



Agenzia Spaziale Italiana

# Annual report 2 0 2 0



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Editorial

# Italy of space in 2020

2020 was a terrible year for everyone, but in the space sector we distinguished ourselves for the continuity of our activities and for a number of very important successes for Italy. To name a few, the return that the Italian industry had in terms of number of secured contracts within the ESA, following the commitments made at the end of 2019 during the Ministerial Council meeting in Seville, when the Italian government, upon proposal of the ASI, increased its contribution to the ESA by over 1 billion euros vs the previous period. An increase based on the awareness of the level of expertise and production capacity reached by the whole Italian space industry value chain, such that we can compete for the leadership in terms of important contracts and programs at a European level. In fact, we closed 2020 with a return – in just a year – which is equal to half of the investment: an unprecedented result! It's a clear sign that Italy now plays a leading role in the international space sector. And we continued also to operate on national initiatives and budgets, thanks to the continued engagement of the ASI, and underlined also the importance of space activities to support the COVID emergency, through a tender aimed at identifying the use of useful technologies and services for telemedicine and remote education, with a huge return in terms of ideas and proposals. 2020 was also the year when Italy, among the first countries, decided to sign the Artemis Accords, as evidence of its willingness to be an important partner in the mission to return to the Moon, and to stay this time. Even in such a difficult year, the Italian space, under the guidance of the ASI, proved to be mature and ready to accept the international challenges of the "New Space Economy" and the innovative research, as a means of recovery, economic growth and sustainability. A challenging sector of excellence to serve the future of our country!



GIORGIO SACCOCCIA - President of the ASI

The Italian Space Agency (ASI) was born in 1988 with the task of promoting, developing and diffusing scientific and technological research, applied to the fields of space and aerospace.

# Italian Space Agency



## IN FIGURES



**3**  
decades

Created in 1988, the ASI can boast over three decades of experience in the sector of space and aerospace.

The ASI's budget in 2020 within the ESA and bilaterally, with international and national partners.

**1.100**  
billion euros

**4**  
locations

The ASI operates in four locations. The registered office and headquarters are in Rome, as well as other three operations centers: in Basilicata, Sardinia and Kenya.

The ASI is made up of 298 persons, 277 of whom have a permanent contract and 21 of whom have a fixed-term contract.

**298**  
persons

**8**  
directorates

The new organization of the ASI is structured in 8 management directorates and a strategic area, in order to operate better in all space sectors and meet the requirements of the new space governance.

The ASI participates, as a main shareholder, in the CIRA S.C.p.A company and holds non-controlling interests in ALTEC S.p.A, SpaceLab (previously ELV S.p.A.) and e-GEOS S.p.A. and is a cofounding partner of the "E. Amaldi Foundation".

**175**  
signed agreements

**5**  
investee companies

The ASI can boast a long tradition in the field of space cooperation, to carry out programs and international missions, and "Space Diplomacy", to contribute to the positioning of Italy in the global scenario.

## Legal status and bodies

The Italian Space Agency (ASI) is a public research body with legal personality, which enjoys statutory **autonomy pursuant to article 33, paragraph six, of the Italian constitution**, and scientific, financial, property and accounting autonomy (article 2, legislative decree 2009, n. 213 and article 2, legislative decree 2003, n. 128).

### Board of directors

Engineer Giorgio Saccoccia, President  
Engineer Maurizio Cheli  
Doctor Duilio Farina  
Engineer Fabrizio Giulianini  
Doctor Luisa Riccardi

## Our governance

To ensure the coordination of space and aerospace policies, as well as to **promote the efficacy of the ASI initiatives**, the **President of the Council of Ministers** has been entrusted with the senior management, general political responsibility and coordination of the Ministries policies, related to space and aerospace programs, and the **Interministerial Committee for Space and Aerospace Policies (COMINT)** (articles 1 and 2 of Law 2018, n.7) has been created.

## The ASI in the global context

In less than three decades, the ASI has established itself as one of the most important global players on the scene of space science, satellite technologies, development of tools to reach and explore the cosmos. Today, the ASI plays a key role both at a European level, where Italy is the third country in terms of its contribution to the European Space Agency, and at a global level, thanks to its continuous partnerships with international partners, such as the NASA, which leads it to participate in many of the most interesting space missions in the last few years. One of the most fascinating projects was the building and activity of the International Space Station, where Italian astronauts are at home.





