

Conference Program

21-23 May 2025 VIII th Space Resources – Path to Lunar Sustainability (KGK 2025)

| Faculty of Materials Science and Ceramics | AGH University of Krakow |
| Building B-8 | Halls A & B |

Day 0 – Wednesday, 21 May 2025

9:30 – 12:30 KFB Workshop Apteka Designu – Agata Bisping & Marta Kotlarska (room 1.05, D-3 building, AGH Campus)

15:00 (MS Teams) Preconference Online Workshop for Presenting Authors ***Pitching your research to diverse audiences*** led by Anna Krukiewicz-Gacek, Sonja Bretschneider and Isobel Kersting.

18:00 – 22:00 Pre-conference Social Network Meeting - Kino Mikro (5 Lea Street , Kraków) – Cosmic Cinema ("Grawitacja") and prelection (dr inż. Paweł Janowski, Faculty of Physics and Applied Computer Science of AGH University of Krakow)

Day 1 – Thursday, 22 May 2025

8:00 – 8:45 Registration

8:45 – 10:00 Opening Session - **Hall A**

8:45 – 8:50	Conference Chairman - prof. Tadeusz Uhl (Dean of Space Technologies Faculty, AGH University of Krakow) - <i>Opening and Welcome</i>
8:50 – 8:55	Vice-Rector of AGH University of Krakow- prof. Rafał Wiśniowski - <i>Opening Speech</i>
8:55 – 9:00	Łukasz Wilczyński (European Space Foundation) - <i>Welcome Word</i>
9:00 – 9:30	Plenary Lecture – Mahulena Hofmann (University of Luxembourg) <i>"Sustainability of Space Mining in the Law"</i>
9:30 – 10:00	Plenary Lecture – Agnieszka Łukaszczyk (hiALtitude Consulting) - <i>„Uniting Beyond Borders: Space Cooperation for Solving Global Challenges”</i>

10:00 - 10:20 Coffee Break

10:20 – 12:00 (Hall A) Session – Space Resources Chairperson – Jakub Ciężela & Justyna Topolska	10:20 – 12:00 (Hall B) Session – Space Structures and Materials Design and Operations Chairperson – Czesław Kapusta
10:20 – 10:45 Tomas Kohout (Department of Electrical Engineering, Aalto University, Finland) <i>"Asteroid geology, resources, accessibility"</i>	10:20 – 10:40 Sarken Kapayeva (East Kazakhstan Technical University) <i>„Passive Ejector-Based Cooling System for Thermal Management in Spacecrafts"</i>

10:45 – 11:00 Gabriela Opila (AGH University of Krakow) „Analysis of distribution of minerals and elements in NWA 869 meteorite”	10:40 – 10:55 Filip Wylegała (AGH University of Krakow) „Investigating Lunar Regolith Adhesion via 3D Tomography and Centrifugal Detachment Method”
11:00 – 11:15 Marko Pratnekar (Cranfield University, United Kingdom) „Towards understanding, de-risking and validating in situ lunar bulk (granular) materials handling to support ISRU”	10:55 – 11:10 Marcelli Matłoz (Silesian University of Technology Faculty of Civil Engineering) "The comparative analysis of conditions of maturing process of geopolymers in relation to their final strength parameters”
11:15 – 11:30 Damian Pietrusiak (Wrocław University of Science and Technology) „Challenges in bulk materials separation in extraterrestrial conditions”	11:10 – 11:25 Wojciech Guzewicz (AGH University of Krakow) „Multifunctional microvascular composites for space applications”
11:30 – 11:45 Agnieszka Królicka (AGH University of Krakow) „LIBS analysis of lunar rock simulants”	11:25 – 11:40 Izabela Kalemba-Rec (AGH University of Krakow) „Friction Stir Welding of Al 5083 and Al 7075 Alloys: A New Opportunity for Designing Spacecraft Structures”
11:45 – 12:00 Merle Ranaud (Department of Earth Sciences , Uppsala University) „Mining lunar titanium: a potential solution for securing metal supply for the coming decades”	11:40– 12:00 Volodymyra Boychuk (Vasyl Stephanyk Precarpathian National University, Ivano-Frankivsk, Ukraine) „The Solid Oxide Fuel Cell: Space Missions Perspectives”

