



ESA TEACH WITH SPACE ONLINE CONFERENCE 2021

6–8 July 2021

PRIMARY AND SECONDARY EDUCATION AT ESA

Dear teachers,

A warm welcome to the 2021 ESA Teach with Space Online Conference!

Every year I am delighted to see hundreds of educators like you joining ESA for an exciting opportunity to learn something new and let us – the ESA Education Office – learn something new from you. Indeed, we share the same objective: helping the future generations to become better informed, prepared, knowledgeable, active and responsible citizens, thinkers, innovators, leaders.

I truly hope you'll get the inspiration you are looking for, and that you will enjoy the use of space in support of STEM teaching and learning in school.

Enjoy every moment of it!



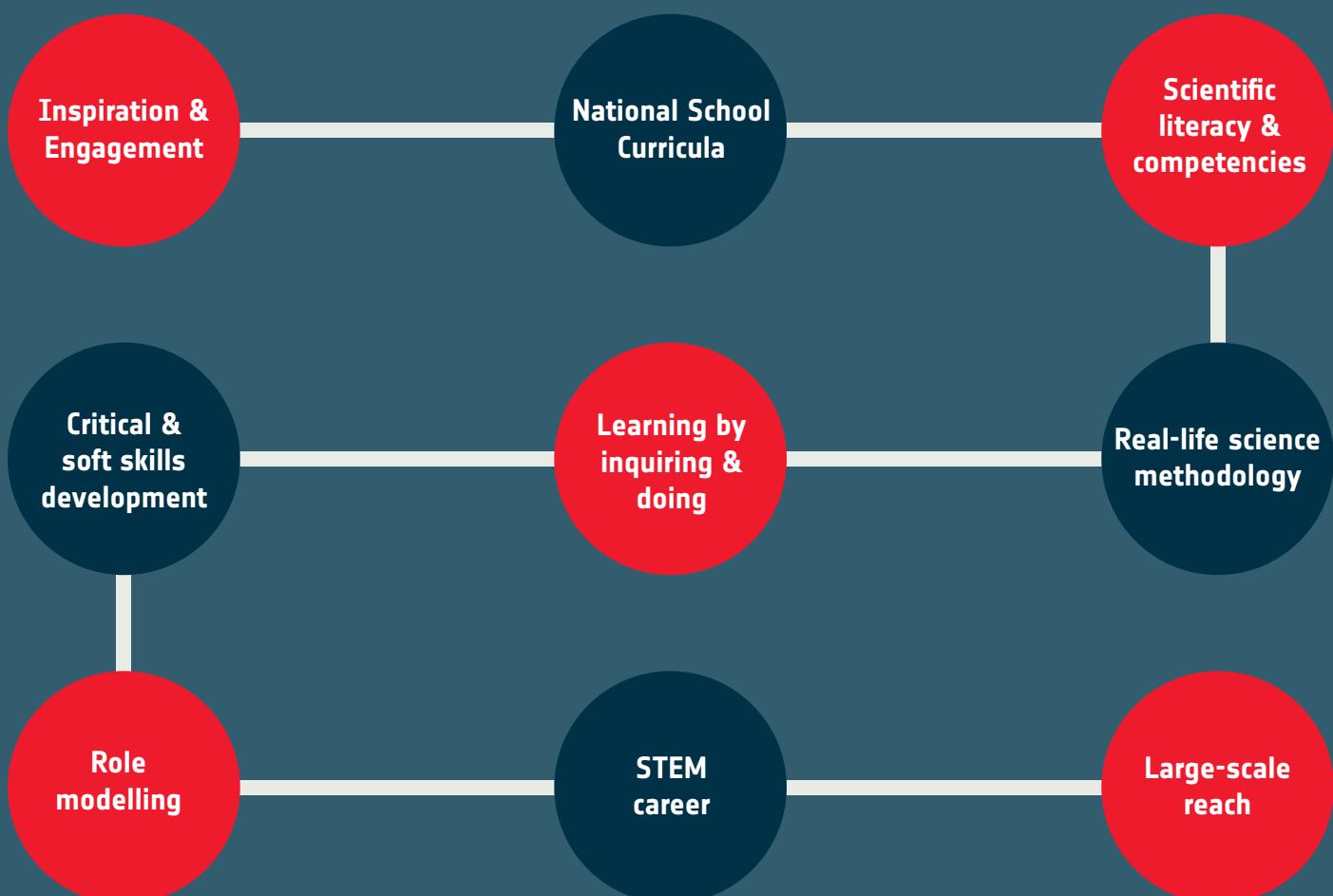
Hugo Marée
Head of the ESA Education Office

A handwritten signature in black ink, appearing to read "H. Marée".

SPARKING INTEREST, NURTURING SKILLS

ESA's primary and secondary school education programme uses **space as a theme** to effectively engage pupils in STEM (science, technology, engineering and mathematics). It builds on the latest STEM pedagogical results and trends, putting each pupil at the centre of an active learning process, and places a high focus on the new set of skills requested from them in the 21st century. The objective is not only to attract young people to STEM studies and careers, but also to help them become active citizens able to overcome the global challenges our society is confronted with nowadays.

Space has it all, from a school educator's point of view: it triggers pupils' natural interest and curiosity in the world that surrounds them, it touches all scientific and technical curricular disciplines and link them together in an interdisciplinary fashion, it provides a powerful model for the application of scientific methodology to real life, it helps them to communicate and collaborate, and enable them to develop the critical thinking they need to master their own future.



ESERO – GOING NATIONAL, THINKING LIKE A NETWORK



ESERO (European Space Education Resource Office) is ESA's flagship project in the field of primary and secondary school education. The project consists of a network of national offices that supports the teacher community in delivering the national STEM school curricula in the national language(s). ESERO provides pre-service and in-service teacher training, curricular classroom resources, interdisciplinary school projects that resemble the real practice of science, and information about the wide variety of space careers.

