

# Implementation of New Positioning System in Riga

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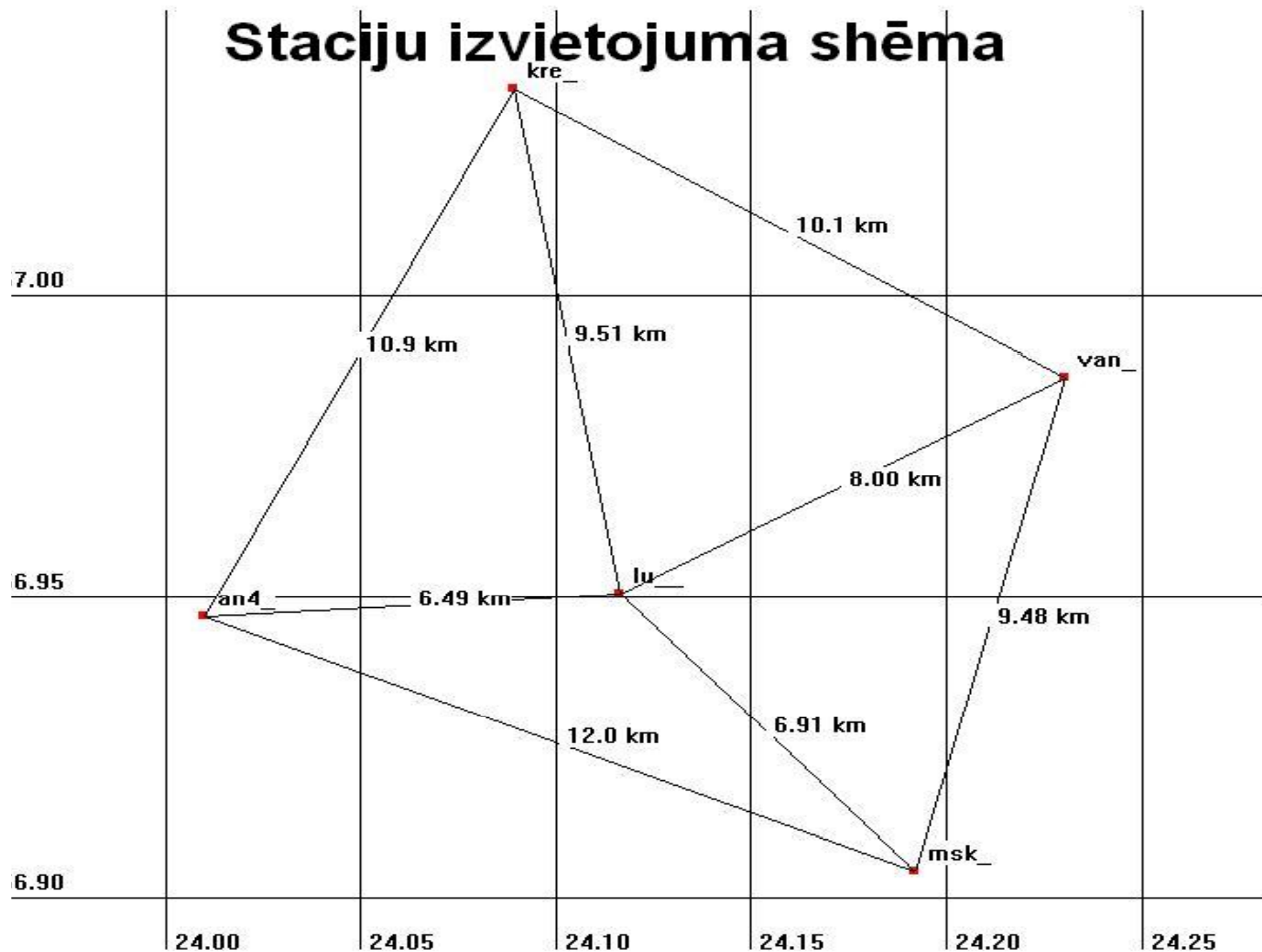
# Multipurpose positioning system

***SLR for LEO***



***RIGA***

# Staciju izvietojuma shēma



# University Of Latvia

## Institute of Geodesy and Geoinformation



### Development of the GIS Component for the Economy of Latvia





# *SLR for LEO*



## **Component development of GIS for Latvian economy**

Līgums Nr.VPD1/ERAF/CFLA/05/APK/2.5.1./000081/039  
LU REĢISTRĀCIJAS Nr.ESS 2006/32





# Laser

**Ekspla PL2241 532 nm**

**Pulth length ~ 30 psec**

**Energy 15 mJ +- 4%**

**Pulse frequency 50 Hz**



**Frekvence**

**S**

**standarts**

**Qurtzlock A8-B OXCO+  
GPS-vadīts kvarca oscilators**

<b>Stabilitāte:</b>	<b>1 s</b>	<b>2E-11</b>
	<b>1000 s</b>	<b>2E-12</b>
	<b>nedēļa</b>	<b>1E-12</b>

