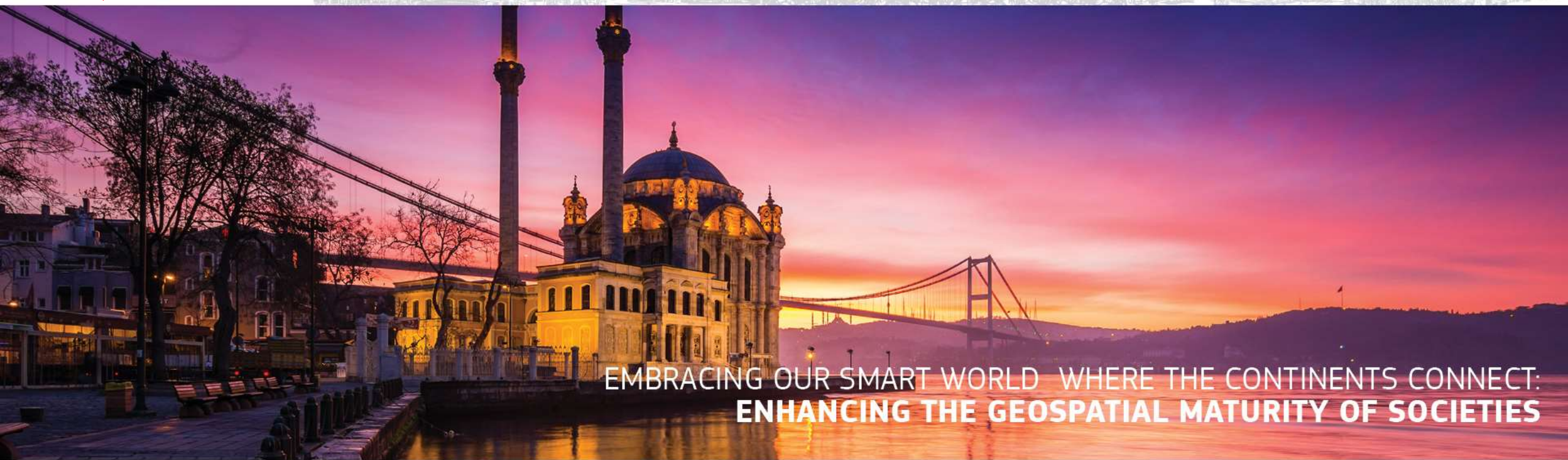
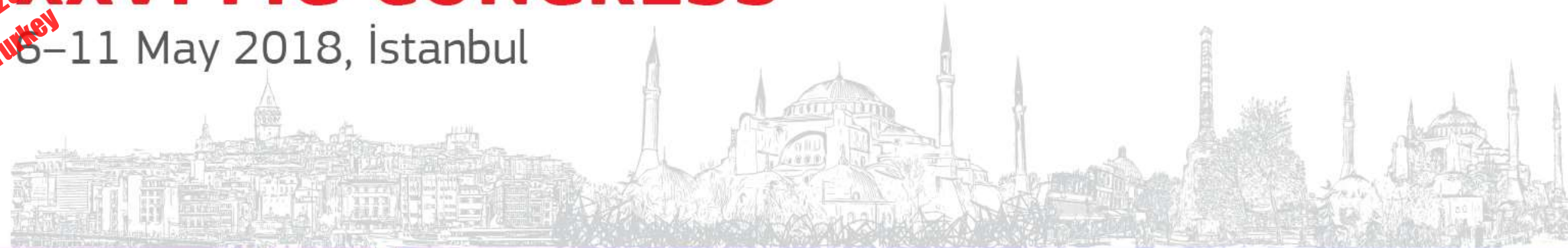


FIG
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TESTING HEIGHT ACCURACY IN CORS-TR TECHNIQUE

Ercenk ATA, Atinc PIRTI, Ramazan Gürsel HOŞBAŞ, Turkey

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Purpose of Presentation

This work involves testing the validity of the CORS-TR technique for the orthometric height values. Orthometric heights were computed and compared with the geometric leveling as well as the CORS-TR technique was performed in the selected test points. In this study, the accuracy of the orthometric height by using the CORS-TR technique was obtained about centimeter values.

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INTRODUCTION

Our country has a network of constantly observing constant GNSS stations (CORS-Continuously Operating Reference Station), which has been operating since May 2009 and is called TUSAGA-Active (CORS-TR). This network is a network of 147 stations covering the entire country (CORS-TR). The station locations and the areas to be covered are shown in Figure.

We can use this network for many surveying applications, also orthometric height determination. The height accuracy obtained by this method generally varies between 1 and 10 cm.

