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SOME STUDIES ON THE QUALITY OF GNSS DETERMINATIONS UNDER SPECIFIC CONDITIONS

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“GEO ZEMIA” Ltd.

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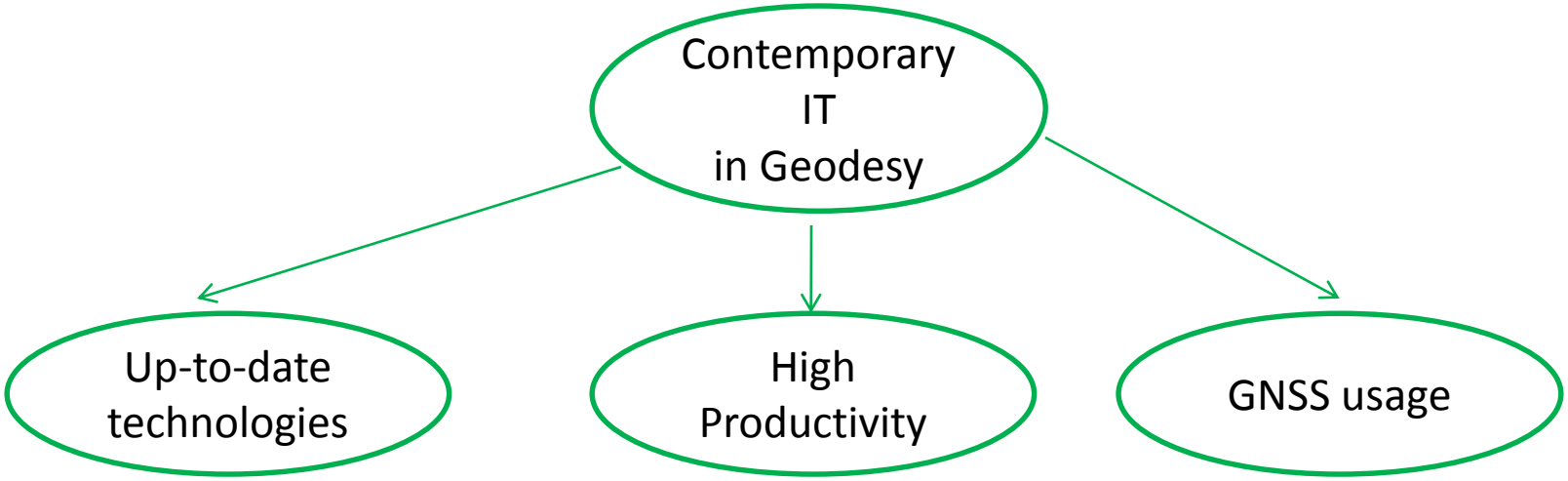
1. Introduction



The contemporary IT in geodesy offers to professionals:

- Up-to-date technologies;
- High productivity and quality;
- GNSS usage.

2. Aim of the study

To determine the *eventual differences* in the overall quality of measured spatial chords when using:

- *Various session length:* 2 min., 5 min., 10 min., 15 min. and 30 min.;
- *Changed value of the cut-off angle :* 0, 5, 15, 20 and 25 degrees;
- *Night time* for conducting of the geodetic measurements.

For this study Fuzzy logic was applied and application Vienna_Fuzzy was used.

3. Performed geodetic measurements

In this paper studies are performed over six spatial chords with lengths:
a) up-to **5** km.;
b) from **5** up-to **10** km.;
c) from **10** up-to **15** km.;
d) from **15** up-to **20** km.;
e) from **20** up-to **25** km.;
f) over **30** km.

The record rate of the satellite signals was set to 15 sec.
Measurements were done with length of the sessions: from 2 min. to 30 min.
The geodetic determinations done during *the night* were compared with the day-time observations.

4. Used criteria for accuracy

In this study the following accuracy criteria were used:

a) Quality in position and height M_{3D} ;
b) Elements of the co-variance matrix for the chord: Q_{xx} Q_{yy} Q_{zz} ;
c) Number $Gdop(\max)$;

d) Number $Pdop(\max)$.

These criteria were used as input data in the application Vienna_Fuzzy.