12:00 – 12:15 Radosław Gurdak (POLSA) „NSIS, CAMILA activities” Hall B

12:15 – 13:00 Lunch Break/ Group Photo

13:00 – 14:40 (Hall A) Session – Moon Exploration and Exploitation Chairperson – Karol Seweryn	13:00 – 14:40 (Hall B) Session – Business models and value chains in Space Mining. Economy, management and law. Chairperson – Katarzyna Malinowska
13:00 – 13:20 Matteo Pulliero (Qascom srl) „Extending GNSS Capabilities for Lunar Exploration: The NAVCOM Mission”	13:00 – 13:15 Katarzyna Malinowska (Kozminski University), Bartosz Malinowski (Centre of Space Research PAN) "Space sector governance models and international cooperation - strategic and legal approach to the role of space agencies in space mining”
13:20 – 13:40 Mateusz Pawłowski (University of Wrocław) „Test bench for identification the dynamic angle of repose of extraterrestrial, lunar simulants with visual system”	13:15 – 13:30 Piotr Kurczak- Kaczmarek, Nikodem Sarna (Centre for Space Studies, Kozminski University) „Economic conditions and business models in Space Mining - current state and future outlook”
13:40 – 14:00 Adam Kolusz et al. (AGH University of Krakow) "Comparative	13:30 – 13:45 Bartosz Sawik (Space Technology Centre, AGH University of

<i>Application of PIV and DIC for Analyzing Internal Failure Mechanisms in Tool-Regolith Simulant Interaction</i>	Krakow) „Multi-Criteria Optimization of Space Mission Supply Chain”
14:00 – 14:20 Danijela Ignjatović (Faculty of Natural Sciences and Engineering, University of Ljubljana) <i>“Standardizing Lunar Oxygen Extraction for Sustainable Space Infrastructure”</i>	13:45 – 14:00 Oleksandr Koshovyi (Southern Machine-Building Plant named after A. M. Makarov (Pivdenmash), Ukraine) <i>“Space Law and Management”</i>
14:20 – 14:40 Andrzej Bielecki (AGH University of Krakow) <i>“Functional properties of the autonomous robot equipped with the model of conditioned anxiety”</i>	14:00 – 14:40 Discussion Panel

14:40 – 15:00 Coffee Break

15:00 – 16:40 (Hall A) Session – Cybersecurity in Space Chairperson – Magdalena Ostasz	15:00 – 16:40 (Hall B) Session – Student Session Intro Chairperson – Piotr Kulinowski
15:00 – 15:10 Magdalena Ostasz (Head of the Legal Advisors Department, AGH University of Krakow) <i>“Navigating Cybersecurity Risks in the Space Sector: Supply Chain Vulnerabilities and Regulatory Frameworks under NIS2”</i>	Session Intro – Piotr Kulinowski & Anna Krukiewicz – Gacek (AGH University of Krakow)
15:10 – 15:20 Anna Blechova (PhD candidate) <i>“Cybersecurity, the EU and National Approaches: Are we winning the legal battle on the final frontier?”</i>	Fifty 2 min slots for Students (Posters Introduction)
15:20 – 15:30 col. Przemysław Przybylak (Polish representative in NATO for cybersecurity) <i>“Current courses of action to ensure the cybersecurity of satellite technology in NATO”</i>	
15:30 – 15:40 col. Paweł Chodosiewicz (Geospatial Intelligence and Satellite Service Agency) <i>“Standards, best practices and recommendations for space technology cybersecurity”</i>	
15:40 – 15:50 płk rez Piotr Januszewicz (advisor to the Rector of the AGH University of Krakow for defence projects) <i>“Use of classic methodologies for analysing the cybersecurity of satellite systems using the system decomposition method as an example”</i>	
15:50 – 16:00 dr Nafaa Jabeur (associated professor, GUtech Oman) <i>“Secure AI-Driven Social Bubble”</i>	

Framework for Resilient Shared Mobility in Lunar and Space Environments"

16:00 – 16:40 Discussion Panel



19:00 – 23:00 Space Galaxy Fluo Gala Dinner



Invited Speech – Kuba Kulesza, Agata Bisping - Grupa Robocza/Apteka Designu

Day 2 – Friday, 23 May 2025

8:00 – 8:30 Registration

8:30 – 9:30 Opening Session – Plenary Lectures **(Hall A)**

8:30 – 9:00 - Plenary Lecture – Emma Gatti (Space Analysts, AGH University of Krakow) *"Prospecting the Moon: Facts, Myths and Markets"*

9:00 – 9:30 - Plenary Lecture – Martin Tajmar (AGH University of Krakow) – *„From Rockets to Deep Space Exploration: What's the State-of-the Art in Propulsion"*