National networks of partners – education institutions, ministries of education, space agencies and more – is the key to ESERO's success. To date, the project is active in 18 ESA Member States (AU, BE, CZ, DK, DE, EE, ES, FI, FR, IR, IT, LU, NL, NO, PL, PT, RO, UK), with more countries to join the network soon (SE, GR, LT, HU).

INTERNATIONAL TEACHER TRAINING @ ESA

Every year ESA runs **international teacher training** workshops that complement the national teacher training offered by the ESEROs. Besides experiencing how space can be used in the classroom, teachers have access to space facilities, meet space experts, and network in an international environment.

Sessions are normally given at ESTEC, ESA's European Space Research and Technology Centre, in the Netherlands, and at the **e-technology lab**, ESA's permanent teacher training facility located at ESA's ESEC-Galaxia Centre in Belgium. Since 2020 ESA also delivers teacher training online.

TEACH WITH SPACE

In collaboration with the ESERO network, ESA produces a wealth of innovative curricular classroom resources that, altogether, make the **Teach with Space** collection. These resources include teacher guides, pupil activities, and experimental kits.

SCHOOL PROJECTS – ESA DIDACTIC MATERIALS



Every year ESA runs **international school projects** that engage pupils in a **multidisciplinary** mission, just as it is done in the real space practice. With these projects pupils are able to reinforce their knowledge of curricular STEM subjects, link such subjects together, develop skills and competences – such as the ability to think critically and solve problems, work scientifically, learn by technical design, do practical work, collect and analyse data, exercise presentation skills – as well as core values and attitudes, such as teamwork, collaboration and sustainability.

The ESA school projects come with **plenty of support for the teachers**, who are provided with dedicated training, classroom resources helping them to guide and support their pupils in the execution of each project, and direct help from their national ESERO office.

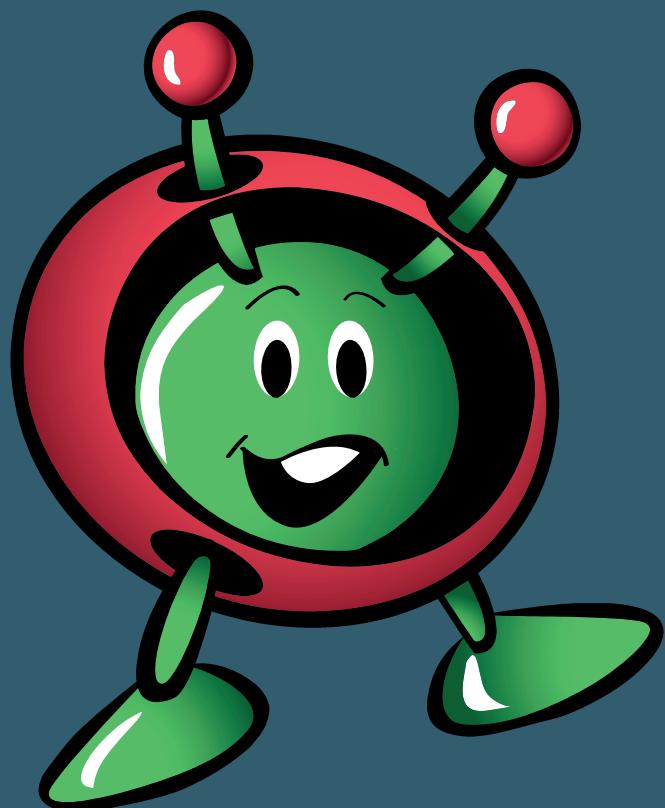
- **European Astro-Pi challenge**, upper primary/lower secondary school level – design a scientific experiment, write the computer code to run it and have it operated on the International Space Station. In collaboration with the Raspberry Pi Foundation
- **European CanSat competition**, secondary school level – assemble, launch and operate the simulation of a small satellite that fits into a soft drink can
- **Climate Detectives**, primary and secondary school levels – identify a climate-related issue, investigate it with Earth Observation data and propose positive actions to monitor or mitigate the problem, that is...to make a difference for our planet!
- **Moon Camp**, primary and secondary school levels – learn what it takes to live on the Moon and 3D design a human shelter on its surface. In collaboration with the Airbus Foundation
- **Mission X – Train like an astronaut**, primary school level – stay healthy, stay fit, eat well. In collaboration with the UKSA

PRIMARY AND SECONDARY EDUCATION AT ESA

PAXI & ESA KIDS – SPACE FOR THE LITTLE ONES



Learning by playing is the philosophy of ESA Kids, ESA's online platform for the juniors (4-10 y/o). Animated by Paxi the alien, a fictional cartoon character, the platform offers children an attractive and accessible way to stimulate their interest in science, technology and space, and familiarise them with scientific concepts within their reach.



6**JULY**

PROGRAMME OF THE DAY

Time	Type of session	Title	Space theme	Level	Curricular topics
10:00-11:00	Welcome session	Introduction to ESA and its education programme			
11:00-11:15	Experiment of the day 1	The size of the Solar System	Exploration	Primary / Secondary	Science, Astronomy
11:15-11:45	Plenary 1 - ESA Expert key-note	Climate from Space			
11:50-12:30	Splinter session 1 - classroom activities	Weather and climate in the classroom	Earth Sciences	Primary	Science
	Splinter session 2 - classroom activities	Do it Yourself 3D printed rover	Technology	Secondary	Programming, Robotics and Mathematics
14:00-14:30	Plenary 2 - ESA Expert key-note	Clean Space			
14:35-15:15	Splinter session 3 - classroom activities	Cleaning space debris	Technology	Primary	Science, Arts
	Splinter session 4 - classroom activities	Space exploration activities	Exploration	Secondary	Physics, Chemistry and Biology
15:20-16:00	Splinter session 5 - classroom activities	The science of Space Movies	Exploration	Primary	Science, Physics and Chemistry
	Splinter session 6 - classroom activities	EO Browser - Do it Yourself Earth Observation	Earth Sciences	Secondary	Mathematics, Geography, Physics, Biology
16:15-17:00	Plenary 3	Virtual tour of ESTEC facilities			
17:00-17:15	Q&A with ESA Education team	Coming up next...			

