Development of SLR, GNSS MS and VLBI collocation nodes for refinement of GLONASS

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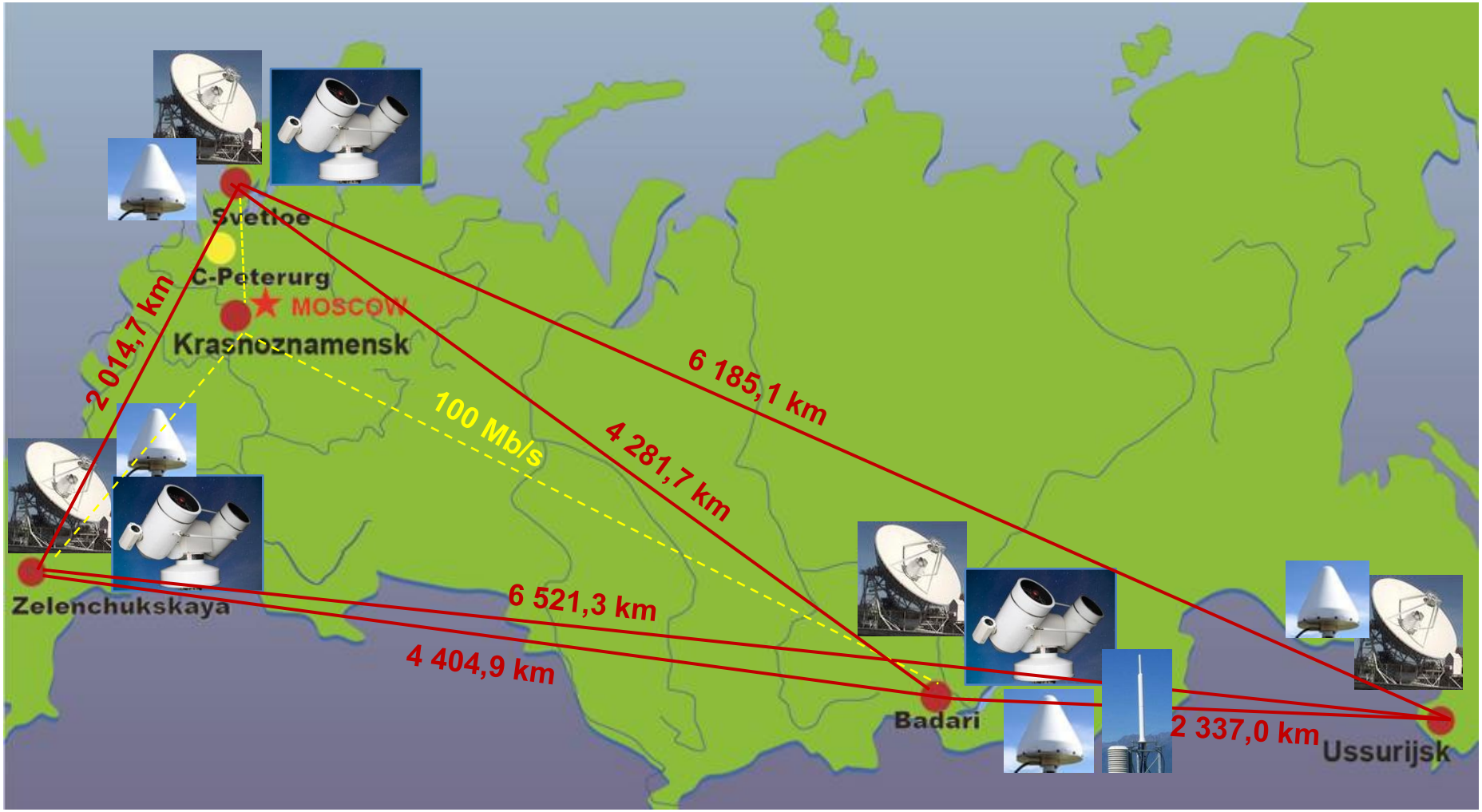
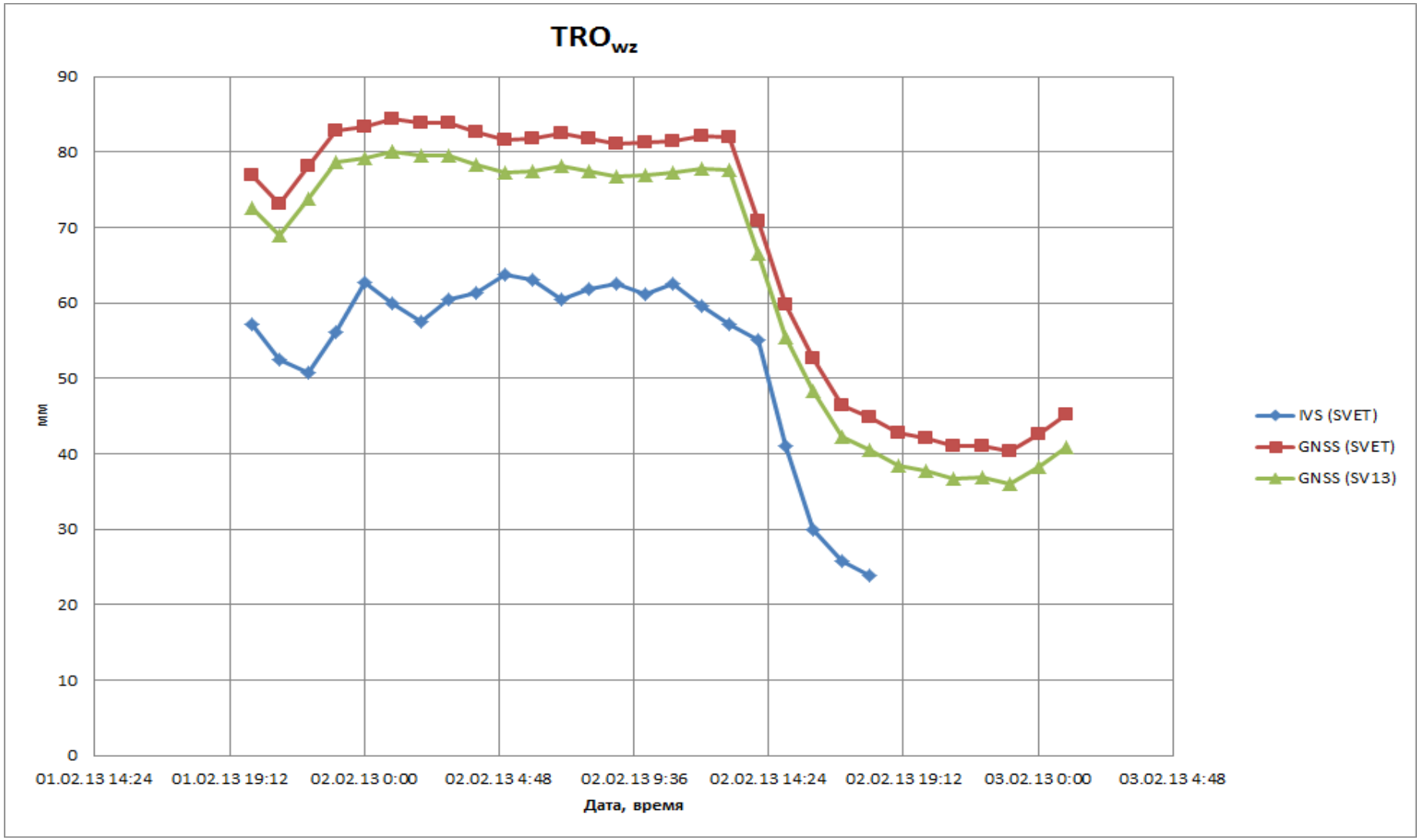
Next tasks of GLONASS development