9:30 – 10:30 POSTER SESSION with Coffee part I (Chairman: Piotr Kulinowski)

10:30 – 12:10 (Hall A) Session – Deep Space Exploration Chairperson – Olga Sergijenko	10:30 – 12:10 (Hall B) Session – Earth Observation and Sensors Issues Chairperson – Michał Lupa
10:30 – 10:45 Olena Kompaniiets (Main Astronomical Observatory of the National Academy of Sciences of Ukraine, Kyiv, Ukraine) <i>„Tracing X-ray Signatures of 2MIG Isolated AGNs: Uncovering Potential Milky Way Analogues"</i>	10:30-10:45 Ilze Bargā (SIA Baltic Satellite Service) <i>"Earth Observation data platform for governments and R&D institutions and variety of platform's supported applications"</i>
10:45 – 11:00 Inna Izviekova (Main Astronomical Observatory of the National Academy of Sciences of Ukraine, Kyiv, Ukraine) <i>„Isolated galaxies with AGN: Tracing Milky Way Analogues"</i>	10:45 – 11:00 Wojciech Bylica (Cloudferro S.A.) <i>„A step towards World's first Planetary Data Lake -Beyond Earth-STAC by Cloudferro as an Earth's Moon Comprehensive Data and Information Access Service"</i>
11:00 – 11:15 Olga Sergijenko (AGH University of Krakow) <i>„Primordial black holes: observational constraints and gravitational-wave signatures"</i>	11:00 – 11:15 Karol Przeździecki, Joanna Strużewska, Jacek Kamiński, Damian Mochocki, Lech Łobocki, Wojciech Bagiński (Instytut Ochrony Środowiska) <i>„Satellite Observations Supporting Air Quality Monitoring and Forecasting in the Context of the CAMS Service"</i>
11:15 – 11:30 Arturs Korotkijs (Lulea University of Technology) <i>„Conceptual Design of Active Radiation Shield for Human Space Missions"</i>	11:15 – 11:30 Dariusz Ziólkowski, Katarzyna Dąbrowska-Zielińska, Szymon Jakubiak, Konrad Wróblewski (Instytut Geodezji i Kartografii) <i>"Modeling of soil moisture under wheat and natural grasslands using Sentinel-1 radar data"</i>

11:45 – 12:00 Maciej Mikulski (AGH University of Krakow) „ <i>Transformer-based Physics-Informed Neural Network for Lunar Lander Trajectory Recovery under Telemetry Blackouts</i> ”	11:30 – 11:45 Giovanni Laneve (Sapienza) " <i>Hyperspectral images applications in Italian Space Agency funded project CLEAR-UP and SAPP4VU</i> "
12:00 – 12:10 Discussion Panel	11:45 – 12:00 Martyna Gatkowska (Institute of Geodesy and Cartography, Ex ESA Ambassador for Business in Poland) „ <i>EO based solutions as the reply to the end users needs – agriculture use case</i> ”
	12:00 – 12:10 Discussion Panel

12:10 – 13:10 Lunch Break

13:10 – 15:00 (Hall A) Space and Society book: pre publication panel Chairperson – Joanna Pyrkosz-Pacyna & Vincent Simoulin	13:10 – 15:00 (Hall B) Session - Space Biology & Astrobiology Chairperson – Agata Rudolf
13:10 – 15:00 Discussion Panel	13:10 – 13:40 Anna Neubeck (Uppsala University, Sweden) „Nickel: its role in chemical and biological evolution”
	13:40 – 14:00 Gabriela Opiła (Faculty of Physics and Applied Computer Science, AGH University of Krakow) „ <i>Magnetic and plasmonic nanoparticles as sustainable means of theranostic treatment for space environments</i> ”
	14:00 – 14:20 Barbara Szaflarska (AGH University of Krakow) „ <i>From an idea to a space project – insights and takeaways from prototyping the GraviTE</i> ”
	14:20 – 14:40 Tomasz Zajkowski (AGH University of Krakow) „ <i>Investigating the Role of Amyloids in the Origin of Life</i> ”
	14:40 – 15:00 Agata Rudolf (AGH University of Krakow) „ <i>Adaptive Changes in the Spaceflight Environment - From Earthlings to Alien Life</i> ”

15:00 – 15:40 Coffee Break / Poster Session part II (Chairman: Piotr Kulinowski)

15:40 – 17:30 (Hall A) Session - Habitats, Bioastronautics & Life Support Systems Chairperson – Agata Kołodziejczyk	15:40 – 17:30 (Hall B) General Space Session Chairperson – Czesław Kapusta
--	---

