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The Effect of Session Duration in Determination of Point Movements with GNSS

Burhaneddin BILGEN, Cevat INAL, Sercan BULBUL

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PRESENTATION OUTLINE

1. INTRODUCTION
2. APPLICATION
3. CONCLUSION

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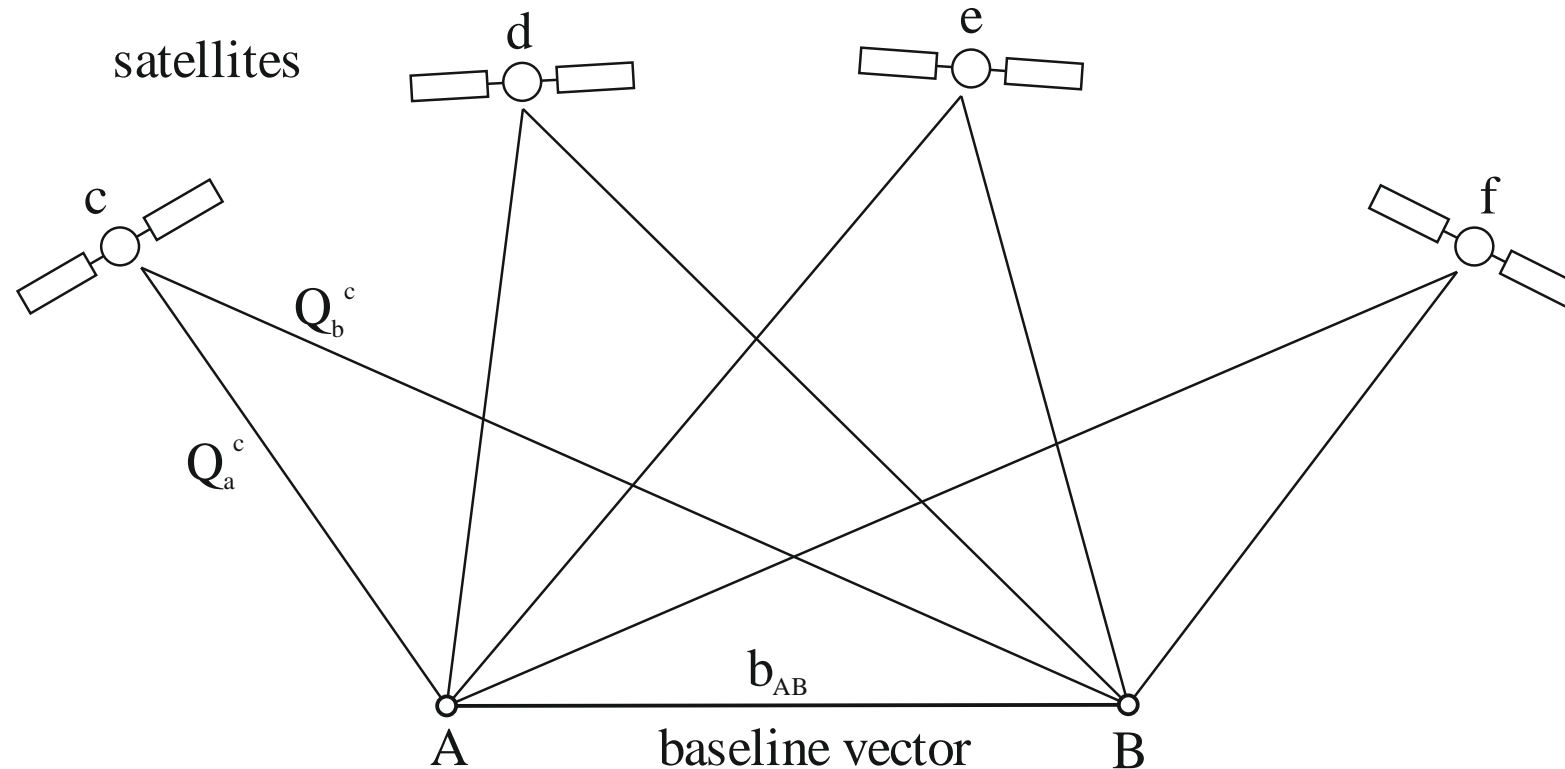