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PLENARY SESSIONS SUMMARY

10:00-11:00

Introduction to ESA and its education programme

Speaker: Monica Talevi, ESA Education



Monica Talevi, Head of STEM Education and Outreach Unit at ESA Education will provide an overview of the European Space Agency activities and highlight the strength of space when used in the classroom. She will present the ESA Education programme and explain how you and your students can be involved and participate in our school projects and teacher training workshops.

11:00-11:15

Experiment of the day 1 - The size of the Solar System

Space Theme: Exploration

Curricular topics: Science, Astronomy, Mathematics

Participate in real time.

Level:
Primary & Secondary

You will need these materials:

- Paper strip, pen or pencil

Each of the eight planets of our Solar System occupies its own orbit (path) around the Sun. In the classroom, it can be tricky to address the question: how far are the planets from the Sun?

In this simple activity using just paper and a pen, you will in real time examine the 'real' distances of each planet from the Sun and compare them with your predictions.

11:15-11:45

Plenary 1 - ESA Expert key-note - Climate from Space

Speaker: Paul Fisher, ESA Climate Office



The Climate Office delivers the ESA Climate Change Initiative, a research programme that transforms satellite data into global climate observations that are increasing understanding of our planet's climate. In this session, Paul Fisher will present the ESA Climate Change Initiative and give an overview of ESA's climate related missions and explain the role of space in tackling climate change.

12:30-14:00

Meet the ESEROs

Learn more about the activities being organised in your country in the ESERO booth. ESERO representatives will be available to answer your questions in the live chat.

14:00-14:30

Plenary 2 - ESA Expert key-note - Clean Space

Speaker: Antonio Caiazzo, ESA Clean Space office



Why does space debris pose a problem to humankind? What is the European Space Agency doing to solve it? Antonio Caiazzo, from the ESA Clean Space office, will help us explore the different areas that require our focus. Covering topics such as Space Debris Removal, Debris Mitigation Strategies and Satellite EcoDesign, this session gives a glimpse into some of the most pressing sustainability challenges for the space industry.

16:15-17:00

Plenary 3 - Virtual tour of ESTEC facilities

Speaker: Robert Willemsen



In this live and interactive virtual tour you will discover the world of space, technology, and innovation at ESA ESTEC. You will participate in a virtual panoramic tour of the satellite test centre. You will also learn more about 3D printing for space applications and robotics for Moon and Mars missions.

17:00-17:15

Q&A with ESA Education team. Coming next...

Do you have questions? Ask a member of the ESA Education team

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SPLINTER SESSIONS

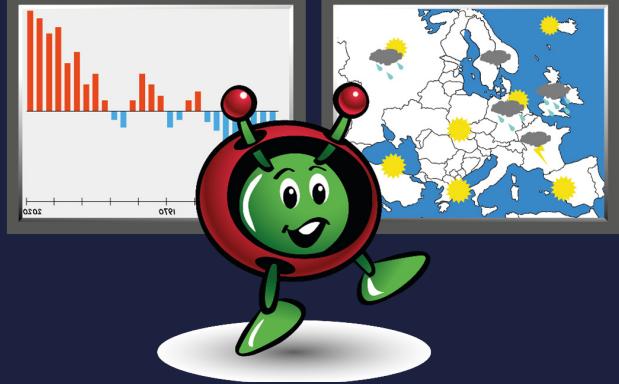
SPLINTER SESSION 1 - WEATHER AND CLIMATE IN THE CLASSROOM

11:50-12:30

Space Theme: Earth Sciences

Curricular topics: Science

Level:
Primary



Earth's weather and climate are complex systems that scientists study using data from satellites and ground-based measurements. In this session we will explore the differences between weather and climate and investigate the importance of Earth's natural greenhouse effect to sustain life in our planet. But what happens when this delicate balance is upset and the greenhouse effect gets stronger? We will demonstrate, with simple experiments, the impact of melting land and sea ice as a result of global warming and the acidification of oceans.

SPLINTER SESSION 2 - DO IT YOURSELF 3D PRINTED ROVER

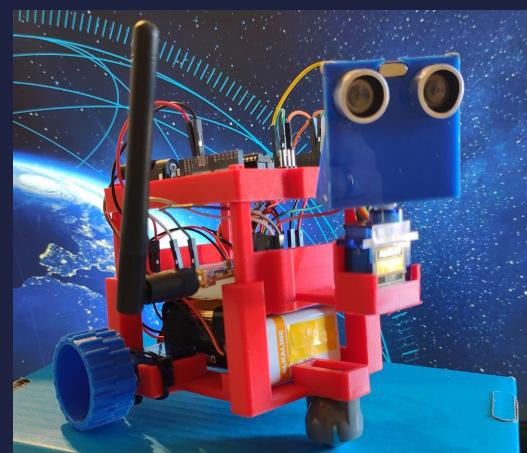
11:50-12:30

Space Theme: Technology

Curricular topics: Programming,
Robotics and Mathematics

Level:
Secondary

Did you ever wonder how a planetary exploration robotic vehicle is designed and tested? Even more, how does it receive orders from the operation centre on Earth and how does it send experimental data back?



Within this activity we will demonstrate the design and operation of a planetary exploration mission. We will show how to design a robotic vehicle from scratch, using 3D design software to design and 3D print the robot's main parts. We will use Arduino to program the robot to move and to receive orders from the operation centre. We will also perform a simple environmental experiment and send data back to the operation centre.

So be prepared to get a taste of the job of a planetary vehicle engineer, a RF communication engineer, a programmer and a scientist, working together as a team, for the same mission.

