

**XV - INTERNATIONAL SCHOOL OF  
“THE DETERMINATION AND USE OF THE GEOID”**

**from April 7 to 11, 2025  
Kazakhstan, Almaty**



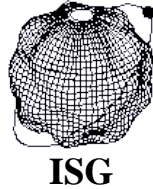
**Final Report**

**15th International School on**

**“The Determination and Use of the Geoid”**

**April 7 to 11, 2025**

**Institute of Ionosphere, Almaty, Kazakhstan**



## **15th International School on “The Determination and Use of the Geoid”**

April 7–11, 2025

Institute of Ionosphere, Almaty, Kazakhstan

The 15th International School on “The Determination and Use of the Geoid” took place in Almaty, Kazakhstan, from April 7 to 11, 2025. The event was organized by the Institute of Ionosphere in collaboration with the International Service for the Geoid (ISG) and the International Association of Geodesy (IAG).

This edition represented a landmark achievement, being the first occurrence of the School in Central Asia, thereby reflecting the region’s growing prominence and strategic relevance in the domain of global geodetic research.

The School was specifically designed to train graduate students, early-career researchers, and specialists from national geodetic agencies and academic institutions in the determination and application of gravimetric geoids for a broad spectrum of scientific and technical geodetic applications. It provided participants with a unique opportunity to acquire practical skills in state-of-the-art methods of geoid computation and to foster international cooperation among experts engaged in the modeling of the Earth's gravity field.

Structured as an intensive, week-long program, the School offered a well-balanced combination of theoretical lectures and practical workshops, encompassing such topics as global geopotential models, satellite gravimetry missions (including GRACE and GOCE), and various techniques for geoid determination. Attendees were introduced to specialized computational tools and became acquainted with different methodological approaches, such as the Stokes integral formula and Least Squares Collocation.

A significant focus was placed on the role of gravimetric geoid modeling in the realization of the International Height Reference Frame (IHRF) and in supporting the implementation of the Global Geodetic Reference Frame for Sustainable Development (GGRF). These international frameworks are essential for the harmonization and modernization of national vertical datums.

An important emphasis of the School was the promotion of collaboration between the scientific community and national geodetic services, encouraging the integration of advanced geodetic methodologies into operational geospatial infrastructure projects and national height reference systems.

All activities were conducted in person in Almaty, with English as the official working language, ensuring effective communication and facilitating professional networking and knowledge exchange among a diverse group of international participants.

## Faculty

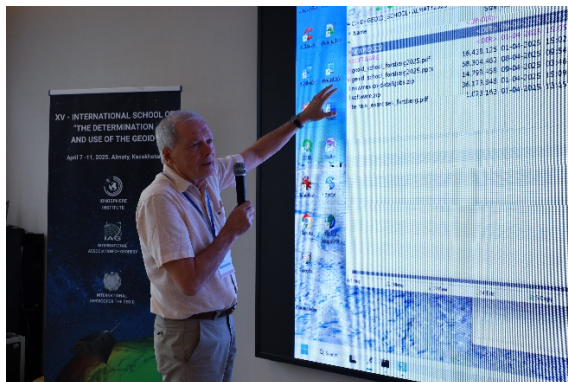
- Prof. Riccardo Barzaghi (Politecnico di Milano, Italy) (in person).
- Prof. Adrian Jäggi (Astronomical Institute, University of Bern, Switzerland) (In person).
- Prof. Rene Forsberg (Technical University of Denmark, DTU, Denmark). (In person).
- Prof. Laura Sánchez (DGFI-TUM), Germany. (In person).



***Prof. Riccardo Barzaghi***  
Politecnico di Milano  
(POLIMI)  
Milan, Italy



***Prof. Adrian Jäggi***  
Astronomical Institute, University of Bern  
(AIUB)  
Bern, Switzerland



***Prof. Rene Forsberg***  
Technical University of Denmark  
(DTU Space)  
Lyngby, Denmark



***Prof. Laura Sanchez***  
Deutsches Geodätisches Forschungsinstitut,  
Technische Universität München  
(DGFI-TUM)  
München, Germany

## Organizing Committee

- Serik Nurakynov (Director of Institute of Ionosphere, Kazakhstan)
- Daniela Carrion (Director of ISG, Politecnico di Milano, Italy)
- Mirko Reguzzoni (President of ISG, Politecnico di Milano, Italy)
- Daniya Shoganbekova (Institute of Ionosphere, Kazakhstan)
- Asset Urazaliyev (Institute of Ionosphere, Kazakhstan)