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INTRODUCTION



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- Session durations for static surveys

Receiver	Conventional Static	Rapid Static
Single-frequency	30 min + 3 min/km	20 min + 2 min/km
Dual-frequency	20 min + 2 min/km	10 min + 1 min/km

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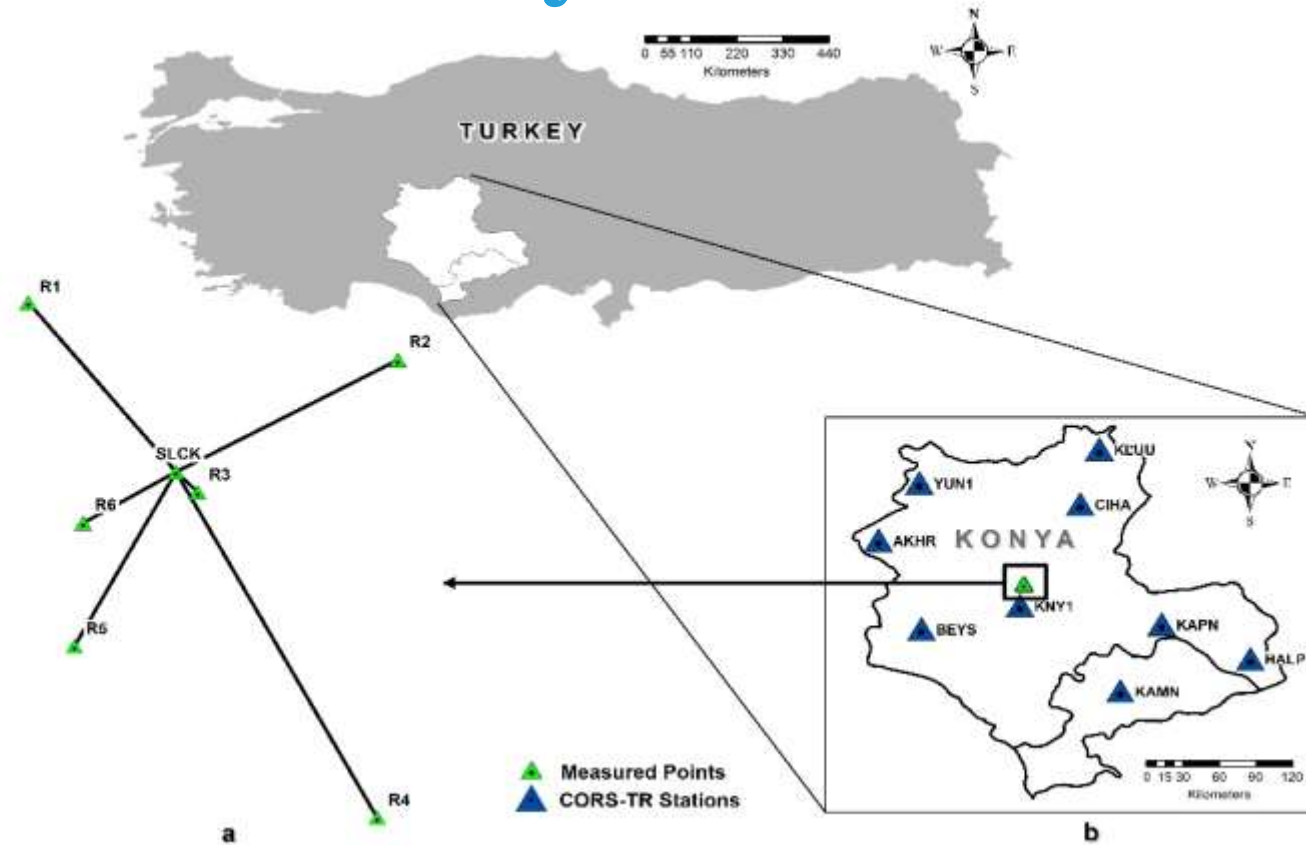
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Study Area



