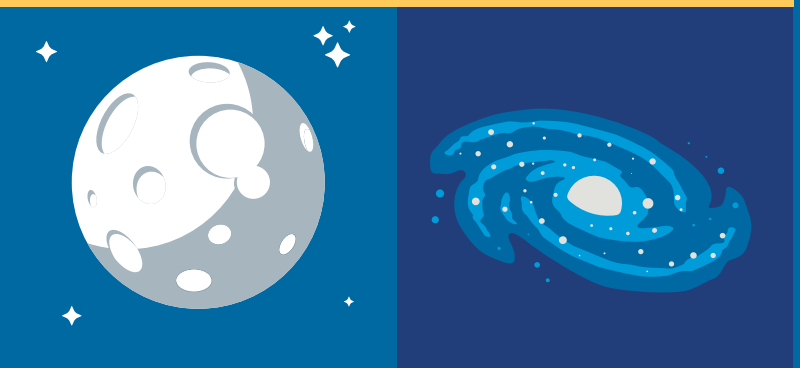
ESA TEACH WITH SPACE ONLINE CONFERENCE

2025

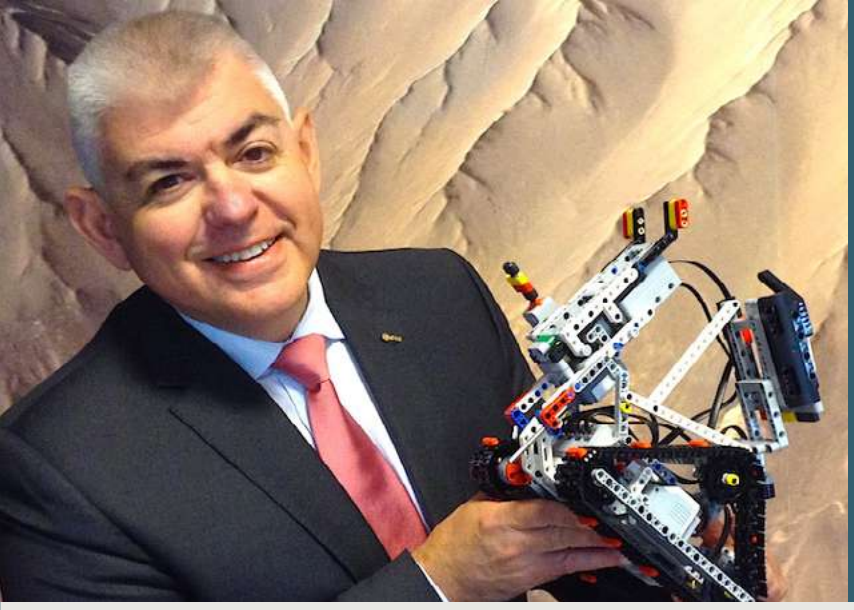
9-10 July 2025



→ THE EUROPEAN SPACE AGENCY

ESA TEACH WITH SPACE ONLINE CONFERENCE 2025

	TIME	SESSION	TITLE	LEVEL
WEDNESDAY 09 JULY	10:00-10:20	Welcome session	Introduction to ESA and its Education Programme	
	10:25-10:45	Splinter session 1: Classroom Activities	Teach with Space - A journey through the ESA Education Primary resources	Primary
		Splinter session 2: Classroom Activities	Teach with Space - A journey through the ESA Education Secondary resources	Secondary
	10:45-11:00	Social Activity	Networking Carrousel	
	11:00-11:30	Plenary 1 – ESA Expert keynote	Earth's Climate from Space: The Long-Term Satellite View	
	11:35-12:05	Plenary 2 – Classroom Activities	Investigating Earth from Space: Tools to access satellite data and practical activities	Primary/ Secondary
	12:10-12:40	Plenary 3 – ESA Education: Challenge	Observing Earth's climate, building awareness in education	Primary/ Secondary
	12:40-14:10		Visit the ESERO and ESA Education booths!	
	14:10-15:10	Share your project	Teachers present their projects	
	15:20-16:25	Plenary 4 – ESA Expert keynote	ESA astronaut talk and Q&A	
	16:30-16:55	Splinter session 3: ESA Education: Challenge	Health, Nutrition, STEM	Primary
		Splinter session 4: ESA Education: Challenge	Exploration activities on the ISS and the Moon	Secondary
	17:00-17:15	Closing Session	Coming up next... Q&A with the ESA Education team	
THURSDAY 10 JULY	09:40-10:10	Plenary 5 – ESA Expert keynote	Space Applications: Systematic Earth Observation from Satellites addressing Climate Change	
	10:15-10:35	Splinter session 5: Classroom Activities	Explore biodiversity with Paxi	Primary
		Splinter session 6: Classroom Activities	Nexus Island Game on Biodiversity – A collaboration between ESA and EMBL	Secondary
	10:40-11:10	Plenary 6 – ESA Expert keynote	In search of exoplanets	
	11:15-11:35	Splinter session 7: Classroom Activities	Exoplanet in a box (using micro:bit)	Primary
		Splinter session 8: Classroom Activities	Hack an Exoplanet activities	Secondary
	11:40-12:10	Plenary 7 – ESA virtual tour	Virtual tour of ESEC facilities	
	12:10-12:30	Plenary 8 – Classroom Activities	Exploring Space through inspirational activities - Meet your guide, Paxi!	Primary/ Secondary
	12:30-14:00		Visit the ESERO and ESA Education booths!	
	14:00-14:30	Plenary 9 – ESA Expert keynote	From low Earth orbit - To Mars and beyond	
	14:35-14:55	Splinter session 9: Classroom Activities	Moon Constitution	Primary
		Splinter session 10: Classroom Activities	Power from sunlight	Secondary
	15:00-15:30	Plenary 10 – ESA Expert keynote	Use of Artificial Intelligence in Space	
	15:35-16:00	Splinter session 11: Classroom Activities	Using image recognition to navigate an online rover	Primary
		Splinter session 12: Classroom Activities	Building a joystick to control a device	Secondary
	16:05-16:30	Plenary 11 – ESA Expert keynote	Getting closer to space after finishing secondary school: ESA Academy and Early Careers	
	16:30-16:55	Plenary 12 – ESA Expert keynote	ESA 50 years - Beyond Borders: Europe's Journey to Space	
	17:00-17:15	Closing Session	Let's wrap-up!	



