nereus

network of european regions
using space technologies

SPACE EDUCATION AND TRAINING

Examples from NEREUS Regions

CONTENTS

Foreword from Alain Bénéteau, NEREUS President

It is with great pleasure that I present the latest publication of the NEREUS network, a prime example of our expertise to make Education and Training in Space-related topics more accessible in our regions and across Europe. The aim of this brochure is to give you a flavor of a NEREUS initiative planned for October 2011, in cooperation with CNES (Toulouse) – a public, online e-catalogue, mapping all of the Space-related university courses in our 26 regions and 33 associate members across Europe. Apart from that, you will find several examples and best practices of the education and training courses and initiatives offered throughout our regions – from the universities in the East Midlands, UK to technical research institutes across Italy.

The demand for highly-educated, motivated young professionals across the space industry has always been strong. Many of our member regions' universities and research institutes annually produce world-class professionals who go on to work at the cutting edge of their areas of expertise. However, with a rapidly growing space market comes along the demand for highly-qualified human resources. Thus it is now the time to provide paths to education and employment for our future space engineers, scientists, researchers and astronauts.

Using this database we will assist young undergraduates and graduates in science and engineering to demystify routes to specialist training and education across our European regions. As the first tool of its kind, we hope to build an invaluable resource for prospective students of space-related topics and provide a recognized vehicle for the promotion of our institutions' courses.

In order to be successful in supporting our future space market and research in being innovative and productive, we must make it accessible to those who want to play a part in it. NEREUS, as a network spread across 26 European regions is in a unique position with our renowned academic expertise to bring Education and Training closer to regions and their citizens.

I wish you a pleasant read of this information brochure and look forward to presenting the final online product later this year and welcoming you to make use of the completed e-catalogue.

Yours,

Alain Bénéteau
NEREUS-President

INTRODUCTION

Announcing the e-catalogue

The NEREUS CET (Communication, Education and Training) Working Group was established in 2009 and has since then been an active platform. Communicating space related education at universities (maybe in cooperation with industry) in the NEREUS regions has been in the centre of the discussions. It turned out that a broad rage of activities and capacities exist all over Europe but that information about them is not easy to achieve. In this context a mapping of Space relevant Education in the regions is equally important as linking them. This brochure shows that there is already a broad portfolio of interesting education opportunities for students and young researcher in Europe in particular in the NEREUS regions. No question, NEREUS regions are regions that do not only support enterprises and industries. They are also aware of the importance of education and training in the field. However, the network wants to move beyond the current status. The aim is to explore and better exploit European funding mechanism in order to improve and harmonise curricula. Also fostering mobility and networking universities are of special interest for students and universities.

A first important step in this direction will be the **NEREUS e-catalogue** on space related training that will be up and running in autumn 2011. With this tool an on-line data base will be established that gives access to information on Space related activities at universities and makes in particular students aware of them. A search by regions, by theme and by multi-criteria (type of training, language, theme…) will be possible, www.nereus-space-training.eu.

We think that this tool will add a new quality to the regions active in space technologies and we are looking forward to working with it.

Martina Hilger and Malecka Saleman (chairs of the CET working Group).

ANDALUSIA

Aerospace Forum of Andalusia

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The Aerospace Forum of Andalusia was established in February 2002, hosting **more than 90 lectures in the Faculty of Engineering in the University of Seville**, in collaboration with institutions and people involved in aeronautics and space. The Forum was established after regular meetings of professionals, where topical issues in the sectors were freely debated. A cohesive structure was developed by a lecturer whose knowledge, experience and ability to communicate are well recognized.

The Forum is well respected for its professionalism, **independence**, **and freedom of expression**. The unique dynamic of the Forum provides not only a platform for players in the aeronautics and space sectors – it is consolidated by the presence and participation of the University, the Spanish/Andalusian administrations, economic and social agents, as well as professional associations

All sessions are open to the public. About 20% of the lectures deal directly with Space.

Source: www.esi.us.es

APULIA

Master on Space Technologies

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Since 2001, the inter-university of Physics (University and Polytechnic of Bari) offers a Master Degree in «Technologies for Remote Space Sensing for Environment and Territory». The Master's main objective is to equip graduate students with an advanced understanding of space technologies and prepare them for the challenges of operating in this context. Currently the Master is co-organised by the Italian Space Agency and e-Geos (a Telespazio/ASI company), and therefore training activities are based in ASI research facilities in Matera and on laboratories of the Inter-University Physics Department in Bari. Most of the graduated students are currently working in space firms or as researchers in public laboratories.