## Final school program

Date	Start time	End time	Lecturer	Topic
Monday				
07/04/2025	8.00	8.50		Registration
	8.50	9.00	Serik Nurakynov	Welcome, opening
	9.00	10.30	Prof. Riccardo Barzaghi	General theory on gravity field General Theory for Geoid Computation
	10.30	11.00	Coffee break	
	11.00	13.00	Prof. Riccardo Barzaghi	
	13.00	14.00	Lunch time	
	14.00	15.30	Prof. Riccardo Barzaghi	
	15.30	16.00	Coffee break	
	16.00	17.00	Prof. Riccardo Barzaghi	
Tuesday				
08/04/2025	9.00	10.30	Prof. Adrian Jäggi	Global geopotential models and practical exercises
	10.30	11.00	Coffee break	
	11.00	13.00	Prof. Adrian Jäggi	
	13.00	14.00	Lunch time	
	14.00	15.30	Prof. Adrian Jäggi	
	15.30	16.00	Coffee break	
	16.00	17.00	Prof. Adrian Jäggi	
Wednesday				
09/04/2025	9.00	10.30	Prof. René Forsberg	Terrain effect computation and remove/restore and practical exercises
	10.30	11.00	Coffee break	
	11.00	13.00	Prof. René Forsberg	
	13.00	14.00	Lunch time	
	14.00	15.30	Prof. René Forsberg	
	15.30	16.00	Coffee break	
	16.00	17.00	Prof. René Forsberg	
Thursday				
10/04/2025	9.00	10.30	Prof. Riccardo Barzaghi	Residual geoid estimation. The Collocation Method in Geodesy Practical exercises: residual geoid estimation The FFT Methods to Geodesy
	10.30	11.00	Coffee break	
	11.00	13.00	Prof. Riccardo Barzaghi	
	13.00	14.00	Lunch time	
	14.00	15.30	Prof. Riccardo Barzaghi	
	15.30	16.00	Coffee break	
	16.00	17.00	Prof. Riccardo Barzaghi	
Friday				
11/04/2025	9.00	10.30	Prof. Laura Sanchez	Height systems and vertical datum unification
	10.30	11.00	Coffee break	
	11.00	12.00	Prof. Laura Sanchez	
	12.00	13.00	Lunch time	
	13.00	14.00	Departure to the Institute of Ionosphere	Official Award Ceremony for Participants of the International School (at the Institute of Ionosphere)
	14:00	14:30	Overview of the Institute's Activities	
	14.30	15.00	Awarding of Certificates	
	15.00	15:15	Coffee break	
	15:20	16:00	Return to Conference Hall Area	
Roundtable				
11/04/2025	15:15	18:00	Round Table Session	Development and Implementation of National Vertical Reference Systems
	18:00	18:30	Leaving the Institute for Dinner	
	18:30	21:30	Dinner	



## Participants



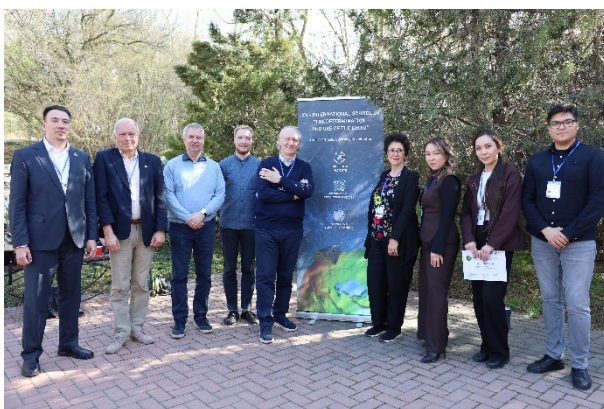
Group photo



Training sessions







Geoid School Closing and Certificate Awards

## Participants of the Geoid School

There were 32 participants registered for training at the school.

