BSSC BALTIC SEA & SPACE CLUSTER

PAN POLSKA AKADEMIA NAUK | Komisja Nauk Kosmicznych

Sea Port + Space Infrastructure

Synergic Network Under Common Management

November 22, 2018
09:00 – 15:00

LOCATION:

University of Business and Administration in Gdynia
ul. Kielecka 7, 81-303 Gdynia, Poland

WSAiB WYŻSZA SZKOŁA ADMINISTRACJI I BIZNESU IM. E. KWIATKOWSKIEGO W GDYNI

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GDYNIA 2018

University of Business and Administration in Gdynia, ul. Kielecka 7, 81-303 Gdynia, Poland

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Sea Port + Space Infrastructure
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CONFERENCE AGENDA

9:00–9:30 Opening

- **PhD Tomasz BIAŁAS –** Rector of the University of Business and Administration
- **PhD Wojciech SZCZUREK –** President of the City of Gdynia
- **Prof. Edmund WITTBRODT –** President of the Space Sciences Committee of the Polish Academy of Sciences

SEA PORTS PERSPECTIVE

9:30–11:00

Moderator: Prof. Marek Grzybowski President of the Baltic Sea & Space Cluster
- **PhD Wiktor SZYDAROWSKI** Project Manager TENTacle
- **Maciej BRZOZOWSKI** Port of Hamburg
- **Representatives of Port and Terminals in** Gdynia, Gdańsk and Szczecin Świnoujście

DISCUSSION

COFFEE BREAK
11:00-11:30

SPACE PERSPECTIVE

11:30-12:30

Moderator: Prof. Zdzislaw Brodecki – President of the THINK-TANK / BSSC
- **Prof. Marek Moszyński –** Vice President of Polish Space Agency
- **Karolina Lipieńska –** Pomeranian Marshal Office
- **Jan Młotkowski –** Vice Director of Maritime Office in Gdynia
- **PhD Tomasz Szymczak –** President of STARTER
- **PhD Zdzisław Długosz –** Security and Safety Research Institute

DISCUSSION

LUNCH BREAK
12:30-13:30

TALENT ACQUISITION OF COMMON MANAGEMENT

13:30-15:00

Moderator: PhD Paweł Chyc – Secretary of the THINK-TANK / BSSC
- **Mateusz Dyrda –** Robotics Association SKALP
- **Jakub Michałka –** SpaceCube
- **Adam Dąbrowski & Young Champions –** Gdańsk University of Technology

DISCUSSION

CONFERENCE CLOSING REMARKS

Edmund Wittbrodt

President of the Space Sciences Committee of the Polish Academy of Sciences

This is the second of six planned conferences organized in this academic year-by the Space Sciences Committee of the Polish Academy of Sciences, Branch in Gdańsk, with the *Baltic Sea & Space Cluster*. The conference is dedicated to issues connected with sea ports in conjunction with infrastructure and space technology and synergetic effects, which are connected with them and are possible to be achieved. We are interested in a wider perception of these matters, which does not only include engineering issues, but also the ones connected with management and law.

Observations from space offer better and larger image of activities taking place on Earth, including our sea ports and coastline. However, space technologies connected with telecommunication, navigation and analysis of satellite data unlock new possibilities. This can contribute to more effective use of the resources of our sea ports.

The first part of the conference is dedicated to all the matters of sea and space as perceived from the perspective of the sea ports, while the second parts deals with these matters as perceived from the perspective of space technologies. We also decided to ask young people – students and newly graduates of our universities interested in space and satellite matters – to cooperate with us. Their activities and achievements will be presented in the third part of the conference.

I would like to express my gratitude to the hosts and key organizers of our conference. Many thanks to Doctor Tomasz Białas, the rector of the University of Business and Administration for his hospitability in these wonderful premises. Let me remind you that last year we also held the conference here. Many thanks also to professor Zdzisław Brodecki, professor Marek Grzybowski, and doctor Paweł Chyc for their efforts in preparing this event.

