GNSS informing and learning updates from Russian Federation

11th Meeting of the International Committee on Global Navigation Satellite Systems
6-11 November 2016

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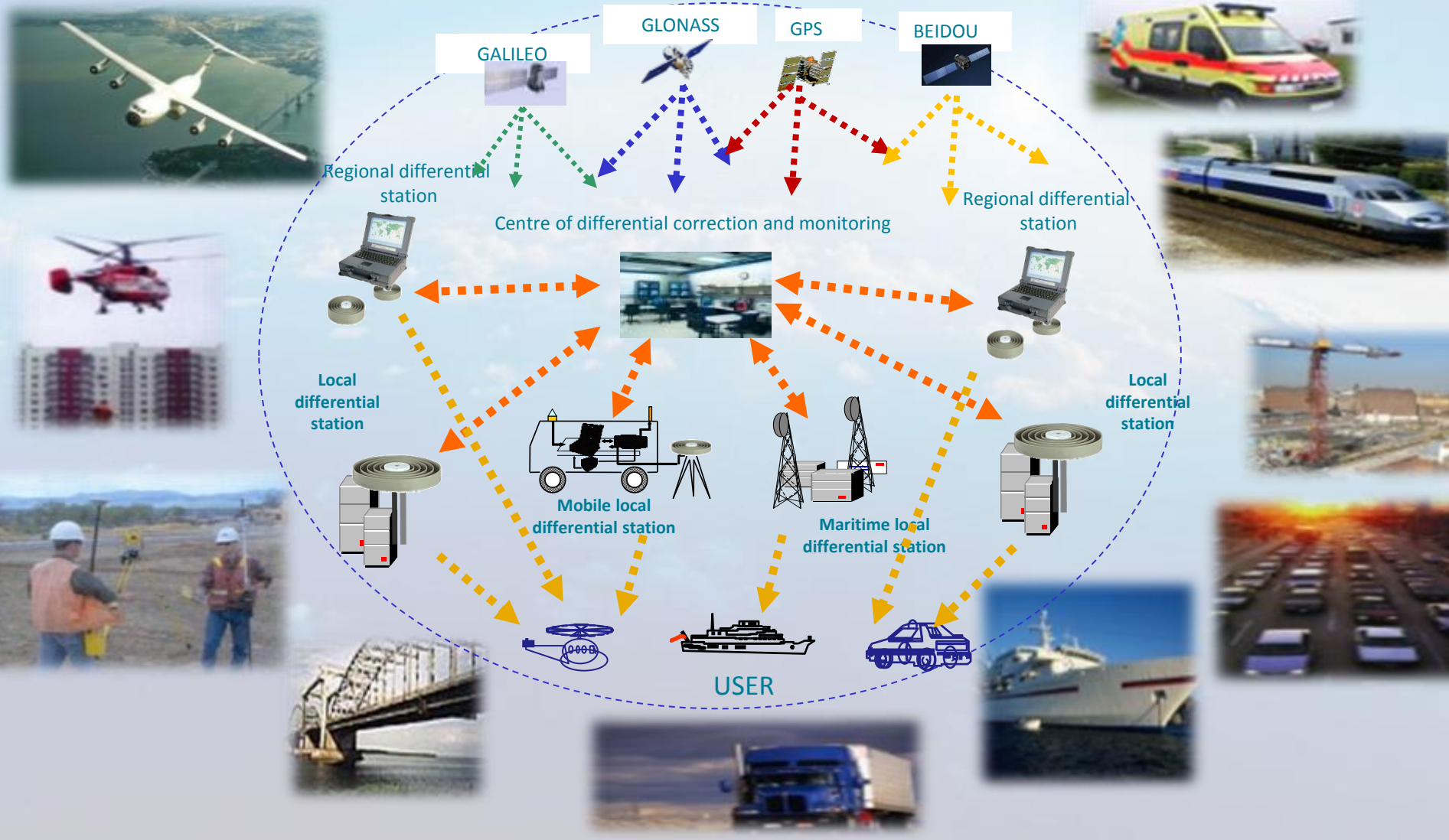