SPLINTER SESSION 3 - CLEANING UP SPACE DEBRIS

14:35-15:15

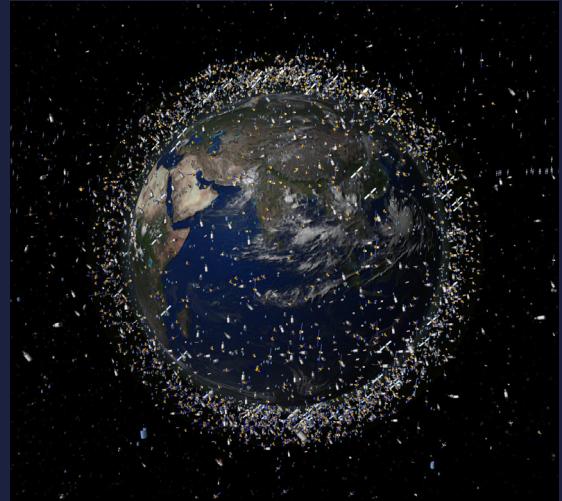
Space Theme: Technology

Curricular topics: Science, Arts

Level:
Primary

The amount of space debris, or space 'junk', surrounding Earth is now at a point that we can no longer ignore, and the situation is only going to get worse if we do not act. The European Space Agency's (ESA) Clean Space program is attempting not only to minimise the debris produced by future space missions, but to actively reduce the debris already in orbit. In these activities, tailored for primary school children, you will:

- learn why space debris is so dangerous,
- Learn how to create your own debris-grabbing device,
- Understand how scientists are trying that satellites that fulfil their mission come back to earth faster to burn up in the atmosphere, by using drag sails.



SPLINTER SESSION 4 - SPACE EXPLORATION ACTIVITIES

14:35-15:15

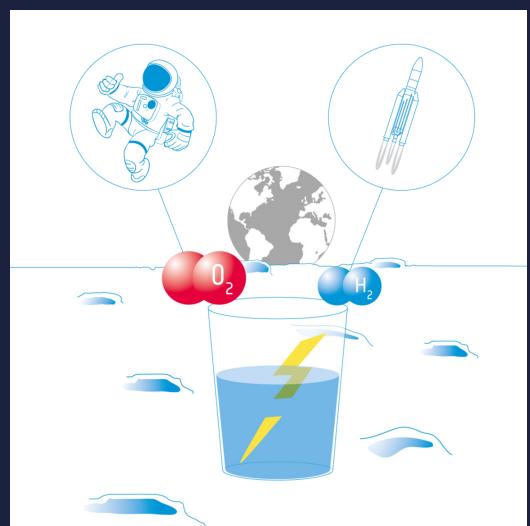
Space Theme: Exploration

Curricular topics: Physics, Chemistry and Biology

Level:
Secondary

Space, outside of our home planet can be an extremely hostile environment for humans to live. The Moon is Earth's closest neighbour and may hold secrets about the formation of our Solar System and how life began more than three billion years ago. Humans have only visited the Moon six times and now ESA, along with space agencies around the world, are planning to go back and beyond. This return to the Moon envisages a series of human missions starting in the early 2020s that would see astronauts interact from orbit with robots on the lunar surface. Robots will land first, paving the way for human explorers.

This renewed interest in the Moon has been partly motivated by the hunt for lunar resources such as water which exists as ice in permanently shadowed craters at the lunar poles. With so much more to explore, and even more to learn, humanity is looking to the Moon for our next giant leap. In this session we will explore some of the challenges future astronauts may face, like energy production, in-situ resources and environmental conditions in space and how it may affect life.



SPLINTER SESSION 5 - THE SCIENCE OF SPACE MOVIES

15:20-16:00

Space Theme: Exploration

Curricular topics: Science, Physics, Chemistry

Level:
Primary

Have you ever wondered if you can steal the Moon like the super-villain *Gru* in Despicable Me? In this session, we will breakdown animated, children's movies and explain how science fiction meets science fact for primary students.