In conclusion, I would like to inform you about the venues of our next four conferences: on 19th March 2019 we will meet at Gdańsk University of Technology, on 18th May 2019 the conference will be held at University of Gdańsk, on 19th September 2019 the conference will take place in the Institute of Oceanology of Polish Academy of Science in Sopot and the last meeting will be hosted by the Polish Naval Academy in Gdynia on 14th November 2019.

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Marek Grzybowski

President of the Baltic Sea & Space Cluster

Polish Sea Ports perspective

There exist three ports in Poland with an important role for the Polish maritime economy, which are administered by three management boards of commercial sea ports. These are ports in Gdańsk, Gdynia and the Szczecin-Świnoujście. In addition, on the Polish coast operate also ports of Elbląg, Police, Kołobrzeg, Darłowo and several smaller, mainly fishing and tourist ports. A number of investments worth more than 11 billion EUR have been made in Polish ports and in their surroundings in recent years. These are key investments to improve the competitiveness of sea ports and state security. Infrastructure investments were implemented intensively after Poland's accession to the European Union. In addition, key strategic investment decisions have been recently made in Polish main ports. In Gdynia, it is the construction of an external port. In Gdansk, it is the construction of the Central Port. In Szczecin, it is the project of "Modernisation of the Świnoujście – Szczecin Fairway by its dredging to 12.5 m". The Szczecin-Świnoujście Ports brought economic effects to the construction of an LNG terminal in Świnoujście and a strong position of the Ferry Terminal Świnoujście. In Port of Gdansk, ocean container ships are admitted to the T2 wharf DCT Gdańsk, commissioned in 2016. The new railway terminal has been effectively used and has been commissioned at the Baltic Container Terminal in Gdynia. The deepened port of Gdynia, the modernized Liquid Fuel Handling Station (SPPP) and the construction modernization of the port quays (including the extension of the port infrastructure for handling ro-ro vessels, the reconstruction of the Swedish and Bulgarian Quays) bring real profits.

Polish sea ports transshipment, amounted to about 81 million tonnes in 2016, exceeded 87 million tonnes in 2017. The latest information obtained from terminal management shows that 2018 will also be record-breaking. The Port of Gdynia has already transshipped 11.5 million tonnes from January to June of 2018. That is 11.3% more than in the analogous period of 2017 – results from data of the Port of Gdynia. Over 14 million tonnes of cargo have been handled in the Szczecin-Świnoujście Sea ports Complex, an almost 12% increase comparing with a corresponding period last year. The high dynamics of transshipments has been noted for several years in Gdańsk, whereas early as 2013, 30 million tonnes have been exceeded, so that in 2015 the decrease in the supply of general cargo in containers will be compensated by record-breaking oil reloading. The terminals of the Szczecin-Świnoujście Ports exceeded 23 million tonnes in 2014, and due to the launch of the LNG terminal, the supply of liquid cargo increased by more than 3 million tonnes in 2017. The total transhipments in both ports exceeded 25.4 million tonnes. After record-high reloading in 2014 (over 19.4 million tonnes) in Port of Gdynia, in 2015 the supply of goods decreased (especially in containers).

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In 2017, record-breaking container reloading was recorded in Polish ports – 2 385 thousand TEU. The level of 2 million TEUs in Polish container terminals has already been exceeded in 2014, but the recession on the Russian market has caused a reduction in transhipments in DCT Gdansk in 2015 and a reduction in cargo handling by more than 100 thousand TEU. The market was rebuilt in 2016 and 2017, thanks to the increased demand for containerized loads of the Polish economy.