- GEOGESY

  GNSS technologies in geodesy, physical geodesy, geodetics methods for study of Earth geodynamic processes, the Earth gravitation study, astronomy-geodesy, space astrometry, theory of celestial mechanics, mathematical astronomy, gravitational astronomy, theory of motion of satellites and the orbit determination on base of on board measurements, geodetics applications for municipal administrations, mathematical treatment of measurements, software development, aero and space imaging, photogrammetry and phototopography, space remote sensing, charts and atlases design, graphics and revision, geoinformation technologies, cadastre, land and real estate monitoring and inventory etc.

- OPTO-TECHNOLOGIES

- Applied optics, Optics and Optoelecrtonic equipment, Laser equipment

MIIGAiK special GNSS courses

- Base course: Global Navigation Satellite Systems
- Space Geodesy
- Space Navigation
- Orbital Methods
- GNSS applied geodesy, reference networks applications for monitoring of global, regional and local geodynamic, etc.,etc
- Survey technologies, methods and equipment on base of GNSS signals
- Monitoring of Constructions

Post-graduate education, Graduate school

(including GNSS applications)

- Geodesy
- Cartography
- Land management, cadastre and land monitoring
- Aerospace research of Earth, photogrammetry
- Geoinformatics
- Optical and optoelectronic equipment and systems
- Geoecology
- Economy and management of nation’s economy (in sectors including economy, development and management of enterprises, industry branches, complexes)

Education courses by MIIGAiK and Russian Space Systems

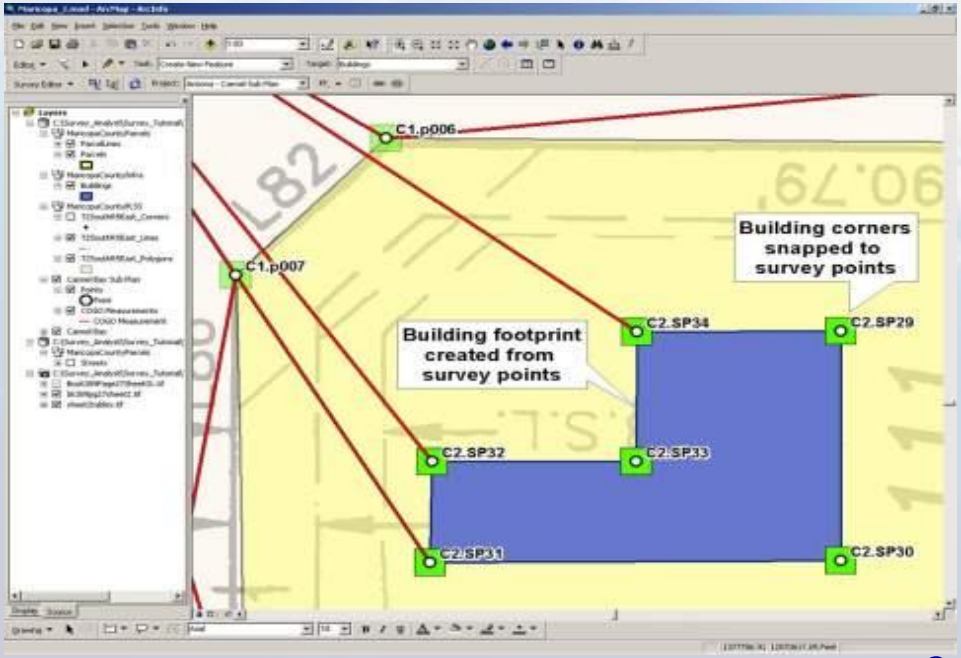
1. The fundamentals of satellite navigation
2. Application of satellite navigation to cadastral and land planning work
3. Application of satellite navigation to state geodetic networks
4. The organization and planning of field operations while making GNSS cadaster surveys
5. Application of satellite technologies in earthquake regions
6. Application of satellite navigation in railroad and VTS
7. Application of satellite navigation in buildings deformations monitoring
8. Structure of satellite-based geodetic networks
9. GLONASS-GNSS application for global, regional and local geodynamics
10. Metrological aspects of GNSS (GLONASS) equipment applications
11. GNSS technologies in the inventory of real estate lands and objects
12. GNSS technologies in monitoring of transport infrastructure objects, the procedure for keeping and making a digital cartographic basis
13. GNSS technologies for making of digital navigation charts
14. GNSS application in topographic surveying and linear constructions monitoring (oil and gas pipelines, power transmission lines)
15. GNSS technologies and equipment in making underground metro lines, underground constructions, tunnels