## DIRECTORATE FOR HUMAN RESOURCES

The Directorate for Human Resources, in partnership with the Agency's top management, is in charge of the policies related to the staff, and ensures their implementation, consistently with the vision, values and culture of the organization, contributing to build an adequate system of company welfare; ensures the administrative management of the staff and the reporting activities towards the Directorate General; coordinates the implementation of planning and recruiting processes and the assessment, development and enhancement of skills, through appropriate training paths; helps to identify goals, indicators and targets based on the Performance Measurement and Assessment System for its fields of activity and supports those in charge of each sector in their assessment of employees, by ensuring the storage of the individual files for each employee. Furthermore, it guarantees office functions for disciplinary proceedings, in accordance with the current legal and contractual provisions, is in charge of preparing any documents regarding the management of labor relations (steering documents, agreement protocols, authentication procedures pursuant to article 40bis, Legislative Decree 165/2001, as amended (subsequent modifications and integrations)), ensures and coordinates the internal communication function and supports the Legal affairs unit in civil litigations. It guarantees any organizational and functional asset related with the servicing mission tasks carried out by the employees or similar, as well as the bodies of the entity. Finally, it manages the process related to the welfare activities required by the regulations in force; it's in charge of the relations with social security institutions; it provides for the assessment, storage and verification of the pension and social security contribution positions related to the staff; it follows the paperwork related to the integrated or rejoined periods of employees and the recognition of the different periods of useful service; it verifies the requirements for employees' retirement and prepares the related retirement paperwork, as well as the preliminary activities aimed at guaranteeing the liquidation of severance pay (TFS, TFR).

# The ASI human resources

Managing and enhancing human capital



## THE BEST PLACE TO WORK PROUD TO BE ASI



Headquarters  
in Roma



Matera  
Space Center



Malindi  
Space Center



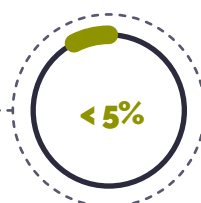
San Basilio  
Space Center,  
Cagliari



### IN FIGURES



THE HUMAN  
RESOURCES  
(NUMBER OF UNITS)



INCIDENCE OF THE  
COST OF HUMAN  
RESOURCES VS THE  
OVERALL BUDGET

**277**

permanent  
employees

(with a gender  
balance: 144  
women and  
133 men)

(yes to  
opportunities, no  
to precariousness)

**21**

fixed-term  
contracts

**16**

research grant  
and scholarship  
holders

(our internal  
training offers)

# To grow consistently with role and activities

Following the news introduced by the Law of 11th January 2018, n. 7 (the so-called "Space law"), the Agency was given more autonomy in regards with preparing the Three-year plan of activities (PTA) and establishing workforce needs. In fact, unlike the provisions of the former statute, instead of the required assessment and approval by the supervising Ministry and the favorable opinion of the Ministry of Economy and Finance and the Department of Public Administration in regards to workforce needs, as of today "the Agency, after hearing the trade unions, establishes independently the consistency and changes of staff and the workforce needs plan" and, subsequently, sends the PTA adopted by the relevant bodies to the Ministry of University and Research.

The ASI's recruitment plan is established, therefore, autonomously with the PTA and in compliance with the very recent special law, paragraphs 895-896-897 and 898 contained in the article 1 of the State Budget Law for the financial year 2021. Based on the budget planning (approved in November 2020), it is assumed that 60 new people will be recruited, with the addition of the recruitments generated by the provisions of the Decree of the Ministry of University and Research, n.802, defining the repartition of the Fund for extra hirings, pursuant to paragraph 2, article 238 of the Legislative Decree 19 May 2020, n.34, estimated at approximately 35 further units. The total of new hirings that can be predicted in 2021 (the hiring process should be concluded by the first quarter of 2022) amounts to about 95 units. 7 terminations for retirement are planned during the year, with a net balance of about 88 new employees.

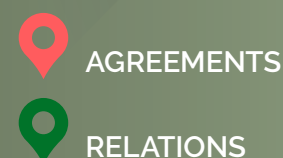
A success factor for the Agency is not only completing this important growth and reaching a sufficient size to face the challenges entrusted to the ASI by the new governance, but, simultaneously, making an important investment to enhance the existing human resources, by applying – in a meritocratic, selective and incentive manner – the motivational levers, which consist of the contractual conditions planned for career development and training, and offering challenging opportunities for self-fulfillment, through the assignment of responsibilities in regards to the positions forecast by the new organizational structure.





# International relations

The ASI's cooperation and space diplomacy



## BILATERAL RELATIONS AND SUPERVISION OF MULTILATERAL ORGANISMS

GABRIELLA ARRIGO  
Head of the  
International  
Relations Unit



The long Italian tradition in the space sector is not only the result of a solid technical-scientific knowledge, but also of an intense activity of international relations and partnerships, both at a bilateral and at a multilateral level. The majority of the Italian space activities is expressed, in fact, within international partnerships with historical partners, such as the ESA and the NASA, but also with several new partners spread over the six continents. This means that Space is increasingly becoming a tool not only for scientific and technological progress, but also for an economic and social sustainable development, with a view to achieving the goals set by the 2030 Agenda of United Nations. The International Relations Unit contributed to the mission of the Agency in this field by coordinating the bilateral negotiations and supervising the work within the different international committees and space bodies, starting from the United Nations.



