

SPACE NEWSLETTER

DECEMBER 2020



UNI@VERSO LO SPAZIO

University Mediterranea of Reggio Calabria



UNI@VERSO LO SPAZIO

University Mediterranea of Reggio Calabria



Dear Members of the University Community,

We are facing a historical period in which technology and digital media are trying to bridge the gap between us. Looking with a hopeful eye to a return to normality, our Community continues to work on new ideas and objectives to brighten our lives.

The Space Newsletter, being created, aims to encourage Community participation in the activities related to Space Sciences and Technologies, following the roadmap initiated by the "4th International Space Forum at Ministerial Level - The Mediterranean Chapter" hosted in Reggio Calabria at the end of last year together with the contemporary signing of an agreement with the Italian Space Agency (ASI). The "Reggio Calabria Page" summarized the outcome of that International Space Forum and laid the foundations for the development of our involvement in the field of Space Sciences and Technologies. In fact, Ministers, Diplomats and Heads of space agencies are committed to enforcing cooperation in space science and technology disciplines with universities and research centres in the Mediterranean region, with the support of national and international space agencies and institutions, and in particular the International Astronautical Federation (IAF). Besides, creating a greater awareness of space programs, existing national and international space centres, infrastructures and satellite systems have been promoted to contribute to the United Nations 2030 agenda at a regional level, especially in the Mediterranean Region. A further step was taken when the University Mediterranea was appointed as a new member of the International Astronautical Federation - IAF - by the Federation General Assembly during the 70th International Astronautical Congress - IAC 2019 - held in Washington D.C. (USA) from 21 to 25 October 2019.

Following this pattern, the internal working group Uni@Verso lo Spazio has worked enthusiastically on this newsletter as one more step aimed at spreading information within the Community, starting from young researchers and students, together with the tributes and experiences as well as the opportunities for the Academia to develop project ideas and join the space science world together with other stakeholders, such as space industry.

I hope you will enjoy this first edition of the space newsletter and that it will stimulate your interest in space science matters while looking forward to the next exciting steps, which are especially important for the future of young generations.

Stay safe and healthy.

With my best regards,

Santo Marcello Zimbone
Rector of University Mediterranea of Reggio Calabria, Italy

IN THIS ISSUE

NEWS

- 4 HOW SPACE TECHNOLOGIES ARE HELPING US DURING THE COVID-19 PANDEMIC
- 8 "PRIMO SPACE": FIRST ITALIAN FUND FOR INVESTMENTS IN THE SPACE ECONOMY
- 9 SPACEX STARLINK: ONE STEP AWAY FROM THE "MARS OASIS"
- 10 ITALY IS PREPARING FOR THE MOON
- 11 SPACE RESEARCH DAYS ASI
- 12 EXPO 2021: PRE-EXPO SPACE WEEK

INTERVIEW

- 13 **ROBERTO VITTORI:** "SPACE IS A GREAT OPPORTUNITY FOR FUTURE GENERATIONS"

FOCUS

- 18 NASA'S SOFIA DISCOVERS WATER ON THE MOON

STORY

- 20 **GABRIELLA ARRIGO,** DIRECTOR OF THE INTERNATIONAL AFFAIRS, ITALIAN SPACE AGENCY (ASI)

STUDENTS

- 24 THE SPACE GENERATION ADVISORY COUNCIL
- 25 APPLY NOW FOR AN ESA STUDENT INTERNSHIP!

PROJECTS

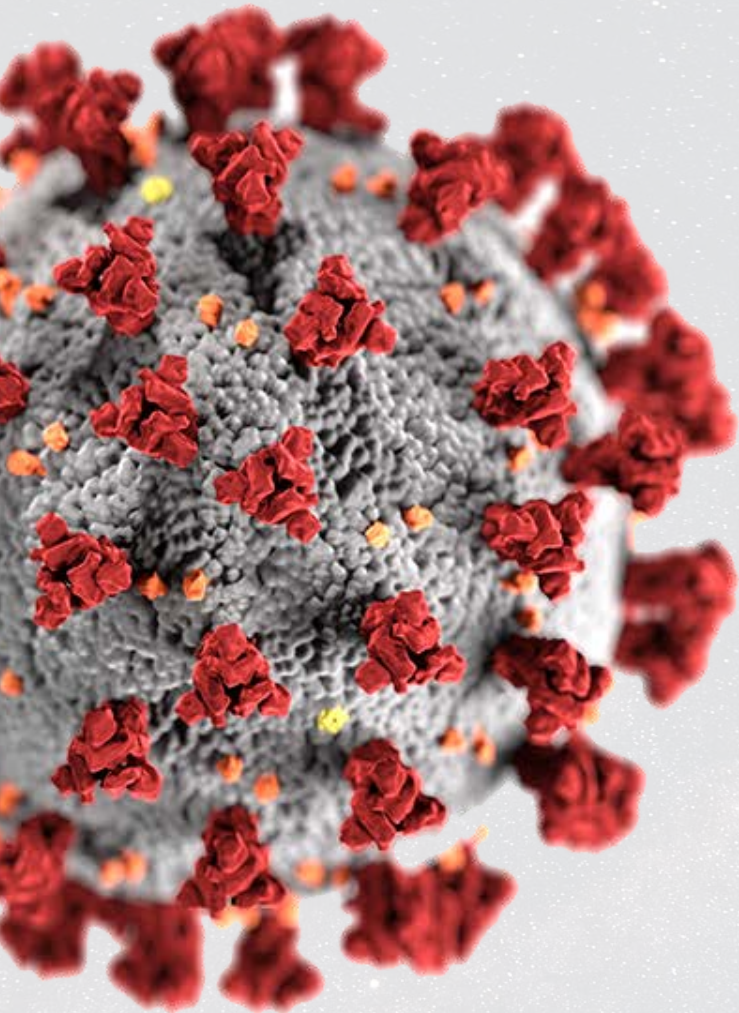
- 26 MORE WOMEN IN THE SPACE INDUSTRY AND ACADEMIA
- 28 WE WILL ROCK YOU...OR BETTER, SPACE WILL!
- 30 THE "PYTHAGORAS" PLANETARIUM

UNIRC

- 31 THE FIRST COURSE ON GEO-INFORMATION AND SPACE DATA MANAGEMENT FOR THE MEDITERRANEAN REGION
- 34 ASI "THEMATIC TABLES" UNIVERSITY MEDITERRANEA CONTRIBUTIONS

EVENTS

40 COMMUNITY



HOW SPACE TECHNOLOGIES ARE HELPING US DURING THE COVID-19 PANDEMIC

by the Editorial Staff

Over the past few months, we have faced challenging times and many changes in our lives. Space-related technologies are making a significant contribution to providing innovative solutions aimed at managing the crisis caused by the Covid-19 pandemic and at improving our life on Earth.



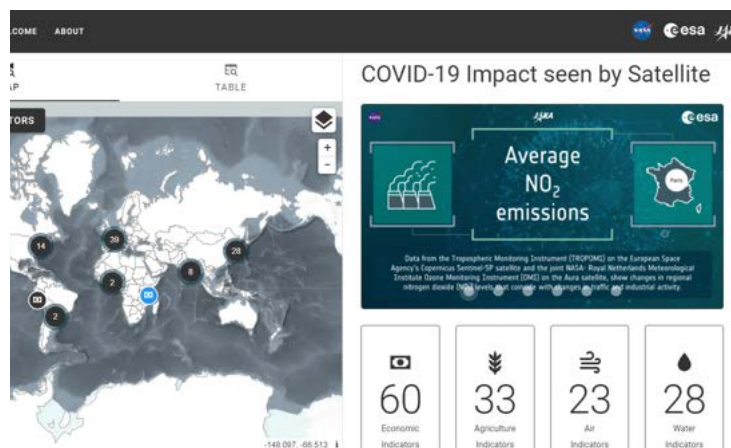
UNOOSA COVID-19 EMERGENCY RESPONSE PORTAL

UNOOSA CREATED A COVID-19 EMERGENCY RESPONSE PORTAL

The United Nations Office for Outer Space Affairs, through its UN-SPIDER programme, has created a COVID-19 emergency response overview page to facilitate the discovery of contributions to address COVID-19 pandemic related to space technologies. These examples are published by government agencies, international and regional organizations, academia, civil society and the private sector.

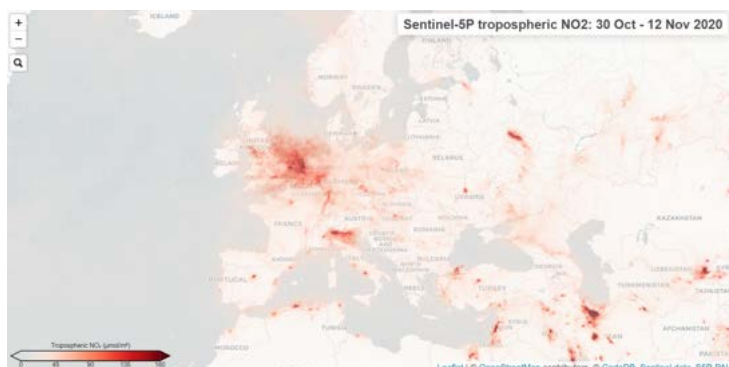
EARTH OBSERVATION ON OUR LAPTOPS

The new 'COVID-19 Earth Observation Dashboard' is a platform created by NASA, ESA and the Japanese Aerospace Exploration Agency (JAXA). The dashboard allows users to track changes in air and water quality, climate change, economic activity and agriculture to explore and investigate how regional lockdowns and social distancing measures have affected the Earth's air, land and water.



COVID-19 Earth Observation Dashboard.