Hugo Marée
Head of the ESA Education Office

Dear teachers,

Welcome to the 2025 ESA Teach with Space Online Conference!

The Education Office is very pleased to host you for this two-days educational journey.

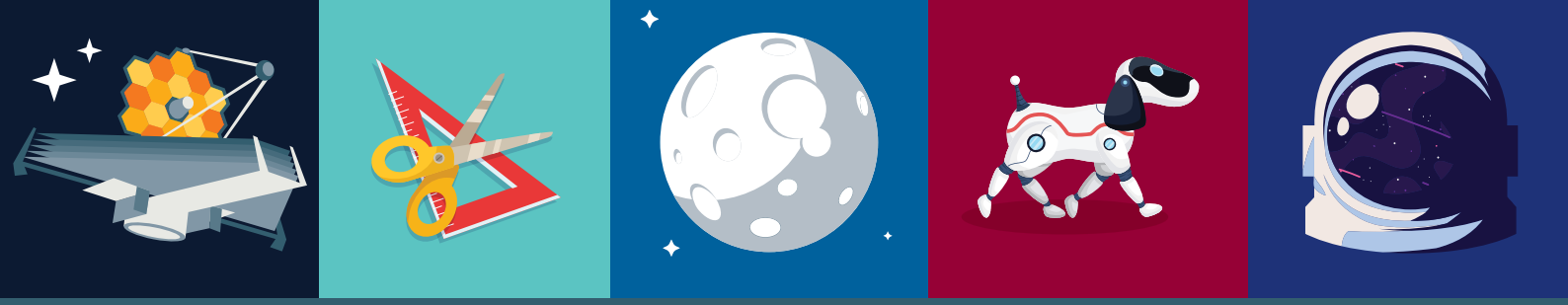
During your time with the European Space Agency, you will explore, among others, the fascinating world of astrophysics and planetary science. You will learn, from the experts that develop them, about groundbreaking space missions and about their applications to address societal challenges such as climate change. You will learn how astronauts prepare for space and hear about the wealth of available classroom resources and exciting space-related projects.

Equipped with the latest knowledge and discoveries in the field, we hope you will eventually gain invaluable insights to inspire and engage your students.

Throughout this journey, even if on-line, I encourage you to actively participate, exchange ideas, and share best practices.

So, be ready to embark on an extraordinary voyage through space! Let's use the power of space exploration to develop technical and scientific literacy, ignite wonder and inspire the next generation of scientists, engineers, entrepreneurs and innovators.

Welcome to the fascinating world of space exploration!
Welcome to the magnificent realm of space for education!

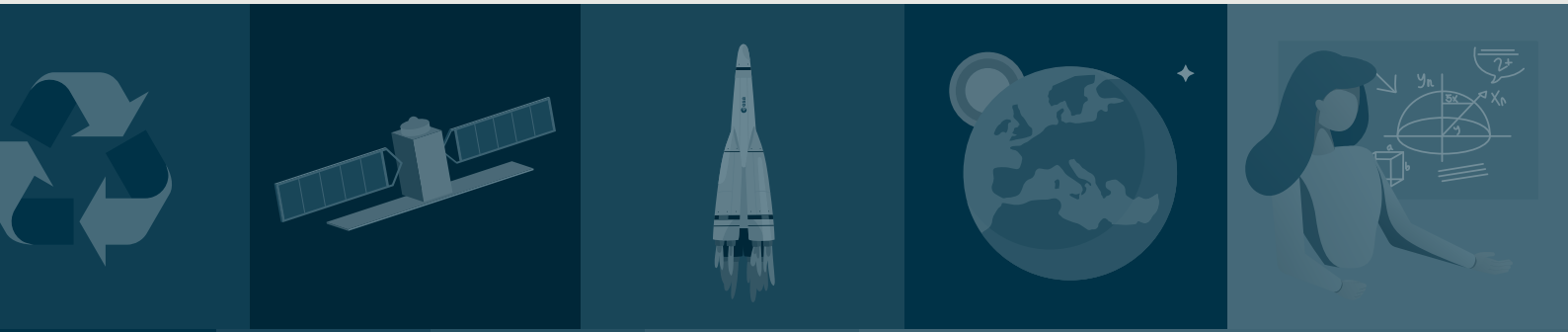


THE ESA EDUCATION PROGRAMME
SPACE AT THE FOREFRONT OF EDUCATION

The ESA Education Programme uses the fascination and the incredible knowledge generated by Europe's unique space programme for the education and the benefit of the younger generation - from early age to early professional levels - and for the growth of society at large. Since 2023, with the Space for Education 2030 vision, education at ESA is set on a fast track to the future.

The ESA Education Programme is a so-called mandatory activity in the ESA Convention. For ESA, Education is fundamental not only to prepare the future workforce that will turn Europe's space strategy and ambitions into reality, but also because it helps build generations of **future citizens** who are informed, able to decide and act responsibly, and who are equipped to face the societal and global challenges of the future, whatever profession they choose.

At ESA we use space as a great asset in support of **STEM** (Science Technology, Engineering and Mathematics) education. Space is a modern myth, it is a large part of contemporary culture, it is a strong societal and economic driver and enabler, and much more. Learning by using space means accessing top-edge knowledge, learning to collaborate, create, and innovate. In other words, learning by using space means being accompanied on an inspired, unique path to developing the so-called **21st-century skills** – that is everything that any young person should be given the possibility to develop to be successful in a career and to contribute to a better future.