The supply of containers in Polish ports is growing dynamically, especially in the Tri-City terminals. The DCT Gdansk container terminal has connections with the Far East via two shipping alliances. The first service was launched by the 2M Alliance in February 2015. It was a continuation of the previous Maersk Line service, to which the Mediterranean Shipping Company (MSC) had joined. APL, CMA-CGM, COSCO SHIPPING, EVERGREEN and OOCL began cooperation with DCT Gdansk in May 2017, as the members of the new OCEAN Alliance. DCT Gdansk saw a container transshipment growth rate of 24% in 2017 with volumes growing to about 1.6 million TEU, thanks to these connections. Hutchison Ports Gdynia has crossed the barrier of 400,000 TEU in 2018. We can expect another annual record of container reloading in Polish ports in 2018, if there is no significant collapse in the supply of containers in the 4th quarter of 2018.

The management boards of main Polish ports continue their investment activity. The Port of Gdynia Authority in 2018 will spend approximately 345 million PLN for the construction of infrastructure and superstructure. Deepening of the fairway and internal sea areas of the Port of Gdynia has been completed. Ships with a length of 400 meters, the largest container ships entering the Baltic Sea, will be able to enter GCT and BCT terminals in 2019. Port of Gdynia Authority S.A. has announced a tender for construction of a public ferry terminal. The estimated cost of the investment is approximately 180 million PLN, with 116 million PLN covered by the European Union. 170 million PLN will be allocated to investments in Port of Gdansk in 2018. The European Union will co-finance projects in the amount of 600 million PLN. Significant investments with a total value of 470 million PLN (co-financing from the EU – 85%) will be taken in the Gdansk Internal Port. The channel will be deepened, thanks to which ships up to 250 m long will be able to enter Gdansk Internal Port. The project 'Preparation of design documentation for the investment of the Modernization of Quays and Dredging of the fairway at the Internal Port of Gdansk is co-financed by the European Union's TEN-T programme. The Port of Gdansk Authority was granted €558,000 pursuant to the decision of the European Commission of 8 November 2013 No. C/2013/7880. Projects should be completed by the end of 2020.

The investment programme of the Port of Świnoujście-Szczecin in the years 2014-2027 includes investments worth approximately 1.5 billion PLN. Key projects contributing to further development of the ports of Szczecin and Świnoujście include dredging Świnoujście – Szczecin fairway to 12.5m on its entire length and access route to Świnoujście from Baltic Sea to 14.5m as the first

stage, and finally to 16.7m. The strategy of the Port of Świnoujście-Szczecin also provides for building an external port in Świnoujście with berthing facilities of technical depth 17 m. Extremely important for Szczecin are plans to modernizing Oder Water System and eliminating barriers for developing inland shipping and investment in local roads.

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Wiktor Szydarowski

TENTacle Project Manager

TENTacle in the context of EU transport policies

The TEN-T core network corridors (CNC) is a new instrument of the EU transport policy, aimed to improve mobility, intermodality and interoperability on the major transport axes across Europe. The Baltic Sea Region (BSR) is intersected by three core network corridors being Scan-Med, North Sea-Baltic and Baltic-Adriatic.

A broad range of stakeholders are expected to be involved in a joint action to remove physical, technical, operational and administrative bottlenecks along these corridors by the year 2030. Implementation of the three core network corridors has a large but untapped potential to stimulate positive effects in the BSR beyond the pure transport sector and beyond the immediate geographical areas they cross.

Opening it up for a broader group of stakeholders and a wider geographical area requires tackling major capacity challenges. These are, for example, related with a low awareness and deficient understanding of how the CNC implementation can help improve accessibility and connectivity challenges in specific territories. And this is what TENTacle will foster in the coming years. By working across the borders and sectors we will improve stakeholder capacity to reap benefits of the core network corridors implementation for the prosperity, sustainable growth and territorial cohesion in the BSR.

In practice, this means that by the end of 2019:

- All territories in the BSR can profit from the CNC, irrespective of the geographical location;
- The involved public authorities and market players are able to deliver effective growth and prosperity policies and strategies, and work out effective logistics solutions complementing the CNC investments;
- European Coordinators leading the CNC implementation receive an organised project-based support in mobilising stakeholders both in and outside the specific corridors to a joint work;

- Transport authorities around the Baltic Sea are aware of the two policy coordination instruments of CNCs and the EUSBSR, and are able to use the synergy gains in routine planning, management and implementation processes;
- Other European macroregions are inspired by the BSR way how to reap benefits of the core network corridors for the purpose of prosperity, growth and cohesion.