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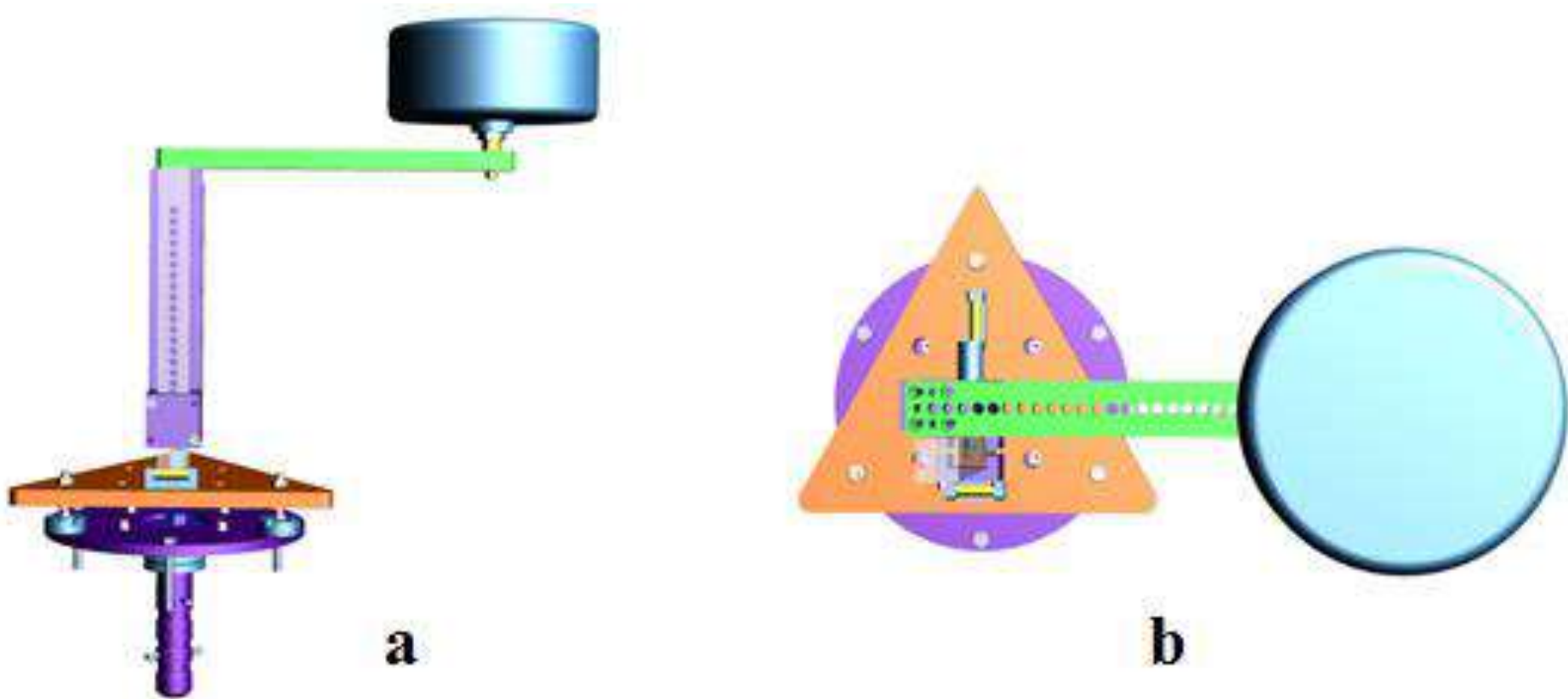