**Precizitāte <50 nsec**



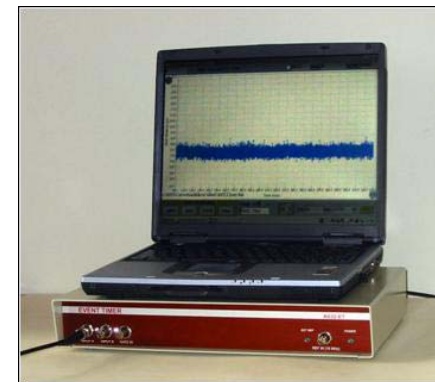
## About Event Timer A032-ET

The A032-ET is the latest commercially available model of Riga event timers

*Event timers used in ILRS laser network. (Data are taken from <http://ilrs.gsfc.nasa.gov/>)*

Manufacturer	Model	Resol. [Ps]	Jitter [Ps]	Linearity [Ps]	Stability [Ps/K]	Stability [Ps/hour]	Max. rep. rate [Hz]	Max. TOF
PESO	PET4/TIGO	1.2	3.5	3	<0.3	<0.5	>100	N/A
EOS	MRCS V.4	2	10	1	N/A	1	1000	N/A
HTSI	MLRO	0.5	<2	N/A	N/A	0.5	2000	N/A
IECS	<a href="#">A032-ET</a>	1	7-9	<1	<0.5	N/A	10,000	1.5 hr

Currently the A032-ET is recognized within ILRS community as the best in term of price/performance ratio. During last few years 18 units of the Riga Event Timer A032-ET have been delivered to Japan, Switzerland, China, Spain, Austria, Latvia, Germany and Finland for use in the ILRS laser network.



# **EXPERTISE**

## **of Institute of Electronics and Computer Science (Riga, Latvia)**

*acquired in the area of timing system design*

Institute of Electronics and Computer Science (IECS) is non-profit research institution dealing with various directions of R&D activity.

Substantial knowledge and well-developed engineering know-how is applied to development and design of high-performance timing systems and devices with emphasis made on applications related to Satellite Laser Ranging (SLR). During last 30 years about ten models of Riga timing systems (total about 35 units) have been developed, made and delivered for SLR applications.

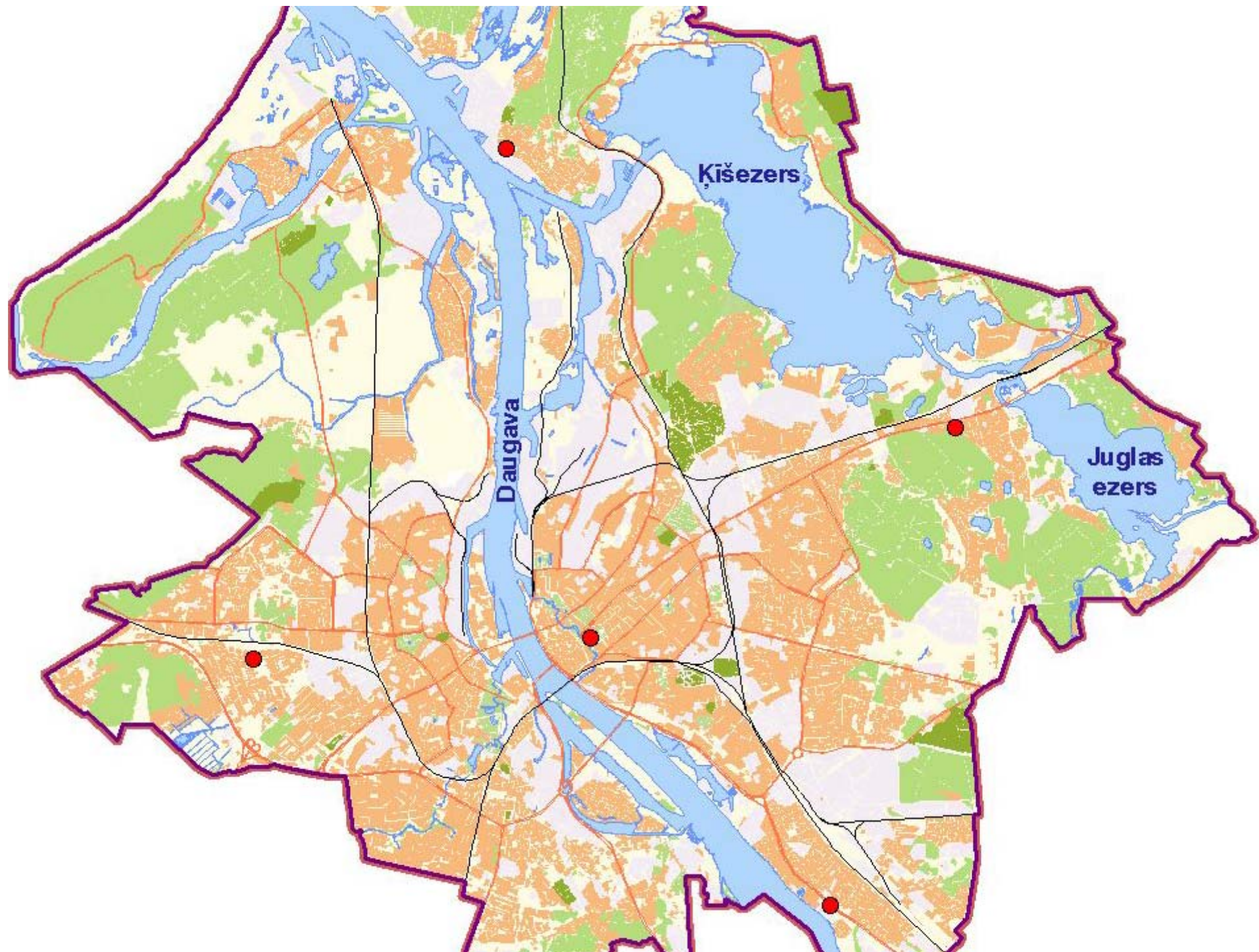
Currently background of such activity is close cooperation with various institutions and specialists within ILRS community. There are long-term agreements on collaboration with:

- Finnish Geodetic Institute, Finland
- Institute for Space Research, Austrian Academy of Sciences
- Changchun Observatory, Chinese Academy of Sciences
- Shainghai Astronomical Observatory, Chinese Academy of Sciences

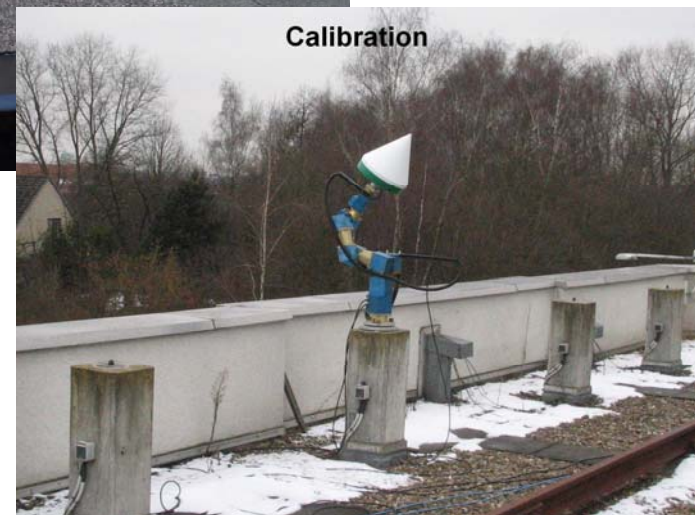
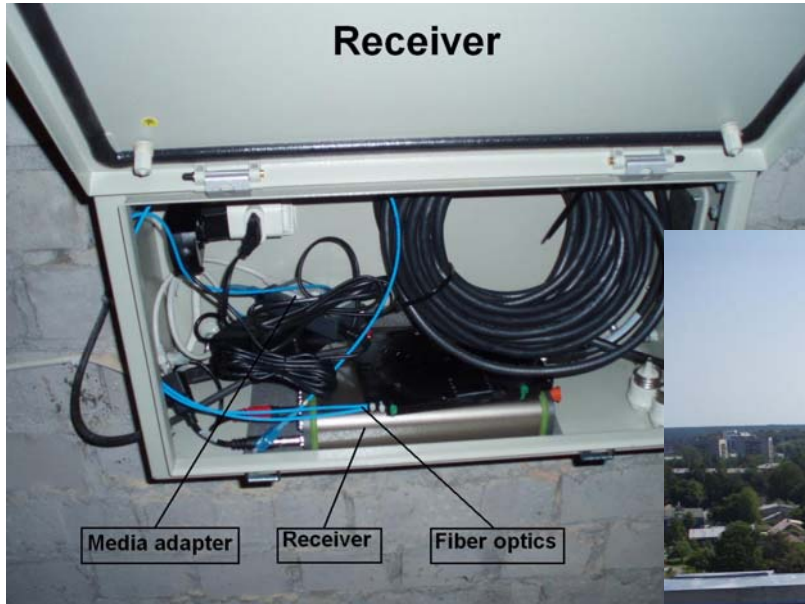