5. Results from the geodetic measurements. Analysis

The rating value for each measured chord, subject of assessment was calculated for each session.
In this particular case, the *bigger* the rating value, the *better* the overall quality.

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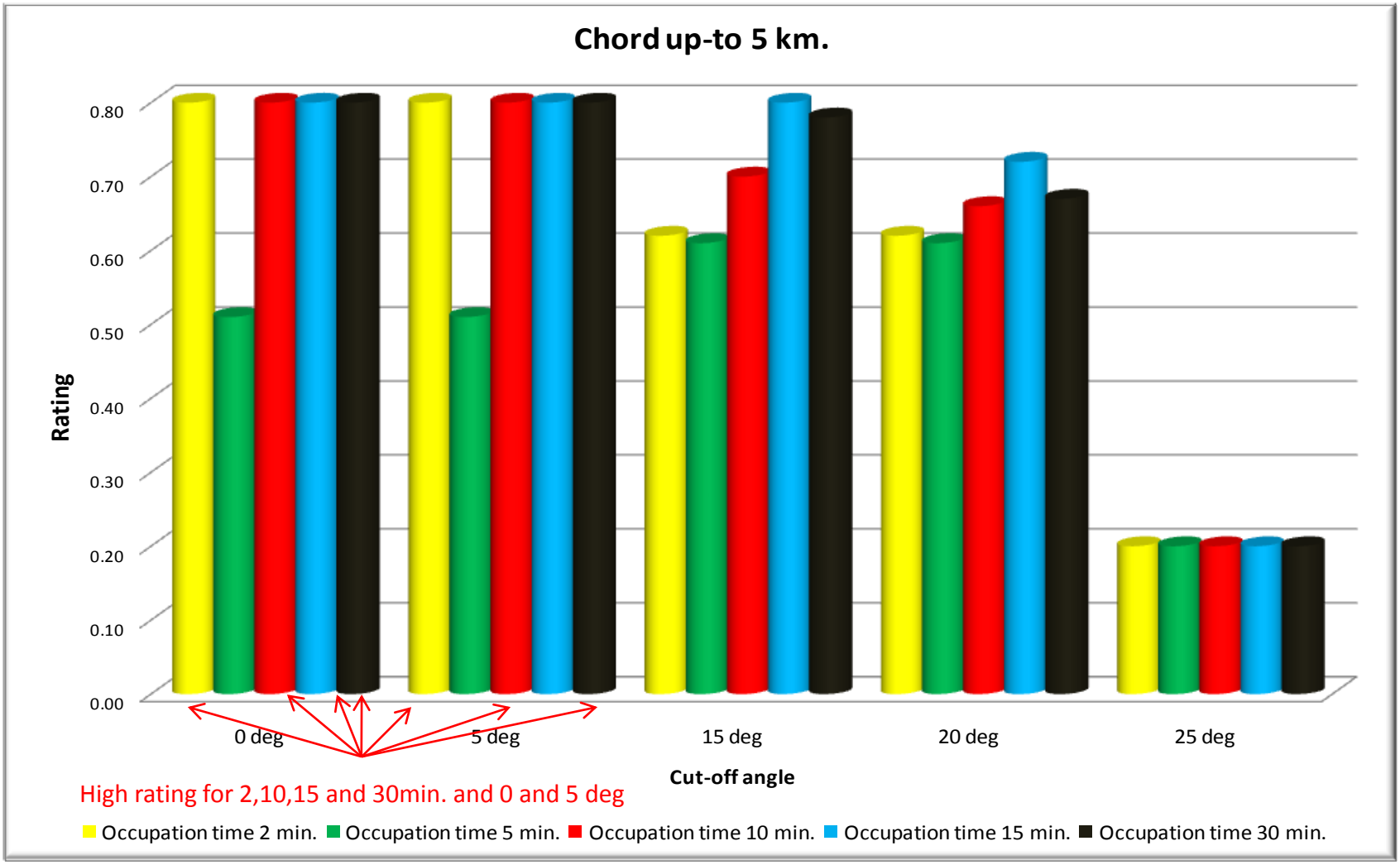

