

An Experimental Study of Surveying Practices Education using GPS data loggers and Google Earth

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1. Introduction

In terms of surveying practices educations, it is difficult to track movements of students because they disperse over a wide area. The use of GPS data loggers might have helped to overcome this difficulty. They constantly records locations, and the recorded data can be downloaded to the PC at a later time for further analysis. They are commonly used in tracking the movements of people, objects, or animals. For example, they can be used to find missing children, animals, or missing items such as cars¹⁾²⁾³⁾. Moreover, the logging data could be used to display on map tools such as Google Earth.

This paper describes an experimental study for surveying practices education using GPS data loggers and Google Earth.

2. Methodology

There are several commercially available GPS data logging devices in the market. These devices basically include a built-in GPS receiver and electronics to capture the user geographical coordinates and store them either in the internal memory of the devices, or on an external memory card (e.g. an SD card). The specifications of three GPS data loggers used in this research are shown in Table 1⁴⁾⁵⁾⁶⁾. These GPS data loggers were used in field practices of locating a simple horizontal curve by Tangent-offset method and measuring vertical distances in the Applied Surveying and Practices course for freshman. The M-241 was mounted on a theodolite for locating curve and M-1200E and TripMate852 on two levels for measuring vertical distances. And after the surveying practices, the GPS logging data from these devices was imported and displayed in Google Earth.

3.Results

Fig.1 shows the path of the leveling and the theodolite used by students during survey practices on the Google Earth. Using the time slider function, position and orientation of them can be animated and a line tracing the path shown. And using elevation profile function, the elevation profile and speed can be plotted. As a result, the movements of students could be guessed during the surveying practices and the improvements of measuring method can be taught to students using them in detail.

4.Conclusion

In this research, availabilities of GPS data loggers for surveying practices education have been confirmed. In the future, position accuracies of GPS data loggers could be examined in details. Furthermore, quantitative evaluation methods for surveying practices have been tried to establish using them.

Table 1 The specifications of the GPS data loggers used in this research

Products	M-241	M-1200E	TripMate852
Frequency	L1, 1575.42MHz	L1, 1575.42MHz	L1, 1575.42MHz
Channels	32ch	66ch	66ch
Size	32.1×30×74.5mm/39g	68.5×22.8×15.5mm/32g	72×27×25mm/57.5g
Position Accuracy	3.0m	3.0m/DGPS:2.5m	3.0m/DGPS:2.5m
Update Frequency	1Hz	1Hz	1Hz or 5Hz
Sensitivity	-159dBm	-165dBm	-165dBm

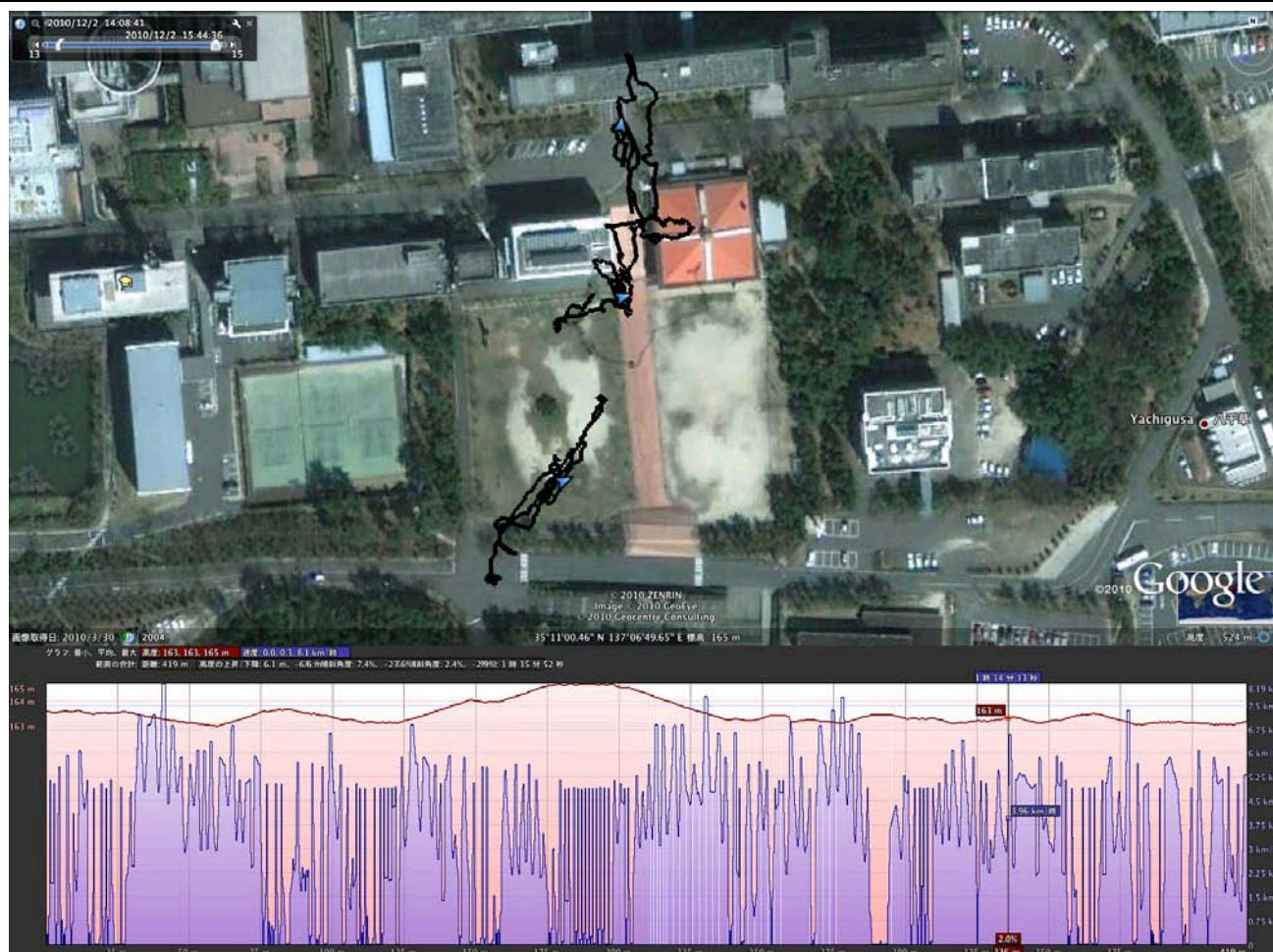


Fig.1 This figure shows the trace of movements of the levels and the theodolite on the Google Earth.

References

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