The course gives general knowledge on the GNSS main segments, the theory of coordinate determination, satellite constellations, signals structure, equipment, GNSS applications market

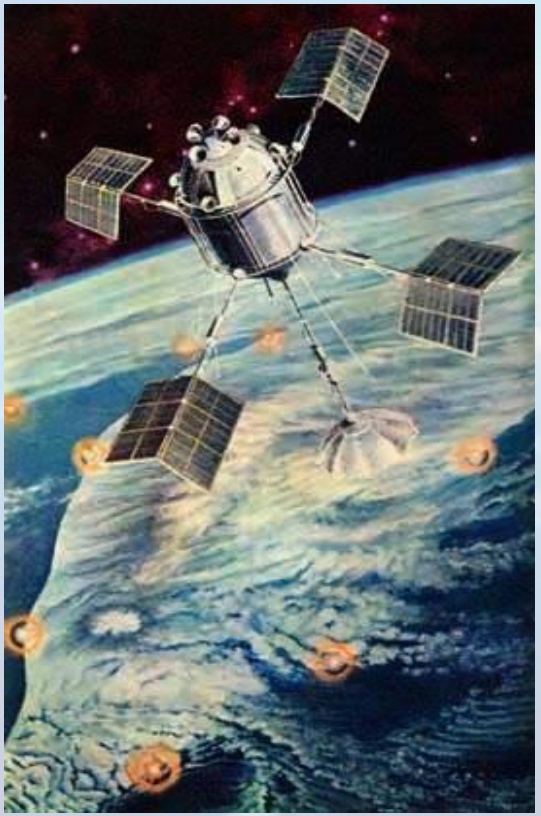
The training course: GLONASS-GNSS technologies and equipment for Cadaster and Land management

Acquaintance of the students with GNSS technologies of defining coordinates with GPS-GLONASS satellite receivers (standalone and dual frequencies). Processing, analyzing and estimating the accuracy of the results obtained for cadaster and land and real estate management.

Training of cadastre and land use specialists with knowledge of technologies of satellite-based geodetic measurements



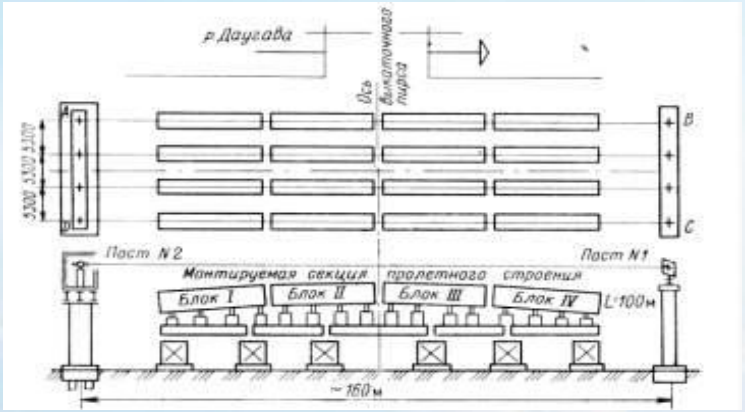
The training course: GLONASS-GNSS applications in earthquake regions



