Training experience of highly qualified specialists in GLONASS/GNSS applications

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ICG-10
1-6 November 2015
Boulder, USA
International educational activities

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

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

- 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
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 Center 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
The next level of mass service – precision positioning

The development of ground infrastructure of high-precision navigation system
Wide Area Augmentation

Precise Ephemeris and Clock System

Earth Attitude and Rotation System

GLONASS/GNSS

Time Reference System

Regional Augmentations

Certification Standardisation

Geodesy Reference and Maps

Special User Equipment

Civil Users Equipment

Inertial navigation

Synergy of performance and requirements
• “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 Optoelectronic 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
• Geodesy (INCLUDES ALL GNSS APPLICATIONS)
• Cartography (INCLUDES ALL GNSS APPLICATIONS)
• Land management, cadastre and land monitoring (INCLUDES ALL GNSS APPLICATIONS)
• Aerospace research of Earth, photogrammetry (INCLUDES ALL GNSS APPLICATIONS)
• Geoinformatics (INCLUDES ALL GNSS APPLICATIONS)
• 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)
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 cadastral surveys with the use of the GNSS,GLONASS"
5. “Application of satellite technologies in earthquake regions"
6. “Application of satellite navigation to railroad and VTS”
7. “Application of satellite navigation to monitoring building structures deformations”
8. "The Structure of satellite-based geodetic networks"
9. “GNSS (GLONASS) application for global, regional and local geodynamics"
10. "Metrological aspects GNSS (GLONASS) equipment applications."
11. “GNSS (GLONASS) technologies for the inventory of real estate lands and objects.”
12. “GNSS (GLONASS) technologies for monitoring of transport infrastructure objects, the procedure for keeping and making a digital cartographic basis“
13. “GNSS (GLONASS) technologies for making of digital navigation charts"
14. “GNSS (GLONASS) application to topographic surveying and monitoring linear constructions (oil- and gas pipelines, power transmission lines)"
15. “GNSS (GLONASS) technologies and equipment in making underground metro lines, underground constructions, tunnels"
The training course “The GNSS, GLONASS BASE COURSE”

- The purposes of the course are to give general knowledge on the GNSS main segments: the theory of coordinate determination, satellite constellations, signals structure, equipment, market segments of on the GNSS application. Practical application of satellite systems, to acquaint students with approaches and technologies of application of satellite navigation.
The training course «GNSS (GLONASS) TECHNOLOGIES AND EQUIPMENT FOR CADASTRE AND LAND MANAGEMENT SPECIALISTS»

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

• Training of cadastre and land use specialists with knowledge of technologies of satellite-based geodetic measurements.
After the Course the students will have basic skills in modern methods for observing the motions and strains of the Earth’s surface in seismoactive regions with the use of global navigation satellite systems.
The training course
«GNSS APPLICATIONS FOR CONSTRUCTIONS DEFORMATION »

As result, student will have knowledge in equipment operation, software, technologies of monitoring of different types of engineering constructions with GNSS technologies.
The training course «FIED SURVEY MANAGEMENT AND PLANNING OF CADASTRE WITH GNSS (GLONASS)»
MIIGAIK students and post-graduate practice
The example of the part of GNSS-GLONASS shelf zone, offshore mining, drilling training course of field application GLONASS-GNSS equipment
International School on Satellite Navigation
GNSS popularisation and the advanced training course

- Navigation signals
- Accuracy characteristics of user equipment
- The integrated use of satellite navigation and remote sensing in various areas (transport, fleet monitoring structures, surveying)
- Metrology, cartography
- Features of the satellite technologies market, practical solving of technical and organizational problems

245 students from Russia, Kazakhstan, Moldova since 2011

Students of various fields are wellcomed! School-VI: September 2016

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Application fields and trends of high precision satellite navigation

Andrey Kupriyanov – Deputy Director of GLONASS/GNSS Forum, MIIGAIK professor – at V-th International School on Satellite Navigation
Objectives:
Providing GLONASS-based services for users of Southeast Asia; establishment of mutually beneficial cooperations.

8 – 9 April 2015:
19 ASEAN representatives (Cambodia, Indonesia, Thailand, Vietnam, Laos, Malaysia, Brunei, Philippines, Myanmar)

Programme in brief:
- State and perspectives of GNSS and augmentation systems;
- Use of GNSS for positioning, car and fleet navigation and monitoring, the state of the Earth's crust, engineering structures, geodesy, mining, environmental protection;
- Practical training: performing a navigation tasks with modern precise equipment, processing of satellite data.
May 10-13, 2016
Moscow, Russian Federation

International Navigation Forum – key event in the field of development and application satellite navigation technologies
Conclusion

It is offered to recommend interested universities, information and education centers and other organizations operating in GNSS applications, to participate in such activities such as International School on Satellite Navigation and Workshop “Practical use of GLONASS/GPS satellite navigation technologies” and international MBA and PhD graduation programs.
Thank you for your attention!