With more than 5000 employees and more than 50 enterprises of big and small dimension, the Apulian aerospace industry includes producers and suppliers characterized by innovative and dynamic capacities. The latter together with public authorities and research and training institutions are member of the Apulian Aerospace District.

Source: www.uniba.it; www.poliba.it

BASILICATA

Academic courses and other activities

University of Basilicata currently offers 4 academic courses on satellite remote sensing and space technology within the ordinary courses of the Engineering Faculty. **2 doctoral schools at Department of Engineering and Physics of the Environment** (DIFA) are currently including Satellite Remote Sensing and Earth Observation curricula. Additionally, a First level Master on **"Technologies for Space Remote Sensing"** is co-organised by University of Basilicata, Agenzia Spaziale Italiana (Matera branch) and Telespazio and e-Geos (Matera Offices). Finally, as an ongoing initiative, an international PhD in Space Technology for Earth Observation, is planned to start in 2011. It is organized by University of Basilicata (and supported by CNR-IMAA).

CNR-IMAA and University of Basilicata-DIFA are involved, as Italian laboratories, within the ICTP-TRIL programme (Joint Programme for Higher Education in Physics). It is organized by the Abdus Salam International Centre for Theoretical Physics. CNR-IMAA, University of Basilicata and ASI are also involved in training and tutorial activities in collaboration with Basilicata Region for education and training of young graduate people (GEL Project). In particular, since 2007 at CNR-IMAA about ten trainees are learning Satellite Remote Sensing methods and applications devoted to natural and environmental risks monitoring and investigation.

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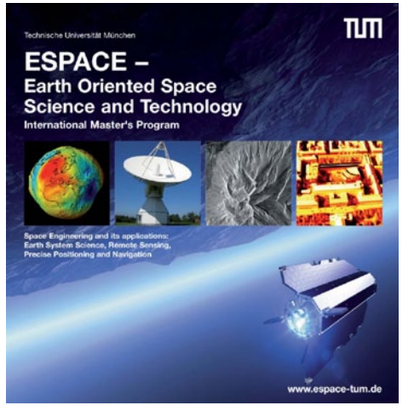
BAYERN

Earth-oriented Space Science and Technologies (ESPACE)



Earth-Oriented Space Science and Technology (ESPACE) is a 2-year international M.Sc. course at the Technische Universität München, **combining space engineering with satellite applications related to Earth science, remote sensing and navigation**. ESPACE benefits from a unique concentration of expertise related to space science and technology in Munich. **Since 2005**, 4**6 students from 17 countries have graduated from the programme.** ESPACE alumni are sought-after specialists in satellite applications. The majority of graduates work at **national and international space agencies**, research institutes or universities as well as at renowned firms in the aeronautics, navigation or energy industry.

Source: www.espace-tum.de

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BREMEN

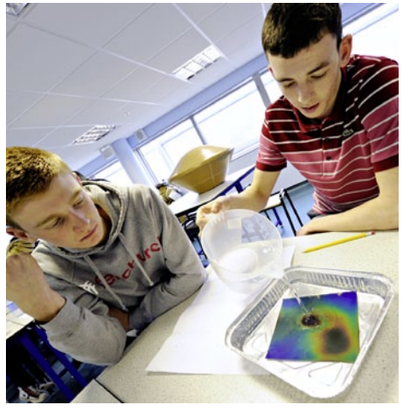
System Enabling Technologies

The new **“Christa and Manfred Fuchs endowed professorship”** – sponsored by a donors’ association, OHB System AG, German Aerospace Centre in Bremen (DLR) and Stifterverband – underlines Bremen’s importance as a **cluster of the aerospace industry**. This further endorsement of Bremen’s model of endowed professorships is yet another illustration of the **excellent cooperation between the University**, l**arge-scale research** and **industry**. The new professorship will not only strengthen the field of teaching in the area of space technology. It will also enhance Germany’s chances of attracting substantial orders for systems technology within the context of space missions planned by the European Space Agency. Scientific satellite missions call for close collaboration between scientific preparation, high-tech development and industrial implementation. **System Enabling Technologies is the most recent addition to the portfolio at the University of Bremen.**