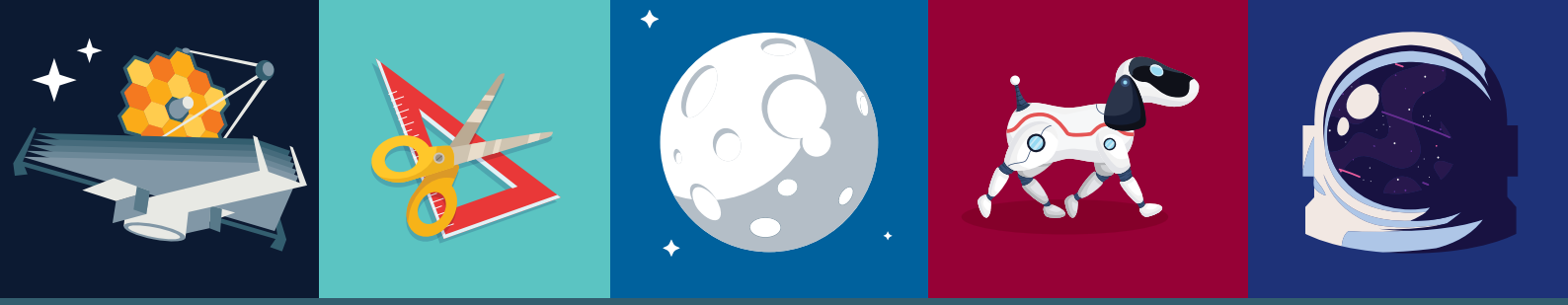


OUR MISSION

Space for Education 2030 is the long-term vision and plan for the ESA Education Programme, aligned with the strategy and ambitions for Europe in space set by ESA's Agenda 2025 and ESA Strategy 2040.

With Space for Education 2030, ESA puts itself at the forefront of **innovation** in education, to achieve **capacity building** for the evolving **space sector** and for a **sustainable society**, and to help the young generation be ready *"for jobs that have not been created, for technologies that have not yet been invented, to solve problems that have not yet been anticipated. [OECD, 2018]"*

We are achieving these objectives by building on the successes and best practices we collected so far, but we have enlarged our programme's scope and scale. We are pursuing didactics. We are covering new subject knowledge such as artificial intelligence, quantum technologies, and more, and with them, we are reaching additional target audiences. We are systematically addressing **interdisciplinarity** and 21st century skills, so much needed by today's labour market, are being, and all are tapping from the whole range of space disciplines and their so-called 'downstream' applications for the benefit of society. Last but not least, we are pushing on the **inspiration** accelerator as never before.



WHAT'S IN SPACE FOR EDUCATION 2030?

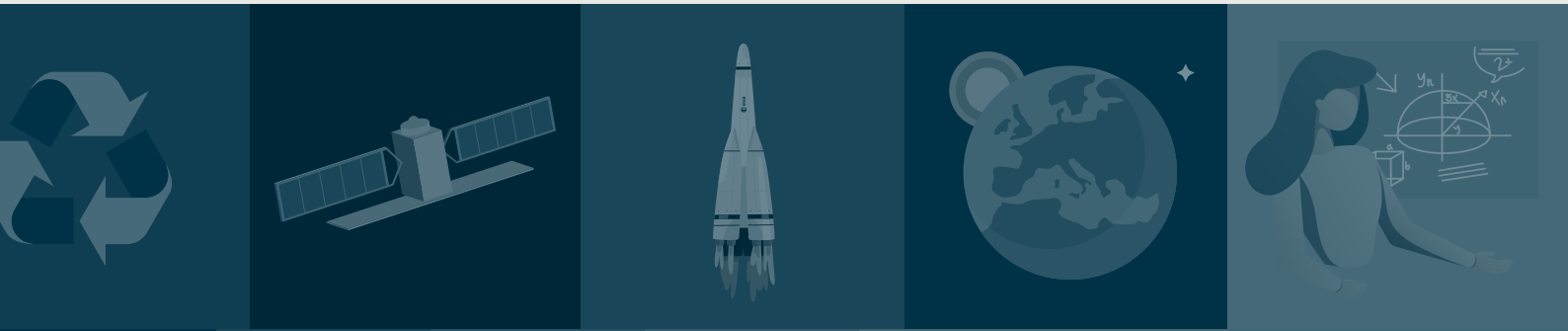
Space for Education 2030 targets a very wide age spectrum, from early ages up to the very first career stages, through two main pillars of unique activities:

ESA for schools

the **STEM Learning and Inspiration programme**, for the education and inspiration of 3-18-year-old children and pupils, both directly and through their educators.

ESA for universities

the new **ESA Academy programme**, for the skill-building and engagement of students in higher education.



3-18 Y/O: STEM LEARNING AND INSPIRATION PROGRAMME

The new STEM Learning and Inspiration programme consists of two activity sets. The first one – Learn with Space – is strictly educational, with activities designed with specific learning objectives in mind, both for youngsters and their educators. The second – Let Space Inspire You – is strictly inspirational; it is aimed at using the 'wow' factor generated by space to spark children and teenagers' curiosity and imagination, and to stimulate their interests towards STEM and space studies and careers. Whenever possible, synergy of activities within the two sets is pursued, to mutually reinforce the learning and inspirational elements of the experience proposed.

All these activities are solidly rooted and implemented at the national level through the ESA **ESERO framework project**, a network of dedicated national offices and consortia of partners established by ESA in its Member and Associate States.

In a nutshell:

- **Learn with Space** is a vast portfolio of initiatives to support educators from formal and non-formal education venues, starting from early childhood up to upper secondary age groups, implemented at national level by the ESERO project. Such activities primarily consist of professional educator training, didactics resources, interdisciplinary school projects, thematic workshops, and an international community of practice, all connecting the national and international dimensions together by building on the best from both experiences to boost STEM education at large.

- **Let Space Inspire You** is a large variety of inspirational and engaging events, role modelling, career awareness initiatives, and access to space experts – astronauts included – for youth and their families to share the fascination and importance of space and STEM; in doing so, help to break diversity barriers, boost accessibility, and promote sustainability for a better future.

WED
09
JULY

SESSIONS SUMMARY

9:30-10:00

Welcome Session

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.

10:00-10:20

WELCOME SESSION

Introduction to ESA and its education programme

Speaker: ***Clara Cruz Niggebrugge, ESA Education***

Clara Cruz Niggebrugge, STEM Leaning Coordinator, 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 activities.

Available after the conference:

Session recording *Presentation PDF*

10:25-10:45 – *Splinter Sessions 1 & 2*

10:25-10:45

SPLINTER SESSION 1 CLASSROOM ACTIVITIES

Teach with Space – A journey through the ESA Education resources

Level: ***Primary***

10:25-10:45

SPLINTER SESSION 2 CLASSROOM ACTIVITIES

Teach with Space – A journey through the ESA Education resources

Level: ***Secondary***

In these sessions, we will provide an overview of the ESA's Teach with Space collection, developed in collaboration with the European Space Education Resources Office (ESERO) network.

