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INFLUENCE OF THE NUMBER OF GPS SATELLITES ON THE ACCURACY OF GEODETIC MEASUREMENTS BY USING RTK METHOD

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The aim of the research: to evaluate the influence of the number of GPS Satellites on the accuracy of GPC receiver Topcon Hyper II by performing measurements using the RTK method in forest areas under different conditions.

The tasks of the research:

1. To analyze the factors influencing the accuracy of geodetic measurements.
2. To perform statistical and comparative analysis of the received data.

The object of the research: different area in the territory of Girionys village (Lithuania, Kaunas district)

The methodology of the research: During the research the measurements were performed with a Topcon HiPer II GPNS receiver (Fig.1).

15 selected point located in an area at different distances from tall objects were measured 10 times different times of the day. After that, the correlation coefficient was determined between different measurement factors.



Fig. 1. Topcon HiPer II

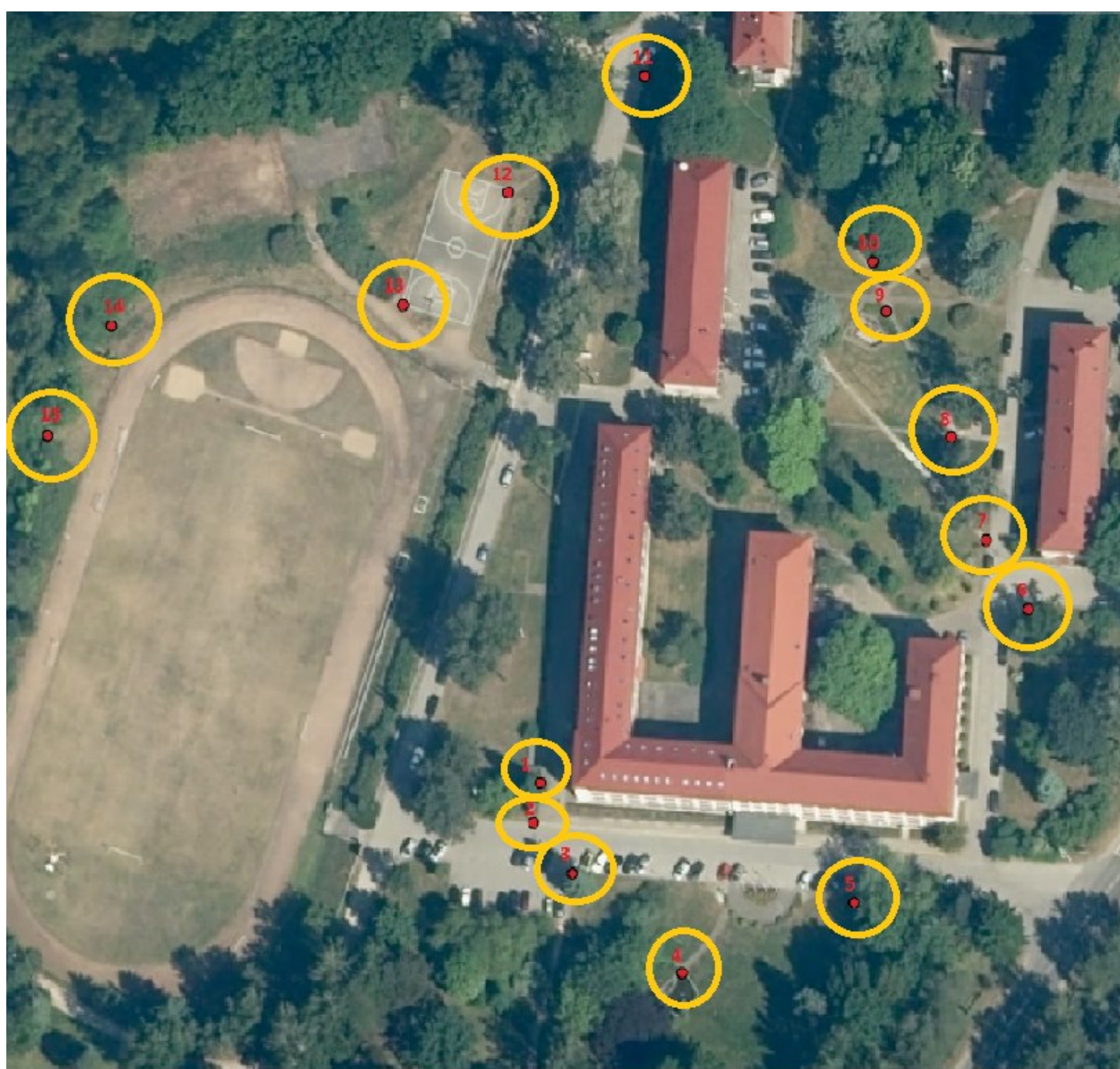


Fig. 2. Location of point

Table 1 Accuracy of measurement (average of all sessions)