SPLINTER SESSION 6 - EO BROWSER - DO IT YOURSELF EARTH OBSERVATION

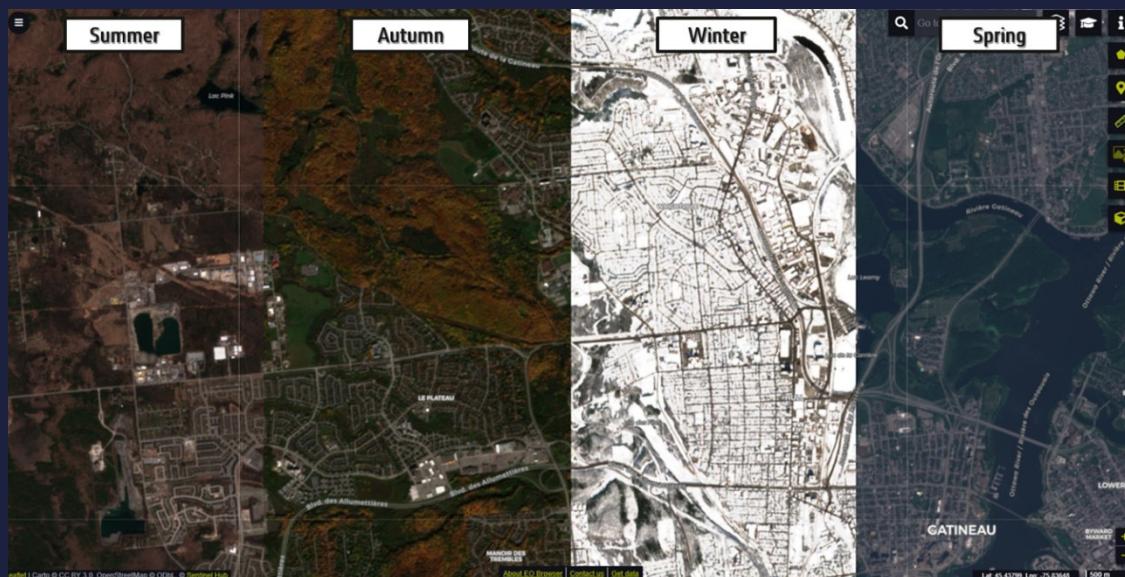
15:20-16:00

Space Theme: Earth Sciences

Curricular topics: Mathematics, Geography, Physics, Biology

Level:
Secondary

Earth observation satellites enable us to monitor and observe our planet in many different ways. In this session you will create your own timelapse and beautiful satellite images with EO Browser! EO Browser is an online tool that provides easy and free access to satellite images from different Earth Observation missions. We will explore the basic functions and measure geographical features such as geometry and size, changes in the landscape, mathematical applications, and explore different types of satellite data. Explore the Earth with us and try it for yourself!



A series of Sentinel-2 satellite images of Gatineau Park in Montreal, Quebec, Canada showing the four seasons of the year in 2020 with the "Compare" function in EO Browser.

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PROGRAMME OF THE DAY

Time	Type of session	Title	Space theme	Level	Curricular topics
10:00-10:10	Welcome				
10:10-11:15	Plenary 4 - ESA Expert key-note	Space exploration and sustainability			
11:30-11:45	Experiment of the day 2	Tea bag balloon	Earth Sciences	Primary / Secondary	Physics
11:45-12:30	Splinter session 7 - classroom activities	Building stuff for space - Spacecraft Materials kit & Bionic Hand	Exploration	Primary	Science, Arts, Physics and Biology
	Splinter session 8 - classroom activities	The science of Space Movies	Exploration	Secondary	Physics and Chemistry
14:00-14:30	Plenary 5 - ESA Expert key-note	How does space benefit society?			
	Splinter session 9 - classroom activities	Artificial Intelligence	Technology	Primary / Secondary	Mathematics and Programming
14:35-15:15	Splinter session 10 - classroom activities	Understanding our Earth from Space with Easy-to-Use Augmented Reality Apps	Earth Sciences	Secondary	Mathematics, Geography, Physics, Biology
15:20-16:00	Splinter session 11 - classroom activities	Experimenting with sensors made easy	Technology	Primary / Secondary	Programming, Robotics, Physics and Mathematics
	Splinter session 12 - classroom activities	Exoplanets in a box	Exploration	Secondary	Physics and Mathematics
16:15-17:00	Panel Discussion 1	"The STEM classroom 4.0 - Education of the future: how to implement learner-centred and interdisciplinary methodologies in the classroom?"			
17:00-17:15	Q&A with ESA Education team	Coming up next...			
17:15-18:00	Trivia & Space Drinks				

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PLENARY SESSIONS SUMMARY

10:00-10:10

Welcome

Get ready for a day full of interesting talks and activities! We will start the programme with a short overview of the sessions to come.

10:10-11:15

Plenary 4 - ESA Expert key-note - Space exploration and sustainability

Speaker: Tim Peake, ESA Astronaut

Tim Peake is a European Space Agency (ESA) astronaut of British nationality. He finished his 186-day Principia mission working on the International Space Station for Expedition 46/47 when he landed back on Earth 18 June 2016. Tim has a background as a test pilot and a British Army Air Corps officer. Tim is currently taking an unpaid leave of absence from ESA for two years



from 1 October 2019. Astronauts often use the period between space missions for personal and career development. Over these two years, Tim has continued to support the Agency but returned to the UK where he has been working more closely with the United Kingdom Space Agency (UKSA) on their education and outreach programme.

In this session he will talk about his experience as an astronaut and explain how space exploration is important for a sustainable future.

11:30-11:45

Experiment of the day 2 - Tea bag balloon

Space Theme: Earth Sciences

Curricular topics: Physics

Participate in real time.

You will need these materials:

- Tea bag; matches

Level:
Primary & Secondary

Why is there wind? And how does an air balloon rise? With this simple activity and by using just a tea bag and matches, you will be able to answer these questions and demonstrate that hot air is less dense than cold air and that the temperature differences cause air currents.

12:30-14:00

Meet the ESEROs

Learn more about the activities being organised in your country in the ESERO booth. ESERO representatives will be available to answer your questions in the live chat.

14:00-14:30

Plenary 5 - ESA Expert key-note - How does space benefit society?

Speaker: Amanda Regan, ESA Phi Lab



ESA's Φ-lab mission is to accelerate the future of Earth Observation (EO) with the aim to strengthen the world-leading competitiveness of the European EO industrial and research sectors. Amanda is the Head of the Phi-Lab Invest Office and is the Programme Manager of the new Investment in Industrial Innovation (InCubed) Earth Observation programme at ESA-ESRIN in Italy. In this session, Amanda will present some examples of how EO space activities are monitoring the complexities of the Earth system and improve everyday life on Earth.

16:15-17:00

Panel Discussion 1 - The STEM classroom 4.0 - Education of the future: implementing learner-centred and interdisciplinary methodologies in the classroom

Moderator: Monica Talevi and Clara Cruz Niggebrugge, ESA Education
Panelists:

- Jessica Newint Gori, Indire
- Alex Brown, STEM Learning
- Eilish McLoughlin, Dublin City University
- Achilles Kameas, Hellenic Open University

Space 4.0 represents the evolution of the space sector into a new era, at a time of rapid change in science, technology, and society as a whole, and with burning global challenges ahead. Is education ready for these changes? Are we on the break of a new education paradigm? This expert panel will discuss and present their views about the future of education. Join the debate, ask questions and share your opinion.

17:00-17:15 _____

Q&A with ESA Education team. Coming next...

