,48
>6 m/sec	0,83	0,41

Results: Exemplary Presentation



Comparative presentation of GPS and LAVEG velocity curves during a n exemplary soccer specific sprint run.

Conclusions

This preliminary study demonstrated an average deviation (RMSE) of $0.45 \text{ m}\cdot\text{sec}^{-1}$ per measurement between the GPEXE devices and LAVEG. Further, results showed that the GPS systems tends to overestimate velocities at low speeds to a lesser extent whereas velocities at higher speeds are slightly underestimated. Both the lowest RMSE and the highest correlation were found in velocities above $6 \text{ m}\cdot\text{sec}^{-1}$.

1. Rampinini, E., et al. (2015). "Accuracy of GPS devices for measuring high-intensity running in field-based team sports." International Journal of Sports Medicine 36(1): 49-53.