EARTH OBSERVING DASHBOARD



Maps of tropospheric NO_2 concentrations averaged over 14 days.
Credits: Copernicus Sentinel-5P Mapping Portal

DATA FROM COPERNICUS SENTINEL-5P MONITORING CHANGES IN AIR POLLUTION

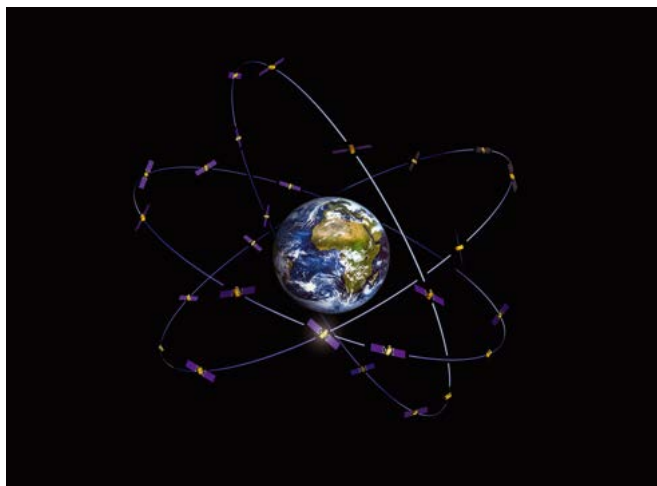
In June, ESA released an online platform that allows users to explore air pollution all over the world, including being able to zoom in on Europe. The maps presented on the platform, which use data from Copernicus Sentinel-5P, show nitrogen dioxide concentrations using a 14-day moving average.

COPERNICUS SENTINEL-5P MAPPING PORTAL

SATELLITE NAVIGATION IN OUR DAILY LIFE

Since the outbreak of COVID-19 pandemic, many apps have been developed using satnav-based location data to monitor the global spread of the virus and to map outbreaks of the COVID-19 disease. ESA's partner agency, the European Global Navigation Satellite System Agency (GSA), working with the assistance of the European Commission, has put together a repository of such apps.

The GSA is also developing its Galileo-enabled application, Galileo for Green Lane, to monitor and ease the circulation of goods between the EU Member States while identifying any potential congestion at Green Lane border crossings, thus ensuring that EU citizens can access the required supplies of critical goods.



Galileo Space Segment. Credits: GNSS Website

GNSS FOR CRISIS

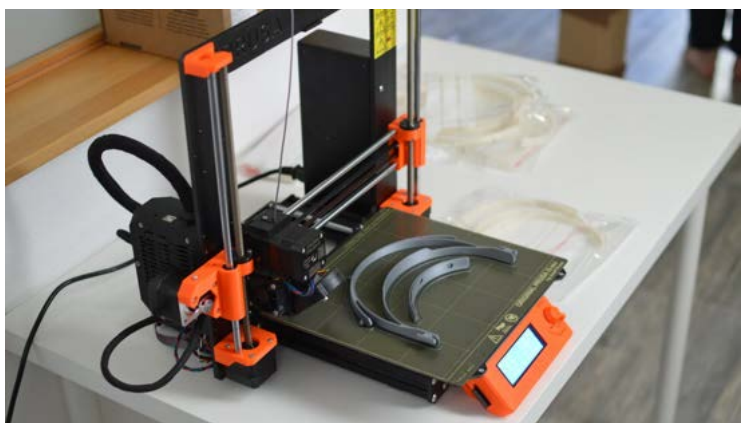
TELEMEDICINE AND 3D PRINTERS NOT ONLY FOR ASTRONAUTS

Emergency responders have been using two ESA-supplied telemedicine devices to triage and treat patients in need of urgent care. Via a secure satellite link or phone network, the Tempus Pro devices allow operators to quickly check a patient's vital parameters such as heart rate, blood pressure, respiration rate and temperature, before transmitting these to medical colleagues elsewhere. The two devices are normally used by doctors at ESA's European Astronaut Centre (EAC) to assess and communicate the condition of astronauts when they return to Earth. Besides, 3D printers that are usually used to print special items for astronaut training and test ideas for future spaceflight are proving to be an ideal tool for producing components for face shields.

GALILEO FOR GREEN LANE



Tempus Pro aids emergency teams in Spain during the COVID-19 pandemic. Credits: ESA Website



3D printing face shield parts in EAC. Credits: ESA Website

FUNDING COMMERCIAL IDEAS

ESA in cooperation with ASI and the Italian Minister for Technological Innovation and Digitization launched the "Space in response to COVID-19 outbreak" funding scheme, to encourage the development of space-based solutions addressing healthcare and education to fight the COVID-19 emergency.

Among the 130 proposals, some projects focus on Galileo's positioning services for the contactless delivery of goods or on data from the Italian hyperspectral satellite PRISMA for a deeper understanding of the spread of the virus. Satellite communication is exploited to tackle the digital divide and offer e-learning opportunities from the ISS laboratories with other solutions. The psychological support needed in order to understand how young people perceive the pandemic is investigated too using other proposals.



SPACE IN RESPONSE TO COVID-19 OUTBREAK



IAF

ESA WEB TV

ASI TV

SGAC

REDUCING THE DISTANCE

Many online initiatives have been organised to reduce the distance and keep us united during the pandemic.

The most famous worldwide event for the Space Community organised by the International Astronautical Federation, the International Astronautical Congress, IAC 2020, this year was a Cyberspace Edition based on the theme of "IAF Connecting @ll Space People".

ESA, with the expertise of economists, geopoliticians, psychologists, medics, data scientists, have organised a series of interactive online seminars that explored how space can help to improve life on Earth both during and after the outbreak.

The Italian Space Agency has organised a series of seminars called "From Home to Space" with Italian and American interlocutors on space-related scientific topics. The Space Generation Advisory Council has organised many online events such as the SpaceGen United, SGAC's very first online Congress.

Most of these events (or part of them) can be viewed again at any time online.



'PRIMO SPACE': FIRST ITALIAN FUND FOR INVESTMENTS IN THE SPACE ECONOMY

by Carmelina Bevilacqua

Assistant Professor in Urban Planning, University Mediterranea of Reggio Calabria, Italy

In July 2020, the first technology venture capital fund specializing in space investments was launched. The new fund, called Primo Space, is focused on aerospace start-ups and is promoted by Primomiglio SGR, with the support of the Italian Space Agency (ASI). Primo Space started with an initial endowment of 58 million euro and depends on the contribution of important investors, such as the European Investment Fund (EIF, part of the EIB Group), CDP Venture Capital SGR. The target figure to be raised is 80 million euro. The 30-million-euro investment by the EIF is supported by the European Commission's Investment Plan for Europe, as well as the InnovFin Equity space pilot program, funded by the Horizon 2020 budget. Primo Space aims at investing in high-potential technological

start-ups operating in the Space Economy sector: from the research, development and manufacture of enabling space infrastructures, the so-called "Upstream", to the manufacture of enabled innovative products and services, the so-called "Downstream", such as environmental monitoring, weather forecast services, Communication, Logistics, Tracking, Data platforms, Data processing, Data storage. The aim is to stimulate innovation by encouraging new ideas that can boost the space economy sector and support them so that they may develop into start-ups. The investment in a single company can amount to 5 million euro starting from low-TRL start-ups to the scale-up phase. The focus is on Italian start-ups, but may also extend to the EU, Israel and the US.



[Primo Space Fund, the first Italian fund focusing on aerospace start-ups](#)

[Primomiglio SGR](#)

[Fondazione Amaldi](#)





Credits:
Thom Baur | Reuters

SPACEX STARLINK: ONE STEP AWAY FROM THE “MARS OASIS”

by Federica Rinaldi,

Post-Doc Researcher in Telecommunications Engineering, University Mediterranea of Reggio Calabria, Italy

In 2002, space technology was revolutionized by the newly-created spaceflight company known as Space Exploration Technologies Corp. or SpaceX, whose aim is to develop and launch powerful rockets and spacecraft into orbit. Supported by NASA, SpaceX develops spacecraft (e.g., “Falcon 9”) ready to carry high cargo loads and to transport cargo supplies to the International Space Station. Moreover, SpaceX aims to make people fly aboard better spacecraft, such as “Falcon Heavy”, which in February 2018, successfully soared to orbit equipped with the “Tesla Roadster” electric car and a space-suited mannequin, the so-called “Starman”. SpaceX speeded up the evolution of rocket technology and developed “Starlink” as satellite mega-constellations

flying around our planet in the Low Earth Orbit and providing low-cost and high-speed broadband internet connectivity (i.e., remote learning, telehealth, virtual conferences, and many other applications) in remote and rural areas. SpaceX successfully launched a full stack of Starlink that creates a linear pearl string of lights as the satellite bright “train” flies overhead and amazes skywatchers with a thrilling sight in the sky. On the other hand, SpaceX is working on a sun shield to reduce satellite brightness and facilitate observations of the universe, stars, planets, galaxies, and other space bodies. In addition, researchers from many space companies are focusing on missions to avoid collisions with space debris since the ever-increasing number of space objects represents

a challenge for rocket companies in finding a clear launch path. The ambitious SpaceX never stops and is looking to the future to realize multi-planetary interconnections. In fact, the next step is the creation of Martian transport by pursuing the primary dream of a self-sustaining colony on Mars in the next 50 to 100 years. We are confident that the “Mars Oasis” greenhouse will take up position on the Red Planet!



SpaceX spacecraft, the Starship, flying over the Red Planet. Credits: SpaceX website.

ITALY IS PREPARING FOR THE MOON

NASA SIGNS AGREEMENT WITH ITALY TO COOPERATE ON ARTEMIS

by Andrea Morabito,
Assistant Professor in Electromagnetic Fields, University Mediterranea of Reggio Calabria, Italy

“Artemis will be the broadest and most diverse international human space exploration program in history, and the Artemis Accords are the vehicle that will establish this singular global coalition,” said NASA Administrator Jim Bridenstine.

“We are uniting with our partners to explore the Moon and are establishing vital principles that will create a safe, peaceful, and prosperous future in space for all of humanity to enjoy”.

Eight member nations signed the Accords, i.e., Australia, Canada, Italy, Japan, Luxembourg, United Arab Emirates, United Kingdom, and the United States of America. The principles of the Artemis Accords lay the foundations for a new, important and peaceful collaboration between the member states for space exploration and scientific activities.

