



# Installing SLR systems at the “Quasar” VLBI network observatories

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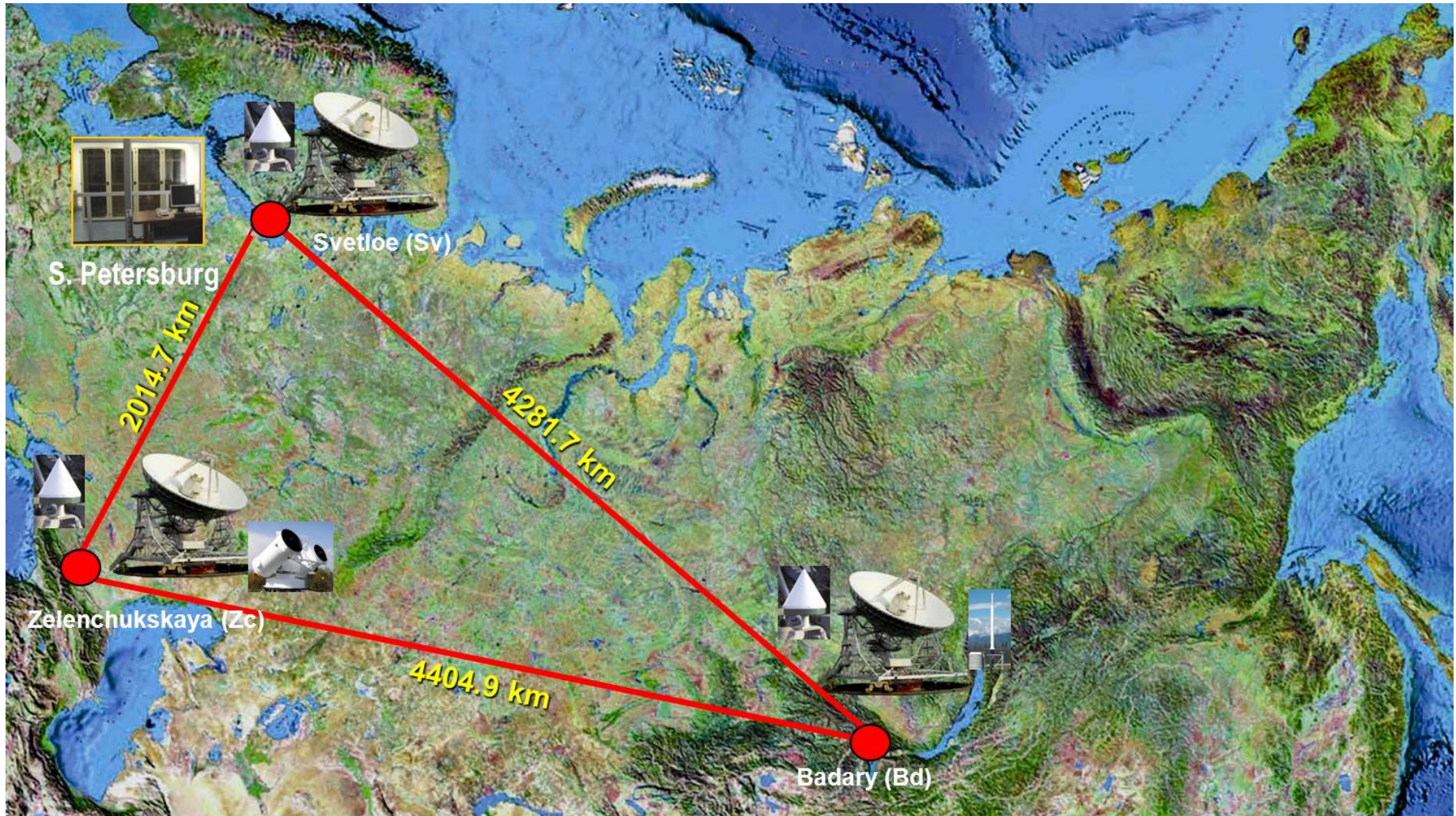
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**Presented at 17<sup>th</sup> International Workshop on Laser Ranging,  
Bad Kötzting (Germany), May 16 - 20, 2011**