How to achieve it? What will we do and deliver in practice? Specific connectivity and interoperability needs differ from one area to another and require adequate place-based response. Therefore, we will carry out the stakeholder capacity-raising actions on regional and macroregional level. Seven pilot showcases in different areas will demonstrate how to strengthen positive CNC spill-overs in different geographies and development contexts. The cases will be launched in the sites representing (1) the corridor node and transit areas (located along a CNC), (2) the corridor catchment areas (located in a close distance to one or a few CNCs) and (3) the corridor void areas (located farther away from the three CNCs). In each of the sites we will address the key growth challenge that may be resolved through a better physical and/or functional connection to the core network corridors.

Through interfacing with the target groups (local/regional authorities, business companies and their clusters, entrepreneurship groups, NGOs, cross-border networks etc.) we will deliver replicable products, including action, transport and investment plans for regional growth and development:

- Fehmarnbelt: impulse for regional development – transport volume forecasts, best practices, recommendations;
- Westpomerania – Skåne: Boosting supply chains – cross-border business models, policy support incl. EGTC;
- Gdynia transport node: pre-investment studies – last mile bottlenecks, traffic management, organisational solutions;
- Central Scandinavia borderland: access systems – to inter-metropolitan train connection and industrial clustering;
- Lahti – North Karelia: better access to the CNC – interoperability, labour markets, technology and system innovations.

In the macroregional dimension we will generalise results of the seven regional showcases and analyse win-win opportunities. Through interfacing with the European Coordinators, transport authorities and administration in the BSR countries and pan-Baltic networks of local, regional and business decision-makers we will deliver policy and action packages:

- Guiding decision-makers in corridor node/transit areas, corridor catchment areas and corridor void areas on how to capitalise on the core network corridors irrespective of the geographical location;
- Encouraging stakeholders in and outside the core network corridors to be actively involved in their implementation;

- Promoting a wider territorial perspective and a multi-actor involvement in national and regional transport policy frameworks;
- Contributing to enhanced intergovernmental cooperation in the Policy Area Transport of the EU Strategy of the Baltic Sea Region;

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Marek Moszyński
Vice President of the Polish Space Agency

Innovations for maritime economy in the Polish National Space Program for 2019-2021

Satellite data has become, especially in recent years, an increasingly popular tool for monitoring the marine environment. This is related to the intensive development of research methods based on satellite remote sensing, a significantly increasing number of measuring instruments placed on satellite platforms (eg, Sentinel missions), as well as easier access to data obtained with their help. This significantly increases the affordability of information relating to large areas and impossible to obtain in a different way. Often these data are made available without the need to involve significant resources by their potential recipients, as is the case with the European Copernicus program. In the case of the marine environment, which by its nature is hardly available and its monitoring usually requires the involvement of an expensive measurement and observation infrastructure, it makes it an attractive source of information for science, maritime administration and maritime economy enterprises. The value of data obtained this way will be the greater that they can be freely combined into larger resources with data from other sources already in the possession of particular stakeholders of the maritime sector. The aim of activities related to the use of this data should be to provide intelligent information (system) services, enabling the extraction of useful information for decision making and effective operations at the operational level, and discovering facts and building new knowledge for planning long-term activities at the strategic level, both by individual entities, as well as regions or the whole country. In the National Space Program for 2019-2021 several activities are planned, as a result of which a maritime information infrastructure will be systematicallydeveloped combining different dedicated systems of the national maritime sector, including specialized equipment, information services and processes supported by it, high-quality digital research and economic resources, including satellite data and in-situ data, as well as expert resources. Thisinfrastructurewillenable comprehensive management of the Polish maritime area and solving current problems related to its operation and security. The article presents the planned streams of actions leading to this goal.

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Mateusz Dyrda
Robotic Association SKALP

Unicorns, ambitious students and other mythical creatures and how to catch them.