Source: www.uni-bremen.de/en

EAST MIDLANDS

Space Industry Experience



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The Space Academy is a partnership between the National Space Centre, the Universities of Leicester and Nottingham, Science Learning Centre East Midlands, STEMNET and the East Midlands Development Agency The Space Academy delivers high quality education and training, careers advice and industrial experience programmes for students, teachers within the UK space industry. **In addition, Space Academy masterclasses have been conducted for ESA’s European teacher conferences at ESTEC (Holland) in 2010 and 2011 as well as at NASA’s Johnson Space Center (Texas) and for the British Council in Hong Kong.**

One of its key initiatives is The Space Industry Experience organised in association with various partner organisations providing East Midlands students with an insight into the range of space based STEM careers available to them and the working lives of space scientists. The Space Academy continues to provide industrial placements and experience with East Midlands companies through focussed workshops. One of the workshops is entitled “Reach for the stars” at the African Gifted Foundation, Makere University, Uganda. Its aim is to set the benchmark for gifted education delivering high quality educational opportunities to 1,000 gifted Africans each year. The theme for this year was maths and ICT and covered subjects such as finance and markets as well as space technology. The Reach for the Stars module was the first time that anyone had taught any aspect of space science at Makerere University.

EAST MIDLANDS

GIONET, University of Leicester

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Prof. Heiko Balzter from the University of Leicester is co-ordinating the GMES Initial Operations - Network for Earth Observation Research Training (GIONET) funded by the Marie Curie People Actions under the European Seventh Framework Programme.

GIONET will establish a European Centre of Excellence for Earth Observation Research Training that aims to cultivate a community of Ph.D. students skilled in land and emergency monitoring services in collaboration with partners from higher education and industry across Europe. **This training will be delivered through individually supervised research, a series of international summer schools and local training**. The full partner institutions in GIONET are the University of Leicester (Department of Geography), Astrium GEO-Information Services; Gamma Remote Sensing AG, Switzerland; the Institute of Geodesy and Cartography in Warsaw, Poland; the Department for Earth Observation of the Friedrich-Schiller-University Jena, Germany; the Balaton Limnological Research Institute of the Hungarian Academy of Sciences and the German Aerospace Centre in Oberpfaffenhofen.

Source: University of Leicester, http://www.le.ac.uk/gg/research/projects_balzter_GIONET.html

EURAC

"EURAC Junior"

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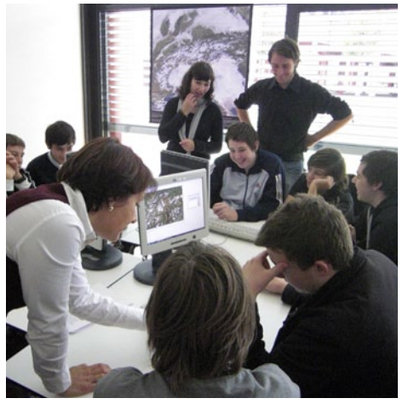
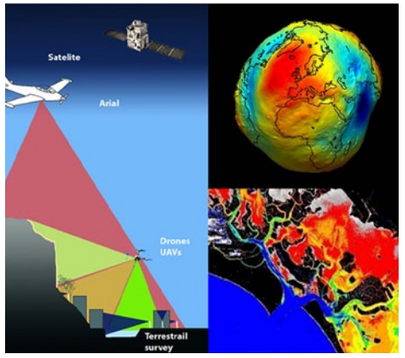


The European Academy project 'EURAC junior' established a **dynamic interface between schools and scientists**. The project offers **2-3 hour workshops together with the EURAC institute of Applied Remote Sensing**. Students, together with qualified scientists explore many space-related research topics using innovative methods of communication. The scientists demonstrate their scientific methods and give a glance of their everyday work with a well balanced programme which combines theory and practical experience. Moreover this opens new opportunities for the teachers to enhance their teaching tool kit and their own education. **So far the project has introduced more than 500 students to the topic of earth observation along with more than 120 secondary teachers.**

Source: http://junior.eurac.edu

LOMBARDY

From Space Technologies to Territorial downstream web services. PhD courses, Politecnico di Milano



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Polimi offers several programs regarding Space technologies and applications:

PhD course on 'Environmental and Infrastructure Engineering' addressing **3 programs - Water engineering, Environmental Technologies, Geomatics and Infrastructures**. In particular, Geomatics challenges are focused on GNSS, GMES, Spatial Gravity Observation, Geographic Data Acquisition and Processing with different applications.