- GLONASS navigation field accuracy – 0.5 m
- Navigation accuracy using functional complement:
  - real-time mode - 0.15 m
  - posterior mode - 0.03 m
- Earth Rotation Parameters at the level of 1.5 cm (in linear measure)
- Improvement of stations coordinates in Federal Geocentric Coordinate System (FGCS):
  - reference to the center of mass - 1 cm
  - relative reference - 0.3 cm
- Accuracy of refraction parameters – not worse than 1 cm using zenith latency in radio range
- Accuracy of calibration of GLONASS navigation on-board and on-ground hardware delays – not worse than 3-5 cm

The role of VLBI-GNSS MS-SLR collocation nodes for geodynamic support



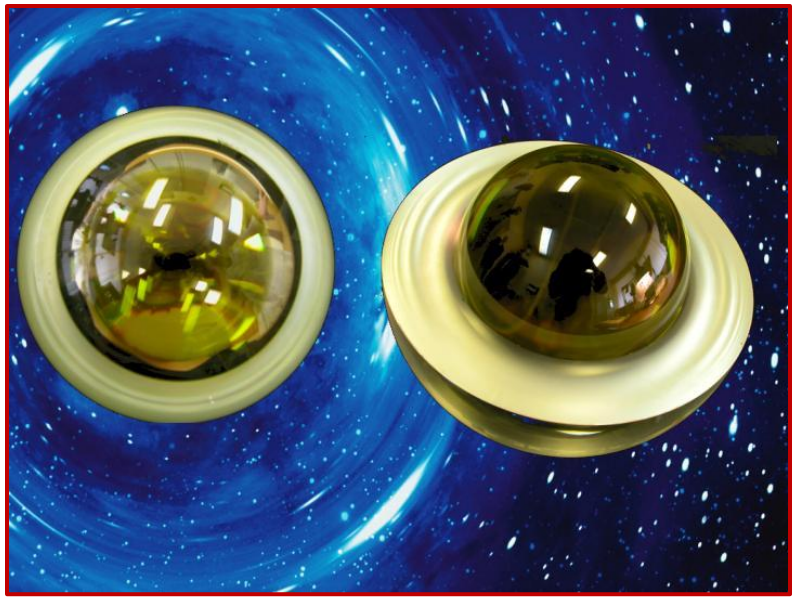
Mutual scaling of tropospheric delay refined using VLBI and GNSSMS data



Universal Time calculation is improved using results of refinement of zenith latency obtained from GNSS MS phase measurements at collocation node.

