The DSinGIS News   No.4

Highlights

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- ❖ Doctoral studies

- ❖ GISCA 2020 and GI 2021 Conferences
- ❖ Final Review Meeting
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Extension

The activities of the project were significantly affected by the COVID-19 epidemic. Based delays in the organization of the GI 2021 conference and study visits, as well as the late administration of the procurements, we requested an extension of the project by 6 months at the EACEA. According to the decision, the project deadline is extended. DSinGIS must be finished by 14 April 2020. The extension has no impact on the budget, all remaining tasks must be completed with the original budget.

Doctoral School

The DSinGIS project aims to support Uzbekistan in sustainable development by GISc focusing on the PhD level of the educational system. The project offers a PhD programme and methods to deliver. The demand on establishing a Doctoral School in the field of Geoinformation Science is in line with the aims of the Ministry of Higher and Secondary Specialized Education of Uzbekistan (MHSSE); consequently, as a breakthrough, the establishment of the Doctoral School has already been registered by the Supreme Attestation Commission under the Cabinet of Ministers (VAK) as a state-recognized PhD course.


The following eighteen courses were developed as part of the PhD program in accordance with the project objectives.

Common courses

1) *Spatial representations and spatial data infrastructures (SDI)*. The course providing a comprehensive overview on the state-of-the art of SDI, the underlying principles, as well as technological and non-technological components of SDIs.

2) *Spatial statistics*. The course aims at advancing knowledge on spatial data analysis and spatial statistics. It focuses on methods that are relevant in fields related to sustainable resource use and development of rural areas, such as land use change, climate change, soil degradation, and spatial analysis of well-being.
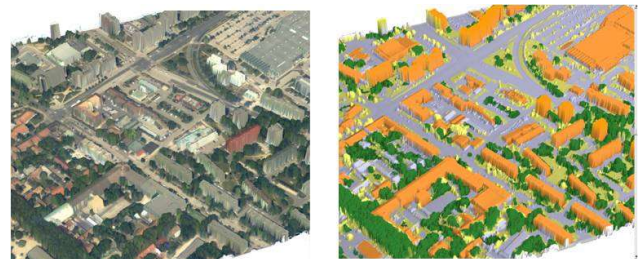
3) *Global Navigation Satellite Systems (GNSS)*: This course provides the students with an in-depth knowledge about global navigation satellite systems. The course will focus on high accuracy positioning methods, long term static observation methods for deformation monitoring and reference networks, and on atmospheric effects on GNSS signals.

4) *Visually interfacing with spatial information*: This course aims at introducing the complex field of visually interfacing with spatial information. Techniques and tools as well as concepts and standards to find, filter and visualize spatial data are presented. Technical skills and human-computer interaction competencies are built up.

5) *Research methodology and scientific communication*: This course introduces students to general research methods as well as practical research process, with focus on critical and creative thinking, addressing also scientific writing and communication in different forms and different media. Furthermore, social impact of scientific research, commercialization of research results through innovation is concerned.

6) *Advanced remote sensing and digital image processing*: This course aims at advancing remote sensing and digital image processing knowledge, techniques and skills for getting information from imagery and ability to solve complex tasks based on remote sensing. Emphasis is placed on gaining a practical understanding of the principles behind each technique and a consideration of their appropriateness in different applications.

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Courses for specializations

These courses are organised into 3 specialisations as follows:

Geodesy

o *Geodetic Reference Systems*. This course aims to further deepen the theoretical knowledge and practical skills for the development and management of research projects.
o *Advanced theory of errors*. This course consists of studying the theoretical foundations of multivariate statistical analysis in relation to the processing and analysis of geodetic measurements.

o *Satellite gravimetry & advanced physical geodesy* (in English). The course aims at advancing on physical geodesy knowledge from observational aspects, focusing on obtaining positioning and physical information from satellite-borne observations.
o *3D laser scanning and mapping by UAV*. This course focuses on application of 3D laser scanners and unmanned aerial vehicles in analysing data and creating digital maps or update existing maps.

Geoinformatics

o *Geo-databases and distributed architectures*. This course is on developing techniques and skills for designing and building a geospatial database, as well as managing such distributed geodatabases, and working with multi-user spatial data base.
o *Advanced thematic mapping*. The course supports candidates in cartography, thematic mapping, cartosemiotics, contemporary issues of spatial data representation, use of automation and tools in geovizualisation.
o *Advanced spatial analyses*. This course aims to provide knowledge and skills necessary to investigate the spatial patterns, advanced analytical and practical skills to identify and apply the correct analytical tools for problem solving, and to appropriately interpret the analysis results.
o *Integration of remote sensing and GIS*. This course is a compulsory course for the PhD degree programs and

main aim of this course is exploring the synergies of integrated remote sensing systems and GIS.