No of the point	Accuracy in horizontal projection	Accuracy in vertical projection	General accuracy	No of Satellites
1	0.009	0.028	0.022	5
2	0.013	0.022	0.027	5
3	0.009	0.024	0.033	5
4	0.007	0.011	0.025	7
5	0.011	0.018	0.019	6
6	0.014	0.013	0.022	7
7	0.007	0.015	0.022	6
8	0.010	0.019	0.028	7
9	0.010	0.012	0.020	7
10	0.015	0.030	0.019	9
11	0.007	0.013	0.015	9
12	0.007	0.010	0.013	10
13	0.006	0.008	0.012	10
14	0.007	0.009	0.012	10
15	0.009	0.009	0.013	10
Average	0.009	0.016	0.020	7.5

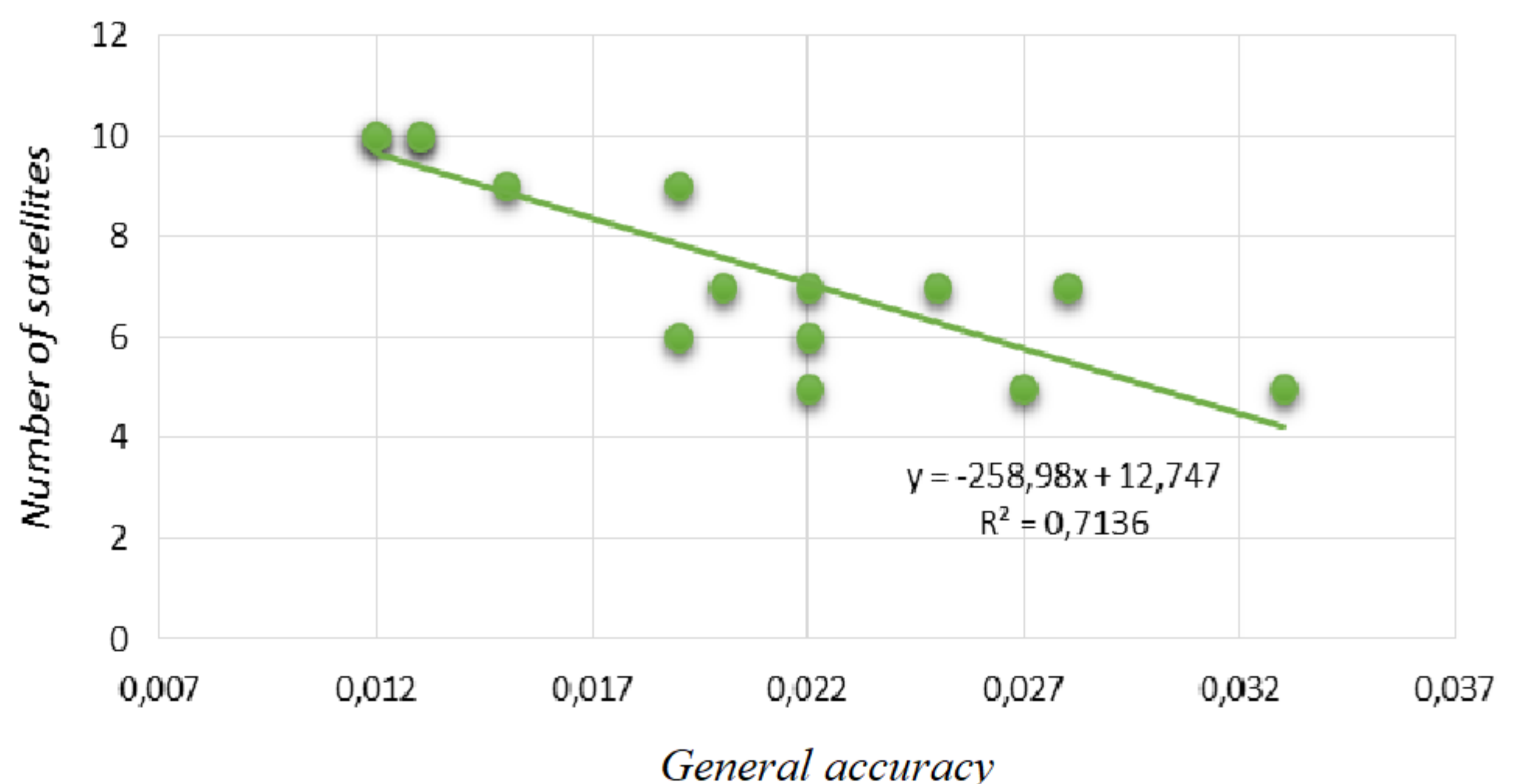


Fig. 2. Correlation coefficient of general accuracy and satellites

During the measurements, the number of satellites varied from 5 to 10. It was found that in open areas their number is higher than in the vicinity of tall objects.

This also affected the measurement time, which ranged from 12 to 31 minutes for each measurement session.

The time interval for recording each individual point ranged from half a minute to 6 min.

It was found that the measurement time was influenced not only by the adjacent tall objects, but also by the weather conditions.

With high winds and cloud cover, the measurement time increased and the accuracy decreased.

Conclusion

1. After analyzing the data of other authors, it was established that the accuracy of geodetic measurements is influenced by: the position of satellites in orbit, the position of tall objects and the phenomena of the ionosphere. At higher PDOP values, the marginal positioning error is smaller, and in the open area it decreases twice compared to the built-up area.

2. After mathematical statistical analysis, the obtained correlation coefficient of 0.7136 shows the dependence of geodetic measurements on the number of satellites.