15:40 – 16:00 Bhalamurugan Sivaraman (Physical Research Laboratory, India) <i>"Tardigrades in icy moon conditions"</i>	15:40 – 16:00 Kamil Muzyka (Prawo i Kosmos) <i>"Privateers and space - the legal aspects of authorizing space resource activities under art VI and VIII of the Outer Space Treaty"</i>
16:00 – 16:15 Magdalena Mrozek (Faculty of Civil Engineering, Silesian University of Technology) <i>"STRUCTURAL ANALYSIS OF A GEOPOLYMER LUNAR HABITAT SITUATED WITHIN A LUNAR CRATER"</i>	16:00 – 16:20 Olena Kompaniiets (NGO BEE FIRST, (Main Astronomical Observatory of the National Academy of Sciences of Ukraine, Kyiv, Ukraine) <i>"Panoramic space-borne polarimeter based on polarization-sensitive matrix detector"</i>
16:15 – 16:30 Agata Maria Kołodziejczyk (Space Technology Centre, AGH University of Krakow) <i>"Remote monitoring of microorganisms - citizen science project for life suport"</i>	16:20 – 16:40 Cyryl Konstantinovski Puntos (Jagiellonian University in Kraków) <i>"Introduction to the Mars colonization - GIS analysis with the use of archaeological experience"</i>
16:30 – 16:45 Bernard Foing (ILEWG EuroMoonMars, The Netherland) <i>"HIGHLIGHTS FROM EUROMOONMARS AND EUROSPACEHUB 2024-2025: RESEARCH, TECHNOLOGY, SPACE RESOURCES, ASTRONAUTICS, INNOVATION"</i>	16:40 – 17:00 Bartosz Sawik (Space Technology Centre, AGH University of Krakow) <i>"Blockchain Technology Optimization for the Space Mission Supply Chain"</i>
16:45 – 17:00 Michał Silarski (Faculty of Physics, Astronomy and Applied Computer Science, Jagiellonian University) <i>"Space research in the Neutron Activation Analysis Laboratory: status and perspectives"</i>	17:00 – 17:30 (Hall B) Student Session Summarizing and Awards
17:00 – 17:15 Magdalena Strus (Chair of Microbiology, Jagiellonian University Medical College) <i>"Microbiome changes and epidemiological risks in Analogue Space Missions"</i>	
17:15 – 17:30 Jakub Sikora (AGH University of Krakow) <i>"Mental health in space – considerations and perspectives for real-time assessment"</i>	

17:30 Conference Closing

Student Session – 2 minutes presentation (Hall B) + poster presentation (building B-8 and D-3)

Poster Session/ Student Session
(Chairman: Piotr Kulinowski)

23 May (Friday) 9:30 - 10:30 BUILDING B-8		
P1	Aleksander Kopyto	1550 nm optical ground station for high data rate satellite downlink
P2	Agata Sanecznik	Challenges of the future: Public Attitudes Toward Space Exploration, Artificial Intelligence and Ecological Awareness
P3	Mehmet Kara	EDGE Computing in Spacecrafts
P4	Rashid Hajivand Dastgerdi	Installation of a Space Safety-Targeted Shield on the Lunar and Martian Surfaces
P5	Stanisław Sękara	AstroAtus - Impact of light wavelength and microgravity on Pleurotus ostreatus mycelium growth in Lunar Simulation Laboratory
P6	Zuzanna Słobodzian	Open-Pit Mining Detection & Monitoring
P7	Oliwia Pająk	BioPrintLife – 3D Bioprinting for Future Space Missions
P8	Alicja Gowarzewska	Numerical Analysis of a Lunar Habitat Structure
P9	Alicja Jagielska	Martian city simulator: what does it take to survive on Mars?
P10	Wojciech Nikiel	Jet-Powered Fixed-Wing UAV for Long-Range Environmental and Subsurface Exploration
P11	Mikołaj Mizera	Multitemporal analysis of changes in the extent of Greenland`s ice cover using Earth Engine and GIS tools
P12	Urszula Ulanowska	CubeSat: Optimal Material Selection for the Primary Structure