# VLBI network “Quasar” and IAA RAS activity

- **Russian VLBI network “Quasar” (IAA RAS)** observatories  
«Badary» (VLBI, GPS/GLONASS, DORIS),  
«Svetloe» (VLBI, GPS/GLONASS) ,  
«Zelenchujskaya» (VLBI, GPS/GLONASS)  
carry out regular VLBI observations under both IVS and domestic programs.  
Co-located IGS stations perform continuous GPS and GLONASS observations.  
DORIS-system at «Badary» observatory is operating.  
Local-ties between different space geodetic instruments at the observatories are regularly monitored.
- In the framework of **IAA EOP Service** the processing of different types of space geodetic observations is performed:
  - VLBI (IVS programs: 24h-, Int-sessions);
  - VLBI (Domestic programs: 24h-, 1h-sessions);
  - GPS (IGS subnetwork, 24h-arcs, daily);
  - SLR (ILRS network, 96h-arcs, daily).
- In 2011 the **Russian SLR system “Sazhen-TM”** (Research-and-Production Corporation “Precision Systems and Instruments”) will be installed at all observatories of the “Quasar” network.

# “Quasar” VLBI network geometry





# Main technical characteristics of the “Sazhen-TM” SLR system

- Ranging distance:
  - day 400-6000 km
  - night 400-23000 km
- Aperture 25 cm
- Wavelength 532 nm
- Beam divergence 12”
- Laser pulse frequency 300 Hz
- Laser pulse width 150 ps
- Pulse energy 2.5 mJ
- Mass 170 kg
- Normal points precision 1 cm
- Angular precision 1-2”



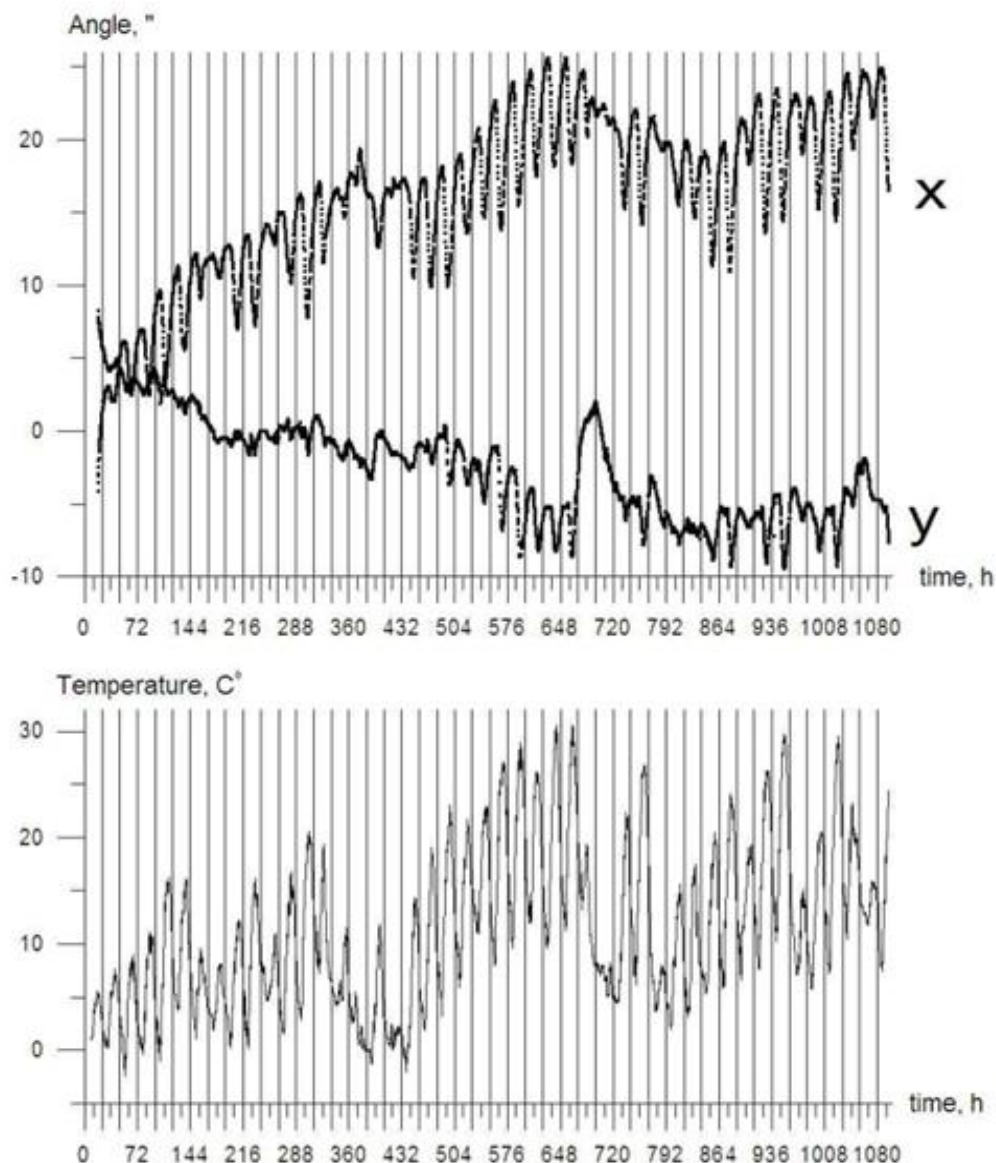
Roofs of the laboratory buildings at the observatories were considered as primary installation places for SLR systems.