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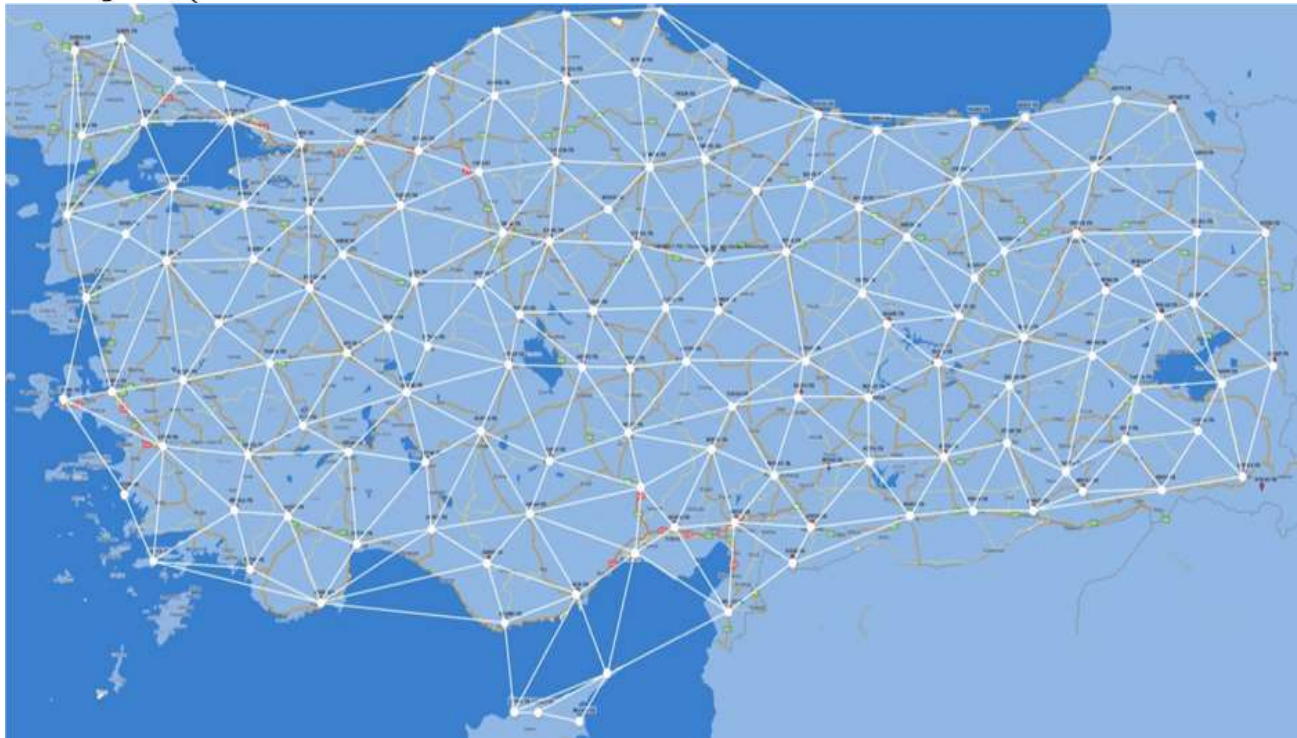


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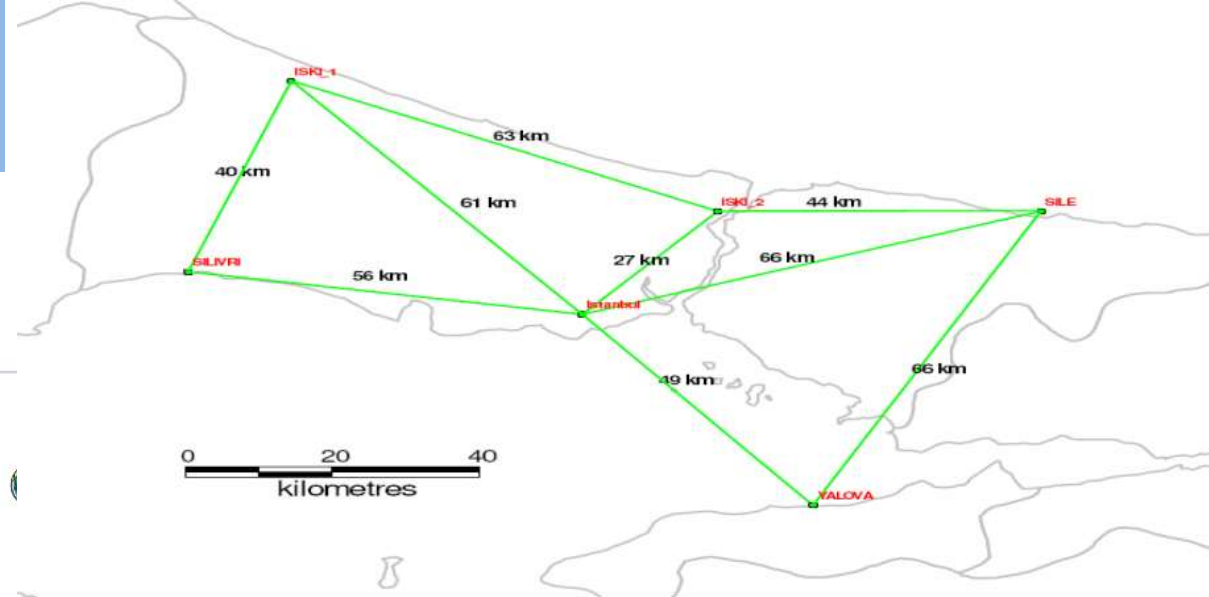