After the Course the students have basic skills in modern methods for observing the motions and strains of the Earth's surface in seism active regions with the use of global navigation satellite systems

The training course: GNSS applications in constructions deformation monitoring

HIGH-RISE BUILDINGS



BRIDGES

DAMS

As result student have knowledge in equipment operation, software, technologies of monitoring of different types of engineering constructions with GNSS technologies

The training course: Field survey management and planning of Cadaster with GLONASS-GNSS

РКС
РОССИЙСКИЕ КОСМИЧЕСКИЕ СИСТЕМЫ

MIIGAIK students and post-graduate practice

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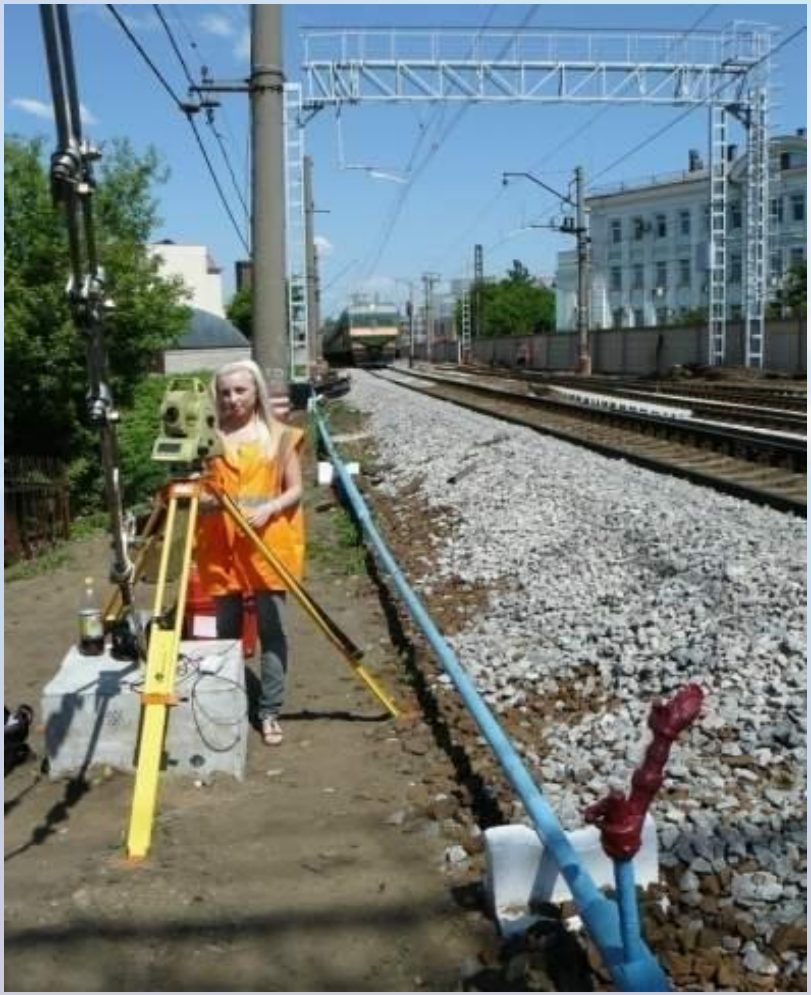

Russian Space Systems Training center

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Cooperation with leading universities for target training

Work of basic subfaculties in universities

Involving young people to participate in programs, grants, schools, workshops

Postgraduate study in Russian Space Systems

Russian Space Systems profile faculties

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РОССИЙСКИЕ КОСМИЧЕСКИЕ СИСТЕМЫ

Aerospace and geographic information systems and information technology; Electronic-computing devices and informatics

Information technology rocket telemetry

Physical and mathematical methods of designing complex technical systems of space technologies