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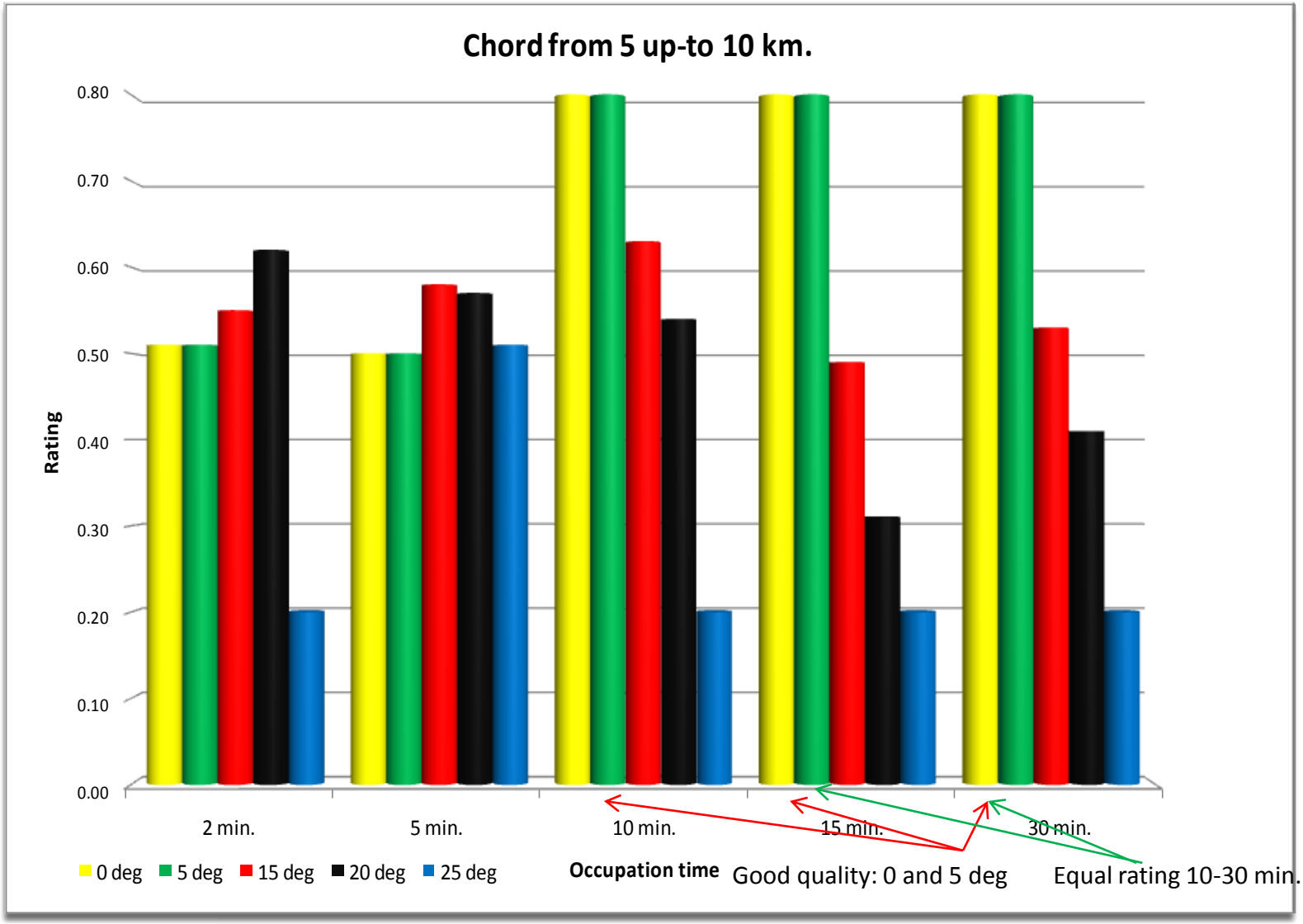