According to Giorgio Saccoccia (President of the Italian Space Agency - ASI) “The first multilateral international cooperation agreement of the Artemis Lunar Program will land the first women and the next men on the surface of the Moon while developing the technologies and experience necessary to mount a historic human mission to Mars. The Implementation Agreements between NASA and ASI that will follow will define the Italian contribution to this Program. This will include habitat modules, scientific experiments, and telecommunication services, so as to fulfil the dream of a sustainable human presence in orbit and on the lunar surface”.

Italy is preparing for the moon!



Watch the
video of
Artemis
Accords here!



SHOWCASE

Credits:
ASI Website

SPACE RESEARCH DAYS ASI

by Nadia Mammone,
Assistant Professor in Electrical Engineering, University Mediterranea of Reggio Calabria, Italy

Space has always been a cutting-edge scientific and technological research field. "Space Research Days" is a virtual event promoted by the Italian Space Agency (ASI) with the ultimate goal of promoting collaboration between Italian research centers and universities involved in space research. With "Space Research Days", ASI means to launch a project with a manifold purpose: Supporting the interaction between universities and research institutions, companies and the Agency; offering a showcase for national technical-scientific skills and education opportunities; promoting the construction of an

Italian space research community starting from universities. The [ASI website](#) hosts a section dedicated to Academic Space Research reporting video-pitches, a public presentation and a contact form from universities and research entities that are involved in space research and aim at publishing and explaining their research activities to the scientific community. The first 'live' web streaming event took place on 30 June 2020, offering a very full program with exceptional guests: the President of ASI, the Minister of Research, the President of the CRUI, the astronaut Samantha Cristoforetti and other important speakers representing the European Space Agency (ESA), European Research

**Watch ASI
Research day first
live web
streaming here!**



Council, National Aerospace Technology Cluster and industry associations. During the event, the "Thematics Tables" initiative was launched, with the aim of gathering new ideas and proposals for collaborative research projects between the scientific community and the world of business dealing with a set of highly relevant specific topics: Data/image analysis, Advanced Materials, Cybersecurity, Scientific Instrumentation, Proximity Operations.



Credits:
EXPO 2020 DUBAI
Website

EXPO 2021: PRE-EXPO SPACE WEEK

by Carmelina Bevilacqua

Assistant Professor in Urban Planning, University Mediterranea of Reggio Calabria, Italy

On the 1st October 2021, Dubai will host Expo 2020. The global mega-event has been delayed by one year because of the COVID-19 restrictions. Nevertheless, from May 2020 several on-line events (still running until November) have preannounced the pivot topics of EXPO 2020, among them the Space Week. Two days, 5-6 October 2020 were dedicated to preempting the first Space Week, which will be held and will feature expert speakers from astronauts and astronomers to other leading figures in the space sector. Space Week is one of the 10 Expo-led thematic weeks charged with finding collaborative solutions to some of the most pressing challenges of our time. Running over the course of

the six months of Expo 2020 – which will blast off on 1 October 2021 and run through to 31 March 2022 – each event will focus on specific issues, including Climate and Biodiversity; Health and Wellness; Urban and Rural Development; and Travel and Connectivity.

The first pre-event on Space Week took place over the length of two days, 5-6 October 2020 and was attended by representatives of the main aerospace institutions and organizations from 12 countries. Italy was represented by the Undersecretary of the Italian State to the Presidency of the Council of Ministers responsible for the aerospace sector, Riccardo Fraccaro,

and the Principal Investigator of the Ma_MISS instrument on board of ExoMars mission; Researcher, Institute of Space Astrophysics and Planetology of Rome-based INAF, Maria Cristina De Sanctis. Panel discussions were organized concerning “How investments in space support sustainable economic growth and create value for society”, “Women in Space”, “The Future of Space Exploration: How can we safely and productively explore new frontiers?”.

INFO: [EXPO 2020](#)





**"Space is a great
opportunity for
future
generations."**

**Brigadier General
Roberto Vittori
Pilot of the Italian Air Force and Astronaut**

When did you decide to become an astronaut?

«La selezione dell’Agenzia Spaziale Italiana in forza della quale sono diventato astronauta è stata nel 1998. Al tempo ero pilota collaudatore sperimentatore di base a Pratica di Mare. Un pomeriggio sul tardi, rientrando da un volo collaudo ho casualmente sentito miei colleghi parlare del bando dell’Agenzia Spaziale Italiana che tra l’altro stava per scadere. Ho partecipato e sono arrivato primo di un gruppo di circa 500 contendenti. Devo dire che non mi ero preparato. E’ stata una fortunatissima coincidenza aver saputo del bando (il giorno prima che scadesse).

La mia iniziale passione era per la fisica; in particolare ero affascinato dall’antimateria e dalla possibilità dell’esistenza di universi paralleli. Quindi avevo una impostazione molto teorica, senonché nel bel mezzo degli studi di fisica ho avuto la possibilità di spostare completamente il baricentro del mio sforzo principale diventando pilota, e poi pilota collaudatore sperimentatore dell’Aeronautica Militare. Quindi un passaggio brusco dalla fisica teorica al volo militare e in particolare all’attività sperimentale.

Avevo in questo modo costruito, senza saperlo, il profilo del perfetto candidato astronauta. In effetti, i requisiti che sia ESA/ASI che NASA richiedono è una laurea in materie scientifiche oppure il brevetto da pilota con almeno 1000 ore di volo; avere l’ulteriore specializzazione di pilota collaudatore è un vantaggio aggiuntivo. Iniziava così per me una nuova avventura come astronauta e come cosmonauta. Tre voli, ed esattamente 2002 e 2005 (Soyuz), e poi 2011 (Shuttle); tre missioni di breve durata a bordo della Stazione Spaziale Internazionale, il nostro ponte verso il futuro.»



«I applied for the position of astronaut at the Italian Space Agency in 1998. At that time, I was an experimental test pilot at Pratica di Mare. On one late afternoon, back from a test flight, I accidentally heard my colleagues talking about the application for the position at the Italian Space Agency, which was about to expire. I applied and ranked first among about 500 candidates. Honestly speaking, I was not well prepared. Hearing about the position was a lucky coincidence (the day before it expired). In the beginning, I was a physics enthusiast. In particular, I was keen on antimatter and on the possible existence of parallel universes. I had a very theoretical approach but, half-way through my physics studies, I had the chance of shifting my focus and my efforts towards becoming a pilot, and then an Air Force experimental test pilot. So an abrupt transition from theoretical physics to military flight and to experimental activity, in particular. Because of all this, I was creating, without being aware of it, the profile of the perfect astronaut candidate. Both ESA/ASI and NASA require a degree in scientific subjects or a pilot's license with at least 1000 flight hours; a further specialization as a test pilot is an added value. Thus a new adventure as an astronaut and a cosmonaut began for me. Three flights, in 2002 and 2005 (Soyuz), and then in 2011 (Shuttle); three short-term missions aboard the International Space Station, our bridge to the future.»

Bringing Mars to Earth
Credits: ESA

How will Space and Space Technologies change our life?

«La nostra generazione dipende sempre di più dalle tecnologie spaziali, in primis, i così detti servizi satellitari (osservazione della terra, navigazione e telecomunicazioni). A partire dallo Sputnik, infatti, le piattaforme satellitari hanno visto un aumento esponenziale dell'interesse, anche grazie alla semplicità realizzativa, alla versatilità dell'architettura, e flessibilità delle specifiche possibili applicazioni. Il mercato dei satelliti e dei relativi servizi è così cresciuto a dismisura con prospettive di ulteriore esponenziale espansione, in questo momento soprattutto per l'osservazione della terra.

La nostra vita quotidiana è cambiata di conseguenza. Oggi possiamo spostarci da un punto all'altro, ovvero possiamo spostarci sul pianeta terra sotto la guida dei satelliti, possiamo rimanere connessi (telefono-internet) in qualunque punto, abbiamo possibilità di studiare, analizzare, monitorare la superficie terrestre tramite immagini satellitari, per l'appunto. Grazie alle tecnologie spaziali la superficie terrestre non ha più segreti. In realtà le opportunità che derivano dalle piattaforme satellitari sono solamente una minima parte di quanto lo spazio ha possibilità di offrire come banalmente evidente osservando che le risorse extra-atmosferiche sono infinite.»

«Our generation depends more and more on space technologies, first and foremost, the so-called satellite services (Earth observation, navigation and telecommunications). Starting with Sputnik, satellite platforms have been experiencing an exponentially increasing interest, also thanks to the simplicity of construction, the versatility of the architecture, and the flexibility of specific possible applications. The market for satellites and related services has thus grown dramatically with prospects of further exponential expansion, especially for Earth observation. Our daily life has been changing accordingly. We can move from a point to another one or we can move across the Earth under the guidance of satellites. We can stay connected (phone- internet) everywhere, we have the chance to study, analyze, monitor the Earth's surface through satellite images. Thanks to Space Technologies, the Earth's surface holds no secrets for us. The opportunities deriving from satellite platforms are only a small part of what space can offer. It becomes clear by merely observing that extra-atmospheric resources are infinite.»

How will Space and Space Technologies change our life?

«Siamo ormai prossimi a effettuare i primi passi in questo senso. La comunità internazionale, infatti, sta concentrando le proprie energie per riuscire a sfruttare le risorse della superficie lunare. Oggi si parla di Artemis. Nel dopo elezioni USA e a seguito del cambio al vertice, verosimilmente vi saranno cambiamenti profondi del programma; tuttavia la direzione rimarrà quella, ovvero lo sfruttamento progressivo e sistematico delle (infinite) risorse extra-atmosferiche. Del resto, il vero significato della Space Economy è proprio questo: lo sfruttamento delle risorse extra-atmosferiche.