Space industry

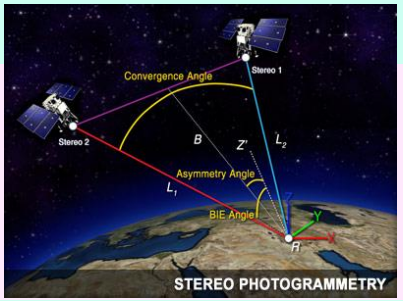
Space and aviation industry

РКС
РОССИЙСКИЕ КОСМИЧЕСКИЕ СИСТЕМЫ

Radio engineering, including systems and TV devices

Radiolocation and radio navigation

System analysis, management and information processing (on branches: engineering science, physics and mathematics



Solid-state electronics, radio-electronic components, micro- and nano- electronics, devices based on quantum effects

Aerospace research of the Earth, photogrammetry

Russian Space Systems
GNSS informing and educational activities

International School on Satellite Navigation

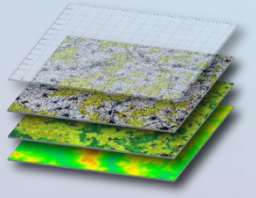
***56 – 72** hours (5-10 days)*

Lections, practical, round tables, excursions

*Since 2011: **over 300** students from Russia, Kazakhstan, Moldova*

International School on Satellite Navigation

- GNSS architecture, development, compatibility trends
- Navigation signals
- User equipment accuracy characteristics
- The integrated use of GNSS and Remote Sensing data in transport, fleet, big constructions and earth surface monitoring, surveying
- Metrology, cartography
- Features of the GNSS market, practical solving of technical and organizational problems



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Russian Space Systems: other educational activities

Seminar for ASEAN countries "Practical use of satellite navigation technologies GLONASS/GPS" - April, 2015

Seminar for Ministry of Internal Affairs of the Russian Federation «Use of GLONASS/ technologies in resolving special tasks" - November, 2015

Seminar «Use of Remote Sensing data" - October 2016

Planned on 2017:

VII International School on Satellite Navigation (September, 2017)

Practical seminar for Russian Railways company on use of GLONASS-GPS

International activities and initiatives

- The Moscow State University of Geodesy and Cartography education system and the global navigation satellites systems application

  United Nations/Moldova/United States of America Workshop on the Applications of Global Navigation Satellite Systems Chisinau, Moldova, 17-21 May 2010

- The Moscow Geodesy and Cartography State University (MIIGAIK) experience in educating of specialists in applications of GNSS

  United Nations/United Arab Emirates/United States of America Workshop on the Applications of Global Navigation Satellite Systems Dubai, 16-20 January 2011

- GNNS/GLONASS SPECIAL APPLICATIONS AND THE PROGRAMS OF PRACTICAL TRAINIG OF SPECIALISTS

  The Seventh Meeting of the International Committee on Global Navigation Satellite Systems (ICG-7), 4 - 9 November 2012, Beijing, China

International activities and initiatives (continued)

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Organizing the cooperation of Russian Education Center with the United Nations – affiliated Regional Centers for Space Science
and Technology Education
ICG-5, Turin, October 2010

Multimedia in training of specialists in GNSS: Russian experience
ICG-6, Tokyo, September 2011

Proposed role of Russian Education Cenger in constituted world GNSS centers network
ICG-7, Beijing, 2012

GLONASS Learning Centre
ICG-8, November 2013, Dubai

The Moscow State University of Geodesy and Cartography is the education centre for graduation of international specialists of the global navigation satellite systems
ICG-9, November 2014, Prague

GNSS Training Of Specialists
United Nations seminars and workshops: 2013 - 2015

Conclusion

In cooperation Joint Stock Company "Russian Space Systems" and Moscow State University of Geodesy and Cartography are working actively to inform users about the GLONASS-GNSS technologies

It is offered to highlight an experience of Russian Space Systems and Moscow State University of Geodesy and Cartography and inform the interested universities, information and education centers about the educational GNSS activities in Russian Federation

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Thank you for you attention!