# Main activities of 2020

2020 was a year defined by the COVID-19 pandemic, which, without any doubt, had a massive impact on the Agency's international relations, considering that all missions abroad were cancelled and most work was completed remotely. Nevertheless, the International Relations Unit was able to carry out relevant activities and reach successful goals.

## January

- Participation in the 15<sup>th</sup> Ilan Ramon International Space Conference in Tel Aviv (Israel) and meetings with the Israel Space Agency (ISA).
- Participation in the "Aerospace sector in Poland: opportunities for investments and partnerships" seminar, organized by the Polish embassy in Italy.
- Signing of the ASI agreement with CONIDA (Peru Space Agency).

## June

- Participation in the webinar with the United Arab Emirates on Space Exploration, in preparation for the Emirates Mars mission, Hope.
- Participation of the ASI, along with the Indian Space Research Organization (ISRO), in the DigITALYinINDIA Innovation Forum 2020, organized by the Italian embassy.



## July

- Meetings with the Mexican Space Agency (AEM) and other Mexican bodies to cooperate in the fight against the COVID-19 pandemic.

## October

- Preparation and participation in the works of the Space Economy Leaders Meeting, organized by the G20 Saudi Presidency and attended by all the Chiefs of the Member States space agencies, as well as the ESA, UNOOSA and Space Forum/OCSE.
- Participation in the 2020 annual congress of the International Astronautical Federation (IAF) 2020, which took place for the first time in virtual mode. The ASI participated, for the last time, in the activities of the Bureau IAF, where it held the vice presidency with mandate for the relations with Science and Universities from 2015 to 2020.
- After an intensive negotiation, actively attended by the ASI, Italy signed, along with other 7 countries, the ARTEMIS agreement launched by the NASA.
- Signing of a new agreement between the ASI and the Japanese Space Agency, JAXA.
- Participation of the ASI in the webinar with the United Arab Emirates on "Space Exploration and Earth Observation for present and future challenges".
- Participation of the ASI, with Roscosmos, in the XVII session of the Italian-Russian Council for Economic, Industrial and Financial cooperation.

## February

- Visit of Space System Italy, guided by the ASI in Australia, with two stages: Sydney, where the ASI attended the Industrial R&D in Space and Market Leaders and Space Start Ups' Innovation Day, organized by the Italian embassy, ICE and Chamber of Commerce; Adelaide, where the ASI attended the Australian Space Forum organized by the South Australian Space Industry Centre, CASIC, and SMARTSAT. In Adelaide, there were several industrial and institutional meetings, starting from those with the Australian Space Agency, with the Prime Minister of Australia, with the Prime Minister of South Australia and with the Minister of Science, Industry, Technology and Space.
- Signing of the ASI agreement with Azercosmos.
- Signing of the ASI agreement with the Bahrain Space Agency.



## November

- First meeting with the representatives of space agencies and delegations of the ASEAN countries, in view to holding the International Space Forum (ISF) of Southeast Asia in Kuala Lumpur (Malaysia), in 2021.



## December

- Participation of the ASI, along with the China National Space Administration (CNSA) and the China Manned Space Agency (CMSA), in the Italy-China Government Committee.
- Participation of the ASI, along with the Ukrainian Space Agency, in the IX Session of the Italian-Ukrainian Council for Economic, Industrial and Financial cooperation.
- Participation in the Italy-ASEAN Space Cooperation for Emerging Global Challenges.
- Participation in the Italian Space Industry, Sharing Technology, Building Capabilities webinar with Oman, organized by the Italian embassy in Oman.





# Italy, Europe, world

Where space is industry and economics

## SPACE, A PILLAR OF THE NATIONAL INDUSTRY POLICY

MARIA CRISTINA  
FALVELLA  
*Head of Strategies  
and Industrial Policy*



From the years of the first space probes until today, space has undergone a deep evolution. From a frontier domain, reserved for frontier research, it has become an enabling tool, which allows to produce technologies, goods and services for the entire society. The investments in the space sector, which are mainly public but also private and have always been regarded as strategic by our country in terms of innovation and growth, have started in the last two decades to generate a social-economic impact for a wider user base than those working in the sector. This creates new and relevant satellite activities, which go beyond the classic activity perimeters and generate a virtuous effect that feeds the so-called space economy, confirming space activities as a flywheel for innovation and competitiveness. Through space infrastructures, we can improve the efficiency of terrestrial services, making them more sustainable both from an economic and an environmental point of view, and also more usable in terms of time and user base.