In every area of life, in recent years, we have seen deep transformations caused by the digital revolution. Increasingly, we can hear about the fourth industrial revolution and its variants by all cases: Industry 4.0, Medicine 4.0, Agriculture 4.0, Space 4.0. The common denominator of all these issues is one factor – information. This information has become the universal currency of the 21st century. Therefore, the process of acquiring, assimilating and manipulating knowledge became critical. Like other branches of human culture, education must undergo a revolution in the new era. New technologies pose new challenges for both students and teachers.

One of the symptoms of this educational revolution is the formation of places called Makerspaces (as well as Fablabs, Hackerspaces). The phenomenon of these organizations is very new. Accurate defining what these types of undertakings are is both difficult and inappropriate. What distinguishes them from traditional methods of education is precisely this not-definite character of the activities, the lack of a hierarchical management structure, as well as the resistance to close to a specific field of science or engineering. Well-functioning makerspace should be a meeting place for people who in rare conditions have opportunity to exchange ideas and experiences. This is a place where artists outline their vision of a work that uses elements of robotics, and engineers try to find a solution that enables such a task. That is why it is so important for such a space to remain open, in the sense that the person's level of education or experience is not decisive for the possibilities of participating in projects, but rather the commitment and willingness to develop themselves.

One of the main aims of the SKALP Robotics Association is to create and actively support creative and ambitious student communities. In the following presentation I will describe the details of the projects that have been implemented or are currently under development. I will also explain the function and indicate the importance of our robotic laboratory. Finally, I will describe our strategy for creating the incubator of the most talented members of our association.

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Jakub Michałka
Space Cube Association

Can Poland into Space? – Perspectives for students of Space and Satellite Technologies.

Space and Satellite Technologies MSc studies is a new major on Gdańsk University of Technology. One of the most important aspects of these studies is very strong cooperation with Polish space industry, as the main intention of them was the creation of key personel for the sector. To accomplish this, it is necessary to allow the representatives of the industry to teach the students according to the needs and requirements of their companies. It is crucial to educate the undergaduates with practical knowledge, which is impossible to gain relying solely on university. The fact, that Poland is a member state of *European Space Agency* grants the students (and the teachers) a lot of additional opportunities. The best example is the access to workshops organized by *ESA Education*, such as *Concurrent Engineering Workshops*. The courses are led by *ESA* staff members, specialists in many fields (orbital mechanics, communication, data handling) who work on large satellite missions, such as the *BepiColombo*. The Agency covers the costs of transportation and accomodation for the students accepted into such workshops – the aspect which normally would limit the accessability. To apply for the workshops it is only required to submit the cover letter and the recomendation letter from the university.

European Space Agency also organizes workshops and trainings in the universities, where the only costs that need to be covered by the university are the acomodation costs of the visiting trainer. The great example of such training is the *Ladybird Guide to Spaceraft Operations*, which is a complete, multi-aspect course on how to design, develop, integrate and perform a satellite mission on example of cubesat type satellite. The teachers on such course present very practical approach to the typical problems, that are to be met in the proces of developing a satellite mission and it is a great complement to the theoretical knowledge, lectured on university. One of the largest opportunities for students are internships or traineeships in facilities of the *ESA*. The Agency offers summer internships for students and full time jobs for graduates. The most famous is the *Young Graduate Trainee* program, which allows the newly graduated students to work on real projects of ESA. Every year the Agency offers around hundred of posts in every facility in Europe and USA. The traineeship lasts one year with possibility to extend it for another one. The trainees are taught the methodology of work in space sector, they gain experience in their own field of expertise, but the most important possibility is developing the international contact network.

Also polish sector offers interesting opportunities for students, such as internships in *Space Research Centre* of *Polish Academy of Sciences*, where it is possible to be a part of development of the projects comissioned by the *European Space Agency*. Also the *Polish Space Industry Association* each year holds the competition for students and awards the most promising ones with scholarships and

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possibilities of paid internships in leading companies of the Polish space sector. These actions are highly oriented on development of future key personel for these companies and thus – for the sector.