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Introduction of Mechanism



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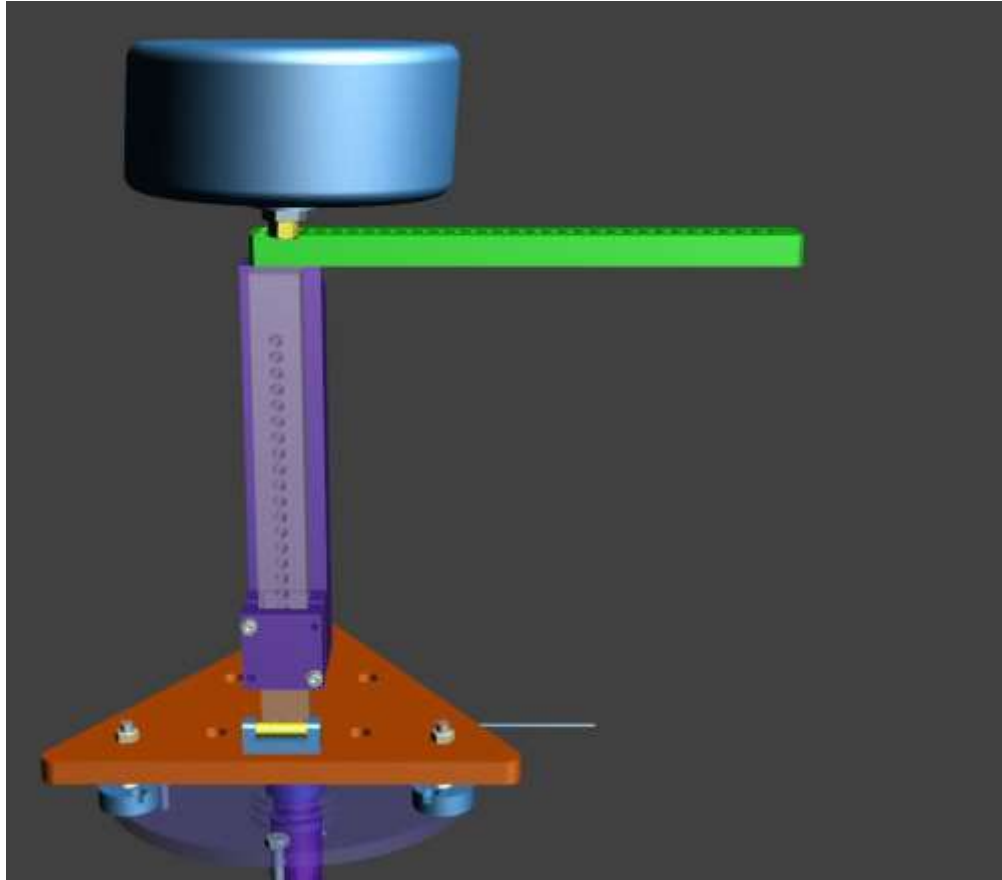