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CORS-TR Stations (147 stations, approx. 50-100 km)



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EXPERIMENT AND DATA PROCESS

In this study, CORS-TR/VRS and Geometric leveling measurements were made on the landmarks of known locations and elevations (the fixed points) in the Davutapasa Campus of YTÜ and the orthometric heights of these points were obtained from both surveying methods (Geometric leveling and CORS-TR/VRS).

CORS-TR/VRS (GNSS) measurements were performed twice at different times of the day (10 epochs) in accordance with "Large Scale Map and Map Information Production Regulations" (BÖHHBÜY). Mean errors of the measurements were examined and the mean values of the two measures were used.

Point heights were computed by making a round-trip geometric leveling at these fixed points. The three main landmark points in the YTU-Davutapasa Campus are used as references for the geometric leveling.

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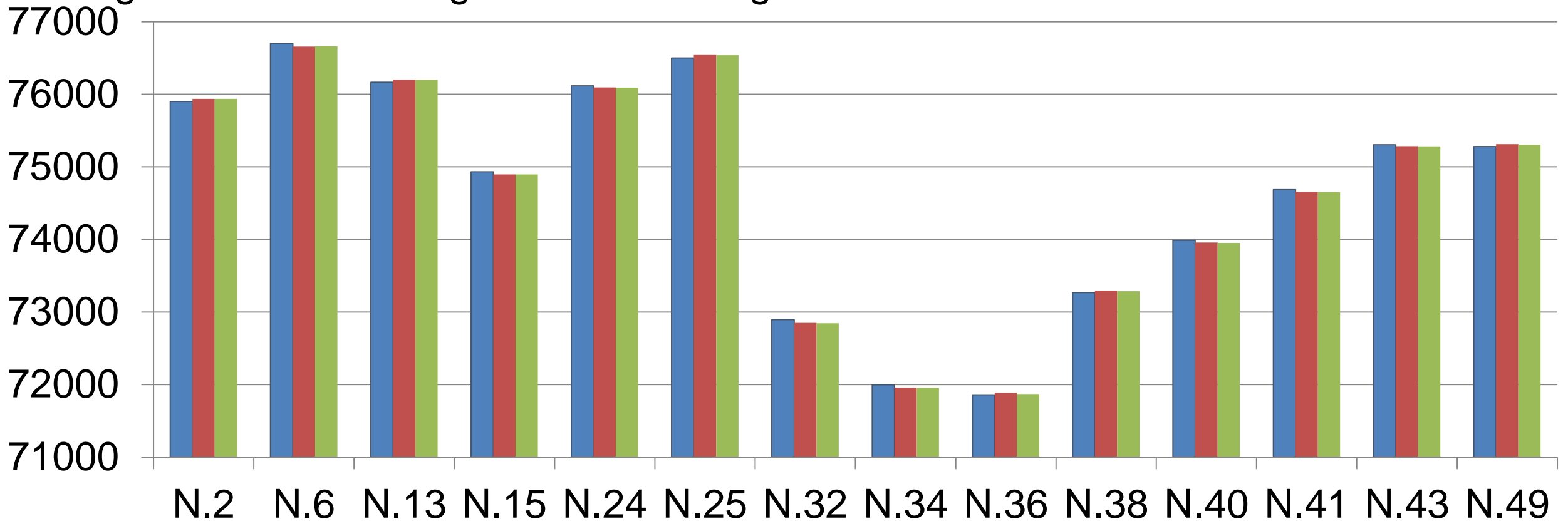


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■ ~~Heights obtained with CORS-TR VRS~~ ■ Precise heights of points

■ heights obtained with geometric leveling



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Precise heights and orthometric height values obtained from two different surveying methods



RESULT AND ANALYSES

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Min. ± 0.3 mm, Max. ± 15.9 mm