Lecito chiedersi come questa seconda fase cambierà la vita di tutti noi. A differenza dalle piattaforme satellitari (semplici, versatili e flessibili) lo sfruttamento sistematico delle risorse della superficie lunare richiederà la specializzazione dei sistemi di trasporto che invece sono estremamente complessi e difficili da gestire. Non è quindi possibile prevedere il momento in cui ci sarà un aumento esponenziale simile a quanto visto per le piattaforme satellitari. La cosa certa tuttavia è che quando questo accadrà la nostra dipendenza dal combustibile fossile avrà termine. Il collegamento tra sfruttamento delle risorse della superficie lunare ed il combustibile fossile è che in prospettiva futura sarà più semplice ed economico l'estrazione dell'idrogeno dal ghiaccio secco lunare piuttosto che continuare a estrarre petrolio in zone sempre più remote della Terra. La nostra vita quotidiana finalmente non dipenderà più dal petrolio con il vantaggio di eliminare la principale causa dell'inquinamento atmosferico. L'idrogeno infatti è un combustibile in grado di sostituire la benzina. Una boccata di ossigeno per l'ecosistema terrestre e un miglioramento significativo della vita di ciascuno di noi. L'esplorazione spaziale continuerà poi verso Marte e verso gli asteroidi, e con essa continueranno a presentarsi infinite opportunità derivanti dalle risorse e dalle tecnologie spaziale.»



«We are now close to taking the first steps in this direction. The International community is focusing its efforts on exploiting the resources of the lunar surface. We are currently talking about Artemis. In the wake of the U.S. elections and following the change at the top, profound shifts in the program are likely to happen. However, the main direction will remain the same: the progressive and systematic exploitation of the (infinite) extra atmospheric resources. After all, the true meaning of Space Economy is precisely this, namely the exploitation of extra-atmospheric resources. It is worth wondering how this second phase will change our lives. Unlike satellite platforms (simple, versatile and flexible), the systematic exploitation of the lunar surface's resources will require the specialization of transport systems which, on the other hand, are extremely complex and difficult to manage. It is therefore not possible to predict when an exponential increase, similar to that which satellite platforms offer, is going to happen. However, as soon as it happens, our dependence on fossil fuel will end. The link between the exploitation of the lunar surface's resources and fossil fuel is that, in the future, extracting hydrogen from the lunar dry ice will be easier and cheaper than continuing to extract oil in increasingly remote areas of the Earth. Our daily lives will finally no longer depend on oil and consequently, the main cause of air pollution will be suppressed. Hydrogen is a fuel capable of replacing gasoline. A breath of fresh air for the earth's ecosystem and a significant improvement in our lives. Space exploration will then continue towards Mars and asteroids, and the opportunities deriving from space resources and technologies will keep expanding.»



What are your tips for students interested in making their contribution to the Space Industry?

«Lo spazio è la grande opportunità delle generazioni future e per un giovane è un investimento sicuro.

Il mondo universitario è interessato e presente con varie iniziative. Il vero problema è il mondo industriale non solo nostro ma in generale: la grande industria fa difficoltà a interpretare al meglio quanto lo spazio oggi offre. Come esempio mi limito a ricordare della competizione "Davide-Golia" che ha caratterizzato gli anni recenti nel settore spaziale statunitense: da una parte la gigantesca Boeing (che ha un vero e proprio esercito di dipendenti, circa 150.000), e dall'altra la "startup" SpaceX (al tempo circa 4000 dipendenti). Partite assieme, SpaceX con la metà del costo di Boeing ha realizzato la navicella Crew Dragon che ha già effettuato i primi voli, mentre la Boeing con il doppio ricevuto da NASA è ancora ben lontana dal realizzare la propria di capsula. Davide che sconfigge Golia. In Italia purtroppo di SpaceX non ce ne sono; mentre molte delle nostre industrie hanno il problema di Boeing, ovvero non hanno sufficiente dinamicità tantomeno riescono a rigenerarsi. Quindi il modo migliore per dare un contributo alla Space Industry è contribuire a crearla. Quindi partire da idee magari sviluppate proprio all'interno del mondo universitario per poi specializzarle come startup ed in ogni caso cercare delle affinità e parallelismi con le tante piccole medie realtà che sono la dimensione giusta per interpretare il potenziale che oggi offre lo spazio.»

«Space is a great opportunity for future generations and for a young person, it is a safe investment. The academic world is interested and participates actively by promoting the most diverse initiatives. The industry presents the real problem, not only in Italy but in general: large-scale industry has difficulty in fully understanding what space can offer today. As an example, I will simply recall the "David-Goliath" competition, which has characterized the recent years in the U.S. space sector: on the one hand, the gigantic Boeing (which has a huge number of employees, about 150.000), on the other hand, the SpaceX startup (about 4000 employees). While both groups started at the same time, SpaceX has built the Crew Dragon spacecraft, which has already made its first flights, whereas Boeing, with resources which are double that of SpaceX, being funded by NASA, is still far from making its own capsule. David is defeating Goliath. In Italy, unfortunately, there is no SpaceX. While many of our industries are facing the same issues as Boeing, they are not dynamic enough and are not able to rewrite the rules. So the best way to make a contribution to the Space Industry is to help create it. Starting from ideas, maybe developed within universities, and then channelled into startups. Looking for possible affinities between the ideas and the skills of small and medium-sized businesses that are able to recognize the potential of space and make the most from what it can offer today.»

"The best way to make a contribution to the Space Industry is to help create it."





"How water molecules can accumulate on the lunar surface and not decompose under solar radiation in the absence of a true lunar atmosphere?"

Earth's Moon, 1991.
Credits: Lick Observatory/ESA/Hubble/NASA

NASA'S SOFIA DISCOVERS WATER ON THE MOON

by Lucio Bonaccorsi,
Assistant Professor in Materials Engineering in Industrial Design, University Mediterranea of Reggio Calabria, Italy

In the latest issue of *Nature Astronomy* [Honniball, C.I., Lucey, P.G., Li, S. et al., *Nat Astron* (2020)], NASA scientists have published the results of a recent survey of the lunar surface by the Stratospheric Observatory for Infrared Astronomy, SOFIA, where they show proof of the presence of water molecules on the Moon's Southern hemisphere.

It is not the first time that our natural satellite has been given the task of searching for

water but the novelty of the latest results is significant. Studies dating back to the late 1970s have shown the possibility of water ice in the lunar regolith of permanently shadowed craters at the Moon poles. Over the past 20 years, several NASA space missions have confirmed the presence of water ice at the lunar poles as well as the widespread hydration of the lunar surface even in sunny regions, observed in 2009

by the infrared spectrometer aboard the lunar probe Chandrayaan-1. These results are based on the detection on the Moon's surface of the infrared absorption band at $3\ \mu\text{m}$ which is typically attributed to the molecular vibration of the hydroxyl group (OH). Water molecule vibration, on the other hand, produces a characteristic infrared absorption at $6\ \mu\text{m}$ which is not shared by other hydroxyl compounds.

The accepted explanation for the detection of the $3\mu\text{m}$ band alone and the lack of the water adsorption band lies in the presence of hydrated compounds on the lunar surface where the OH is chemically bound to the soil minerals but molecular water is not present except in the form of ice.

The novelty of the discovery of the observations conducted by SOFIA is the detection of the $6\mu\text{m}$ band, the fingerprint of water molecules, in a large region of the Moon not limited to cold and shadowed craters.

This discovery, however, raises two more fundamental questions: How did molecular water form and how can water molecules accumulate on the lunar surface

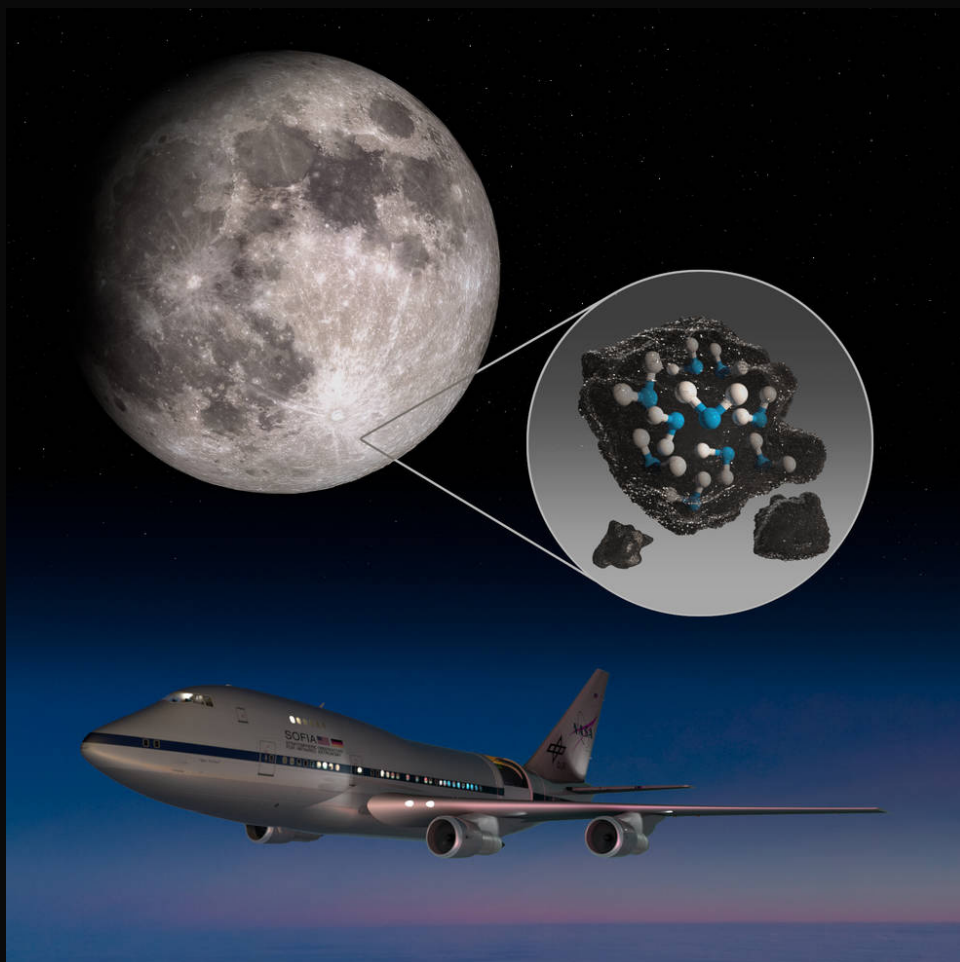
and not decompose under solar radiation in the absence of a true lunar atmosphere?