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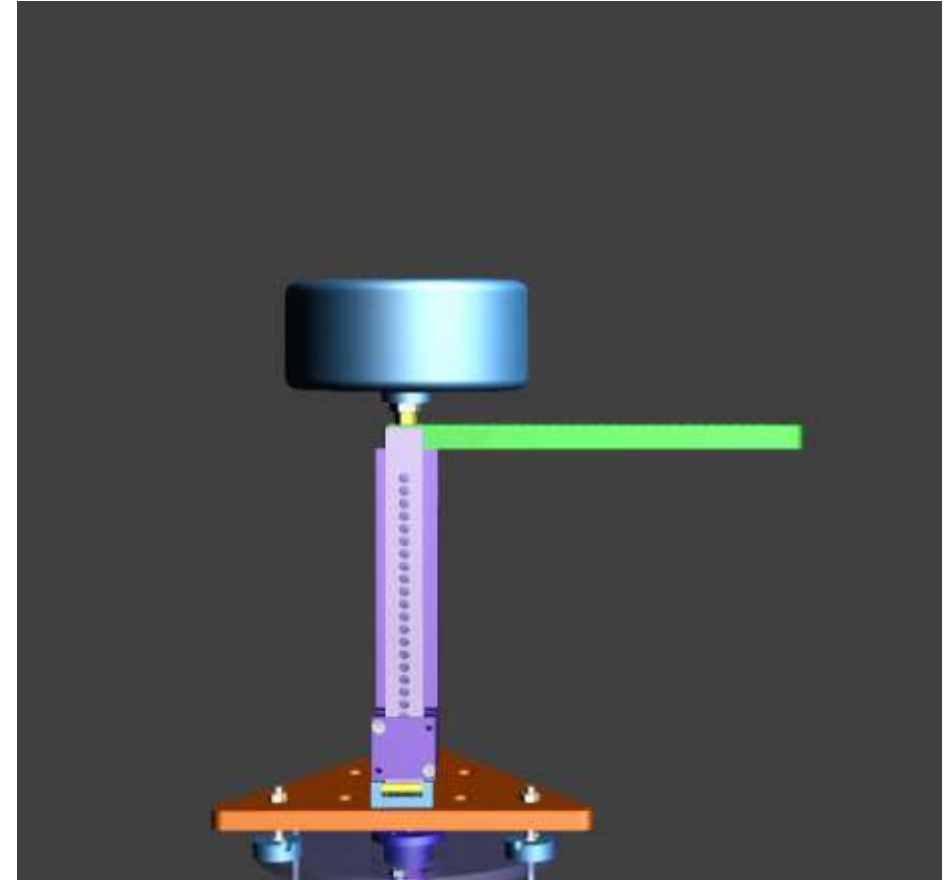


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APPLICATION



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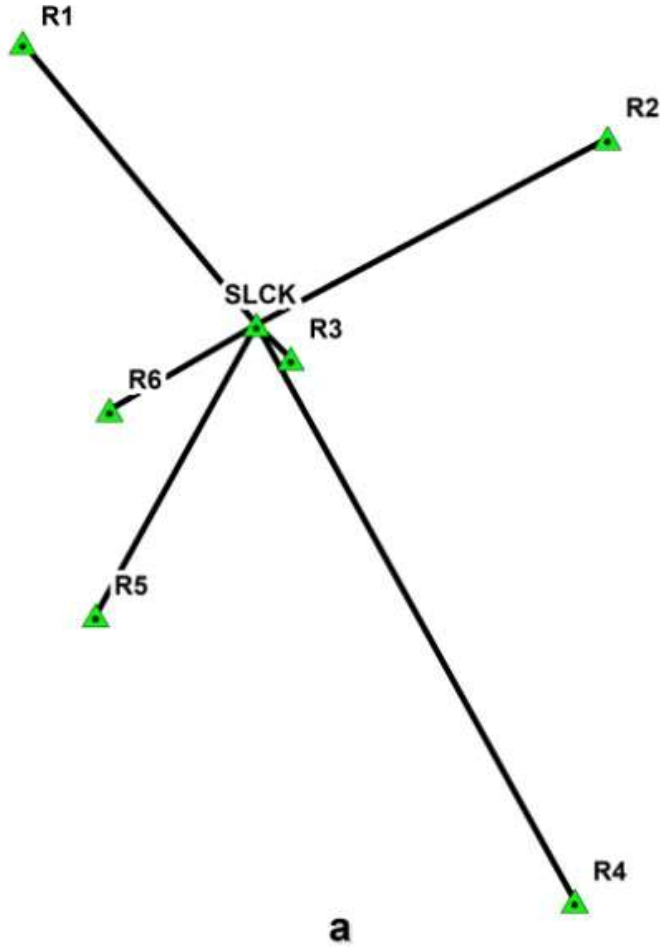