Very important factor to mention, are the students associations. They allow the most ambitious students to get involved in very practical projects while still studying. The great example here is the *Robotics Asscociation SKALP*, whose *ŻUKBOT* project won the *Polish Challenge* of *European Satellite Navigation Competition 2017* or the *Space Engineering Science Association SpaceCube*, whose *Space Navigation System* concept was awarded with second place in the same competition. Universities can provide a lot of bright and talented students and the role of such associations is to accumulate them and equip them with the most practical part of knowledge and give them the access to international contacts via large, international projects.

In the Tricity region there are companies, which are the contractors for the *European Space Agencies*, the great examples are *Scanning And Imaging Research Center*, which develops radars for *ESA* or *BlueDot Solutions*, which is partner of the Agency in *Horizon 2020* program. These companies are known to offer posts or internships for students and this allows to get in touch with the European space sector. They also offer the possibilities to develop BSc or MSc theses for students, which greatly improves the practical value of such theses and the constructive skills of the students.

Students and graduates of the *Space and Satellite Technologies* major on Gdańsk University of Technology have a lot of opportunities to become a part of national and European space sector, but they need to be made aware of that and strongly engouraged. The profits of participating in beforementioned trainings, workshops and internships are imediatly visible, as they greatly increase the students' awarness of real problems in space engineering and teach them the practical approach to these problems. These opportunities allow the students to get acquainted with the nuances of work in space sector and are the best and only viable way to create and develop the future core personel of national space sector.

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Jan Młotkowski

Vice-director of the Maritime Office in Gdynia

Maritime administration systems

The Maritime Office in Gdynia is actively involved in initiatives related to increasing maritime safety and security. The implementation of projects supported by EU funds such as the *National Maritime Safety System – KSMB Stage I and Stage IIA* serves that purpose. Under that Project the maritime safety and security management system, carried out by the maritime administration, has been integrated. The systems for monitoring maritime traffic in the VTS Bay of Gdańsk and VTMS Szczecin-Świnoujście areas have been completely modernised and

expanded. Due to the exchange of equipment, IT and communication developments the ranges of monitoring areas have been increased dramatically making the above mentioned systems one of the most advanced European solutions. The system for monitoring maritime traffic in the area of the route TSS Shoal of Słupsk has also been established providing with radar monitoring and VHF communication coverage the, navigationally sensitive and adjoining military exercise areas, region of ships transit proceeding to the ports of the Bay of Gdańsk and the Russian Federation. All services of the smaller ports have been equipped with devices for traffic surveillance and navigation assistance in emergency situations (port radars, cameras, means of communication, hydro-meteorological stations, electronic access to databases and information related to safety of navigation).

A separate, vital element of the project was the construction of a new operational communication system for Search and Rescue (SAR) Service. The system used for many years has been found completely outdated. The SAR Service faced the actual loss of the possibility of command remotely and coordinate rescue operations from the Rescue Coordination Centres in Gdynia and Świnoujście. The new communication system has met their needs, providing communication to units participating in operations in the Polish marine areas.

The KSMB System aims primarily to prevent crises situations and to protect the natural environment in the Polish marine areas. It is also a tool to supervise compliance with law by users of the sea. The technical solutions applied – radars, automatic identification system (AIS), air and satellite monitoring, creating databases and exchange of information with other Baltic States and the European Union serve this purpose. The crucial component, joining in a way, the above mentioned tasks is continuous work on the development of the Maritime Safety Information Exchange System (SWIBŻ). That comprehensive and versatile IT system is a state of the art device aimed at the cooperation of the institutions involved, in the area of ensuring maritime safety, security and response to emergencies.