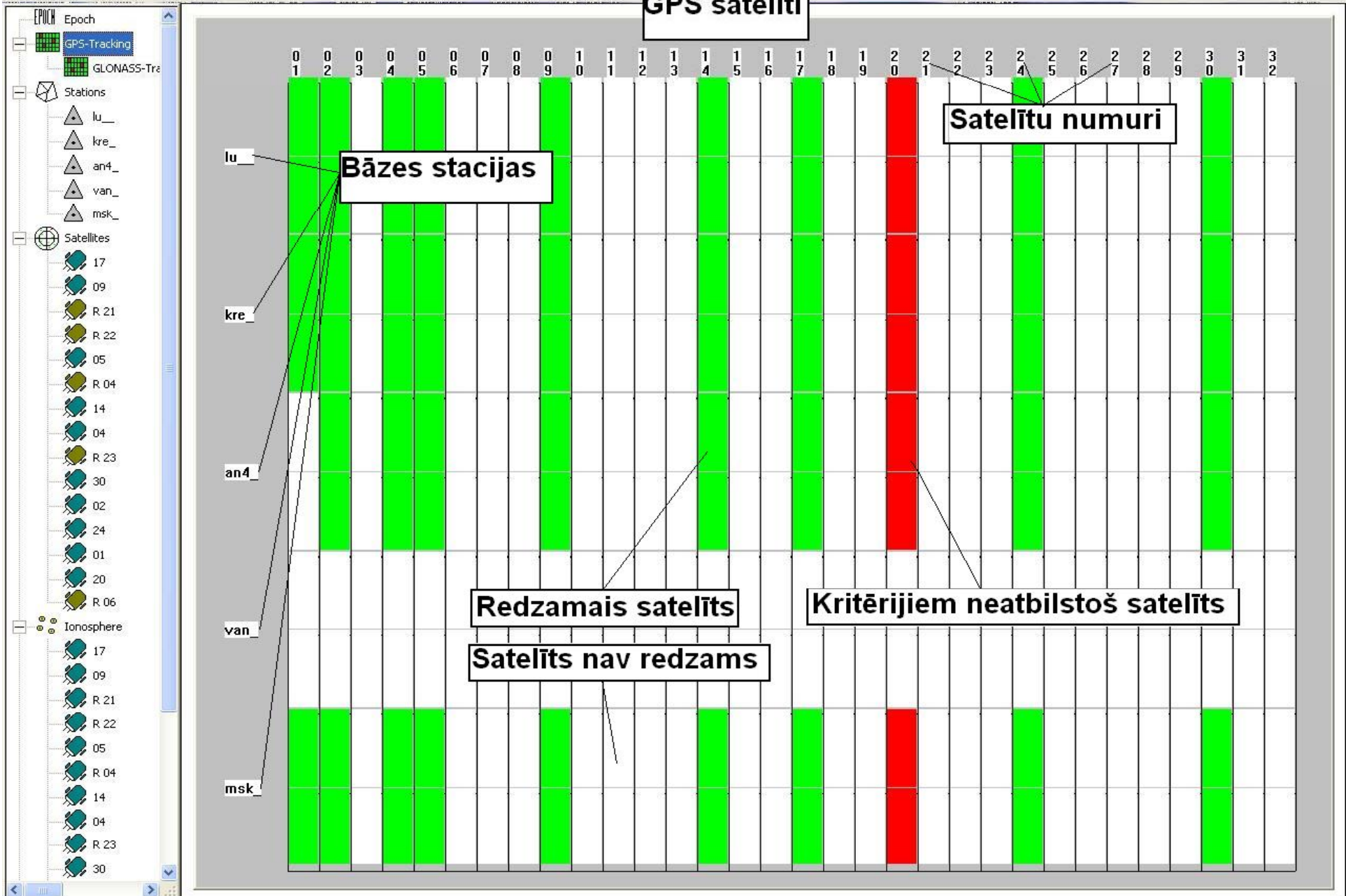
# Rīgas ĢeoMētrs

- to perform the historic map data for land reform and land privatization;
- to manage the Address Register;
- to perform land use planning and cadastral surveying in Riga city; to perform land use planning;
- responsible for the geodetic infrastructure to perform surveying and mapping in Riga city;
- regularly update and monitor the large scale maps of Riga city ,
- participation in the project *EUPOS*® with Riga multifunctional GNSS positioning system.