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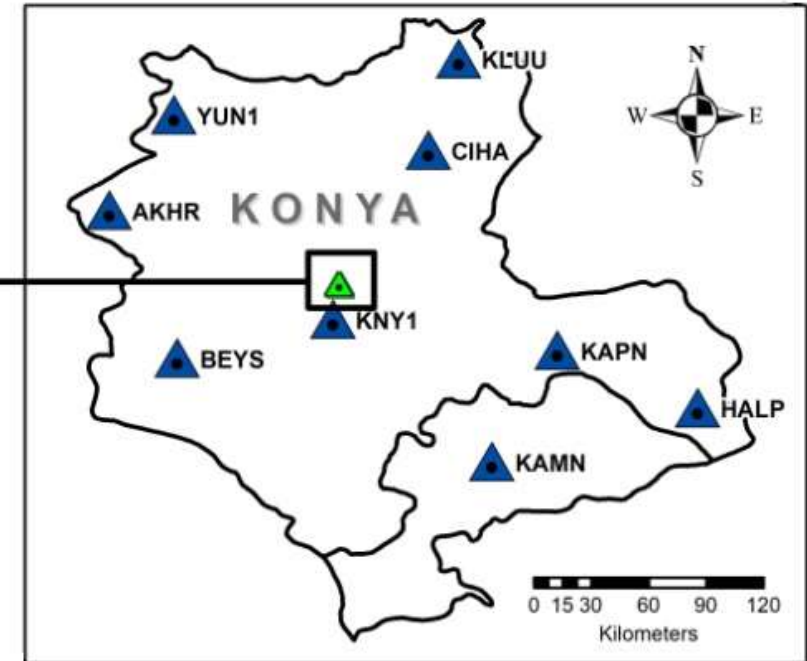




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▲ Measured Points
▲ CORS-TR Stations



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- The coordinate differences (dx, dy, dh) between 1 cm interval points on the mechanism;

$$dx = x_{i+1} - x_i \quad dy = y_{i+1} - y_i \quad dh = h_{i+1} - h_i$$

- errors of these coordinate differences ($\varepsilon_x, \varepsilon_y, \varepsilon_h$);

$$\varepsilon_x = dx - \text{true value} \quad \varepsilon_y = dy - \text{true value} \quad \varepsilon_h = dh - \text{true value}$$

- The rms for the results of the coordinate differences (dx, dy, dh) obtained from 2-h, 30-min. and 15-min observations on the coordinate axes directions, m_x, m_y, m_h :

$$m_x = \pm \sqrt{\frac{[\varepsilon_x^2]}{n}}, \quad m_y = \pm \sqrt{\frac{[\varepsilon_y^2]}{n}}, \quad m_h = \pm \sqrt{\frac{[\varepsilon_h^2]}{n}}$$

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RMS	The north-south			The east-west		
	2-h	30-min	15-min	2-h	30-min	15-min
m_x (mm)	±1.49	±1.60	±1.74	±1.58	±1.68	±1.72
m_y (mm)	±0.76	±0.79	±1.04	±1.12	±1.24	±1.28
m_h (mm)	±1.70	±1.90	±3.02	±2.16	±3.10	±3.30

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CONCLUSION

- Just as classical terrestrial techniques, GNSS techniques can also be widely used today in determination of point movements. The use of GNSS techniques is easier, faster and more economical than terrestrial techniques.
- With the help of the mechanism designed in this study, the point positions were virtually changed in the direction of the coordinate axes and the determination of these movements was investigated.

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- Coordinates of consecutive points were determined by the static positioning method on the mechanism and the calculated point movements were compared with the true value on the mechanism in terms of 2-h, 30-min and 15-min session durations.
- If the distance of the reference points to the object point is short, it can be said that the differences obtained by the 15-min and 2-h observations equal to each other. In this case, it seems that a 15-min session duration is sufficient for such short baselines.

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