The IT industry is subject to rapid developments. Therefore, further work on developing the resources held is in progress. The key issues, on which the maritime administration is currently focused, are:

- continuous increasing IT security;
- ongoing customising the systems to the changing legal conditions;
- SafeSeaNet system's modernisation, under which the exchange of information on ships traffic at European level takes place,
- the single window system for declaring by operators and distributing to authorised authorities data relating to reporting formalities from ships;
- the systems' modernisation (both in terms of hardware and software: modernising the applications for monitoring and providing SWIBŻ information, adaptation to mobile devices' operation, extending cooperation in the framework of the State structures, access to information related to safety of navigation for non-institutional users, cooperation within the Port Community System and creating the database of ships of Polish nationality, carried out by the Maritime Office in Szczecin).

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Adam Dąbrowski, Agnieszka Elwertowska,
Jacek Goczkowski, Szymon Krawczuk, Karol Pelzner
HEDGEHOG Team

Adventure of the HEDGEHOG Team REXUS Project Into the Outer Space

The HEDGEHOG team members share their experience in the preparation of the rocket experiment under the REXUS Programme coordinated by the European Space Agency, the German Space Agency and the Swedish Space Agency. At the Near Space Conference 2017 in Toruń M. Podgórski of Wrocław University of Technology launched the Rocket/Baloon.pl initiative – support for student teams wishing to take part in the REXUS/BEXUS Programme. The Programme allows students of European universities to carry out scientific and technological experiments on research rockets and balloons. Each year, two rockets and two balloons carrying up to 20 experiments, designed and constructed by student teams, are launched. That was the beginning of the adventure for the team of students of Gdańsk University of Technology.

The HEDGEHOG Experiment aims at detailed investigation of the environment, which must withstand the sounding rocket's load. That knowledge is required to prepare properly the load for the flight, as well as to reconstruct similar conditions on Earth. The experiment focuses on the measurement of accelerations and oscillation (in particular free oscillation), as well as the heat flow on the sounding rocket's shells as a basis for the analysis of existing qualification tests. The HEDGEHOG team's members took part in numerous events in the framework of the Programme:

- Selection Workshop (in Noordwijk, Netherlands), where the pre-selected teams present their ideas to the Panel of experts,
- PDR (in Kiruna, Sweden), where the selected teams present the preliminary draft experiment,
- CDR (in Oberpfaffenhofen, Germany), where the design stage is closed,
- IPR (at home university), where the integration progress is assessed,
- EAR (at home university), where the experiment is approved,
- Test week (in Bremen, Germany), where the flight qualification tests take place,
- Launch Campaign (in Kiruna, Sweden), where the experiment is launched.

According to plan the HEDGEHOG experiment will be launched in March 2019 onboard REXUS25 rocket from the ESRANGE Space Centre in Kiruna (Sweden).

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Committee
Polish Academy of Sciences, Gdansk Branch
in cooperation with
Baltic Sea & Space Cluster

invite
for joint conferences

- 22nd November, 2018
  Seaport + Space Infrastructure
  Synergic Network under common management
  Wyższa Szkoła Administracji i Biznesu, Gdynia

- 19th March, 2019
  Autonomous ships
  Inevitable reality at sea
  Politechnika Gdańska

- 18th May, 2019
  Institutional Cooperation at Sea & (Outer) Space
  Essential adjustments needed to boost full potential
  Uniwersytet Gdański, Wydział Prawa i Administracji

- 19th September, 2019
  Remote-sensing
  Challenges in gather and sharing data
  Instytut Oceanologii Polskiej Akademii Nauk, Sopot

- 14th November, 2019
  Sea and underwater drones
  "Unidentified Sea Objects"
  Akademia Marynarki Wojennej, Gdynia

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- 18th May, 2019
  Institutional Cooperation at Sea & (Outer) Space
  Essential adjustments needed to boost full potential
  Uniwersytet Gdański, Wydział Prawa i Administracji

- 19th September, 2019
  Remote-sensing
  Challenges in gather and sharing data
  Instytut Oceanologii Polskiej Akademii Nauk, Sopot

- 14th November, 2019
  Sea and underwater drones
  “Unidentified Sea Objects”
  Akademia Marynarki Wojennej, Gdynia