We will explore with you the inspirational resources that you can use to engage students to learn about STEM topics using space as the entry point.

These resources include teaching guidelines, student activities, videos and experiment kits.

There will be two parallel sessions:
- ***splinter session 1 - for primary school level***
- ***splinter session 2 - for secondary school level***

Supporting resources:

Teach with Space primary classroom resources

Teach with Space secondary classroom resources

Available after the conference:

Session recording *Presentation PDF*

10:45-11:00

PARTICIPATE IN REAL TIME

Social activity – Networking Carrousel

Join the other participants in this Teach with Space networking carrousel.
Interact with teachers, educators, and ESA experts while you sip your coffee, and get to know more about them in 3-minute conversations.

11:00-11:30

PLENARY 1 ESA EXPERT KEYNOTE

Earth's Climate from Space: The Long-Term Satellite View

Speaker: ***Paul Fisher, ESA***

Biography:
Paul is a science communicator who aims to make complex climate science accessible to scientists, policymakers and the public, while highlighting the critical contribution of satellites play in monitoring and understanding the Earth system. He supports the European Space Agency's (ESA) Climate Change Initiative, a research programme that draws on multiple satellites to generate a suite of global, long-term observation records that contribute to the evidence used to assess the state of Earth's climate.

Abstract:
Satellites, with their global and long-term view, reveal how our climate works - and how it is changing in response to human influence. In this presentation, we'll dive into the story of these orbiting workhorses, what they are telling us about the changes tacking place across every region of the planet and how they are helping to guide our response to what is one of the greatest challenges of our time.

Available after the conference:

Session recording *Presentation PDF*

11:35-12:05

PLENARY 2 CLASSROOM ACTIVITIES

Investigating Earth from Space: Tools to access satellite data and practical activities

Discover how to bring real-world satellite data into your classroom with hands-on activities that engage students in Earth observation.

We'll explore Copernicus Browser, a powerful tool for accessing and analysing satellite imagery, and demonstrate practical ways to integrate it into lessons. Perfect for educators looking to inspire curiosity about our planet. Don't miss this opportunity to make space-based learning accessible and exciting for your students!

Supporting resources:

Copernicus-browser-teacher-guide.pdf

Available after the conference:

Session recording *Presentation PDF*

12:10-12:40

PLENARY 3 **ESA EDUCATION: CHALLENGE**

Observing Earth's climate, building awareness in education

This session will introduce participants to the Climate Detectives project run by ESA and ESERO. The project aims to engage students in climate science through inquiry-based learning and real-world data analysis from Earth Observation (EO) satellites. Climate Detectives is open for primary (Climate Detectives Kids) and secondary school levels; the programme empowers young learners to explore climate-related issues affecting their local environment and making a difference.

During the session, educators and stakeholders will discover how the project encourages teamwork, critical thinking, and problem-solving by guiding students to investigate a local climate or environmental issue by using EO data. The presentation will cover the objectives, structure, and resources, highlighting success stories from past participants. Educators will also learn how to register, support students through their investigations, and contribute to raising climate awareness through education.

Whether you're a teacher, school administrator, or science communicator, this session offers valuable insights into integrating space-based climate education into the classroom and inspiring the next generation of climate-conscious citizens.

Available after the conference:

Session recording *Presentation PDF*

12:40-14:10

PARTICIPATE IN REAL TIME

Visit the ESERO and ESA Education booths

Discover more about the activities being organised in your country in the ESERO booth. Find out more about all the ESA Education activities and meet our team.
The booths are available throughout the full duration of the conference. During this time slot representatives will be available to answer your questions in the live chat and networking tables.

14:10-15:10

Share your project

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.

Available after the conference:

Session recording *Presentation PDF*

15:20-16:25

PLENARY 4 ESA EXPERT KEYNOTE

ESA astronaut talk and Q&A

John McFall is a British medical doctor, Paralympic medallist, and member of the ESA astronaut reserve.

After losing his right leg in a motorcycle accident at age 19, John went on to become a decorated Paralympic sprinter and later a UK national Trauma and Orthopaedic Specialist Registrar. In November 2022, he was selected to join ESA's Fly! initiative, a groundbreaking programme to assess the feasibility of astronauts with physical disabilities participating in space missions.
John played a central role in a two-year study examining the training, medical, and operational considerations for long-duration spaceflight, with results confirming that astronauts with a lower-limb disability can safely and effectively serve as fully integrated crew members aboard the International Space Station.
His continued involvement in the initiative's Mission Ready phase marks a significant step toward enabling the first spaceflight of an astronaut with a physical disability and advancing inclusion in space exploration.

Available after the conference:

Session recording *Presentation PDF*

16:30-16:55 – *Splinter Sessions 3 & 4*

16:30-16:55

SPLINTER SESSION 3 ESA EDUCATION: CHALLENGE

Health, nutrition, STEM

Level: ***Primary***
Curricular topics: ***Physical Education, Biology, Science, Maths***

Mission X: Train Like an Astronaut brings the excitement of space exploration into STEM education through hands-on activities that promote health, nutrition, and fitness. Inspired by real astronaut training, Mission X motivates learners worldwide with goal-driven challenges, awarding certificates and special celebratory messages from ESA to acknowledge their achievements.
By connecting students with the real-world challenges faced by astronauts, Mission X makes science relatable and inspiring. Resources are available in multiple languages and include curriculum-aligned teaching materials, videos, and activity guides tailored to different age groups and learning environments.
Join a vibrant global community of educators, discover local events and connect with your national organiser for support and guidance to bring Mission X into your classroom.

Supporting resources:

https://trainlikeanastronaut.org/

Available after the conference:

Session recording *Presentation PDF*

16:30-16:55

SPLINTER SESSION 4 | ESA EDUCATION: CHALLENGE

ESA Education: Exploration activities on the ISS and the Moon

Level: ***Secondary***
Curricular topics: ***Science, Technology, Coding, Biology, Physics, Chemistry, Geography***

Discover exciting opportunities for secondary students to engage in space exploration through two interdisciplinary projects: Astro Pi and Moon Camp.