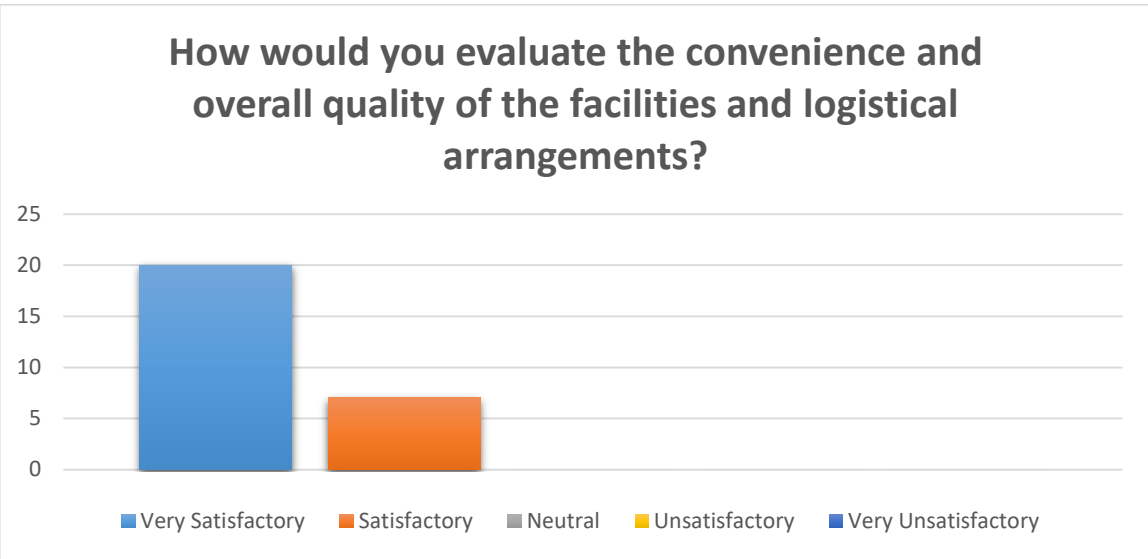
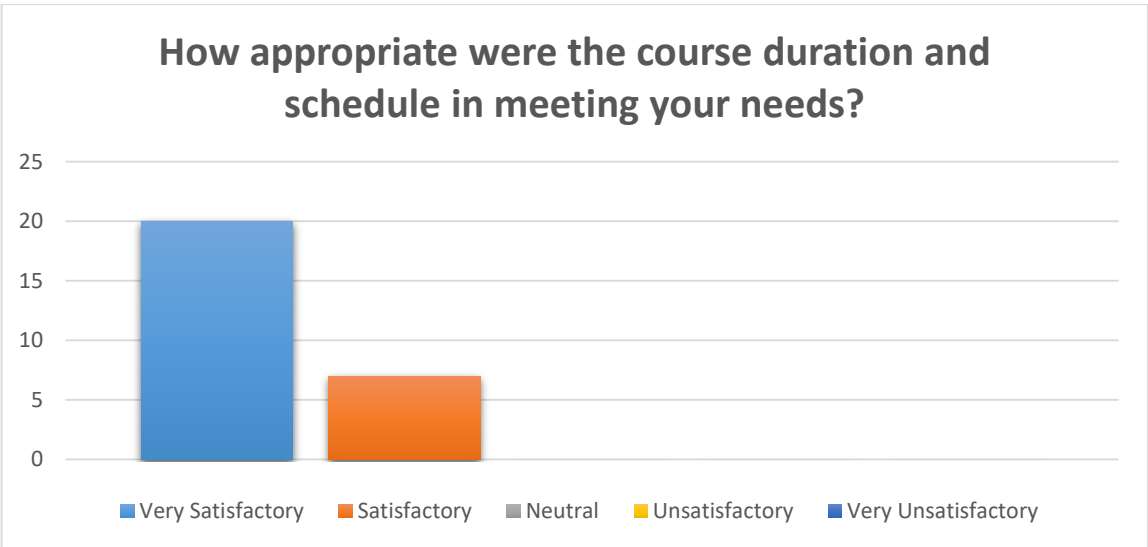
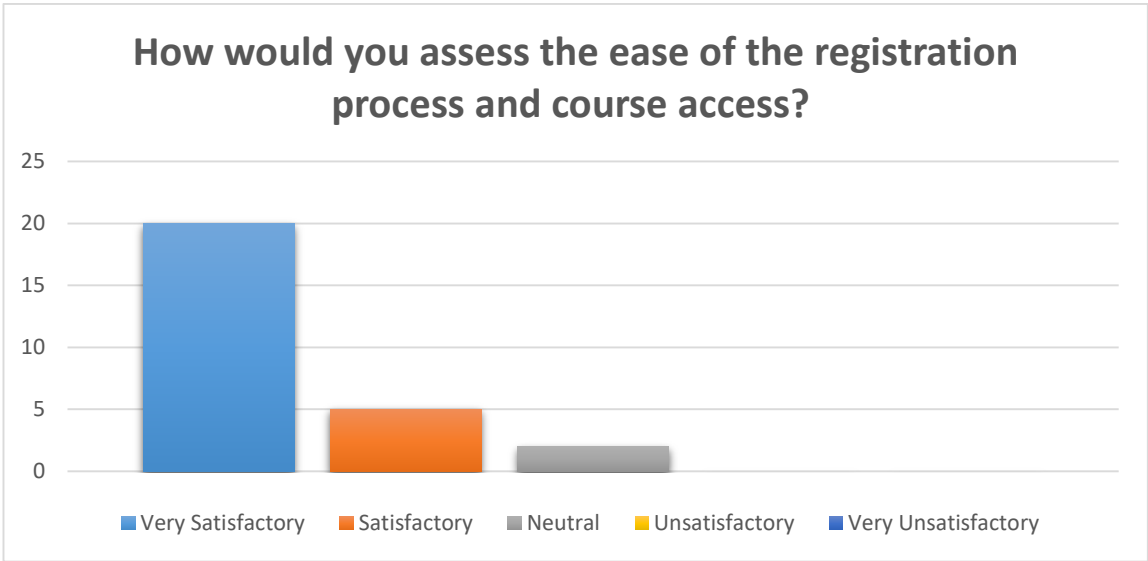
№	Country	Name	Surname	Organization	e-mail
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13	Kazakhstan	Aigerim	Omarbayeva	SEPC "Higher College of Geodesy, Cartography and Construction"	<a href="mailto:aygerim.omarbaeva@mail.ru">aygerim.omarbaeva@mail.ru</a>
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26	Russia	Ilya	Oshchepkov	Geodesy Department of the Geodesy and Metrology Directorate of the PLC "Roscadastr"	<a href="mailto:ilya.oshchepkov@gmail.com">ilya.oshchepkov@gmail.com</a>