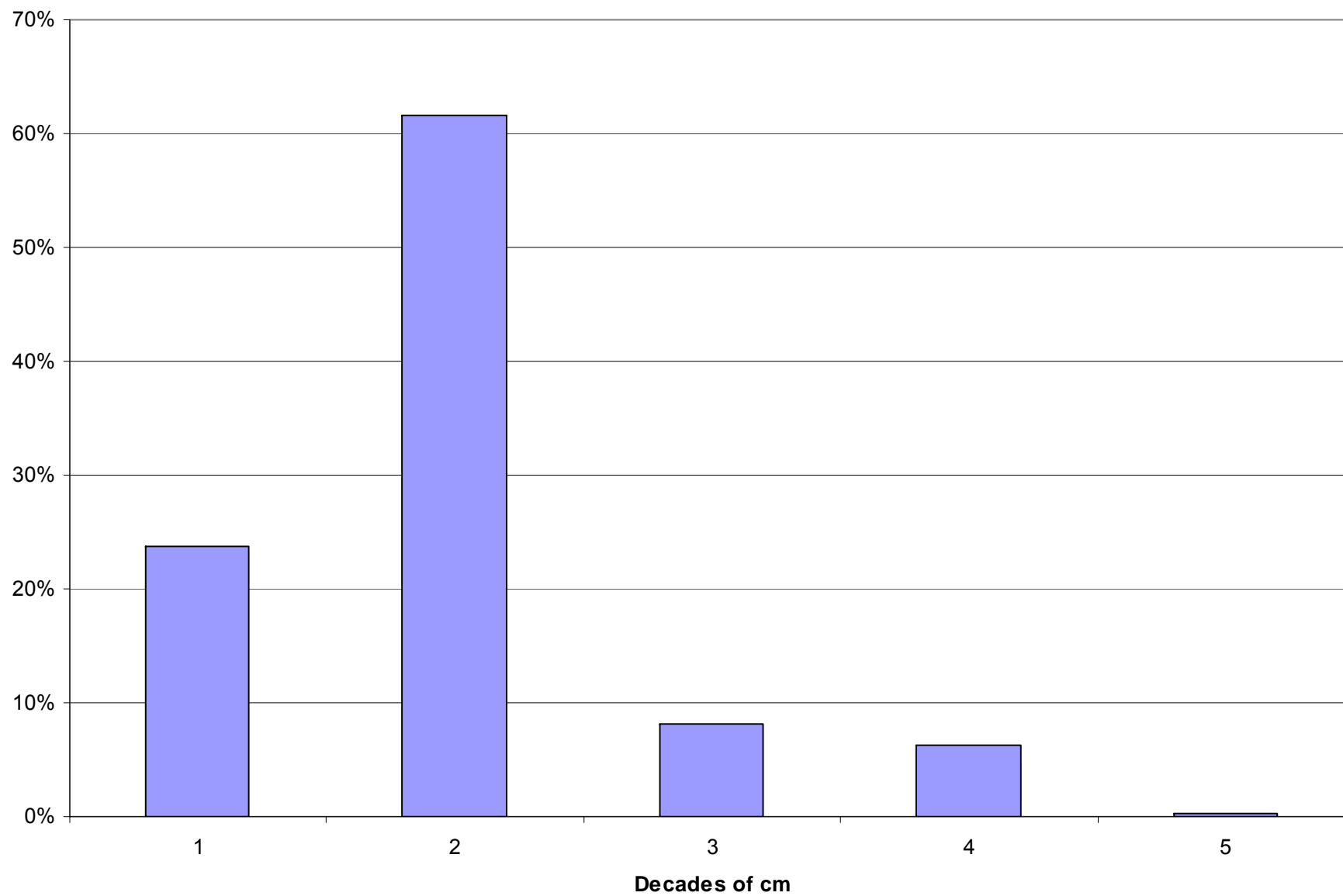


# Equipment

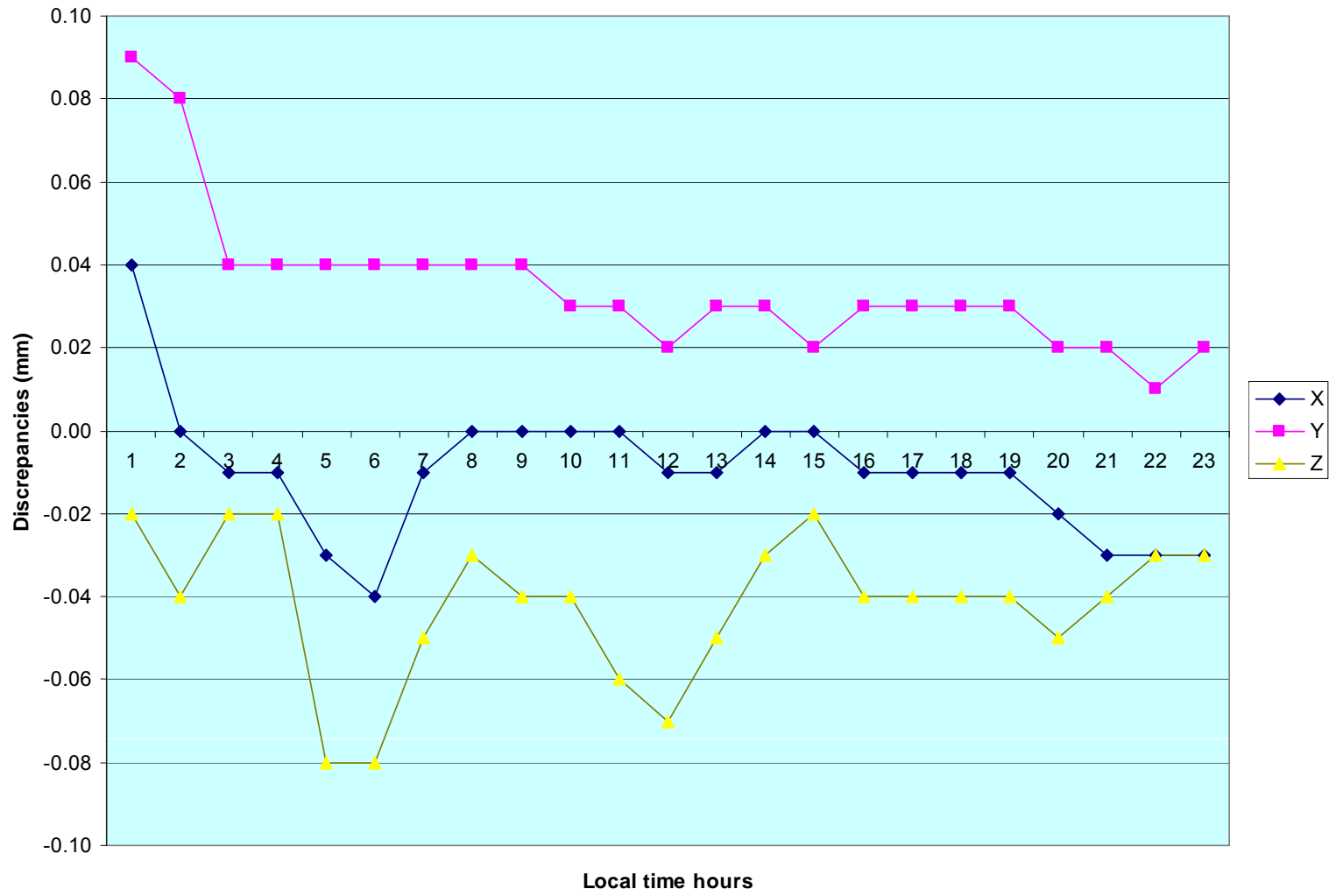




## Discrepancies

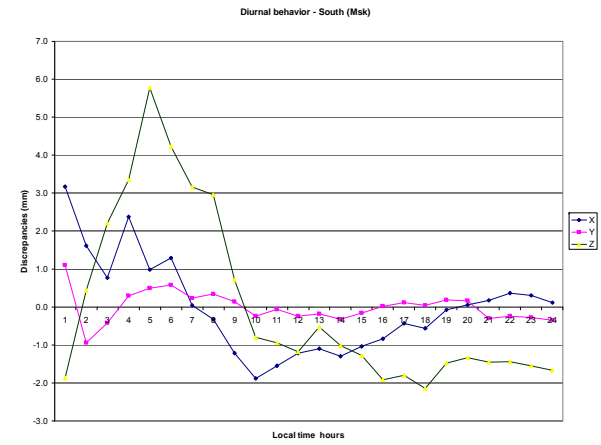