The origin of Moon water could be "extra-lunar" carried by micrometeorites impacting the lunar surface on geological time scales or caused by a two-phase "in situ" generation: hydrogen carried to the lunar surface by the solar wind binds to the oxygen from the minerals in the soil creating hydroxyl groups which, in a second phase, react under the bombardment of the micrometeorites forming molecular water.

The possibility of water accumulation is also an interesting point. One possible scenario is that water may be stored within micro-glass structures formed in the soil

during micrometeorite impacts or, another possibility, that molecular water may be trapped in the voids between the regolith grains away from sunlight so as to remain on the lunar surface.

Even if the quantity of water detected on the lunar surface may appear insufficient for human expectations (the Sahara Desert has a quantity of water 100 times higher than that observed by SOFIA), however, it is still a discovery that opens up new perspectives. Molecular water, in fact, is not only essential for life in any future long-term human missions to the Moon, but it is also a precious source of hydrogen and oxygen and could be used in the future for deep-space missions.



This illustration highlights the Moon's Clavius Crater with an illustration depicting water trapped in the lunar soil there, along with an image of NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) that found sunlit lunar water.

Credits: NASA/Ames Research Center

GABRIELLA ARRIGO

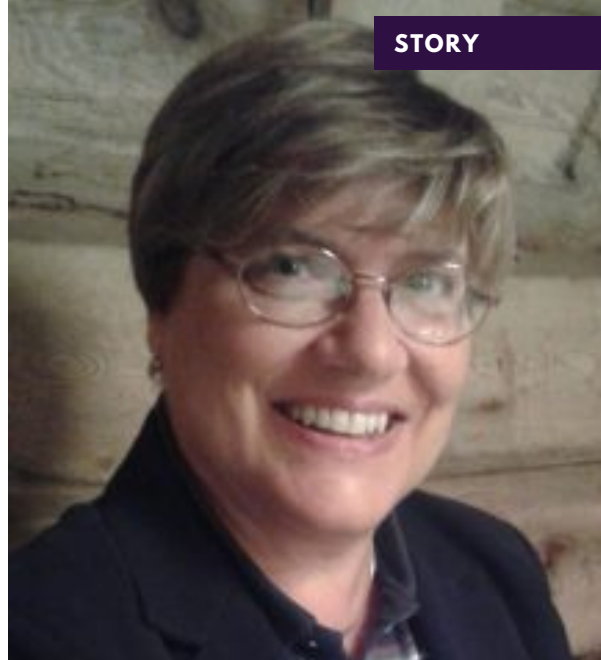
Director of the International Affairs,
Italian Space Agency (ASI)

«Il 20 luglio sera del 1969 ero rimasta sveglia perché con i miei genitori, mio fratello e i miei cugini, tutti davanti al televisore in bianco e nero, volevo assistere all'allunaggio dell'Apollo 11. Avevo 10 anni e ricordo ancora la voce stanca, ma commossa, del giornalista della RAI che esaltato gridò "ha toccato" intendendo che il modulo lunare (LEM) si era adagiato sulla superficie lunare. Il giorno seguente vidi le immagini degli astronauti americani, Neil Armstrong e Buzz Aldrin, passeggiare sulla Luna.

Queste emozioni e questo sguardo sono rimasti vivi fino ad oggi che, con passione, lavoro all'Agenzia Spaziale Italiana (ASI), come Direttore degli Affari Internazionali. In verità, negli anni seguenti mi era sembrato di dimenticare l'episodio dell'esperienza lunare, seppellito da tante altre emozioni di una ragazzina alle prese con lo sviluppo fisico ed intellettuale in una piccola città di provincia del sud Italia, come Reggio Calabria. Così però non è stato.

Durante la scuola media avevo dimostrato interesse per le materie umanistiche, più che per quelle scientifiche. Ciò mi portò a scegliere un percorso di studi classici presso il liceo della città, seguiti successivamente da studi politici e internazionali nella vicina città di Messina. L'economia e il diritto internazionale divennero presto il mio mondo. Cominciavo a vedermi giornalista, analista politico, diplomatica, secondo la luce del giorno e il profumo del mare che attraversavo quotidianamente per raggiungere l'università. Mi sono laureata con il massimo dei voti in Scienze Politiche con indirizzo internazionale.

Ho subito iniziato a competere per vincere una borsa di studio e andare all'estero. Così è stato per alcuni anni di specializzazione, a Ginevra, dove ho seguito studi in diritto internazionale umanitario, a Lussemburgo, a Bruxelles, a Roma, dove ho studiato relazioni internazionali e diplomatiche. Lo spazio era ormai lontano. Mi ero occupata di diritti umani, diritto umanitario, conflitti bellici, avevo scritto il mio primo saggio pubblicato con un editore della mia città natale, frutto degli studi in Svizzera.»



«On the evening of July 20, 1969, I stayed up late to watch the Apollo 11 moon landing, I was together with my parents, my brother and my cousins, in front of a black and white television. I was 10 years old and I still remember the RAI journalist's voice, tired but emotional, when he shouted excitedly "It has landed" meaning that the lunar module (LEM) had touched down on the lunar surface. The next day, I saw the pictures of the American astronauts, Neil Armstrong and Buzz Aldrin, walking on the moon. These emotions and this sight have remained alive right up to this day as I work passionately at the Italian Space Agency (ASI), as Director of International Affairs. In the years which followed, I seemed to have forgotten the episode of the lunar experience, buried by many other emotions of a little girl struggling with physical and intellectual development in a small town like Reggio Calabria, in Southern Italy. But this was not the case.

During middle school, I showed interest in the humanities rather than scientific disciplines. This led me to choose classical studies at the high school in my town, followed later on by Political and International Studies in the nearby city of Messina, in Sicily. Economics and International Law soon became my world. I began to see myself as a journalist, political analyst, or diplomat, according to the light of the day and the scent of the sea that I crossed every day (from Reggio Calabria to Messina) to reach the university. I graduated with full marks in Political Sciences with International and global focus. I immediately started competing to win an international scholarship and go abroad. Firstly, I was in Geneva for a few years of specialization in International Humanitarian Law. Later, I was in Luxembourg, Brussels and Rome, where I studied International and diplomatic relations. Space was now far away. I dealt with Human Rights, Humanitarian Law, War Conflicts. I wrote my first essay, the result of my studies in Switzerland, which was published by an Editor in my hometown.»

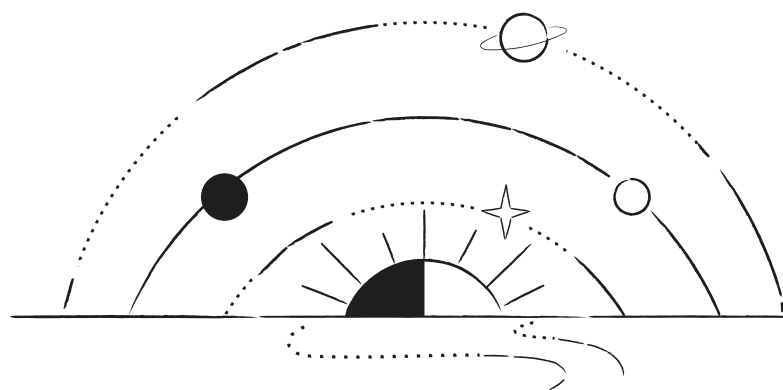
«Quando un giorno del 1989, a Ginevra, il professore con cui avevo discusso la tesi di laurea, mi chiamò, invitandomi a lavorare con lui a Roma, presso il Ministero della Ricerca e dell'Università, per far nascere un Centro nazionale di diritto dello spazio. La sorpresa fu grande, da una parte, perché ormai i miei interessi erano altri, dall'altra, perché lo spazio ritornava nella mia vita come se mai ne fosse uscito. In realtà, il Ministero voleva un'internazionalista e l'offerta era allettante. Dopo pochi mesi, il tempo di organizzarmi, ero a Roma per analizzare e comprendere le prime relazioni nascenti in campo spaziale tra la Commissione Europea e l'Agenzia Spaziale Europea.

Sono rimasta al Ministero appena 15 mesi, perché nel dicembre del 1991 con grande emozione, ho preso servizio presso l'Agenzia Spaziale Italiana, nata solo qualche anno prima. Ho cominciato a lavorare nelle relazioni spaziali europee e, in particolare, nelle relazioni dell'Europa con il resto del mondo. Non mi sembrava vero: ero riuscita a coniugare una profonda e antica emozione con una altrettanta profonda passione per le relazioni internazionali.

Da quei giorni sono trascorsi quasi trenta anni. Sono cresciuta professionalmente in agenzia, a cui devo oggi la mia maturità, notorietà ed autorevolezza all'interno della comunità spaziale nazionale ed internazionale. Ho avuto la fortuna di seguire in questi decenni lo sviluppo dello spazio in Europa, di conoscere tantissimi colleghi nei sei continenti, di visitare circa 50 paesi e incontrare le più note personalità del mondo spaziale, come Capi agenzia, astronauti e scienziati. Ho rappresentato il mio paese e l'agenzia in tantissimi incontri bilaterali e multilaterali, da esperta spaziale sono stata in missioni all'estero con Ministri, Presidenti del Consiglio e Presidenti della Repubblica, ho negoziato centinaia di accordi nel settore spaziale con agenzie e governativi, ho preso la parola alle Nazioni Unite a New York e per anni a Vienna, dove si riunisce il Comitato per l'uso pacifico dello spazio extra-atmosferico (COPUOS).»

"La sorpresa fu grande, da una parte, perché ormai i miei interessi erano altri, dall'altra, perché lo spazio ritornava nella mia vita come se mai ne fosse uscito."