P13	Kacper Wójtowicz	ChronaFlow: An App for Subjective Time Perception Research in Analog Astronaut Missions
P14	Klaudia Kościuk	Monitoring Chlorophyll Levels in Solina Reservoir Using Satellite Data
P15	Martyna Durda	Optimizing Mobile Beekeeping with Satellite Data and Environmental Analysis in Lubelskie Voivodeship
P16	Bartosz Skóra	Calibration of remote sensing water quality measurement using in-situ data from inland waters in the Kraków region
P17	Kacper Krempa	Soil carbon sequestration and its monitoring through IoT and remote sensing techniques
P18	Tomasz Dąbrowa	Monitoring Bare-Soil Exposure Using Satellite Data
P19	Wojciech Kajfosz	Plant growth potential in stimulated enclosed habitat: A focus on pH influence in hydroponic systems
P20	Kacper Odziomek	In Vitro and Physicochemical Evaluation of Hydrogel Delivery Systems of Hydrocortisone for Terrestrial and Space Medicine
P21	Wojciech Kajfosz	Examination of life support systems utilizing the example of the ELSA
P22	Tymoteusz Maj	ASSESSING THE LINKAGES BETWEEN MULTI-DECADAL LAND COVER CHANGES AND URBAN HEAT PATTERNS IN THE UPPER SILESIAN METROPOLIS BASED ON REMOTE SENSING DATA
P23	Karolina Gocyk	Biomimetic approach to 3D printed Electroaerodynamic Propulsion
P24	Zuzanna Micek	INTEGRATED ASSESSMENT OF URBAN THERMAL PATTERNS IN KRAKÓW USING LANDSAT DATA AND GROUND-BASED TEMPERATURE VALIDATION
23 May (Friday) 15:00 – 15:40 BUILDING B-8		
P25	Wiktoria Buczkowska	INVESTIGATING THE IMPACT OF SURFACE WATER TEMPERATURE ON CHLOROPHYLL-A CONCENTRATION IN INLAND WATER BODIES USING SATELLITE DATA AND REMOTE SENSING TE
P26	Kacper Kurek	Mobile device for surface excavation of lunar regolith
P27	Kamil Kyć	A multi-stage sifter separating lunar regolith into specified fractions
P28	Bartosz Fryska	Lunar Equipment Assembly Simulator – Lunar VR Assembly
P29	Julia Baścik	Biomaterials Experiment in Astral Radiation—Evaluating Radiation Shielding Using Bacterial Cellulose Composites in the AGH 2.0 CubeSat Mission
P30	Pauline Roblin	Space and Human Resources for Settlements on Earth, Moon, and Mars: Crew Interactions and Performances in Astronauts Analog Mission

P31	Kajetan Ginter	M3Space 2.0 - Expansion of the system for monitoring time perception with analysis of sensory stimuli
P32	Mateusz Żelasko	„Security by Design" in Space Industry Software: A Critical Imperative
P33	Wiktoria Wiejak	Utilizing Kombucha-Based Bioreactors for Wastewater Treatment in Space: A Sustainable Approach to Life Support Systems
P34	Julia Baścik	Tremor Observation and Response - Experimental Payload for high altitude stratospheric flight on suborbital rocket PERUN
P35	Mikołaj Gąbka	MXenes as biocomposites in polymer matrices as anti-radiation materials
P36	Ewelina Dobosz	Airborne Microbial Biodiversity Across Terrestrial Environments: Comparative Analysis
P37	Michał Pogorzelec	Software Architecture for Lunaris Lunar Payload Mission
P38	Mateusz Boćko	In-Situ Manufacturing of Perovskite Materials on the Lunar Surface: A Technical and Economical Assessment
P39	Agata Maria Kołodziejczyk	The role of UV and IR radiation in sunlight isolation during simulated space analog missions
P40	Mateusz Kaczmarek	Shielding properties of cellulose biofilms with Metal Salt Additives against Gamma and Neutron Radiation
P41	Roman Yaremak	GaAs and CdTe Thin Film Photovoltaic Converters for Space Applications
P42	Zamani Ahmad Mahmoudi Mohammad	From Regolith to Residence: Advances and Challenges in Space Geomechanics for Sustainable Lunar and Martian Exploration
P43	Oleksandr Hetmantsev	Training CNNs on GALFIT Simulations to Detect Polar Ring Galaxies
P44	Debela Alema TeKlemariyem	Optimized Diffuser Design for Horizontal Axis Wind Turbines: A CFD Study on Circumferential Holes
P45	Aram Takmadzan	Multitemporal analyses of forest stand disturbances in different climate zones using Landsat imagery with TVCMA and LandTrendr algorithms
P46	Aleksander Kopyto	Development of a Ground Penetrating Radar for a Himalayan survey mission
P47	Piotr Gałkowski	Harnessing Earth Observation and Space Technologies for Data-Driven Real Estate and Urban Risk Assessment