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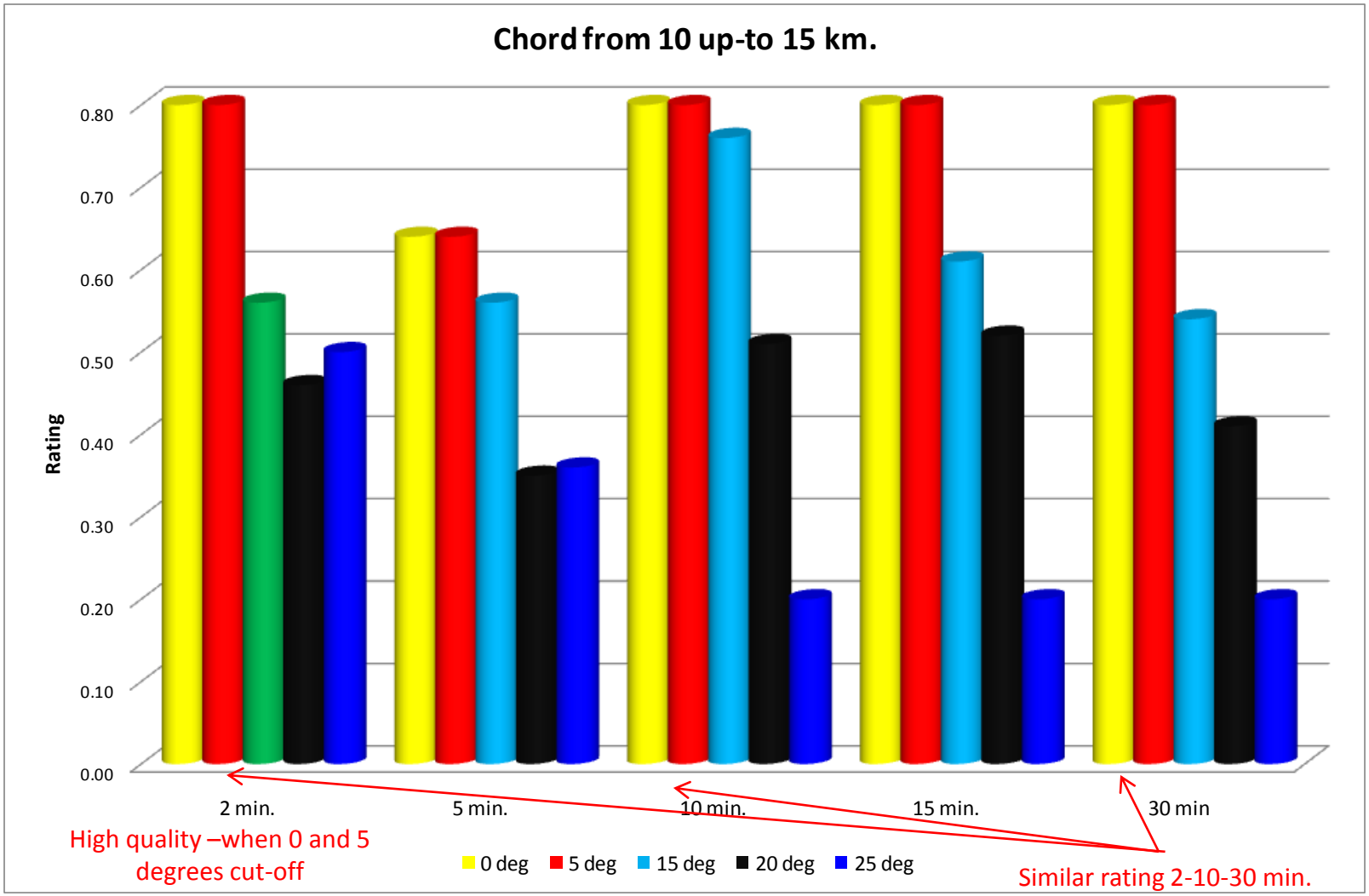