In Astro Pi, students write a program to run on the International Space Station, allowing them to conduct a real-time experiment in space.
Meanwhile in Moon Camp, students are challenged to design a space habitat on the Moon or beyond using a design tool of their choice.

These projects aim to inspire and educate students about the possibilities of space exploration, while gaining a deeper understanding of STEM subjects through practical, hands-on activities.

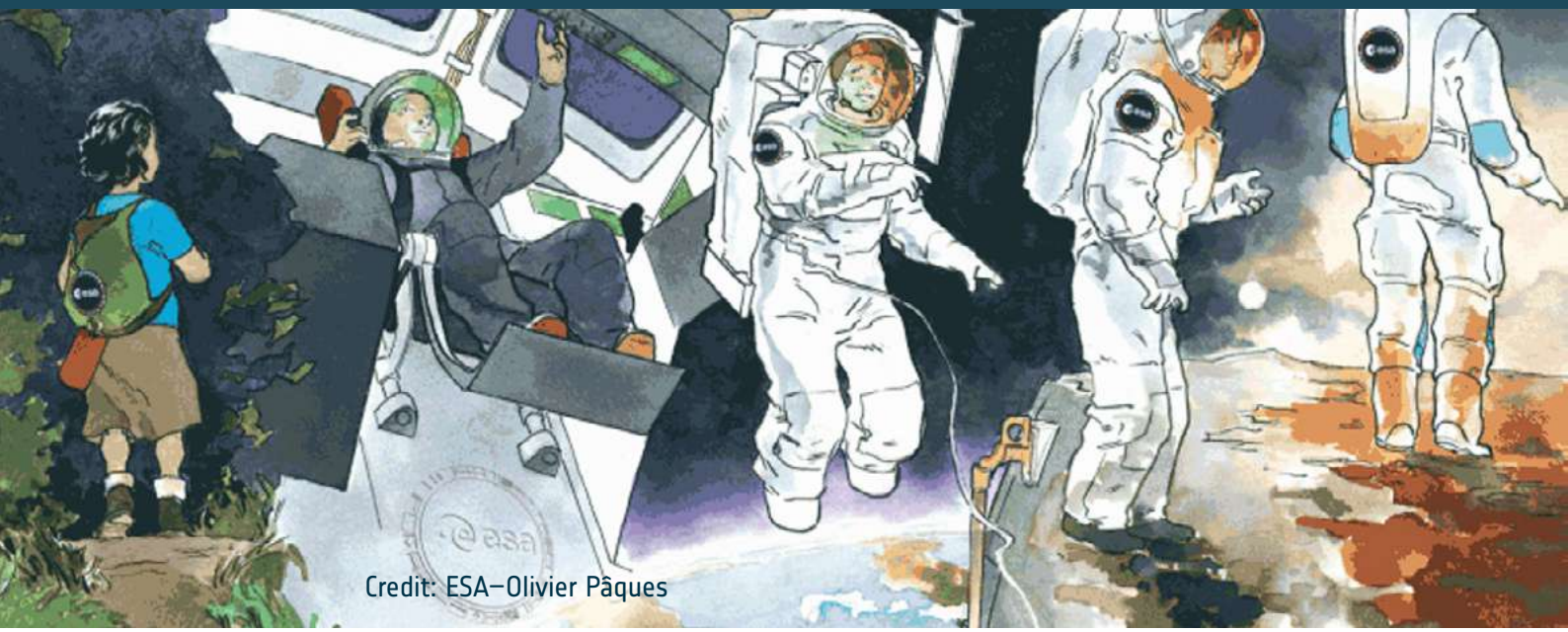
Supporting resources:

https://astro-pi.org/

https://mooncampchallenge.org/

Available after the conference:

Session recording *Presentation PDF*



Credit: ESA–Olivier Pâques

17:00-17:15

PARTICIPATE IN REAL TIME

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

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

SESSIONS SUMMARY

9:30-9:40

Welcome Session

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.

9:40-10:10

PLENARY 5 **ESA EXPERT KEYNOTE**

Space Applications: Systematic Earth Observation from Satellites addressing Climate Change

Speaker: ***Frank Martin Seifert, ESA***

Biography:
Frank Martin Seifert has been working for the European Space Agency at its Earth Observation Centre ESRIN in Frascati, Italy since 2000 as Earth Observation Application Engineer. He has been ESA's focal point for land and forest services from local to global scale for Copernicus and is active in ESA's Climate Change Initiative with applications in the cryosphere and for biomass. He is ESA's Lead in the GEO Flagship Global Forest Observations Initiative (GFOI) and advocates for Earth Observation at UN level as ESA's Designated Contact Point for UNFCCC.

Abstract:
The talk will address the role of systematic Earth Observations (EO) in the Paris Agreement and its Global Stocktake process. Systematic observations of the Earth's atmosphere, ocean and land surface are critical for supporting these efforts. ESA as accredited Intergovernmental Organization is an observer in this process. ESA's contributions to climate research and systematic observations will be highlighted and explained with examples emphasizing the role of EO in mitigation and adaptation.

Available after the conference:
Session recording *Presentation PDF*

- 10:15-10:35 – *Splinter Sessions 5 & 6*

- 10:15-10:35

SPLINTER SESSION 5 **CLASSROOM ACTIVITIES**

Explore biodiversity with Paxi

Level: ***Primary***
Curricular topics: ***Biology , Science and Geography***

Discover how to bring forest biodiversity into your classroom with Paxi and the Forest Kids game, a playful yet educational tool developed by the UN's Food and Agriculture Organization with support from ESA.

In this session, teachers will explore how to guide students through interactive activities that introduce four forest types—tropical, boreal, temperate, and arid—while uncovering key STEM themes like ecosystems, species diversity, and remote sensing. Learn how to use the game to spark curiosity about Earth's natural systems, the role of satellites in environmental monitoring, and the importance of sustainability. Ideal for primary-level educators looking to enrich their lessons with space-based perspectives and engaging digital content.