«When one day in 1989, in Geneva, my Thesis Supervisor called me, inviting me to work with him in Rome, at the Ministry of Research and University, to create a national Center for Space Law. Indeed, I was surprised because my interests were now different, but space returned to my life as if it had never left it. To be honest, the Ministry wanted an internationalist and the offer was tempting. After a few months, the time to get organized, I moved to Rome to analyse and understand the first emerging relations in the space sector between the European Commission and the European Space Agency (ESA). I remained at the Ministry for just 15 months, because in December 1991, I, excitedly, took up service at the Italian Space Agency, created just a few years earlier. I began to work in European space relations and, in particular, studying the European relations with the rest of the world. It didn't seem real to me, I was able to combine a deep and ancient emotion with an equally deep passion for International Relations. Almost thirty years have passed since those days. I grew up professionally in the agency, to which I owe my maturity, visibility and authority within the national and international space community today. I had the good fortune to support the development of space in Europe in recent decades, to meet many colleagues in the six continents, to visit about 50 countries and to meet the most famous personalities of the space world, such as Heads of agencies, astronauts and scientists. I have represented my country and my agency in many bilateral and multilateral meetings. As a space expert, I have been on missions abroad with Ministers, Presidents of the Council of the Ministers and Presidents of the Republic. I have negotiated hundreds of agreements in the space sector with agencies and governments. I have spoken at the United Nations in New York and for years in Vienna, where the Committee on the Peaceful Uses of Outer Space (COPUOS) meetings take place.»



«Dopo tanti anni di attività, di esperienze uniche e opportunità da raccontare, ho capito che era arrivato il momento di trasferire tutto ciò che avevo imparato, di cui ancora oggi poco si trova sui libri. Nel 2009, con l'aiuto di altri colleghi provenienti dall'industria e dall'università, ho dato vita al primo corso di Master in Italia ed Europa in Istituzioni e Politiche Spaziali presso la Società Italiana per l'Organizzazione Internazionale (SIOI) a Roma. In 12 anni abbiamo formato centinaia di giovani, funzionari dello Stato, colleghi, professori con i quali si è creata una rete nazionale ed internazionale molto particolare.

Credo molto nella formazione dei giovani, ma anche di quelli meno giovani, perché la conoscenza è un'avventura senza fine. Per questo, ho contribuito a far nascere corsi di studi e di Master anche in altri paesi, sono nel Consiglio accademico dell'Università di Cordoba (Argentina), nei Consigli di Amministrazione dell'International Space University a Strasburgo e dell'European Space Policy Institute di Vienna. Nel 2017, ad Adelaide (Australia) l'*International Astronautical Federation* (IAF), che riunisce tutte le agenzie spaziali, l'industria del settore e le Università più impegnate negli studi spaziali, mi ha eletta all'unanimità Vice Presidente per le relazioni con la Scienza e l'Accademia per gli anni 2018-2020. Nel 2018, a Brema, l'*International Academy of Astronautics* (IAA) mi ha conferito il titolo di accademico nella sezione "Scienze sociali".»

«After many years of activity, of unique experiences and opportunities to relate, I realized that the time had come to pass on to young people all that I had learned. In 2009, with the help of other colleagues from industry and the academic world, I created the first Master's Course in Italy and Europe in Space Institutions and Policies at the Italian Society for International Organization (SIOI) in Rome. For 12 years, we have trained hundreds of young people, officials, colleagues, professors. In fact, we have created a special national and international space network with them. I strongly believe in the education of young people, but also in that of the older generations, because knowledge is an endless adventure. For this reason, I have contributed to the creation of courses of study and Masters in other countries as well. I am a member of the Academic Council of the University of Cordoba (Argentina), on the Board of Trustees of the International University of Space in Strasbourg and in the Board of Directors of the European Space Policy Institute in Vienna. In 2017, in Adelaide (Australia), the International Astronautical Federation (IAF), whose members are the space agencies, the space industry and universities involved in space studies, unanimously elected me the Vice President of Science and Academic relations for the years 2018-2020. In 2018, in Bremen (Germany), the International Academy of Astronautics (IAA) awarded me the title of Academic in the section "Social Sciences".»

International Space Forum - The Mediterranean Chapter.
5 September 2019, Reggio Calabria.



MODERATOR

«Ho lasciato la mia città nel 1984 dopo la laurea, ci sono tornata nel 2019 come membro esterno del Consiglio di Amministrazione dell'Università Mediterranea e in questo ruolo, oltre che come Vice Presidente IAF e funzionario ASI, sono riuscita a realizzare un sogno: organizzare l'International Space Forum - The Mediterranean Chapter - a Reggio Calabria, in collaborazione con la Mediterranea, il Comune e il Consiglio regionale. Il 5 settembre 2019, con il titolo "Space Technology and Applications meet Mediterranean Needs" si è inaugurato il quarto Forum spaziale internazionale presso la sala del consiglio regionale. Erano presenti 15 delegazioni di governo di 15 paesi del Mediterraneo, 20 rappresentanti tra agenzie spaziali e organismi spaziali internazionali, tutte le Università della Calabria e rappresentanti di altre Università italiane. I lavori si sono conclusi con l'adozione della "Reggio Calabria Page" una sorta di manifesto con cui tutti i delegati hanno preso l'impegno di potenziare la collaborazione spaziale regionale, di promuovere la conoscenza e l'uso della tecnologia spaziale, di creare corsi di studi in discipline spaziali per rispondere ai bisogni del Mediterraneo.

Nei mesi successivi eravamo già a lavoro per creare un primo corso di studi in geo-informazione presso l'Università Mediterranea rivolto a tutti i paesi del Mediterraneo. Il corso si sarebbe dovuto svolgere in settembre di quest'anno, ma la pandemia da COVID-19, ha fatto slittare l'inaugurazione a un altro anno.

Intanto, sta nascendo a Reggio una piccola comunità spaziale, alcuni studenti cominciano a sviluppare tesi in materie spaziali, prendono contatti con altre università e centri di ricerca. Nell'ottobre del 2019, a Washington, l'Università Mediterranea è entrata come membro nell'*International Astronautical Federation*.

La prima edizione di questa newsletter vuole testimoniare tutto questo e fare di Reggio Calabria il centro accademico spaziale del Mediterraneo.»

"Sono riuscita a realizzare un sogno: organizzare l'International Space Forum - The Mediterranean Chapter - a Reggio Calabria."

«I left my city in 1984 after graduation. I returned in 2019 as an external member of the Board of Directors of the University Mediterranea. In this role, as well as being IAF Vice President and ASI official, I was able to realize a dream: organizing the International Space Forum - The Mediterranean Chapter - in Reggio Calabria, in collaboration with the Mediterranea University, the Municipality of Reggio Calabria and the Regional Council. On September 5, 2019, the fourth International Space Forum was inaugurated in the regional council headquarters. This forum was entitled "Space Technology and Applications meet Mediterranean Needs. There were 15 governmental delegations from 15 Mediterranean countries, 20 representatives between space agencies and international space organizations, all the Calabrian universities and representatives of other Italian universities. The work ended with the adoption of the "Reggio Calabria Page". In this sort of manifesto, all the delegates have committed themselves to enhance Mediterranean space collaboration, to promoting the knowledge and use of space technology, to creating study courses in space disciplines in order to meet the needs of the Mediterranean region. In the following months, we were already working to create the first course of studies in Geo-Information at the University Mediterranea aimed at all Mediterranean countries. This course should have taken place in September of this year, but the COVID-19 pandemic caused the inauguration to be put off until the following year. In the meantime, a small space community is being created in Reggio Calabria. Some students are starting to develop their theses on space subjects, networking with other universities and research centres. In October 2019, in Washington, the University Mediterranea became a member of the International Astronautical Federation. The first edition of this newsletter aims to underline these commitments and make Reggio Calabria an academic space centre in the Mediterranean region.»



THE SPACE GENERATION ADVISORY COUNCIL

by Davide Petrillo,
SGAC Deputy Executive Director

The Space Generation Advisory Council in Support of the United Nations Programme on Space Applications is a global non-governmental, non-profit (US 501(c)3) organization and network which aims to represent university students and young space professionals aged from 18-35 at the United Nations, space agencies, industry, and academia.

The SGAC has its headquarters in Vienna, Austria. Its network of members, volunteers and alumni has grown to more than 15000 members representing more than 150 countries.

SGAC was conceived at UNISPACE III in 1999, as part of the Vienna Declaration "To create a council to support the United Nations Committee on the Peaceful Uses of Outer Space, by raising awareness and promoting the exchange of fresh ideas among young people.

The vision is to employ creativity in advancing humanity through peaceful uses of space". SGAC holds Permanent Observer status at the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and regularly takes part in the annual meeting, as well as in its Legal and Scientific and Technical Subcommittees. SGAC holds consultative status at the United Nations Economic and Social Council (UN ECOSOC), contributing to discussions on the role of space in achieving the UN Sustainable Development Goals. As a volunteer-run organisation, SGAC believes in empowering its members and providing them with opportunities for professional development through roles in the SGAC teams.



www.spacegeneration.org



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APPLY NOW FOR AN ESA STUDENT INTERNSHIP!

Apply here



The European Space Agency (ESA) is now offering several internship opportunities that will remain open until 10 December 2020. Internships last from three to six months and positions are available in Engineering, Science, IT, Natural/Social Sciences, business, and administration services.

Due to the exceptional conditions and the uncertainties which have arisen this year because of the COVID-19 pandemic, the student internships programme will be offered remotely.

If you are a student, preferably in your final or second-to-last year of a university course at Masters level (or equivalent), apply for a position!

You can browse this year's opportunities directly on [ESA recruitment website](#). Then simply create your candidate profile, upload your CV, and add your motivation letter to submit your application.

"Don't let anyone rob you of your imagination, your creativity, or your curiosity. It's your place in the world; it's your life. Go on and do all you can with it, and make it the life you want to live."

Mae Jemison, First Black Woman in Space

MORE WOMEN IN THE SPACE INDUSTRY AND ACADEMIA

by Antonia Russo,
PhD Student in Information Engineering, University Mediterranea of Reggio Calabria, Italy

Space is limitless and without barriers. Anyone with passion can contribute to it. Space-related science and innovation improve humankind and our awareness of the universe in the face of every prejudice and obstacle. Many people working in the space industry are striving towards creating the conditions as stipulated by the [Sustainable Development Goals](#) which will lead to the sustainability of our planet. Women and girls play a relevant role in these achievements. In fact, SDG 5 on Gender equality aims at ensuring the empowerment of women in the undertaking of leadership positions at all levels of decision making in political, economic and public spheres.