GIS applications

o *Spatial decision support in land management* is to get an idea of the current regulatory and legal acts that regulate the subject of green law, and the application of this knowledge in practical activities, with emphasis on the current legislation of Uzbekistan.
o *Land use economics*: This course is aimed at promoting the knowledge of doctoral students in the field of land use and its economics.
o *Spatial simulation of environment*: This course is a prolegomenon to spatial simulation of ecosystems, embedding of the PhD student in modern research practices, introducing a young scientist into up-to-day context and language of the simulation domain, including proper software background.
o *Sustainable resource management* (in English): This course introduces key concepts related to natural resource management for food security and sustainable development. The course summarizes major trends in changes in resource management globally, across scales, and by geographic zone and country, considering also impacts of global climate change on water and land use, and their implications for sustainable resource management.

Doctoral candidates

Another important goal of the project was the development of human resources. In addition to the methodological workshops, we provided a total of 15 doctoral candidates with opportunities for short-term research at the European partner universities, 8 of them were able to complete their studies in EU before the COVID-19.

The remaining 7 grantholders of the DSinGIS scholarship will complete their research online within the extended project period. Their name and research topics are as follows: 1) Ilkhomjon Abdullaev: Cartographical providing of the land cadastre based on GIS technologies in Uzbekistan, 2) Akbarjon Khamraliev: Remote Sensing for Precision Agriculture: from data acquisition to gaining the information, 3) Barno Khalilova: GIS methods for land use optimisation in irrigated agriculture area with ecological constraints, 4) Azizjon Ruziev: Experimental researches of the methods and accuracy of engineering and topographic surveys, 5) Abdujalil Muminov: Designing and compiling a gardening atlas of Uzbekistan, 6)Vohidjon Niyazov Geodetic punches installation using GNSS technology, 7) Sherzod Uzokov:The Integrated Application of BIM and GIS in the Process of a Smart City Technology Implementation in Samarkand City.

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Knowledge Pool

Knowledge Centres has already been built for all UZ partner universities. These contain modern tools to host an e-learning infrastructure enabling and perform online scientific communication and provide a Knowledge Pool built in collaboration. The next figure illustrates the structure and the content of the Knowledge Pool.
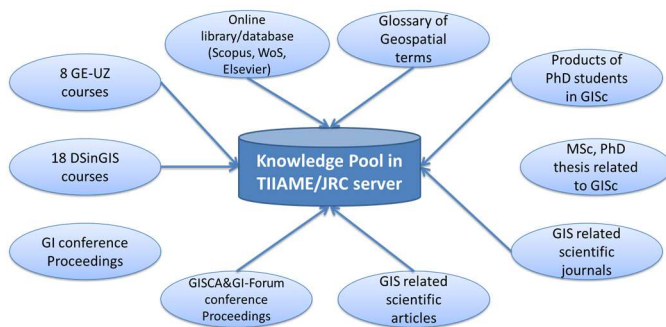
The Joint Research Centre has been planned and accepted by the PMB and will be tendered and purchased in the remaining phase of the project.

Meetings

Third Scientific Conference

Originally, the Final DSinGIS Conference has been planned to be combined with the Annual GISCA 2020 and InterCarto, InterGIS, SilkGIS under the topic „Applied Geoinformatics for Sustainable Development" at TIIAME. Due to the pandemic the confrence is held in online form in 1-3 June 2020. For further details see: http://intercarto.msu.ru/jour/index.php?lang=en While unfortunately the original plans for an on-site gathering of the geospatial community in Tashkent could not be implemented, the virtual conference format allowed for a much broader participation. Around 20 live presentations (for details see https://acagiscience-zgis.hub.arcgis.com) provided ample starting points for synchronous and follow-up discussions, with the freely available session recordings registering hundreds of views since then. The proceedings were published at (http://intercarto.msu.ru/jour) in partnership with InterCarto, some selected papers edited into a special issue of the International Journal for Geoinformatics. Planning for GISCA 2021 already is underway for May 30 – June 2, aiming at a hybrid format with coordinated local on-site conferences in several cities, all live streamed into an integrated experience for participants sharing the common interest in Geoinformatics with a Central Asia focus.