Their stability has been measured with the inclinometer NIVEL-210 (Leica).

Variations of the roof inclination angles at «Badary» observatory for the interval 05.05.2010 – 18.06.2010 are shown.

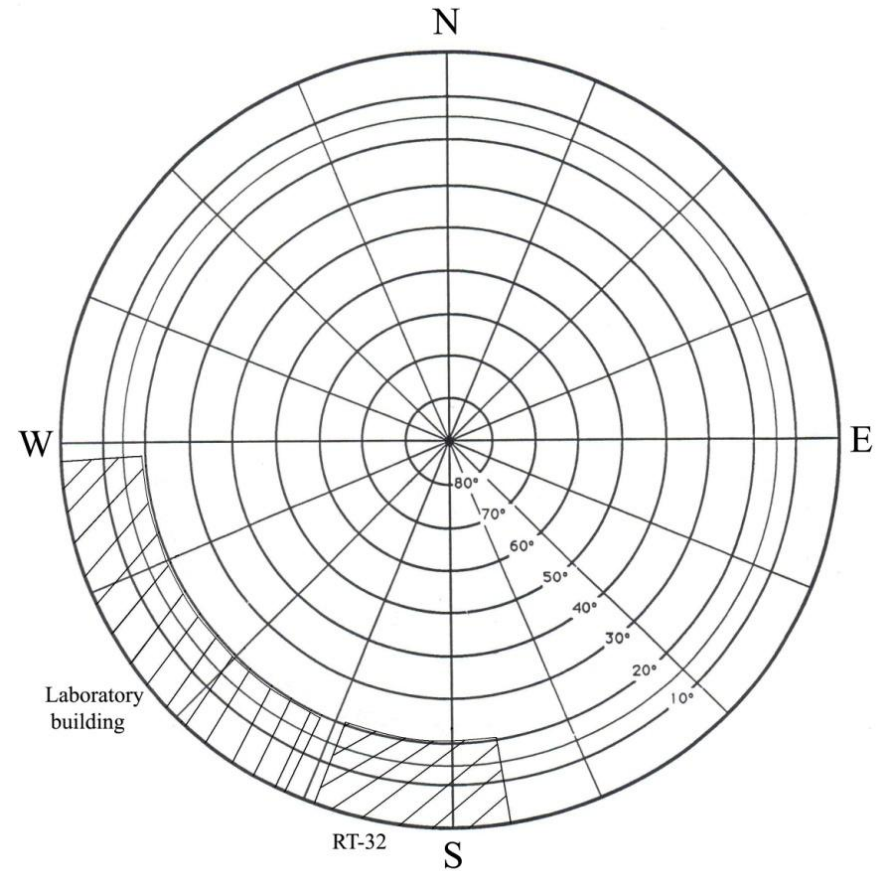
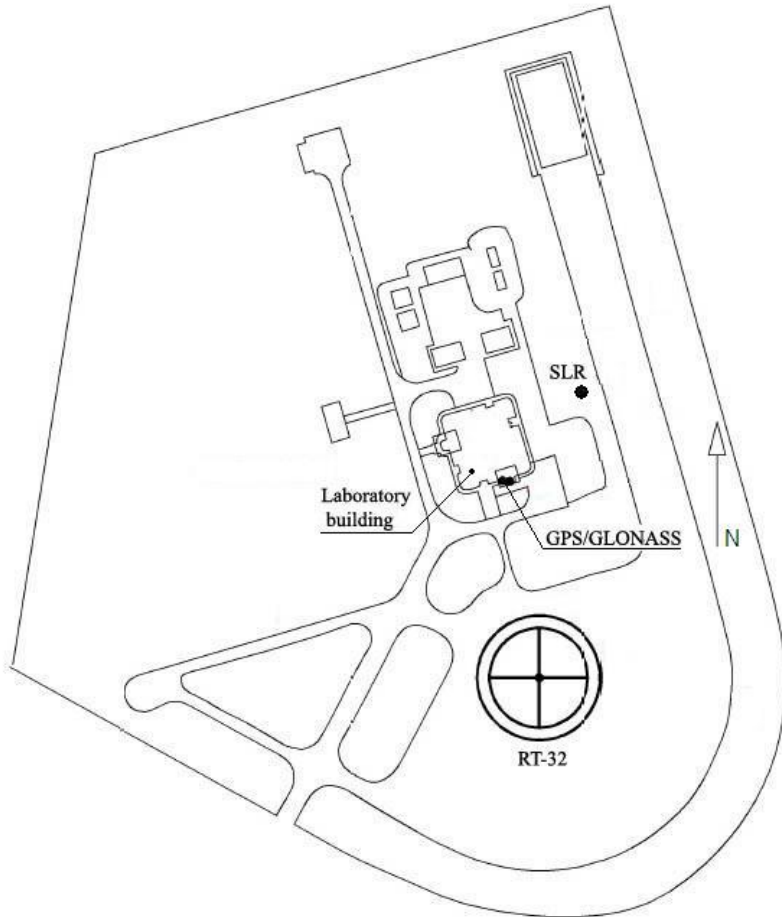
Daily variations up to 10" arise due to uneven heating of the building walls by the sun.