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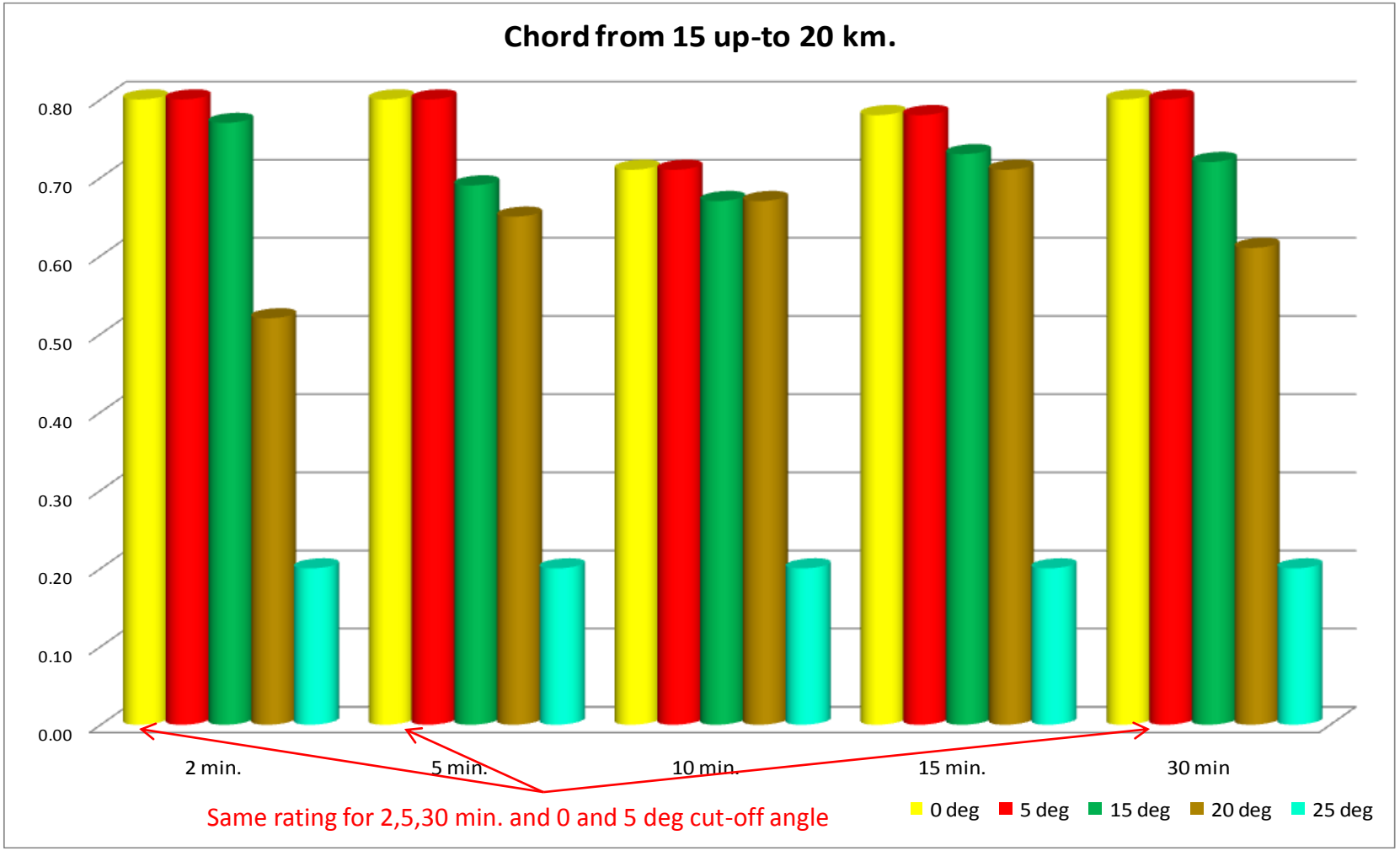