This goal encourages women and girls to pursue Science, Technology, Engineering, and Mathematics (STEM) education enhancing the use of information and communication technologies.

“Despite the many improvements which have been achieved, full gender equality remains unreached”, is what we read on the United Nations website. This observation resonates in many areas. As a matter of fact, the United Nations Office for Outer Space Affairs (UNOOSA) created the Space4Women project which aims at facilitating female access to the benefits of space exploration, Science and Technology, Engineering, and Mathematics. This is STEM education, and STEM careers for women and girls around the world.

The Space4Women network involves role models with different professional and cultural backgrounds in the space sector. This extraordinary diversity creates a creative place which powerfully promotes women

empowerment and gender equality. To be honest, these role models become mentors, crucial figures in everyone's life helping one to succeed in making the right decisions and pursuing the desired choices.

Anybody, of any age and any gender, can apply to be a mentee and can benefit from the advice and story of talented mentors. On the other hand, applications to become a Space4Women mentor open in January.

Don't miss the opportunity to take a step towards the career of your dreams: Space needs you!

Visit
Space4Women
Website!



Alyssa Carson is an American space enthusiast who believes that she was born on planet Earth with the mission of being one of the first to land on Mars. She has wanted to fulfil her dream of being an astronaut since she was only 3. She was also given the chance to speak at NASA about her interest in the red planet when she was only 12. She considered Mars her home.

This 19-year old teenager is also delivering motivational speeches to other children. Currently, she is studying astrobiology at the Florida Institute of Technology.

NASA is planning to send humans to Mars in 2030. Carson considered herself as belonging to a Mars generation. She believes that her generation will be the first to go there and become the Mars generation.

May Alyssa's story inspires your dreams.



Le Voyage dans la lune, Georges Méliès

WE WILL ROCK YOU...OR BETTER, SPACE WILL!

by Alessandro Confido,
MSc Student in Computer Engineering and Telecommunication Systems, University Mediterranea of Reggio Calabria, Italy

Let's start an amazing experience with SpaceRocks organised by the European Space Agency, the new way to juxtapose cosmos with art, music and culture. Tired of the thousands of videos featuring kittens that burn your brain cells? What better way to spend your time escaping from the monotony of quarantine than discovering the harmony which pervades everything around us and, why not, outside the Earth, to infinity and beyond...okay okay okay, not exactly to infinity, but at least close to the Solar System's edge!

Space exploration is not only about Mathematics, theorems, Newton, Euler and Lagrange, but it concerns the power of the human imagination. Maybe it's true that without fire and fuel, any mission couldn't have taken place, but the futuristic vision has always been the timeless research for new ideas, the springboard for the real "leap into the void". Let's think about Astolfo and his trip to the moon to retrieve the lost wits of his fellow Orlando or even Jules Verne's charming novels!

Thirst for knowledge has always affected the whole range of cultural fields, for example, Astronomical art which is the aspect of Space art devoted to visualizing the wonders of outer space or music with the outstanding visionary mind of David Bowie with his famous album "The Rise and Fall of Ziggy Stardust" in which he talks about a starman that will save the doomed mankind.

Well, if I've caught your attention, you just have to take a look at the site [Space Rocks](#), in order to keep in touch with the latest news about ESA's projects and recent discoveries explained by space geeks in articles or podcasts that will literally blow your mind.

SpaceRocks Project





THE “PYTHAGORAS” PLANETARIUM

by Angela Misiano Martino,
Planetarium Pythagoras Scientific Responsible

The “Pythagoras” Planetarium of the Metropolitan City of Reggio Calabria was inaugurated on 12 March 2004. The activities are organized by the Metropolitan City of Reggio Calabria in collaboration with the Italian Astronomical Society. The external dome has a diameter of 12 meters, the inner one has a diameter of 8 meters with a seating capacity for 70 people. The Planetarium also contains a mobile observatory. The Planetarium sets up: educational and scientific dissemination activities; research and training and orientation activities for young people and astronomers; training courses for transversal skills development, including courses for teachers and young scholars; events in the scientific

sector and, particularly in the astronomical one. The Planetarium was also nominated as the tenth interregional pole for the National Astronomy Olympics by the National Olympic Committee. The Calabria section of the Provincial SAit-Planetarium of Reggio Calabria is indeed one of the main Italian poles for the dissemination of astronomy teaching, as endorsed by the excellent results achieved in the National Astronomy Olympics competition. With the construction of the Planetarium, also thanks to the size and beauty of the external Geode, which is recognized as one of the most beautiful in Europe (second only to the Geode in Paris), the Metropolitan City of Reggio Calabria belongs to the group of

European cities that can take advantage of a spectacular and effective means for teaching and disseminating scientific disciplines. The “Pythagoras” Planetarium represents a cultural treasure, being established in a Region whose ancestors contributed to constructing astronomical knowledge. The Planetarium is the living proof of a cultural process that began millennia ago.



**Visit
Planetarium
website [here](#)**

THE FIRST COURSE ON “GEOINFORMATION AND SPACE DATA MANAGEMENT FOR THE NEEDS AND SUSTAINABLE DEVELOPMENT OF THE MEDITERRANEAN REGION”



UNITED NATIONS
Office for Outer Space Affairs



by Giuseppe Araniti,
Assistant Professor in Telecommunications Engineering, University Mediterranea of Reggio Calabria, Italy

and by Francesco Carlo Morabito,
Full Professor of Electrical Engineering, University Mediterranea of Reggio Calabria, Italy

On September 5, 2019, the fourth edition of the International Space Forum (ISF) took place in Reggio Calabria, jointly organized by the Italian Space Agency (ASI), the International Astronautical Federation (IAF) and the University Mediterranea of Reggio Calabria (UNIRC). The ISF initiative is an annual event at Ministerial level resulting from two main recommendations: (i) space activities require a high level of technical and scientific knowledge, both in terms of infrastructure manufacturing and applications; (ii) scientific and academic institutions possess an immense reservoir of knowledge and human talents, as well as a capillary presence all over the world and a strong propensity for cooperation and knowledge sharing.

As a first step to implement the recommendations listed in the “Reggio Calabria Chart”, the Italian Space Agency and the University Mediterranea of Reggio Calabria are

organizing the “1st Course on Geoinformation for the Mediterranean Region – Geoinformation and Space Data management for the Needs and Sustainable Development of the Mediterranean Region”.

The Course, funded by UNIRC and ASI, will be hosted by the University in 2021. It is mainly addressed to students, young researchers, officials and professionals from the Southern Mediterranean Countries, which share almost homogeneous conditions and challenges. Participants will gain knowledge from a wide range of disciplines, such as regional planning, emergency management, environmental sciences, resources management, geography, as well as an overview on the capabilities of Earth Observation in supporting operational services and international programs in different application environments in the Mediterranean area, for the benefit of both countries and their citizens.

ASI and UNIRC are responsible for organizing the Training course with the support of: (i) the United Nations Office for Outer Space Affairs (UNOOSA), mainly involved in the promotion of international cooperation in the peaceful use and exploration of space, as well as for the utilization of space science and technology for sustainable economic and social development and (ii) e-GEOS, a leading international player in the Earth Observation and Geo-Spatial Information business. The organizers are making a huge effort to create a memorable event, in spite of the present pandemic.

We look forward to seeing you in Reggio Calabria!



For any update
on the course
visit [University
Mediterranea
website!](#)



ISF2019 Highlights

UNIRC

2019 INTERNATIONAL SPACE FORUM
5 September 2019
4th International Space Forum 2019
The Mediterranean Chapter
"Space Technology and Applications meet Mediterranean Needs"
Reggio Calabria, 5 September, 2019



ASI “THEMATIC TABLES”

UNIVERSITY MEDITERRANEA CONTRIBUTIONS

by Nadia Mammone,
Assistant Professor in Electrical Engineering, University Mediterranea of Reggio Calabria, Italy

The “Scientific and technological research topics - Research Portal”, is an initiative launched by ASI (Italian Space Agency) to encourage public and private entities to share their knowledge and skills with the scientific community in order to promote collaboration in space research and increase its impact on our everyday life. In September 2020, Universities, companies and research centers had the opportunity to share information concerning their research activities on the following space research topics: Data/image analysis, Advanced Materials, Cybersecurity, Scientific Instrumentation, Proximity Operations. The University Mediterranea of Reggio Calabria provided its contribution by sharing its expertise in the aforementioned fields of research.

Starting from the first Topic “Data and Image Analysis”, Prof. V. Barrile emphasized how the current research activities of the Geomatics Laboratory (DICEAM department), are highly relevant in this area.

The laboratory is developing advanced techniques for remote sensing, classification, and segmentation of remote images (pixel-based and OBIA). The algorithms developed by the laboratory can be applied to systems meant for calculating and forecasting changes in events at the spatial level like orbit changes, identification of changes, and many others.

Prof. G. Modica (Department of Agriculture) illustrated the expertise of his group in the analysis of remotely sensed images with passive multispectral sensors, both from remotely piloted systems (SAPR) from satellite platforms and passive SAR sensors from satellite platforms.

The group’s ongoing research is based on the optimization of automatic classification methodologies for monitoring the health conditions of vegetation through the joint use of machine learning algorithms and suitable software. A semi-automatic process has been recently proposed for the identification of areas covered by the fire with the use of SAR data in comparison with optical multispectral data.

Prof. F. C. Morabito introduced the contribution of the research group from the AI_Lab and NeuroLab laboratories (DICEAM department) in this field. The group has been working for over two decades in the processing of uni- and multi-dimensional signals (including images and tensors) through the development of artificial intelligence (AI) and neural network algorithms. Morabito earlier worked on the processing of Synthetic Aperture Radar images and holds a patent on the reconstruction of remote SAR images for Spotlight modality. The group is currently developing deep learning (DL) systems for the prediction of the diameter of asteroids based on a dataset of Jet Propulsion developed in the Laboratory of California Institute of Technology (NASA) as well as for the automatic identification of stars, quasars, and galaxies. The group relies on a collaboration with ST Microelectronics (Catania) for hardware implementation of DL algorithms.