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29	Kazakhstan	Aizhan	Sakhariyeva	SPC «GEOKEN» LLP	<a href="mailto:aizhaissa@gmail.com">aizhaissa@gmail.com</a>
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31	Kazakhstan	Almat	Utesbayev	RSE "State Institute of Agricultural Aerial Photographic Geodetic Surveys"	<a href="mailto:Alan-ulan@mail.ru">Alan-ulan@mail.ru</a>
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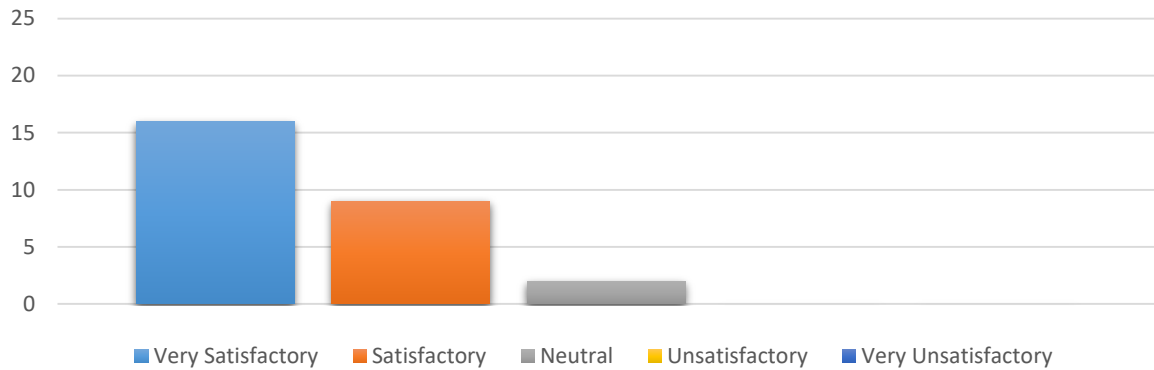
**Feedback questionnaire.** A satisfaction questionnaire has been filled up. The results are depicted in the following figures.