Do you have questions? Ask a member of the ESA Education team

17:15-18:00 _____

Social Program: Trivia & Space Drinks

Broadcasting live from ESA Education, grab a space drink, sit down & relax! Join us for our space-themed online trivia quiz and social to test your knowledge with fellow educators, friends and colleagues. All while enjoying space music, movies and much more – everyone is welcome!

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SPLINTER SESSIONS

SPLINTER SESSION 7 - BUILDING STUFF FOR SPACE - SPACECRAFT MATERIALS KIT & BIONIC HAND

11:45-12:30

Space Theme: Exploration

Curricular topics: Science, Arts, Physics and Biology

Level:
Primary

Space is one of the most dangerous and damaging environments we know. In fact, many robots are already used for the exploration and exploitation of space and soon, it is expected that crews of astronauts and humanoid robots will work together. In this session you will learn how to build a bionic hand and a robotic arm. You will also be introduced to ESA's Spacecraft Materials Kit, a comprehensive resource developed to investigate which materials and properties are best suited to build a spacecraft.



SPLINTER SESSION 8 - THE SCIENCE OF SPACE MOVIES

11:45-12:30

Space Theme: Exploration

Curricular topics: Physics and Chemistry

Level:
Secondary

Does sound propagate in the vacuum? How does a black hole look like? Can plants grow on Mars? In this session, we will explore and learn the correct science of some of the most famous Space Movies of this and the past century, such as Interstellar, Star Wars, Sunshine or Total Recall.

SPLINTER SESSION 9 - ARTIFICIAL INTELLIGENCE

14:35-15:15

Space Theme: Technology

Curricular topics: Mathematics and Programming

Level:
Primary & Secondary

From movie recommendations to self-driving cars, Artificial Intelligence is playing an increasingly large role in our everyday lives. There is huge potential for AI technologies in the continuing journey to understand more about our solar system and beyond. This session introduces the Game of Nimm classroom activity and uses current applications within the space industry as the context for bringing AI into the classroom in a fun and creative way.

This session will be run in collaboration with ESERO Belgium.



SPLINTER SESSION 10 - UNDERSTANDING OUR EARTH FROM SPACE WITH EASY-TO-USE AUGMENTED REALITY APPS

14:35-15:15

Space Theme: Earth Sciences

Curricular topics: Mathematics, Geography, Physics, Biology

Participate in real time.

Level:
Secondary

You will need these materials:

- smartphone with Android 6.0 or higher. Video demonstrations will be shown for those without such phones.

The view onto the Earth from above has always been a fascinating one. In the past few years, a multitude of space-borne sensors has provided remote sensing products with high spatial and temporal resolution that can be used by everyone for everything – from specialists for their research to journalists in news reports to interested individuals for art or leisure activities. Satellite imagery enables everyone to explore spatial patterns too large to grasp from the ground or spectral properties too far off the visible spectrum for human eyes to see.

While the images are aesthetically pleasing, the data behind those images is hardly ever explored in school lessons. That includes the spatiotemporal, spectral, and radiometric properties of the images which are suited perfectly to discuss and combine curricular topics from physics and geography within the field of remote sensing. Other benefits include the excellent visualization and many possibilities of student interaction with the data. Possible topics include: natural and man-made disasters, spectral properties of harmful algae, volcano monitoring using radar, and Earth Observation satellites.

This session is aimed at teachers and interested individuals in geography and physics and will:

- Teach about the basics of remote sensing,
- Present education web portals on remote sensing,
- Use interactive teaching applications that tie remote sensing, geography and physics together.

This session will be run in collaboration with ESERO Germany.



SPLINTER SESSION 11 - EXPERIMENTING WITH SENSORS MADE EASY

15:20-16:00

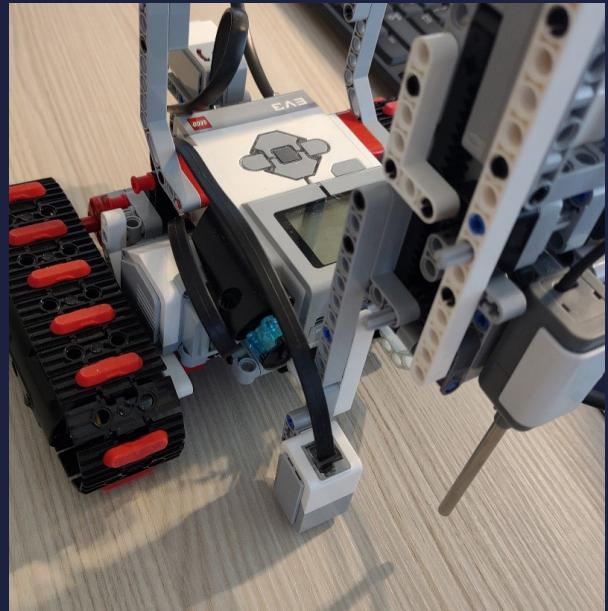
Space Theme: Technology

Curricular topics: Programming, Robotics,

Level:
Primary & Secondary

Physics and Mathematics

Did you ever wonder how scientists perform experiments on other planets? How they receive and process data? We couldn't think of an easierst way than the LEGO mindstorms EV3 educational set, to demonstrate this. The activity focuses on how to perform an experiment using the EV3 hardware and software. Apart from setting up and performing multiple experiments, we will explore ways of receiving and reusing the experimental data. Get ready to experience the role of a scientist on a planetary exploration mission. Be prepared to setup your experiment and manipulate received experimental data. There are many ways to do this; we will demonstrate how, and you can pick up which one fits your classroom setup.



SPLINTER SESSION 12 - EXOPLANETS IN A BOX

15:20-16:00

Space Theme: Exploration

Curricular topics: Physics and Mathematics

Level:
Secondary

Participate in real time.