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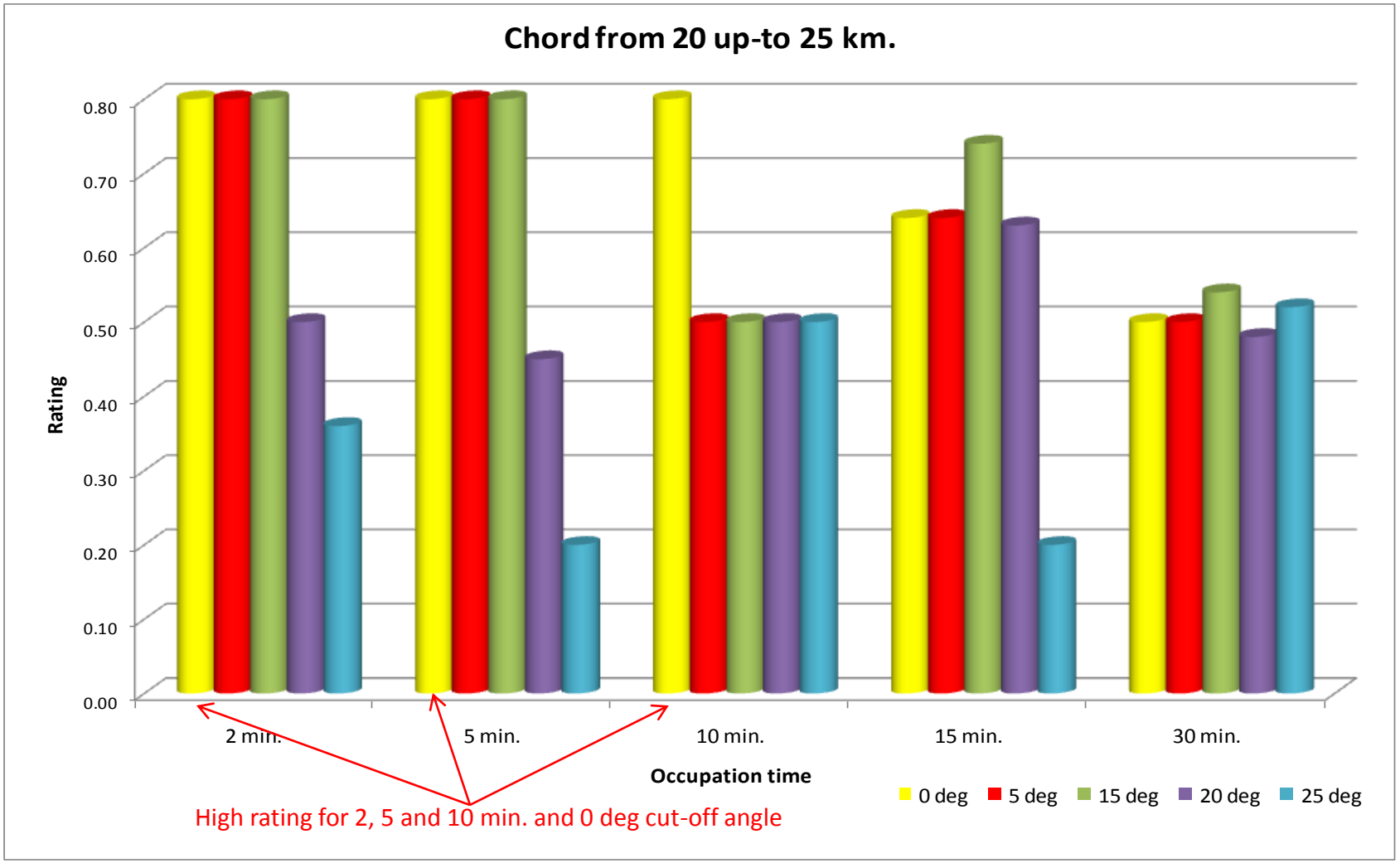