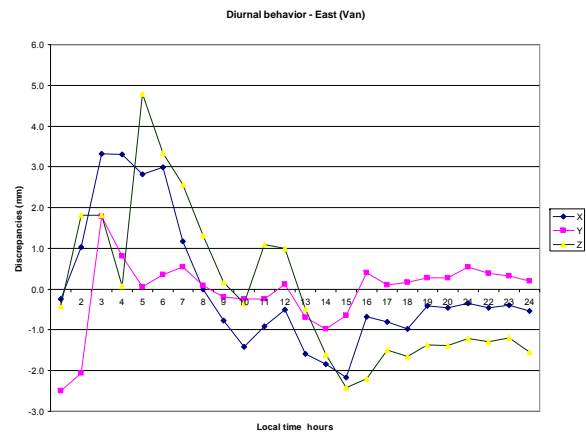
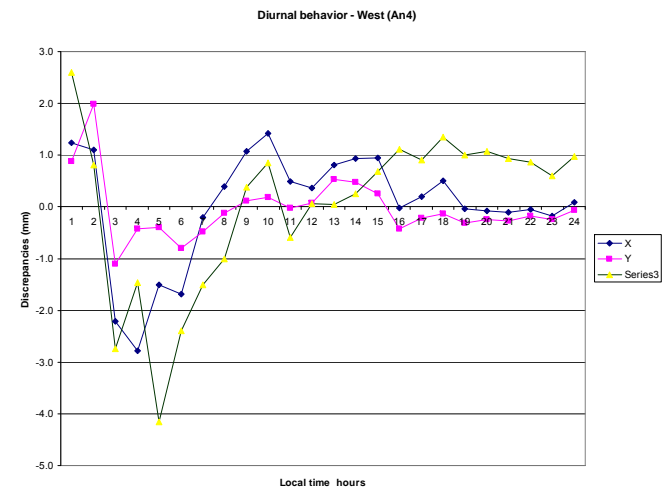
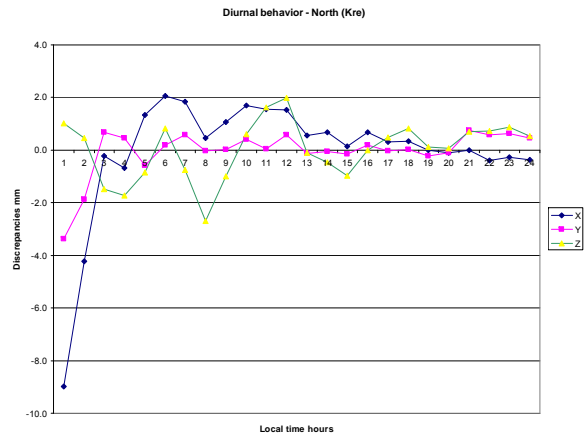