Fourth Scientific Conference

In order to provide an opportunity for face-to-face discussions and presentations, an additional GI conference has been decided to be held at TIIAME, Tashkent under the name GI 2021 "Supporting sustainable development by GIST" in 27-29 January, 2020, as a joint event with the Final Meeting.
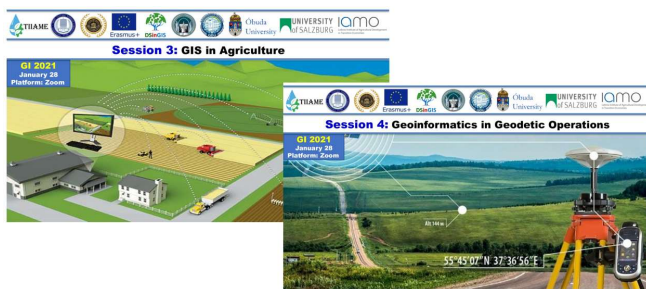
Unfortunately, due to COVID restrictions, these events also had to be held online. TIIAME provided a Zoom platform for more than 500 registered participants. The presentations and discussions were translated into Uzbek, Russian and English by simultaneous interpreters. Key topics of the conference were:
- GIS for regional Sustainable development – 3 papers;
- GIS for management in the field of environmental protection – 4 papers;
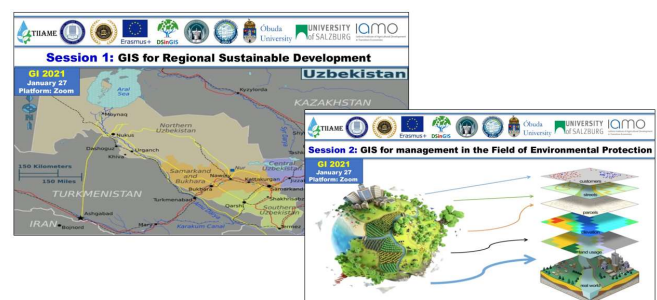
- GIS in agriculture – 4 papers;
- Geoinformatics in geodetic operations – 3 papers;
- New trends and technologies in cadastre and land management – 3 ppts;
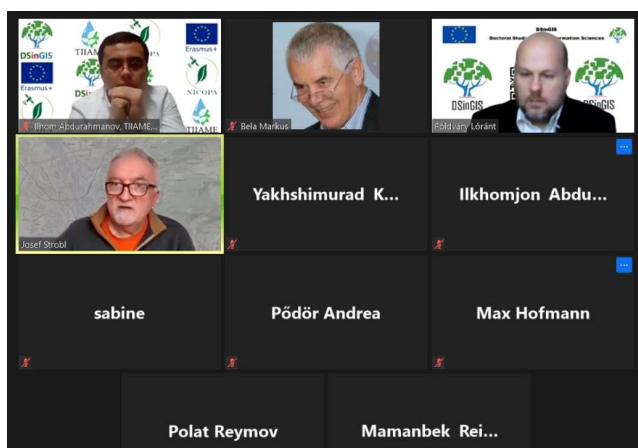- Professional and further education in the field of geoinformatics – 4 ppts;

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o   GIS in Mechanization and Automatization of Agriculture and Water Resources – 4 ppts.

All papers were peer-reviewed and published in the E3S Web of Conferences (Volume 227) at https://www.e3s-conferences.org/articles/e3sconf/abs/2021/03/contents/contents.html.

For more information visit the conference website: http://geo.amk.uni-obuda.hu/gi2020/gi2020.htm

Final Review Meeting

The online Final Review meeting organized by TIIAME (Tashkent, UZ) in January 2021 discussed the results of the GI 2021 Online Scientific Conference; the preliminary agenda and preparations for Geoinformatics Winter School; content of the Knowledge Pool; evaluated the Quality Enhancement Programme; assessed the Internationalization Plan; analysed the Exploitation and Sustainability Report; Newsletters, posters, leaflets; negotiated the establishment of DSinGIS international network; listened the External Evaluation Report #4 presented by the chair of the External Evaluation Committee and the final report of the Project Advisory Board. The PMB has made decisions and give recommendations for the remaining project period.

Geoinformatics Winter School

The Summer School for Geoinformatics planned to be organized at Karakalpak State University in May 2020. The main aim of the course is to provide participants with practical and methodological skills which make them capable to use advanced spatial analysis methodologies and techniques of GISc in solving environmental management, socio-economic issues, and spatial decision support. Due to the COVID-19, the event has been postponed to 15-26 February 2021.

Based on the presentations by Malgorzata Verone Wojtaszek (OU) and mini projects the participants will be able to apply the OBIA (Object Based Image Anylysis) methodology; to detect Land Changes using eCognition approach; to provide Land Cover Mapping by using Remote Sensing.

During the second week Max Hofmann (IAMO) will introduce R, its functionalities, and advantages. Participants will learn Programming Basics (arithmetic operations and variables in R; working with vectors and data frames, indexing elements; if-else conditions, for-loops and functions); Plotting in R and Spatial Data operations (working with raster data and vector data). Each student is supposed to present his/her own research results at the end.

Websites

Two project websites are operated and updated regularly. The English site is available at http://www.dsingis.eu

The Uzbek site is available https://dsingis.geoinformatics.uz