Available after the conference:

Session recording *Presentation PDF*

- 10:15-10:35

SPLINTER SESSION 6 **CLASSROOM ACTIVITIES**

Nexus Island Game on Biodiversity – A collaboration between ESA and EMBL

Level: ***Secondary***
Curricular topics: ***Technology, Biology, Physics, Earth Sciences, Geography, Social Sciences, Ecology, Chemistry***

Nexus Island – ESA Extension is a story-driven, game-based resource that brings Earth Observation into your classroom. Students become scientists investigating the ecological health of a fictional island where everything is connected – from algal blooms to human impact.

Using a large floor map, game cards, and satellite images, students learn how satellites track environmental changes, and apply their understanding to develop strategies to protect the island's ecosystem. Along the way, they discover how satellite data complements ground- based observations and build key skills in scientific observation, collaboration, and communication.
Bring Earth Observation science into your classroom with a hands-on resource that's engaging, curriculum-relevant, and ready to use.

Available after the conference:

Session recording *Presentation PDF*

10:40-11:10

PLENARY 6 ESA EXPERT KEYNOTE

In search of exoplanets

Speaker: ***Gaitee Hussain, ESA***

Biography:
Her research relates to understanding the formation and evolution of solar-type stars and planetary systems like the Sun. I trace the evolution of solar-type stars, from when they are surrounded by discs in which fledgling planets begin to form, through too much older Sun- like systems, i.e. extrasolar systems. I use photometry, spectroscopy and Spectro polarimetry from both ground and space-based facilities to push progress in these areas.

Abstract:
Planets around other stars are called exoplanets and the first exoplanet around a star like our Sun was discovered in 1995. That discovery inspired astronomers around the world to dedicate their time to understanding what these alien worlds may look like and how the planets in our solar system compare. After introducing the latest findings in this exciting area of research, I highlight the areas in which ESA and Europe are contributing to the characterisation of other worlds: CHEOPS is the first dedicated exoplanet mission in our fleet. It will soon be joined by PLATO, which will detect exoplanets across the solar neighbourhood and then by Ariel, which will survey exoplanet atmospheres. My talk will also look further ahead to prospects in the search for habitable planets. Join us to explore how ESA is shaping the future of exoplanet science!

Available after the conference:

Session recording *Presentation PDF*

- 11:15-11:35 – *Splinter Sessions 7 & 8*

- 11:15-11:35

SPLINTER SESSION 7 CLASSROOM ACTIVITIES

Exoplanet in a box (using micro:bit)

Level: ***Primary***
Curricular topics: ***Science, Physics, Technology, Coding***

Discover how scientists detect distant planets using the transit method and replicate this technique with a simple yet engaging experiment using a Micro:bit. Learn how to simulate a star's dimming as an exoplanet passes in front of it and analyse the data just like real astronomers. Perfect for educators looking to bring space science to life in the classroom! Join us for this interactive demo and inspire your students with the wonders of exoplanet discovery.

Supporting resources:

P30_EN_Exoplanets-in-a-Box.pdf

Available after the conference:

Session recording *Presentation PDF*

- 11:15-11:35

SPLINTER SESSION 8 CLASSROOM ACTIVITIES

Hack an Exoplanet activities

Level: ***Secondary***
Curricular topics: ***Science, Physics, Mathematics, Astronomy***

In this activity, students will have the exciting opportunity to characterize mysterious exoplanets by analysing real data acquired by ESA's Cheops satellite. Acting as real scientists, they will fit a model to the data to retrieve the best fit parameters.
This inquiry-based astronomy project on planets outside the Solar System can be completed using a guided format or in a project-based learning format, such as a hackathon.

ESA needs the students' help to profile these exoplanets with real satellite data obtained from Cheops to complete the casefiles!

Supporting resources:

https://hackanexoplanet.esa.int/ P39_EN_Hack-an-Exoplanet-Teacher-Guide.pdf

P39_EN_Hack-an-Exoplanet-Student-Casefiles.pdf

Available after the conference:

Session recording *Presentation PDF*

11:40-12:10

PLENARY 7 ESA EXPERT KEYNOTE

Virtual tour of ESEC facilities

Speaker: ***Anestis Mavridis***

The European Space Security and Education Centre (ESEC) site is in Belgium, around 130 km south of Brussels and it serves as ESA's centre for education activities.
ESEC is also the centre of security, with special attention given on cyber security nowadays, but also hosts several operation activities.

During this session you will be given a tour to some unique infrastructure for the Galileo and Proba missions, and all the infrastructure available for university students.

Available after the conference:

Session recording *Presentation PDF*

12:10-12:30

PLENARY 8 CLASSROOM ACTIVITIES

Exploring Space through inspirational activities – Meet your guide, Paxi!

Level: ***Primary & Secondary***
Curricular topics: ***Science, Geography and Mathematics***

Do you want to explore the Universe with your students? Meet the ESA Education mascot Paxi and get ready to explore inspirational activities for the classroom and beyond. Paxi is a curious alien space explorer from a faraway (and fictional) exoplanet called Ally-O. Paxi has travelled through the Milky Way to explore our galaxy and landed on Earth to make new friends and guide young explorers through the wonders of space.

In this session, you will be introduced to ESA's engaging educational resources for children up to 12 years old, including hands-on activities, classroom materials, space-themed art competitions, the Paxi animations and much more. You will learn how to use these tools to explore space-related topics and inspire curiosity, creativity, and learning in children – all while following Paxi on an exciting adventure across the Universe.
Curious to learn more? Join us – and Paxi – and get ready to explore the Universe together!

Available after the conference:

Session recording *Presentation PDF*

12:30-14:00

PARTICIPATE IN REAL TIME

Visit the ESERO and ESA Education booths

Discover more about the activities being organised in your country in the ESERO booth. Find out more about all the ESA Education activities and meet our team.
The booths are available throughout the full duration of the conference. During this time slot representatives will be available to answer your questions in the live chat and networking tables.

14:00-14:30

PLENARY 9 ESA EXPERT KEYNOTE

From Low Earth Orbit - To Mars and beyond

Speaker: ***Orson Sutherland , ESA***

Biography:

Orson Sutherland leads the Mars & Beyond Exploration Programme within the Directorate of Human and Robotic Exploration. Based at ESTEC, he oversees a portfolio of programmes including ExoMars, ESA's contributions to Mars Sample Return in partnership with NASA, and the RAMSES planetary defence project in collaboration with JAXA.