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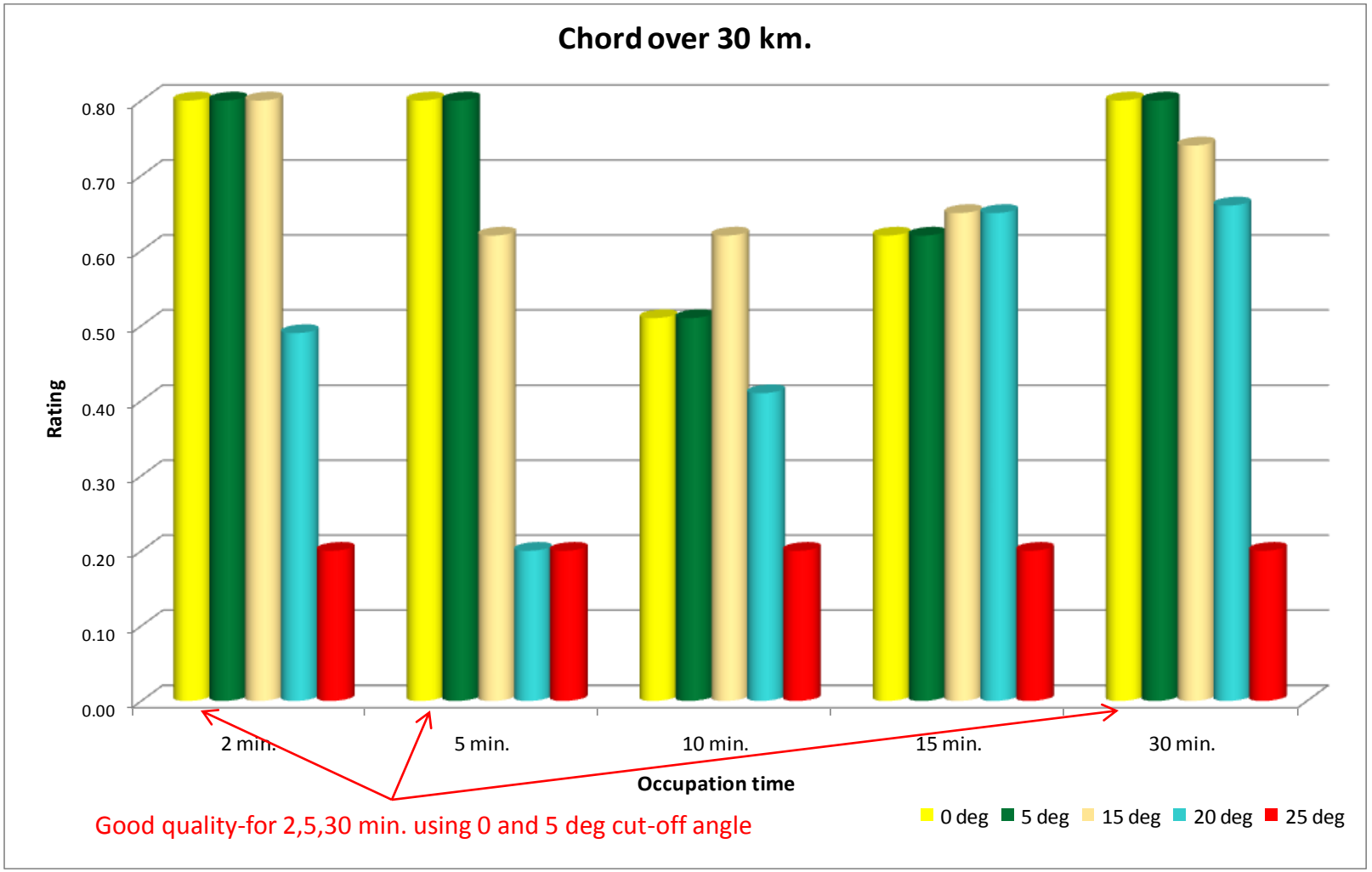