### Diurnal behavior - Centre (LU) \_ no more 0.1 mm

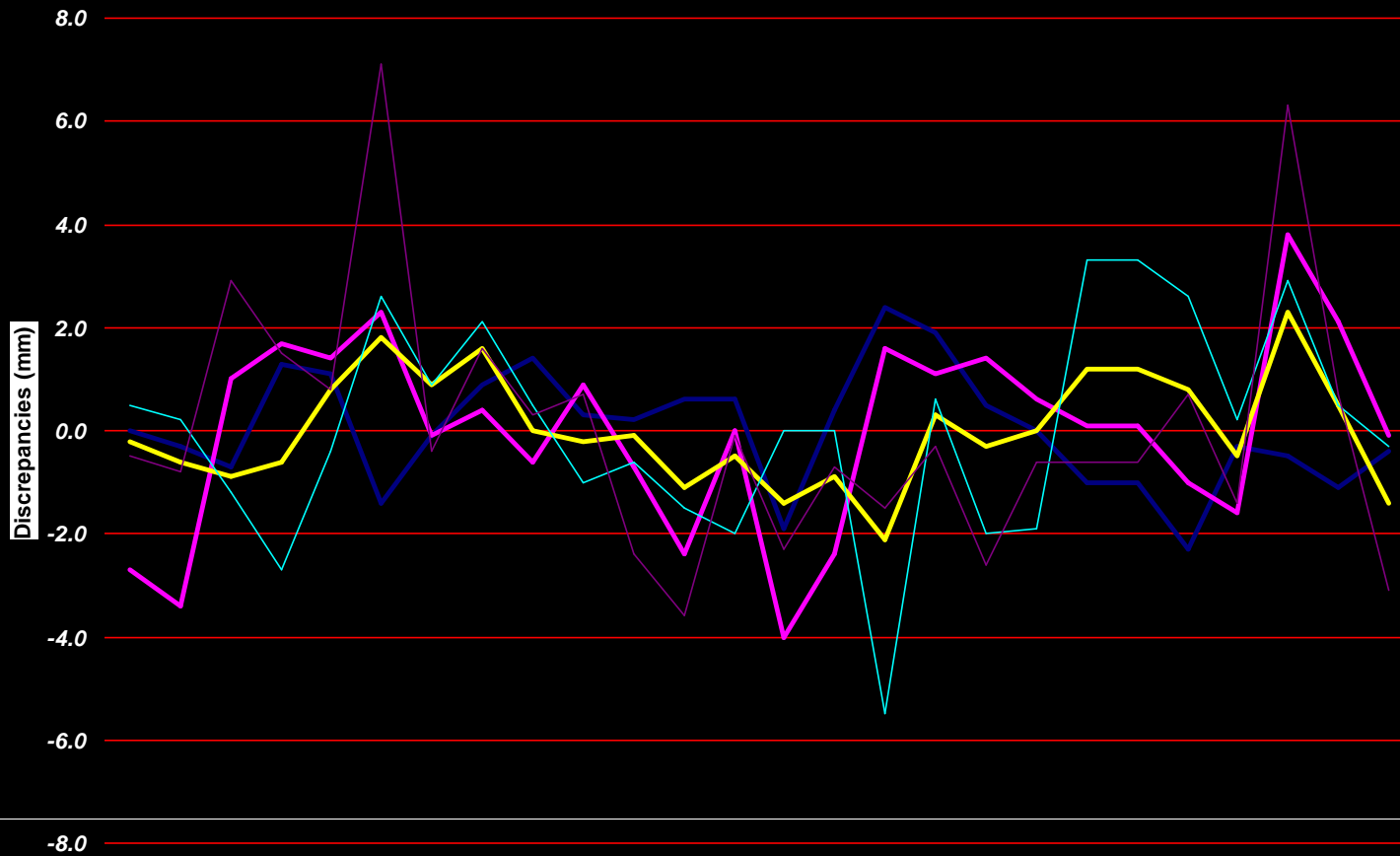


**Base station antenna**



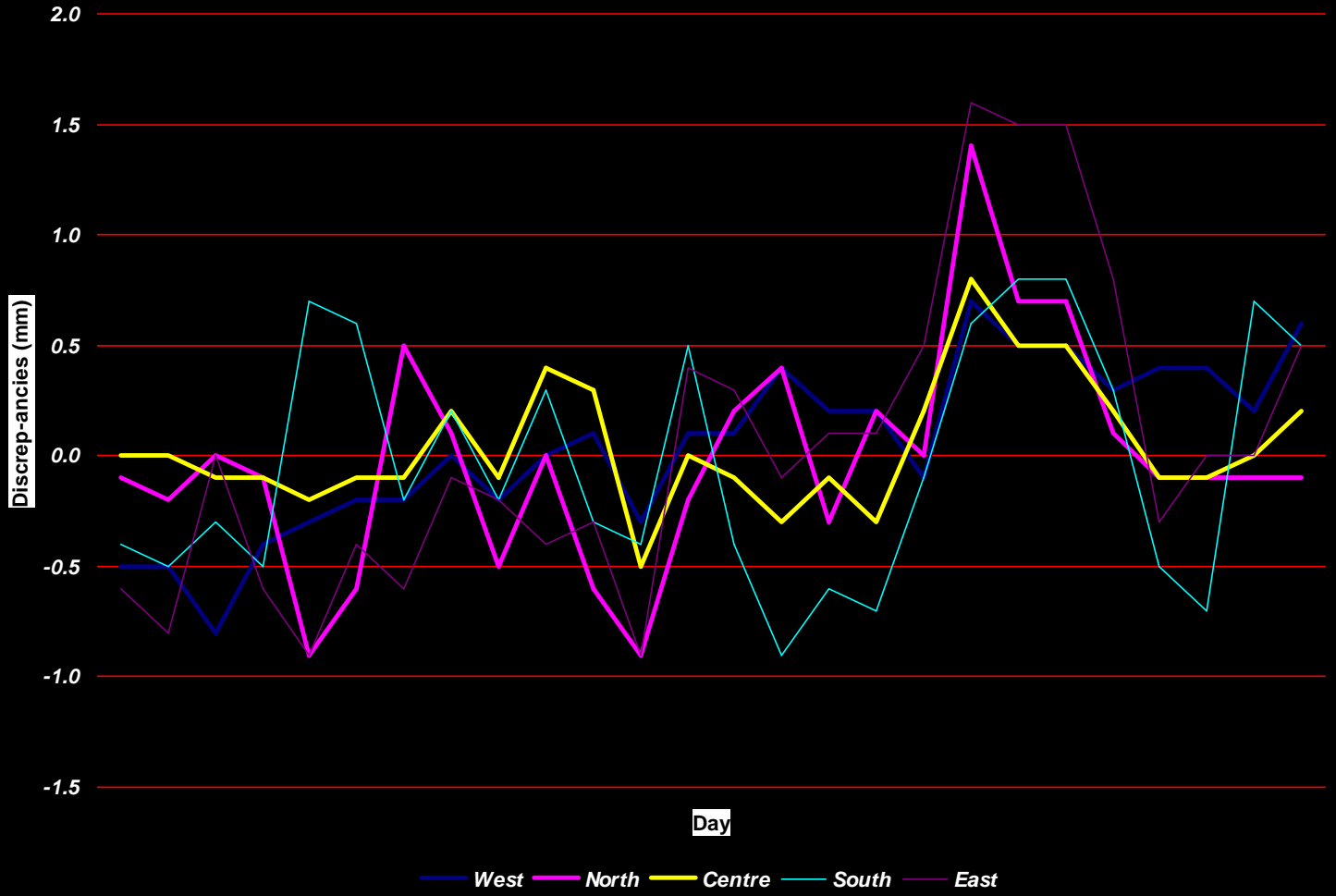


Monthly behavior - Up (Jan 2008)

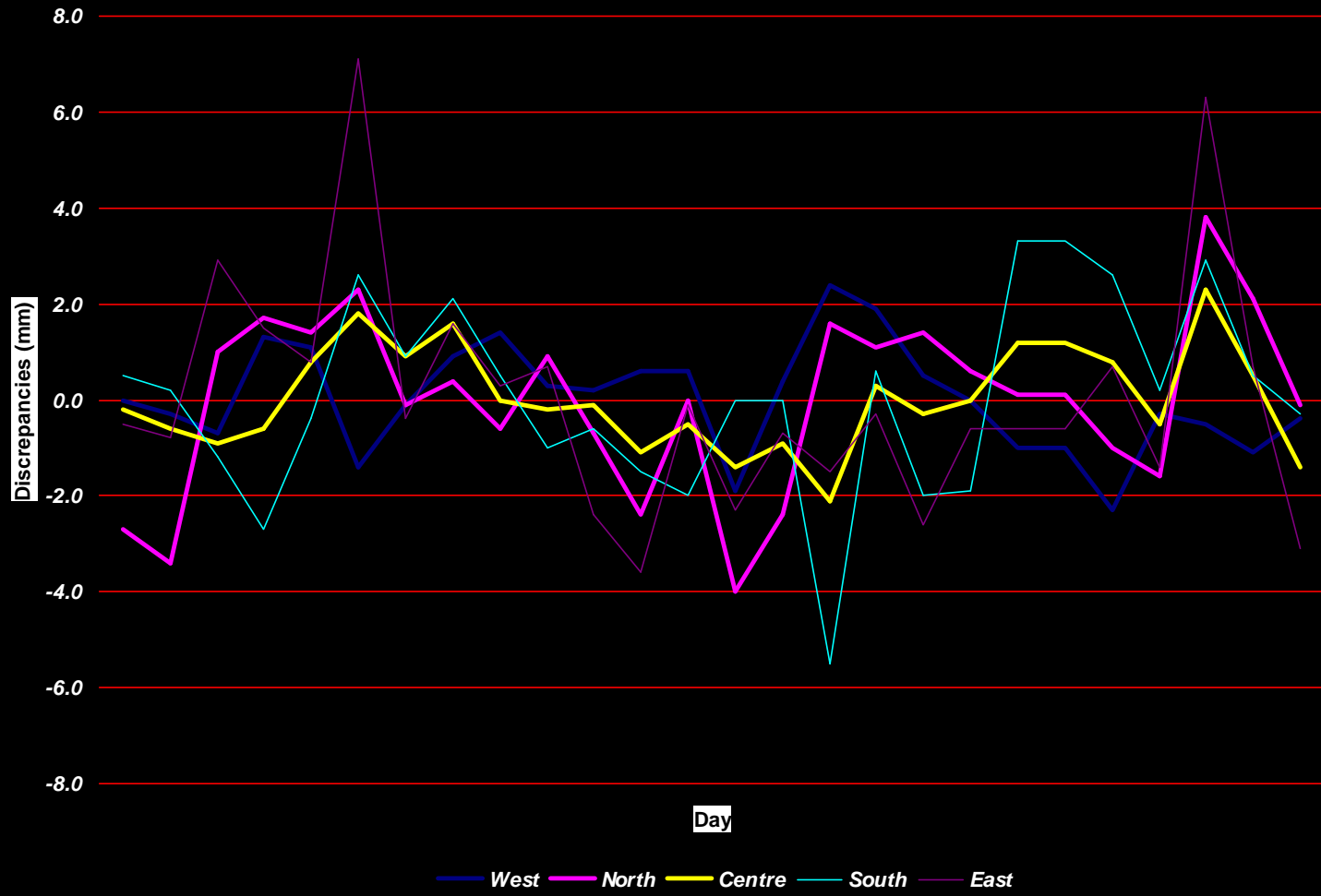


West North Centre South East

Monthly behavior - Easting (Jan 2008)



Monthly behavior - Up (Jan 2008)



# Levelling for EUPOS-RIGA antenna height control



# Levelled height trigonometric transfer to EUPOS-RIGA antenna



Augstumu no precīzi nivelētiem punktiem pārnesti ar trigonometrisko metodi uz jumta plakni

Augstums noteikts no vismaz 2 – 3 ģeometriski nivelētiem punktiem

Mērījumi veikti ar atkārtotu pilna paņēmienu metodi



*Thank you*