**Logistics**

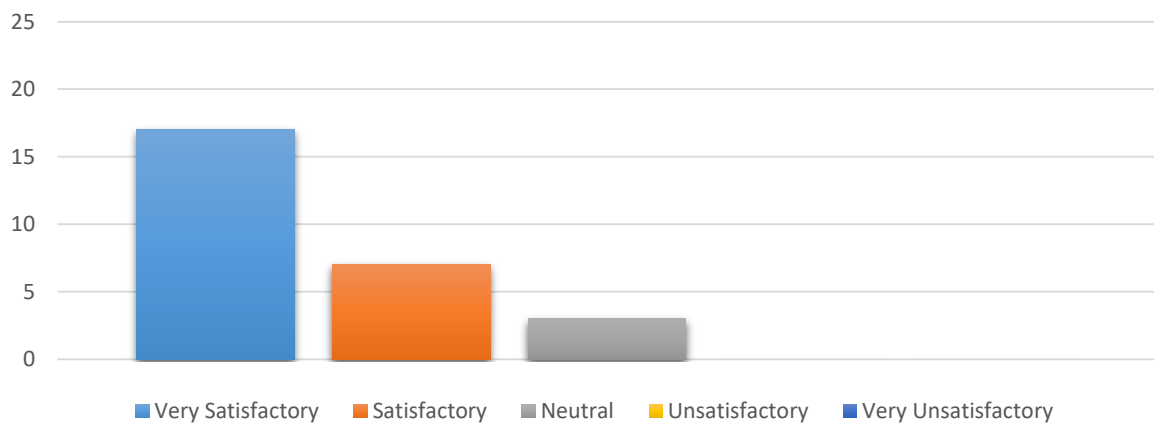


## Quality of Content

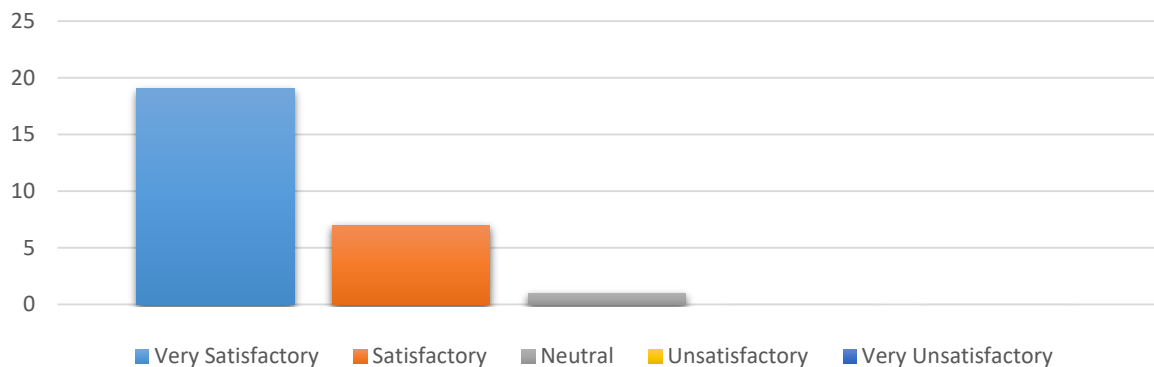
**To what extent was the course content relevant and beneficial to your professional or academic interests?**



**How clear, logical, and easy to follow was the overall structure of the course?**

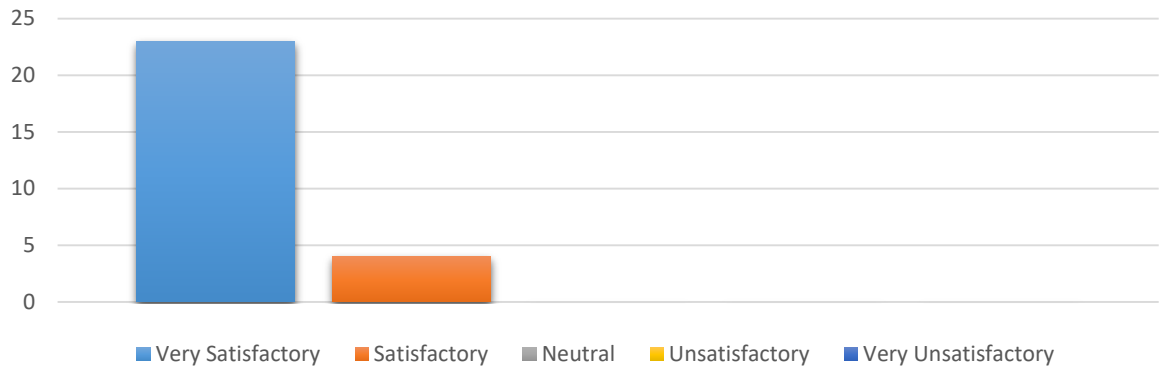


**How would you rate the quality and effectiveness of the instructional materials (presentations, readings, practical exercises)?**