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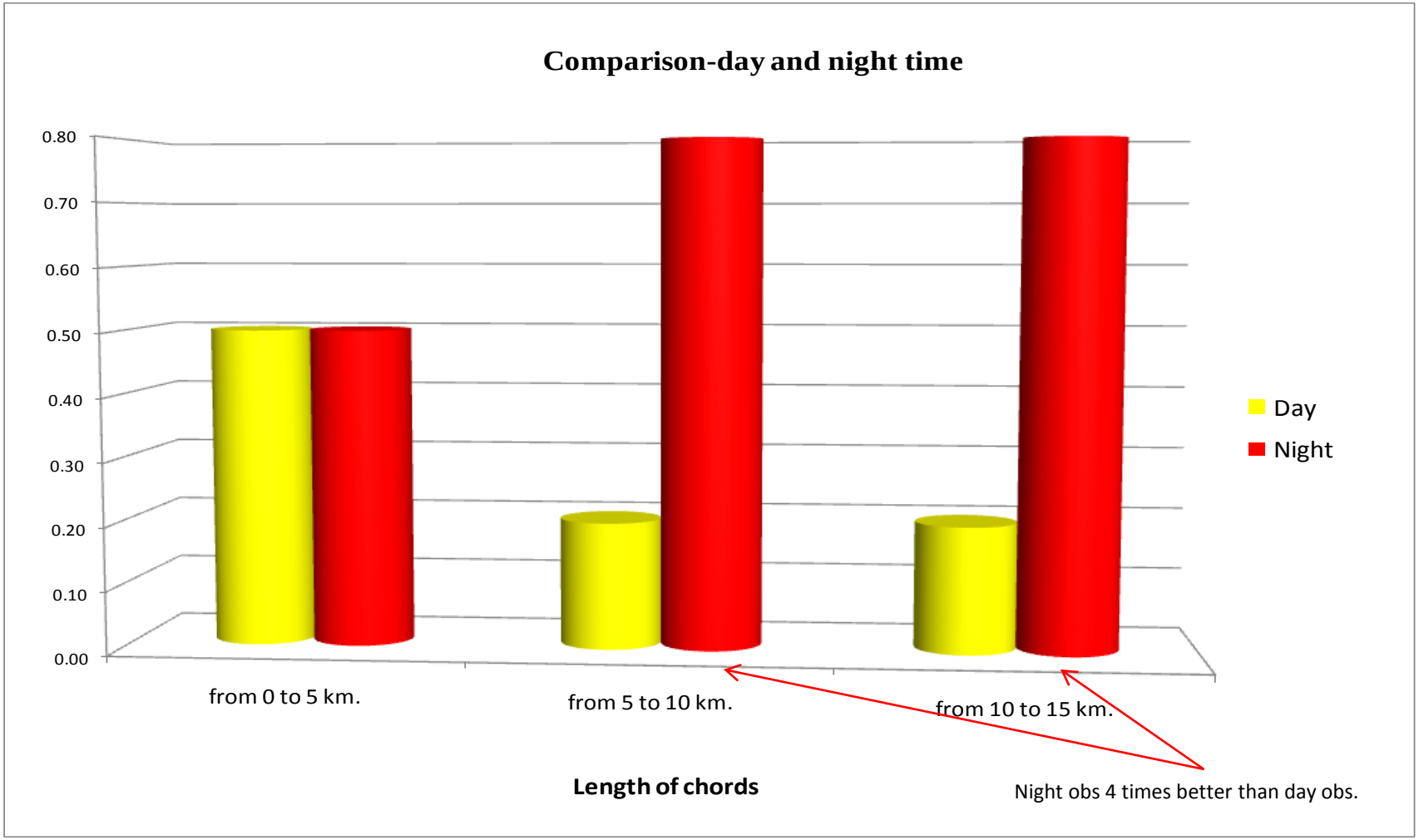

6. Conclusions. Remarks

A value for example of *about 15 degrees* cut-off angle could be denoted as a limit for obtaining *high quality results*. Increasing this value, according to the results decreases the rating of the system.

In most of the cases rating is high, when the cut-off angle is set to either 0 or 5 degrees.

Based on the used Information Technologies it should be noted, that when necessary some satellites are not used in the calculations.

Night measurements are preferable. The overall quality of the chords is much better, when measurements are conducted in night time in comparison to the day-time observations.

If planning to perform *productive* GNSS measurements and well determined spatial chords with high overall quality are of essence, then *fast static geodetic surveys during night time* should be conducted.

According to the results, derived with the used GNSS equipment, based on the specifics of the satellite measurements a cut-off angle of either *0 or 5 degrees* and session length of *up-to 10 min*. should be used to produce results with high rating - good overall quality.

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WEB:

11. ftp://igscb.jpl.nasa.gov/igscb/resource/pubs/wksp_3.pdf
12. http://facility.unavco.org/

Used software:

1. Geomax Geo Office;
2. Vienna_Fuzzy.

Thank you for your attention!