Improvement of geodetic support

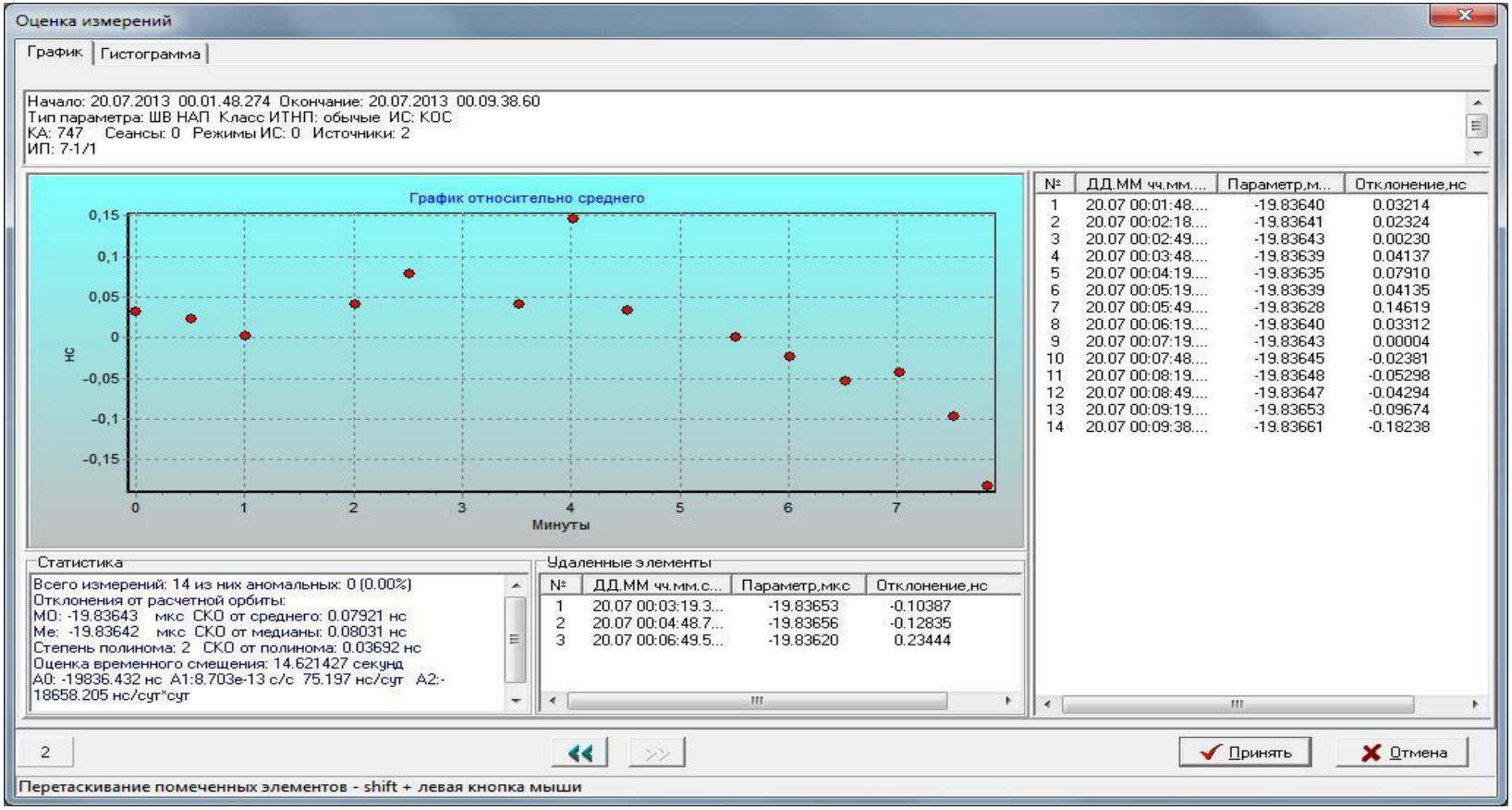
Launch of passive S/C BLITS with sub-millimeter target error for refinement of geocenter parameters



Parameter	Value
Orbit height	2000…3000 km
Orbit type	circular
Inclination	100° -110°
Ground track repetition	non-repeating
S/C diameter	up to 200 mm
COG error	less than 0.1 mm