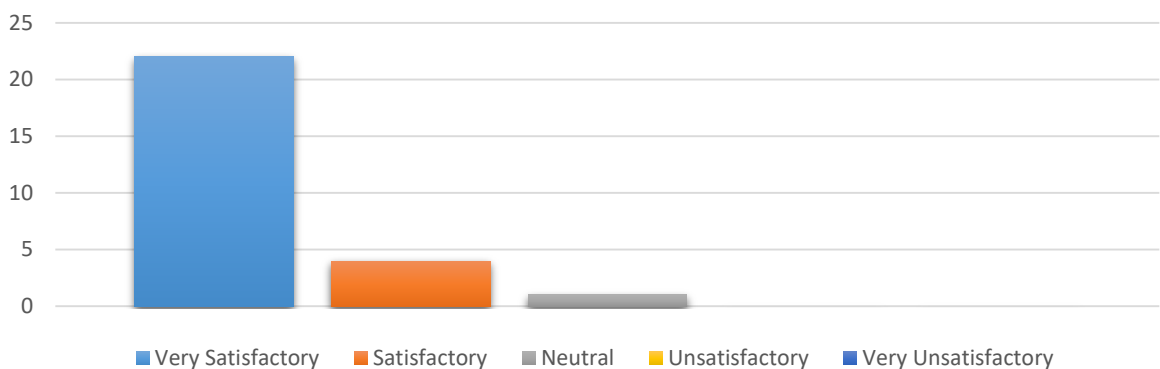


## Instructor Performance & Participant Support

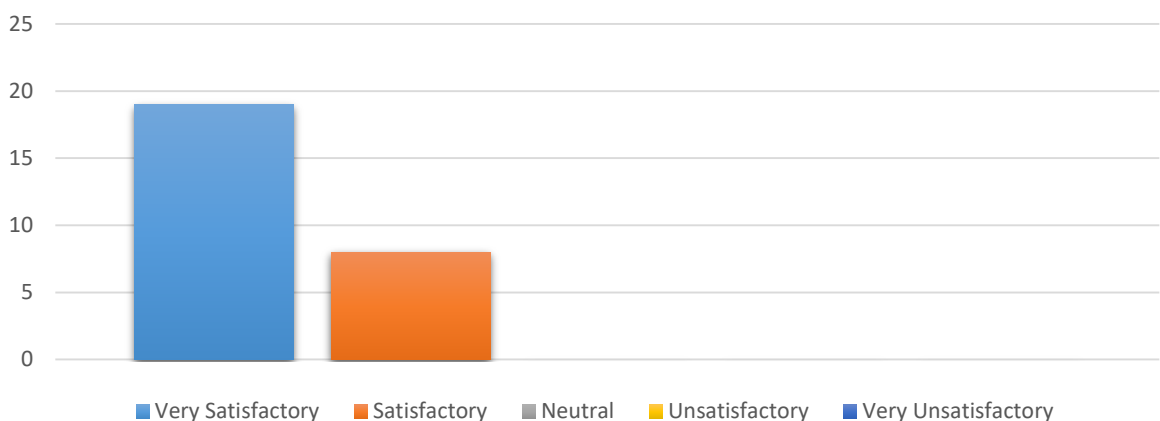
**How effective and responsive was the communication with administrative staff before and during the course?**



**How useful and supportive were the provided instructional materials (presentations, readings, practical exercises)?**



**Did you receive timely and constructive feedback on your performance and participation in the course?**





**Venue:**

Institute of ionosphere, Kamenskoe Plateau, Sadovodcheskoe tovarischestvo Ionosfera, 117 – Almaty, Republic of Kazakhstan.

**Distributed documents**

Presentations, software, data for exercises, and GRAVSOF manual were distributed to the students.

Each student received a participation certificate.

**Round table:**

On April 11, 2025, the Institute of the Ionosphere hosted a round table on “Issues in Establishing and Implementing National Height Systems.” The event brought together over thirty representatives of the relevant agencies from CIS member states. Key expert input was provided by the lecturers of the International School on Geoid Determination—Prof. Riccardo Barzaghi (Italy), Prof. Rene Forsberg (Denmark), Prof. Adrian Jäggi (Switzerland), and Prof. Laura Sanchez (Germany)—who, in an open-dialogue format, commented on the proposed approaches and shared best practices. Thus, the round table not only identified the principal challenges and outlined potential solutions, but also laid a solid foundation for continued cooperation among specialized organizations and the international expert community.





Highlights of the round table