Two PhD programs on Aerospace research, '**Rotary Wing Aircraft**' and '**Space Engineering**', addressed to Space Robotics, Space Missions Design, including Artificial intelligence, Aeronautical sciences and Navigational systems, Micro/Nanosatellites, Awareness Space Debris and Asteroids monitoring, Human in space sustainability.

PhD program in Information Technology with Automation-Computer Engineering and Electronics-Telecommunications domain.

PhD program in 'Building Engineering', with main topics on environmental sustainability and energy strategies, as an EU Grand challenge, Energy Efficiency (building, district, territorial domain), Heat Island analysis, using Remote Sensing and on-site UAV-Geomatic for geographic multi-spatial downstream web services.

One dedicated fellowship per program foreseen.

Source: http://www.polimi.it/

MIDI-PYRENÉES

Institut Supérior de l'Aeronatique et de l'Espace (ISAE)

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The **Institut Supérieur de l'Aéronautique et de l'Espace (ISAE)** in Toulouse has been running its specialised international postgraduate Master course "TAS Astronautics" for more than twenty years. **The course places an emphasis on remote guidance, navigation and control of space systems**. Several hundred engineers have graduated from the course and are now working in various roles in the Space industry.

ISAE has also developed MSc degrees and postgraduate masters taught in English in the field of Space Communication systems (with French partners) and Earth Observation: ERSOS (Earth Remote Sensing and Observation Systems).

With academic partners of the European Consortium for Advanced Training in Aerospace network, ISAE has also established an **Erasmus Mundus Master course** (EUMAS) **with a specialisation in Space Science**.

Endorsed by the European Commission as EM Master, Eumas has produced **more than 150 highly trained graduates** since 2006 representing **more than 40 countries** in the world. In its various modules, the vast majority of activities are performed with tutors from industry using real data and projects.

Source: http://www.isae.fr/en/index.html

PIEDMONT

SpacE Exploration and Development Systems (SEEDS) International MSc

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The SEEDS qualification was established in 2005 **between Politecnico di Torino, Supaero Toulouse and Bremen University along with the European Space Agency**. It aims to produce highly specialised graduates in the challenging domain of human space exploration and the development of related space-science systems. The format is currently being reviewed towards launching an updated programme in the future.

The course lasts 15 months. The first six months are at Politecnico di Torino or ISAE-Supaero and mainly consist of lectures and exercises providing the foundations of the various disciplines related to Space Exploration, ranging from engineering to biomedical and space sciences. In the next nine months the students write a thesis under the guide of experienced senior tutors.

Students of the course have excellent employment prospects, with **100% of graduates gaining employment in the field of European space activities** or in industry shortly after graduation.

Source: www.formazione.corep.it/seeds ; http://www.seeds-master.eu/

VENETO

Bachelor, Master and Doctoral programmes in Space Sciences and Technology, University of Padua.

CISAS G.COLOMBO
Center of Studies and Activities for Space "G.Colombo"

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The **three-year Bachelor programme** aims to equip students in space science with **basic knowledge in the core disciplines of Aerospace Engineering**. **The successful student will be able to identify, interpret, formulate and solve problems demanding a multidisciplinary approach autonomously and innovatively**. The two-year Master programme complements this course and prepares the students to the challenges of the professional career in the Italian, European and International Aerospace Industries and Research Centres. The Ph.D. Programme sees students engage in substantial research activities across a variety of specialist subjects. **The undergraduate programme has 150-180 students**, and the doctoral program 8 – 10 students yearly.

Source:
http://cisas.unipd.it/didactics/aerospaziale/ordinamento2.html

Euro Space Centre

The Euro Space Centre was established to enable people to discover space exploration and its effect on our everyday life. Since it opened in June 1991, t**he Euro Space Centre has obtained recognition in the space and educational fields**. **For young people**, the general public, the press and educational and industrial sectors, it has become a reference point for the demystification of space technologies and sciences.

Moreover, **its educational programmes for schools have received the endorsement of the Ministers of Education who have sent teachers on secondment to lead "space classes."** Furthermore, astronaut camps and the introduction to space programmes make the Euro Space Centre a unique organisation of its kind in Europe. Finally, various leading companies specialising in advanced technology have chosen the Centre as a shop-window for their products thanks to its hi-tech environment.

Source: www.eurospacecenter.be.

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WALLONIA

Master in Space Sciences, University of Liège

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The University of Liège has always had **a strong scientific and technical involvement in space research**. Several Master degrees in the domain are offered to students such as a Master in Space Sciences, **unique in Wallonia**, **and in Aerospace Engineering**, **the only one of its kind in Belgium**.