There are obvious correlations of inclination angles with the air temperature.

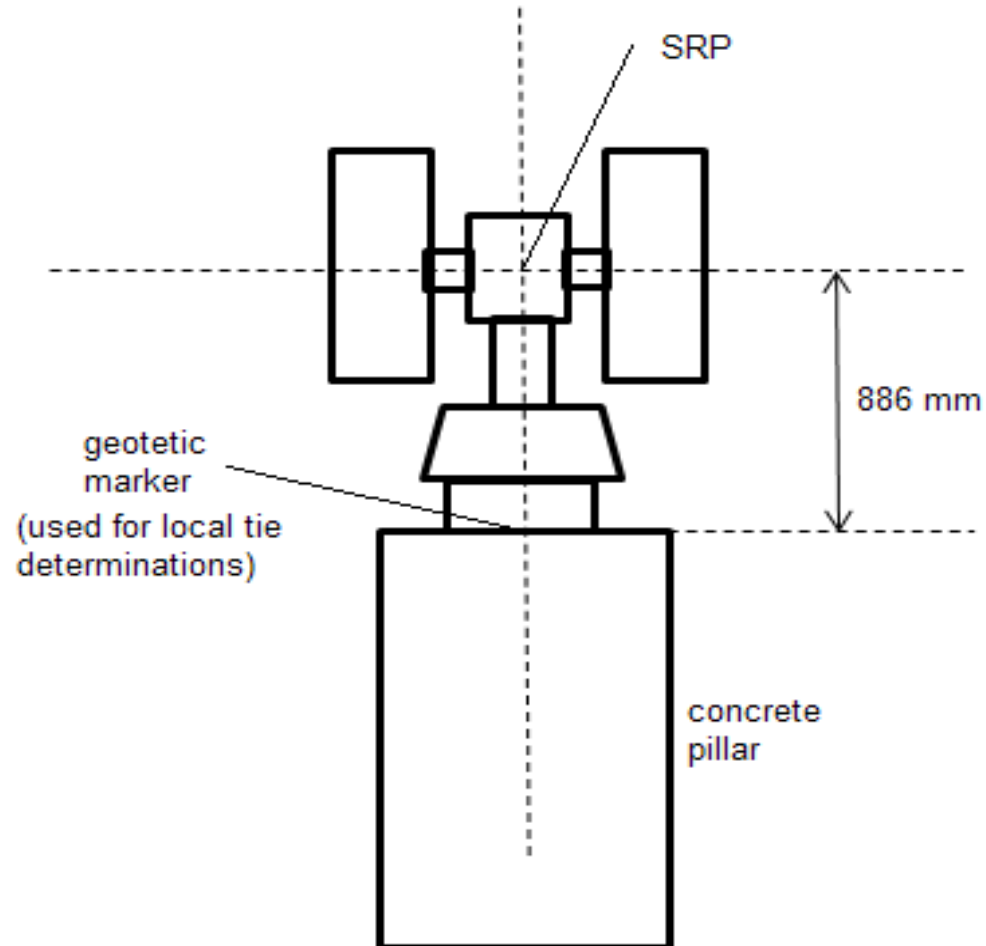


**Final decision was to install SLR system on the special concrete pillar**

# Location of observational instruments at «Zelenchukskaya» observatory



# SLR system reference point and surveyed geodetic marker





# Laboratory equipment of “Sazhen-TM” system



# “Sazhen-TM” and RT-32 radio telescope antenna

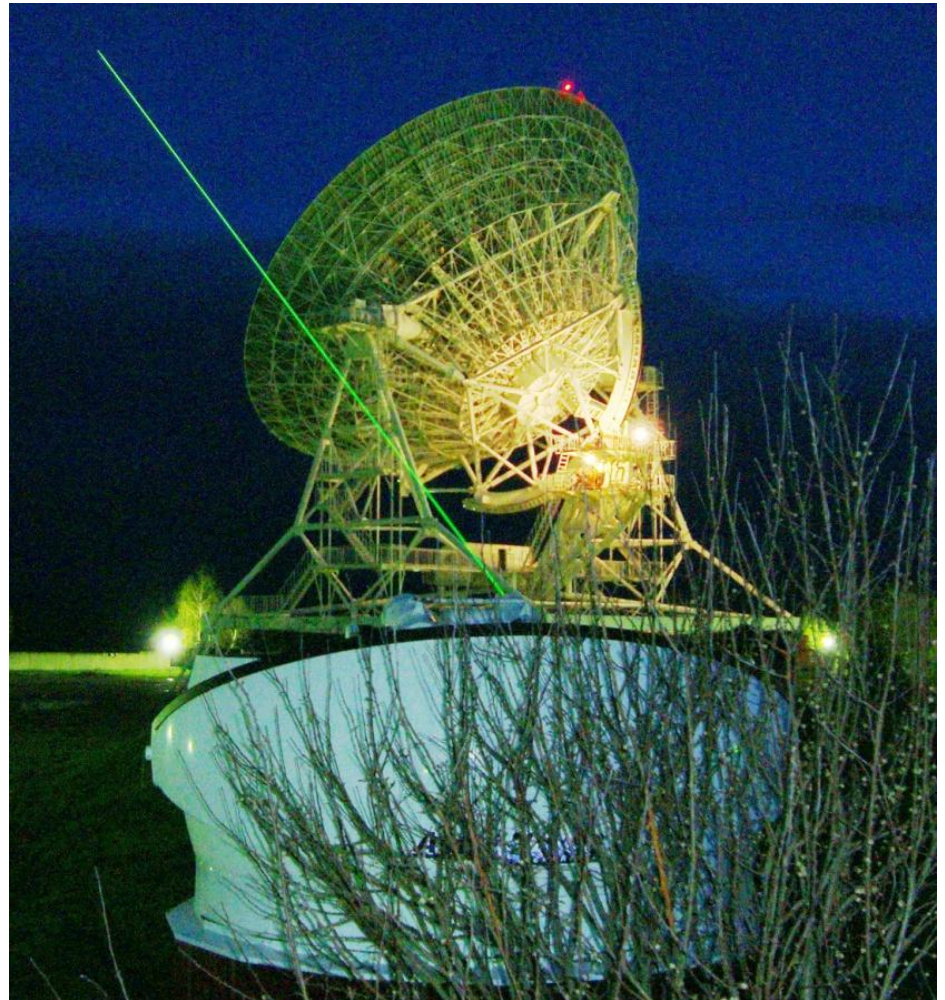




“Sazhen-TM” with dome



Test ranging of satellites with “Sazhen-TM” system



First successful ranging of LAGEOS satellites  
with “Sazhen-TM” system  
at Zelenchukskaya station  
has been carried out 18.05.2011

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