Moving to the second Topic "Advanced Materials", Prof. L. Bonaccorsi discussed the contribution of MATEES laboratory (Materials for Environmental and Energy Sustainability, DICEAM Department), in the production of advanced materials for electromagnetic shielding in the aerospace sector. In particular, the group has proposed the preparation of ultralight composite materials based on carbon microfibers and exfoliated transition metal carbides which are particularly promising for Electromagnetic Interference Shielding in radar and telecommunications frequencies.

As highlighted by Prof. S. Santangelo, the MATEES lab is also carrying out cutting-edge research on the design and synthesis of carbonaceous membranes for water treatment using the method of capacitive de-ionization (CDI) and of electrode materials for rechargeable batteries. The technique of material preparation currently under investigation at the MatEES Lab, namely electrospinning, is suitable for production on an industrial scale.

As regards the third Topic "Cybersecurity", Prof. F. Buccafurri illustrated

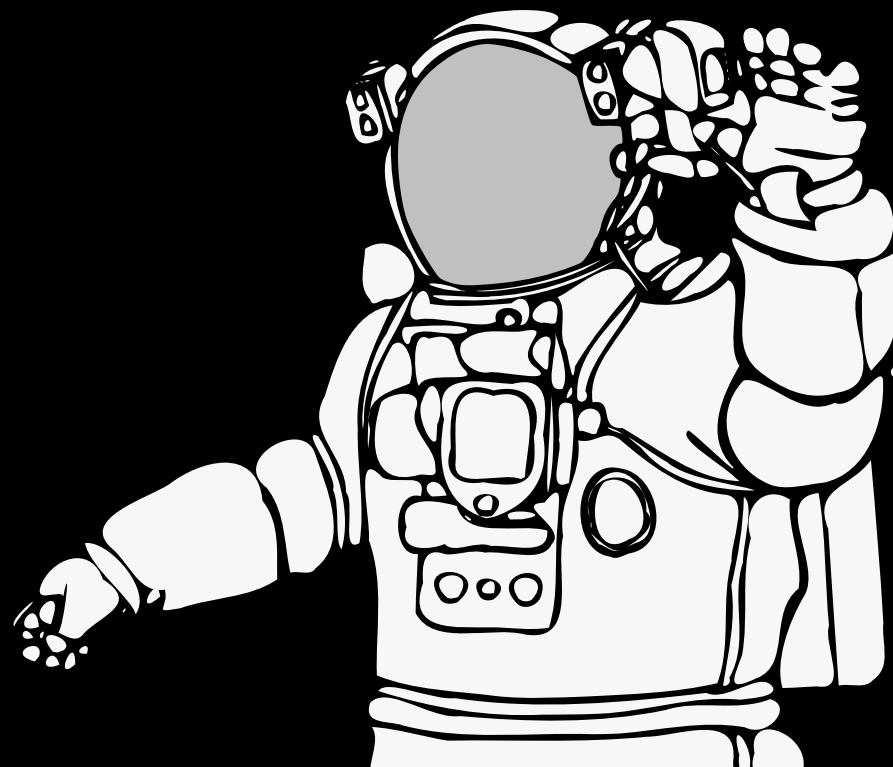
the research activities carried out at the DIIES Department in this field. On the basis of consolidated expertise in the field of cybersecurity, a research activity focused on the creation of a tracking and collision prevention system for objects resident in space as well as on developing model-driven design techniques for space missions ensuring resilience and safety will be investigated in the near future. A further possible application will be the creation of an integrated framework that provides innovative services for the monitoring and detection of random/malicious fault anomalies in the ground segments of satellite systems through sensors and video acquisition.

In regard to the fourth topic, "Scientific Instrumentation", Prof. G. Araniti illustrated the activities of the ARTS laboratory (Advanced Research into Telecommunication Systems, DIIES department), which are highly relevant to the "sensors" macro-area. The activity of the ARTS laboratory concerns the introduction of the IoT paradigm and the novel logic of software and virtualization applied to the field of microsattelites.

In this regard, the research group is collaborating with Ericsson Research (Finland) and Tampere University (Finland) in the context of Non-Terrestrial Networks in 5G networks and is involved in a project in cooperation with the Aerospace Technological District of Campania (Italy).

SPACE EVENTS

December 2020 - February 2021



EUROPEAN SPACE WEEK 2020

7-11 DECEMBER 2020

Learn about the latest status of Galileo, Copernicus and EGNOS. Discuss with industry leaders, space stakeholders and policy makers. Discover the latest applications on Earth observation and satellite navigation.



[Register here](#)

NEW SPACE ECONOMY EUROPEAN EXPOFORUM

11-12 DECEMBER 2020



This international event is focused on the new space economy and its ability to create new market and economic development opportunities in Europe, bringing together space agencies, government institutions, manufacturers, SMEs from inside and outside the space sector, investors, research scientists, academia and start-ups.

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[Register here](#)

AIXSPACE

18-19 JANUARY 2021

Euroconsult and Innovitech have chosen to combine their expertise to create a unique event: AIXSPACE. For the first time, this conference will bring together key stakeholders in space and artificial intelligence industries to allow everyone to obtain concrete information on these markets and connect with potential business partners, positioning themselves at the forefront of the sector.

43RD COSPAR SCIENTIFIC ASSEMBLY: COSPAR2021 - HYBRID

28 JANUARY – 4 FEBRUARY 2021

COSPAR's objectives are to promote on an international level scientific research in space, with emphasis on the exchange of results, information and opinions and to provide a forum, open to all scientists, for the discussion of problems that may affect scientific space research. Join COSPAR2021!

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DATASPACE 2021

16 -17 FEBRUARY 2021

Space-enabled data is an increasingly important means of observing our Earth. It offers solutions for the betterment of life alongside a wealth of new and unimagined business and scientific opportunities. Since 2017, DATA.SPACE aims to raise awareness of the global and local challenges which can be met with space solutions, as well as the commercial opportunities that are being created by the democratisation of space.

GLOBAL SPACE AND TECHNOLOGY CONVENTION

25 FEBRUARY 2021

Global Space and Technology Convention (GSTC) is Asia's Premier Space & Technology event, bringing the latest technology news, what's hot in the satellite scene and space technology updates.



[Register here](#)

THE 4TH AFRICAN SPACE GENERATION WORKSHOP

25- 26 FEBRUARY, 2021

The 4th African Space Generation Workshop (AF-SGW) is a two-day regional workshop, which brings together students and young professionals with agency and industry representatives from across the African continent. It provides an unparalleled opportunity for the future leaders of Africa's space endeavours to proactively establish strong relationships, exchange ideas and knowledge, and to collaborate on brainstorming new ideas and solutions using space technology for the benefit of Africa.



[Register here](#)

SPACE SAFETY & SUSTAINABILITY ESSAY COMPETITION 2020

DEADLINE 30 DECEMBER 2020

This competition is an opportunity for everyone to introduce new ideas and get yourselves involved in resolving the matter of Space Traffic Management.

To apply, write an essay in connection with the theme “What Space Traffic Management Measures must be Internationally Implemented to Improve the Safety and Sustainability of Outer Space?”



Essay Competition

GLEX 2021

CALL FOR PAPERS DEADLINE 29 JANUARY 2021

The conference, co-organized by the International Astronautical Federation (IAF) and ROSCOSMOS, will bring together leaders and decision-makers within the science and human exploration community – engineers, scientists, entrepreneurs, educators, agency representatives and policy makers. Submit your abstract by 29 January 2021.



Call for papers

72ND INTERNATIONAL ASTRONAUTICAL CONGRESS - IAC2021

CALL FOR PAPERS DEADLINE 28 FEBRUARY 2021

With the theme “Inspire, Innovate & Discover for the Benefit of Humankind”, the IAC 2021 looks forward to making a contribution to humanity and science by strengthening and enhancing cooperation between all countries in the space sector. This is the chance to inspire the next generation, to architect the further development and expansion of the space sector’s growing ecosystem. In fact, the IAC 2021 could be your opportunity to contribute to breakthroughs that revolutionise the future of space exploration.



Call for papers



In this book, Samantha Cristoforetti talks about the road she took which allowed her to fulfil her dream and narrates the incredible everyday life on board of the International Space Station. "Diario di un'apprendista astronauta" tells the dream of that tenacious little girl that studied and worked hard to become the real Samatha she wanted to be. Indeed, Samantha dedicated this book to her daughter, born in 2016 and to all those little girls who jealously keep a dream in the bottom drawer, hoping one day to see it fulfilled.

“When the engines of the rocket started, the great dream of my life came true.”

Samantha Cristoforetti, *Diario di un'apprendista astronauta*, 2018, La nave di Teseo

SPACE POSTCARD



This image captures a giant cluster of about 3,000 stars called Westerlund 2. The cluster resides inside a vibrant stellar breeding ground known as Gum 29, located 20,000 light-years away in the constellation Carina. The brilliant stars sculpt the gaseous terrain of the nebula and help create a successive generation of baby stars. When the stellar winds hit dense walls of gas, the shockwaves may spark a new torrent of star birth along the wall of the cavity. The red dots scattered throughout the landscape are a rich population of newly forming stars still wrapped in their gas-and-dust cocoons. These tiny, faint stars are between 1 million and 2 million years old – relatively young stars – that have not yet ignited the hydrogen in their cores. The brilliant blue stars seen throughout the image are mostly foreground stars.

On November 25 in 2014, Star Cluster Westerlund 2

CREDITS: NASA, ESA, the Hubble Heritage Team (STScI/AURA), A. Nota (ESA/STScI), and the Westerlund 2 Science Team

Any ideas?



Find Your Space

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Write an email to Uni@Verso lo Spazio or reach out to us on our social media!



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