He previously served as Project Manager of the Earth Return Orbiter and, from 2008 to 2018, as Engineering Manager of BepiColombo, ESA's flagship mission to Mercury in collaboration with JAXA. Dr Sutherland's background is in Plasma Physics and Ion Optics, with a focus on Electric Propulsion Systems, especially for deep space and inter-planetary missions. He is also the inventor of several internationally patented technologies in the field of charged particle beam systems, which are used in both scientific and industrial settings.

Abstract:

From Low Earth Orbit - To Mars and Beyond: an Introduction to ESA's Exploration Programme This presentation offers a guided tour of the European Space Agency's (ESA) exploration programme, designed to provide primary and secondary school teachers with a clear and compelling overview of current and upcoming missions across the Solar System.

From missions to Mercury and Jupiter's icy moons to preparing human outposts around the Moon and paving the way for a future journey to Mars, ESA's activities reveal the breadth and ambition of Europe's role in space. The presentation will highlight key scientific challenges— such as surviving microgravity, managing closed-loop life support systems, and defending Earth from asteroids—while showcasing how space exploration brings together biology, engineering, medicine, and international collaboration.

Teachers will leave with a deeper understanding of how space science connects to some of the most profound questions of our time: How did life begin? Are we alone? How can we sustainably explore and inhabit other worlds?

This broad overview aims to equip educators with the context and confidence to present Europe's space story to their students—framing it as a shared human endeavour that is already reshaping our future on Earth and beyond.

Available after the conference:

Session recording *Presentation PDF*

14:35-14:55 – *Splinter Sessions 9 & 10*

14:35-14:55

SPLINTER SESSION 9 **CLASSROOM ACTIVITIES**

Moon Constitution

Level: ***Primary***
Curricular topics: ***Science, Arts and Crafts***

Imagine establishing the first human society on the Moon—what rules should govern it? In this interactive activity, we'll discuss and debate key questions: How should resources be shared? What rights should lunar citizens have? Who should be allowed to live on the Moon? Through lively discussion, you'll help draft a "Moon Constitution," tackling real-world challenges of space exploration. Perfect for fostering critical thinking, collaboration, and creativity—join us to shape the future of off-world societies!

Supporting resources:

PR40_EN_Moon_Constitution.pdf

Available after the conference:

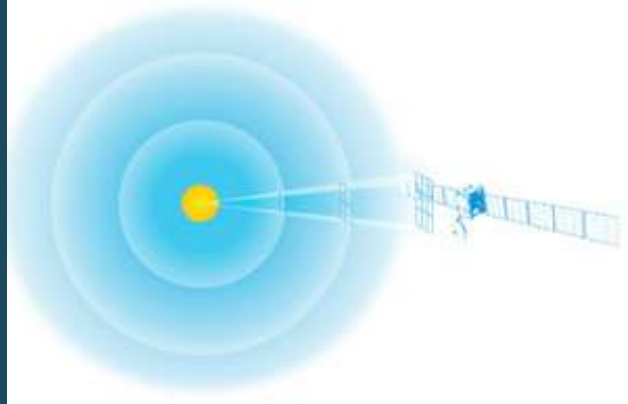
Session recording *Presentation PDF*

14:35-14:55

SPLINTER SESSION 10 **CLASSROOM ACTIVITIES**

Power from sunlight

Level: ***Secondary***
Curricular topics: ***Physics, Science, Statistics***



In this activity, students will learn about two concepts that influence solar panel design for space missions. The inverse square law and the angle of incidence. They will perform two simple investigations using a photovoltaic (solar) cell and a light source.

They will measure how the power produced by the solar cells varies with the distance from the light source and attempt to retrieve the inverse square law for light intensity experimentally. They will then conduct an experiment to investigate the dependence of the power output for the solar cell with the angle of incidence.

Supporting resources:

Powering_space_exploration_with_solar_energy_Teach_with_space_P09

Available after the conference:

Session recording *Presentation PDF*

15:00-15:30

PLENARY 10 ESA EXPERT KEYNOTE

Use of Artificial Intelligence in Space

Speaker: ***Lisa Denzer, ESA***

Biography:
Lisa is leading the AI Lab at the European Space Agency, where she spearheads the development of cutting-edge AI technologies to push the boundaries of human and robotic space exploration missions. With over a decade of experience in deep tech innovation across industries like space, robotics, fintech, real estate and e-commerce, she blends her AI expertise with a passion for pioneering advancements. Holding degrees in IT Digital Innovation and Political Science, Lisa has lived and worked in Austria, Denmark, Germany, and the Netherlands, shaping her global perspective and forward-thinking approach.

Abstract:
How can artificial intelligence help us explore the Moon and Mars? In this talk, ESA's AI Lab Lead Lisa Denzer shares how AI is already supporting astronauts on the International Space Station and how it will enable smarter, more autonomous missions beyond Earth. From robotic assistants and predictive maintenance to navigation on alien terrains, this session offers real-world examples of AI in action—and a glimpse into the technologies shaping the future of space exploration. Educators will gain insights they can bring back to the classroom, as well as behind-the-scenes perspectives from ESA's cutting-edge work.

Available after the conference:
Session recording *Presentation PDF*

15:35-16:00 – *Splinter Sessions 11 & 12*

15:35-16:00

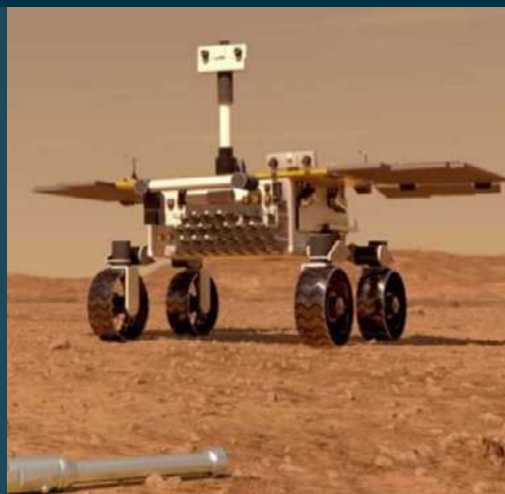
SPLINTER SESSION 11 CLASSROOM ACTIVITIES

Using image recognition to navigate an online rover

Level: ***Primary***
Curricular topics: ***Science, Technology, Programming***

Discover how artificial intelligence helps rovers "see" and navigate alien terrain by training your own image recognition model with Google's Teachable Machine. Learn to classify different landscapes, obstacles, or scientific targets, then test your skills by guiding a simulated rover through a virtual environment. Perfect for educators and students eager to explore AI, robotics, and space technology in an interactive way—no coding experience required! Join us to unlock the potential of machine learning in planetary exploration.