You will need these materials:

- Cardboard box, torch, craft knife, semi-circular protractor, clothes peg, wooden stick, sticky tape, modelling clay or playdough and light meter (you can for example use your smartphone as a datalogger)

Our galaxy, the Milky Way, is estimated to contain a few hundred billion stars. Observations indicate that many stars host planetary systems (exoplanets), so it is likely that billions of planets exist within our galaxy. In this session you will discover how exoplanets are detected. You will create your own physical model of a 'transiting' exoplanet - one that passes in front of its host star, along our line of sight from Earth. Finally, you will capture and plot data from your model, and you will find out how to calculate the radius of an exoplanet.

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PROGRAMME OF THE DAY

Time	Type of session	Title	Space theme	Level	Curricular topics
10:00-10:10	Welcome				
10:10-10:40	Plenary 6 - ESA Expert key-note	Robotics: Mission to Mars			
10:45-11:00	Experiment of the day 3	Seeing the invisible	Technology	Primary / Secondary	Physics
11:00-11:30	Splinter session 13 - classroom activities	Landing on the Moon	Exploration	Primary	Science, Mathematics and Physics
	Splinter session 14 - classroom activities	Plants on Mars	Technology	Secondary	Programming, Robotics, Physics and Mathematics
11:45-12:30	Share your projects				
14:00-14:30	Plenary 7 - ESA Expert key-note	Extreme environments on Earth			
14:35-15:15	Splinter session 15 - classroom activities	Mapping your classroom and beyond	Earth Sciences	Primary	Science, Geography, Mathematics
	Splinter session 16 - classroom activities	Introduction to Astro Pi	Technology	Secondary	Programming and Physics
15:20-16:00	Splinter session 17 - classroom activities	Introduction to 3D Design using Tinkercad	Technology	Primary / Secondary	Programming and Mathematics
	Splinter session 18 - classroom activities	Climate from Space in the classroom	Earth Sciences	Secondary	Physics, Chemistry, Geography
16:15-17:00	Panel Discussion 2	"Skills and Careers of the Future - What are the career perspectives of the future and the right skills 'for the job'?"			
17:00-17:30	Closing session				

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PLENARY SESSIONS SUMMARY

10:00-10:10

Welcome

Get ready for a day full of interesting talks and activities! We will start the programme with a short overview of the sessions to come.

10:10-10:40

Plenary 6 - ESA Expert key-note - Robotics: Mission to Mars

Speaker: Jorge Vago, ESA's ExoMars Project Scientist



Determining whether life ever existed, or is still active on Mars today, is one of the outstanding scientific questions of our time.

Jorge Vago will present us an overview of our understanding of the red planet, and the mysteries we still have to unravel. He will also describe the scientific objectives and technology behind some of the current and future ESA missions such as ExoMars.

10:45-11:00

Experiment of the day 3 - Seeing the invisible

Space Theme: Technology

Curricular topics: Physics

Level:
Primary & Secondary

Participate in real time.

You will need these materials:

- Smartphone with camera, tv remote, optical filters (RGB), candle, matches
- Earth observation satellites can see more than what we see with our own eyes. In this simple activity using just your smartphone camera and optical filters, you be able to see beyond the visible part of the electromagnetic spectrum.

11:45-12:30

Share your projects

Curious for more ideas on how to use space in the classroom? In this session we will share best practices from the participants and highlight a few school projects and classroom activities developed by teachers with their students.

You can explore the full set of projects in the Share your projects area.

12:30-14:00

Meet the ESEROs

Learn more about the activities being organised in your country in the ESERO booth. ESERO representatives will be available to answer your questions in the live chat.

14:00-14:30

Plenary 7 - ESA Expert key-note - Extreme environments on Earth

Speaker: Stijn Thoole, previous ESA-sponsored research doctor at Concordia Station, Antarctica

Cold, dark, remote, Antarctica is as close to space as we can get on Earth. Stijn Thoelen lived and worked at the French/Italian Concordia research station in Antarctica as the European Space Agency's research physician for 1 year. Humans conduct research in Antarctic bases on a wide range of topics, from climate studies and astronomy to glaciology and human physiology and psychology. In this session, Stijn will talk about his experience in Antarctica and how it is to live in one of the most extreme environments on Earth and its implications for human space exploration.



16:15-17:00

Panel Discussion 2 - "Skills and Careers of the Future - What are the career perspectives of the future and the right skills 'for the job'?"

Moderator: Monica Talevi and Clara Cruz Niggebrugge, ESA Education

Panellists:

- Agueda Gras-Velazquez, European Schoolnet
- Amanda Regan, ESA Phi Lab
- Joseph, Dudley, Space Skills Alliance

To conclude the conference, what better than making a dive into the skills and careers of the future, and how space can enable new career opportunities? Join this expert panel to debate, ask questions and share your opinion.

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SPLINTER SESSIONS

SPLINTER SESSION 13 - LANDING ON THE MOON

11:00-11:30

Space Theme: Exploration

Curricular topics: Science, Mathematics and Physics

Level:
Primary

Participate in real time.

You will need these materials:

- one egg, straws, popsicle sticks, rope, cotton balls, balloons, styrofoam, paper, small plastic bags, sticky tape

Landing on another world is extremely hazardous. In this session, you will simulate some of the development phases of a real space mission. You will take on the role of the space industry to develop a Moon lander. You will have a total budget of 500 million euros to build a landing module to secure the survival of the crew (in the form of an egg-naut) during a landing on the Moon.