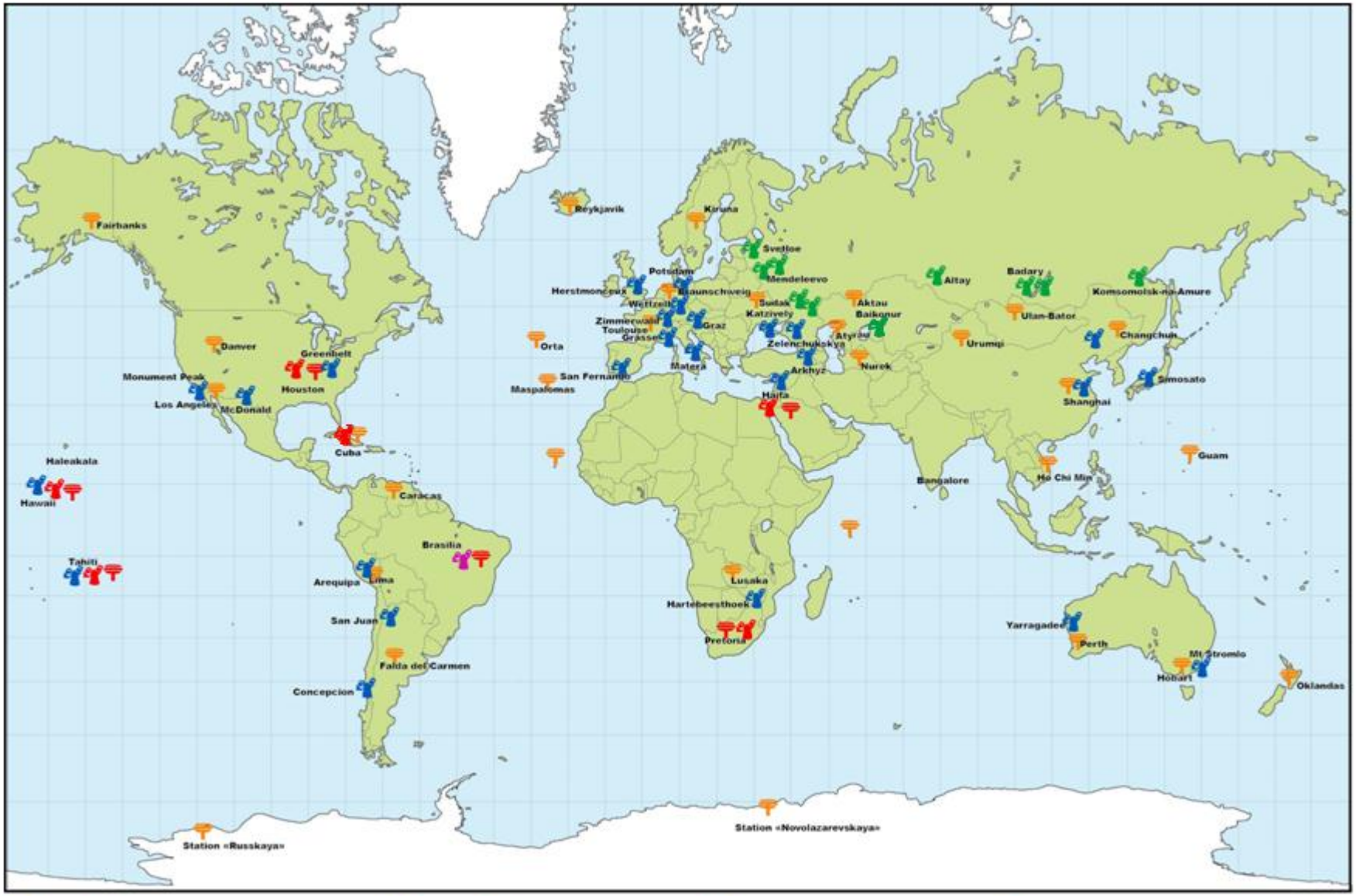
It would be useful to develop ILRS recommendations on BLITS orbital parameters selection

Results of experiment with one-way SLR at GLONASS-M №47 S/C



The error (RMS of 2nd degree polynomial) of comparison of the S/C onboard clock with reference frequency standard of ground one-way SLR of Altay Laser Center is 37 ps.

Proposal for placement of GLONASS receivers at ILRS stations and GLONASS SLR at IVS and IDS stations



БИС | Планируемое размещение БИС | ILRS | КОС на территории РФ | Планируемое размещение КОС | Вводится в эксплуатацию в ближайшее время

Conclusion:

1. Federal Program GLONASS foresees development of Russian stations network in foreign territories. We ask ILRS for support of development of collocation nodes by deployment of Russians GNSSMS at ILRS stations.

2. We are interested n ILRS recommendations regarding orbital parameters of a passive BLITS spacecraft that is preliminary planned for orbital injection at the height of 1500-3000 km.

Cooperation proposals

Placement of 40-50 GNSSMS and 6 SLR in ILRS, IVS and IDS networks

Conclusions

1. **Federal program for GLONASS foresees development of Russian stations network in foreign territories. ILRS support is needed to place GLONASS receivers at ILRS stations with priority for collocation nodes.**

2. **We are interested in ILRS recommendations for refinement of passive S/C BLITS orbital parameters.**

Thank you

for your attention ☺