Available after the conference:
Session recording *Presentation PDF*



15:35-16:00

SPLINTER SESSION 12 CLASSROOM ACTIVITIES

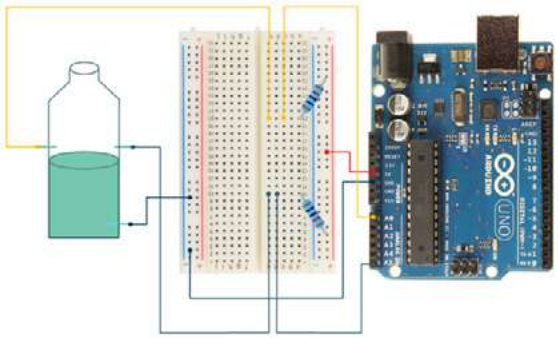
Building a joystick to control a device

Level: ***Secondary***

Curricular topics: ***Physics, Technology, Robotics, Algorithms, Coding, Computer Skills***

In this set of activities, students will get acquainted with technology used in space via an Arduino controller.

They will design and build a joystick, using a plastic bottle of water. They will learn how to build basic electronic circuits and perform electrical measurements, using a breadboard and wires. The basics of programming in C++ will be introduced using the Arduino (IDE) software. Then, they will use their joystick to control a motor and even play a video game that they will program using the MIT Scratch programming environment.



Available after the conference:

Session recording *Presentation PDF*

15:00-15:30

PLENARY 11 ESA ACADEMY & EARLY CAREERS

Getting closer to space after finishing secondary school

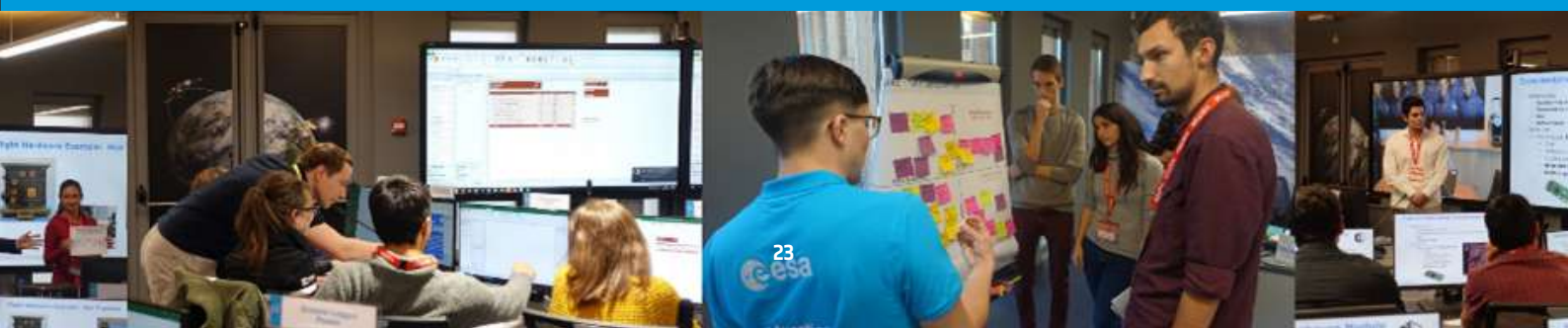
Speaker: ***Gloria Gelosa***

In this talk, students will be introduced to ESA Academy and early-career opportunities at ESA, with a special focus on activities accessible after secondary school.

The session will present ESA Academy's educational programmes for university students, including training sessions, the new Rocketry Training Programme, and the REXUS/BEXUS programme.
Entry-level opportunities such as internships and the ESA Graduate Trainee programme will also be highlighted, offering a glimpse into how young people can get closer to space from the very beginning of their academic journey.

Available after the conference:

Session recording *Presentation PDF*



16:30-16:55

PLENARY 12 ESA EXPERT KEYNOTE

ESA 50 years - Beyond Borders: Europe's Journey to Space

Speaker: ***Laylan Saadaldin***

Celebrating 50 years of the European Space Agency, this keynote traces the bold vision that brought Europe to space. In the aftermath of WWII and amid the Cold War space race, leading physicists saw the urgent need for a united European effort beyond Earth.

Through early struggles with satellite launches and fragmented national programmes, this talk explores how scientific ambition, political will, and timing aligned to create ESA — a story of cooperation rising from division, and of Europe claiming its place among the stars.

Available after the conference:

Session recording *Presentation PDF*

17:00-17:15

Closing session

ESA Teach with Space Online Conference wrap-up.

To conclude the conference, what better than ask questions and share your opinion with the ESA Education team.

USEFUL LINKS

ESA Education:
https://esa.int/education

Classroom Resources Primary:
https://esa.int/Education/Teachers_Corner/Primary_classroom_resources
Classroom Resources Secondary:
https://esa.int/Education/Teachers_Corner/Secondary_classroom_resources

ESA School Projects

Astropi: https://astro-pi.org/
CanSat: https://cansat.esa.int/
Climate Detectives: https://climatedetectives.esa.int/
Mission X: https://trainlikeanastronaut.org/
Moon Camp: https://www.mooncampchallenge.org/

ESA Kids:
https://esa.int/kids

ESEROs:
https://esa.int/Education/Teachers_Corner/European_Space_Education_Resource_Office

Social Media

Facebook:
https://facebook.com/EuropeanSpaceAgency
https://facebook.com/ESAEducation
https://facebook.com/PaxiESAKids

X:
https://x.com/esa
https://x.com/ESA__Education
https://x.com/Paxi_ESAKids

ESA TEACH WITH SPACE ONLINE CONFERENCE

2025