Point	DH(mm)	Point	DH(mm)
N.2	-2	N.34	3
N.6	-4	N.36	16
N.13	3	N.38	8
N.15	3	N.40	7
N.24	3	N.41	4
N.25	2	N.43	6
N.32	5	N.49	7

Min. ± 29 mm, Max. ± 43 mm

Point	DH(mm)	Point	DH(mm)
N.2	35	N.34	40
N.6	42	N.36	29
N.13	35	N.38	29
N.15	37	N.40	30
N.24	20	N.41	32
N.25	42	N.43	-18
N.32	43	N.49	34

Differences between precise heights and the computed heights by using geometric leveling

Differences between precise heights and heights from CORS-TR VRS



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Point	Pr. Heights	Geom. Lev.	CORS-TR	Differences	Differences
	(m)	(m)	(m)	[1] - [2]	[1] - [3]
	[1]	[2]	[3]	(mm)	(mm)
N.2	75,937	75,9387	75,902	-2	35
N.6	76,660	76,6640	76,702	-4	42
N.13	76,202	76,1988	76,167	3	35
N.15	74,895	74,8947	74,932	3	37
N.24	76,096	76,0928	76,116	3	20
N.25	76,543	76,5406	76,501	2	42
N.32	72,850	72,8448	72,893	5	43
N.34	71,957	71,9537	71,997	3	40
N.36	71,885	71,8691	71,859	16	29
N.38	73,295	73,2871	73,266	8	29
N.40	73,958	73,9511	73,988	7	30
N.41	74,655	74,6515	74,687	4	32
N.43	75,287	75,2815	75,305	6	-18
N.49	75,313	75,3057	75,279	7	34

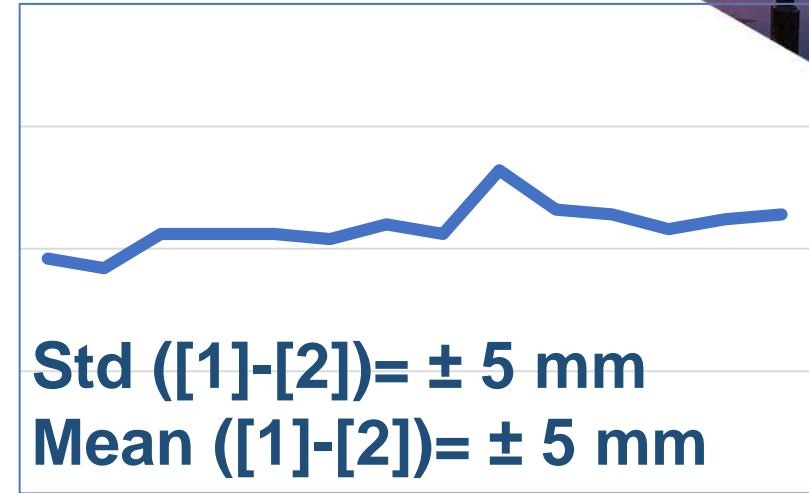
50

25

0

-25

-50



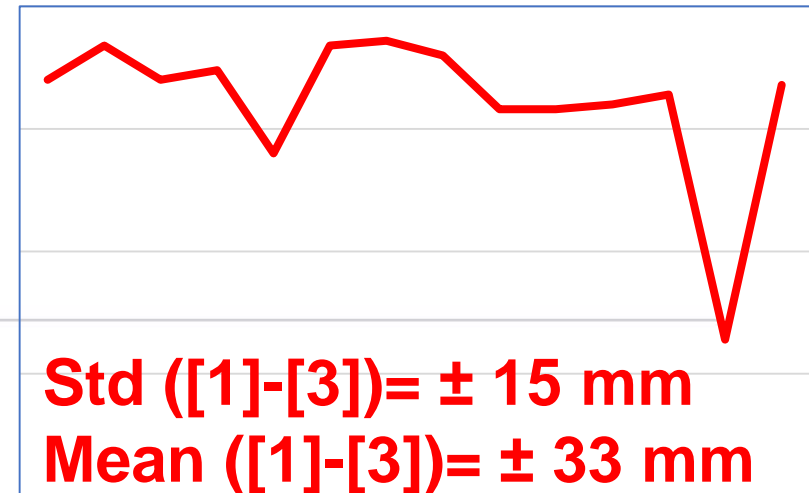
50

25

0

-25

-50



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CONCLUSIONS

The obtained results of these comparisons are that the orthometric heights obtained from the Geometric Leveling and CORS-TR are consistent with the precise heights between about 0-5 cm range. These results show that the heights obtained from CORS-TR/VRS can be used for surveying applications that do not require very high accuracy (millimeter accuracy).

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