The university's research and development activities cover a wide spectrum, **from astrophysics to molecular biology and genetics including aspects from space structures to robotics.**

Its **nanosatellite project** provides a **hands-on experience to students** in the design, construction, and control of satellite systems. The first satellite in this series is called **OUFTI-1**: it is a CubeSat, a 10 cubic cm, 1 kilogramme cube. The key innovative feature of **OUFTI-1** is the use of the D-STAR amateur-radio digital-communication system. It will also carry an innovative electrical power system and high-efficiency solar cells.

Source: http://www.ulg.ac.be/cms/c_5000/accueil

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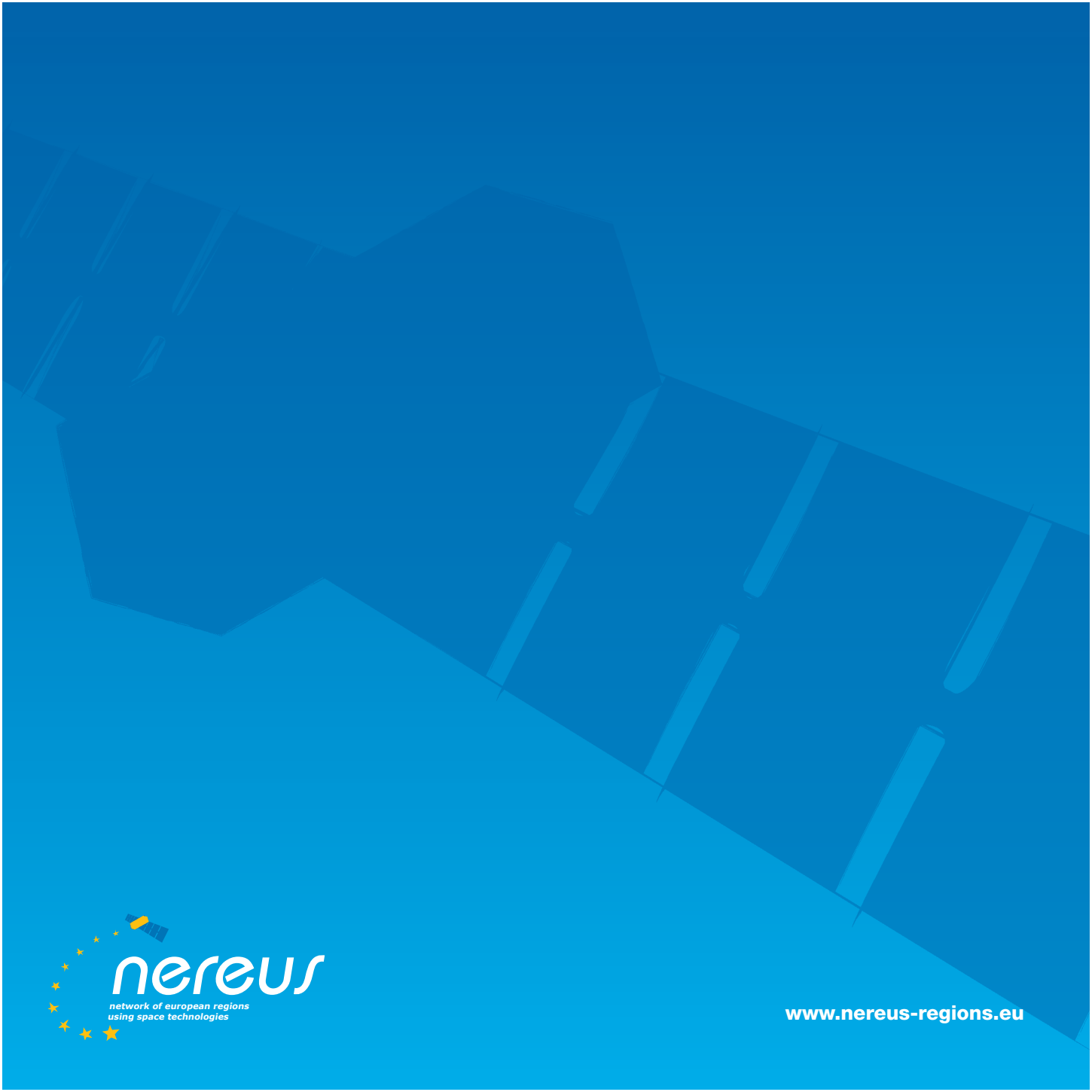

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