SPLINTER SESSION 14 - PLANTS ON MARS

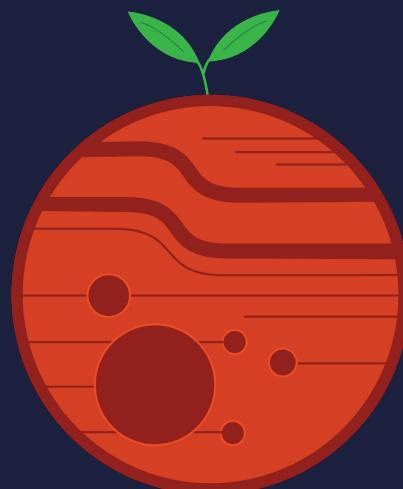
11:00-11:30

Space Theme: Technology

Curricular topics: Programming, Robotics, Physics and Mathematics

Level:
Secondary

Scientists have been studying Mars for years as it has certain conditions which make it a favourable location for a human base. If that ever happened, we would need to be able to cultivate plants there, in order to provide us with food, like potatoes. In preparation for growing plants autonomously on Mars, how can we find smart ways to irrigate a plant on Earth without the need for a human to be present? In this session, you will learn to build an automatic plant-watering system.



SPLINTER SESSION 15 - MAPPING YOUR CLASSROOM AND BEYOND

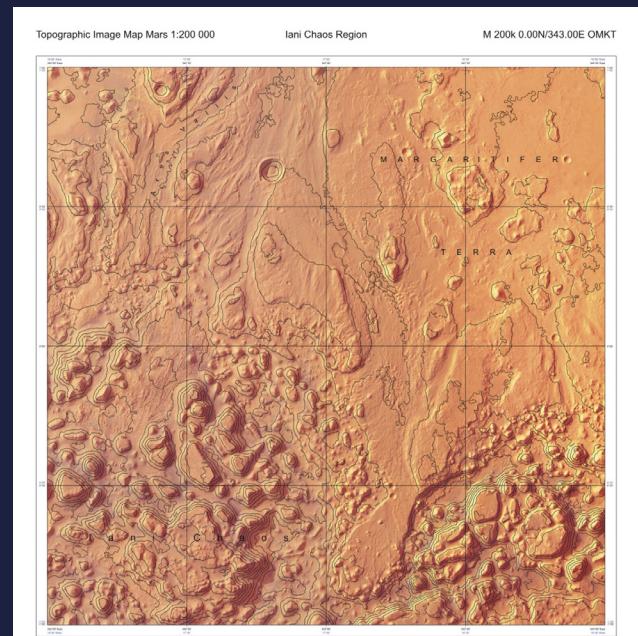
14:35-15:15

Space Theme: Earth Sciences

Curricular topics: Science, Geography, Mathematics

Students develop and practice their spatial thinking and analysis skills using their local surrounding – their very own classroom! Spatial thinking is important for students to develop as they connect the “why of where” in geography, Earth and environmental sciences, and history. This session is an introduction on how students can properly read, interpret, reason and create their own map starting from their very own classroom while learning about perspective, scale, directionality, and even applications to different planets! Students who acquire robust spatial thinking skills will be at an advantage in our increasingly global and technological society and will also build a foundation for analysing environmental issues and challenges.

Level:
Primary



SPLINTER SESSION 16 - INTRODUCTION TO ASTRO PI

14:35-15:15

Space Theme: Technology

Curricular topics: Programming and Physics

Astro Pi computers are small computer devices that are capable of great things. ESA is collaborating with the Raspberry Pi Foundation to run an educational project that makes use of two Astro Pi computers located on the ISS by means of coding and scientific experimentation. During this session, you will be introduced to the Astro Pi software and hardware, including its set of sensors. You will make use of the Trinket emulator and learn to program an Astro Pi in the language that they communicate – Python. These special computers can, for instance, be used to communicate with astronauts on board the ISS through the manipulation of text and images on an LED screen, as well as to run science experiments.

Level:
Secondary



SPLINTER SESSION 17 - INTRODUCTION TO 3D DESIGN USING TINKERCAD

15:20-16:00

Space Theme: Technology

Curricular topics: Programming and Mathematics

Level:
Primary & Secondary

Participate in real time.

You will need these materials:

- Computer and a Tinkercad account

This session will introduce the topic of 3D design. We will provide curricular links and examples of projects that can be developed in the classroom, such as the Moon Camp Challenge.

We will make use of the 3D design software tool: Tinkercad. This user friendly, free, browser based tool can easily be used in classrooms. We will provide a broad overview of the functionalities of the tool and some easy examples that can you follow and repeat live. To create a free account visit www.tinkercad.com.



SPLINTER SESSION 18 - CLIMATE FROM SPACE IN THE CLASSROOM

15:20-16:00

Space Theme: Earth Sciences

Curricular topics: Physics, Chemistry, Geography

Level:
Secondary

Satellite data and complementary ground measurements provide the global coverage needed to monitor our changing climate. We need measurements from land, ocean and atmosphere to make sure our knowledge of the climate is complete. In this session, we will investigate sea currents - "the highways of the oceans", demonstrate with a simple experiment what drives them and discuss their importance for our climate. One more important indicator that scientists study to understand climate change is sea ice. Each year, the polar oceans experience the formation and then melting of vast amounts of sea ice. This seasonal sea ice cycle affects Earth's climate, human activities and also biological habitats. With practical activities and satellite images, we will investigate properties and the evolution of sea ice and highlight the importance of sea ice and its relation to Earth's climate.

USEFUL LINKS

ESA Education:

esa.int/education

Classroom Resources Primary:

esa.int/Education/Teachers_Corner/Primary_classroom_resources

Classroom Resources Secondary:

esa.int/Education/Teachers_Corner/Secondary_classroom_resources

ESA School Projects:

esa.int/Education/Teachers_Corner/Save_the_date_for_Back_to_School_2021-22_with_ESA

ESA Kids:

esa.int/kids

ESA Teacher Training:

esa.int/Education/Teachers_Corner/ESA_Teach_with_Space_teacher_training_opportunities

ESEROs:

esa.int/Education/Teachers_Corner/European_Space_Education_Resource_Office

Social Media:

Facebook:

facebook.com/EuropeanSpaceAgency

facebook.com/ESAEducation

facebook.com/PaxiESAKids

Twitter:

twitter.com/esa

twitter.com/esa__education