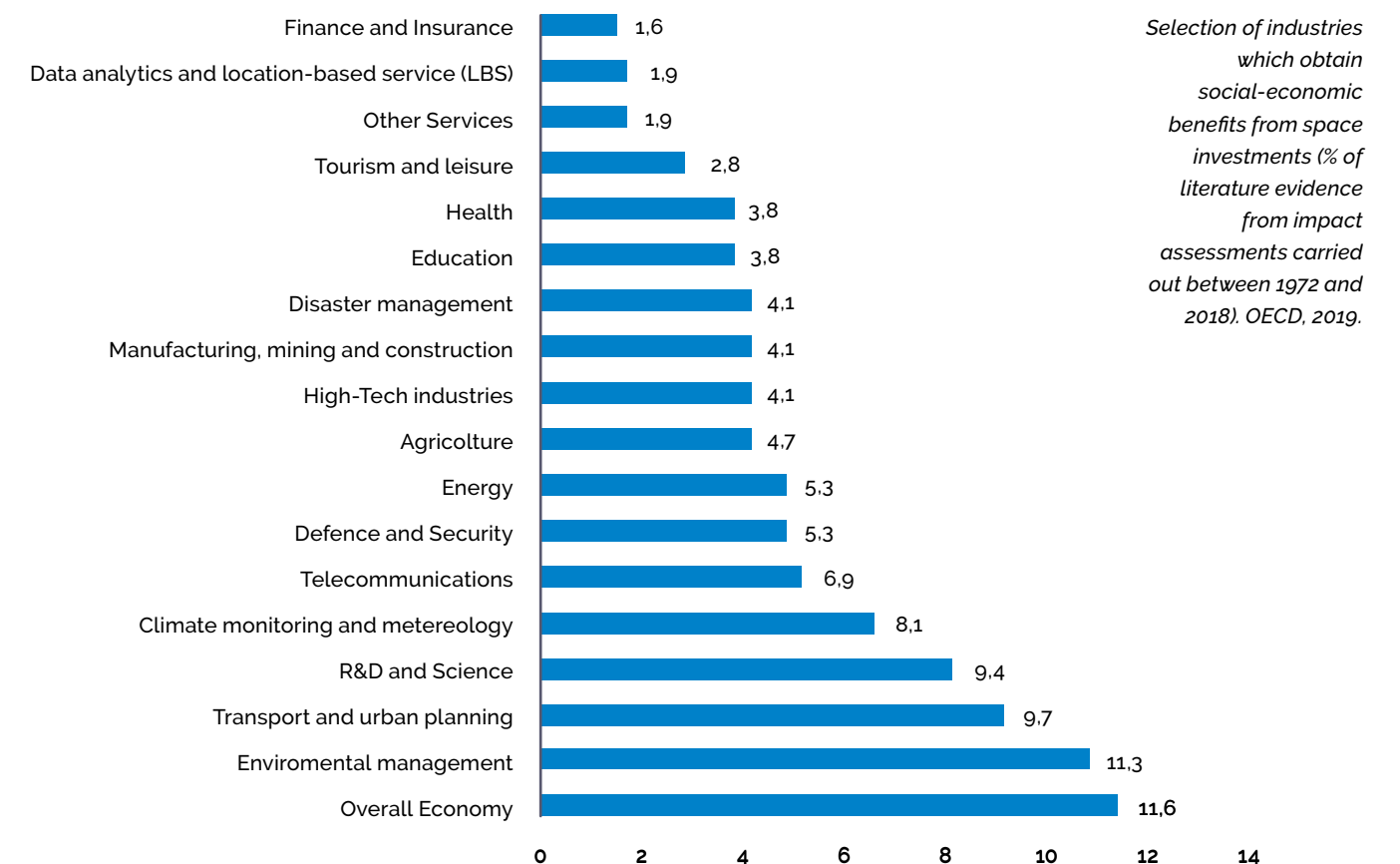
In this context, the ASI activities in 2020 were all targeted at implementing an industrial policy which is both organic, in terms of international relations, and effective in regards to the national fabric, allowing a synergic use of the available resources to obtain, also in the short-term, considerable results which compete to determine the characters of the European industrial policy of space. For this purpose, three main areas of intervention and some relevant transversal elements can be identified: the adherence and organicity of the Italian participation in the ESA vs the guidelines identified at a national level, the support to the national positioning within the EU Space Program and the promotion of the skills and competitiveness of the Italian industrial sector in Italy and abroad. Finally, focusing on space economy means favoring the interdisciplinary nature and search for innovative solutions to face the new challenges of our times, starting from those posed by the UN with its 17 SDGs (Sustainable Development Goals) and the European Union's Green Deal.



*Developed from the National Catalogue of the Italian Space Industry, 2020 edition, on a total of 143 companies.*

## The global economic scenario

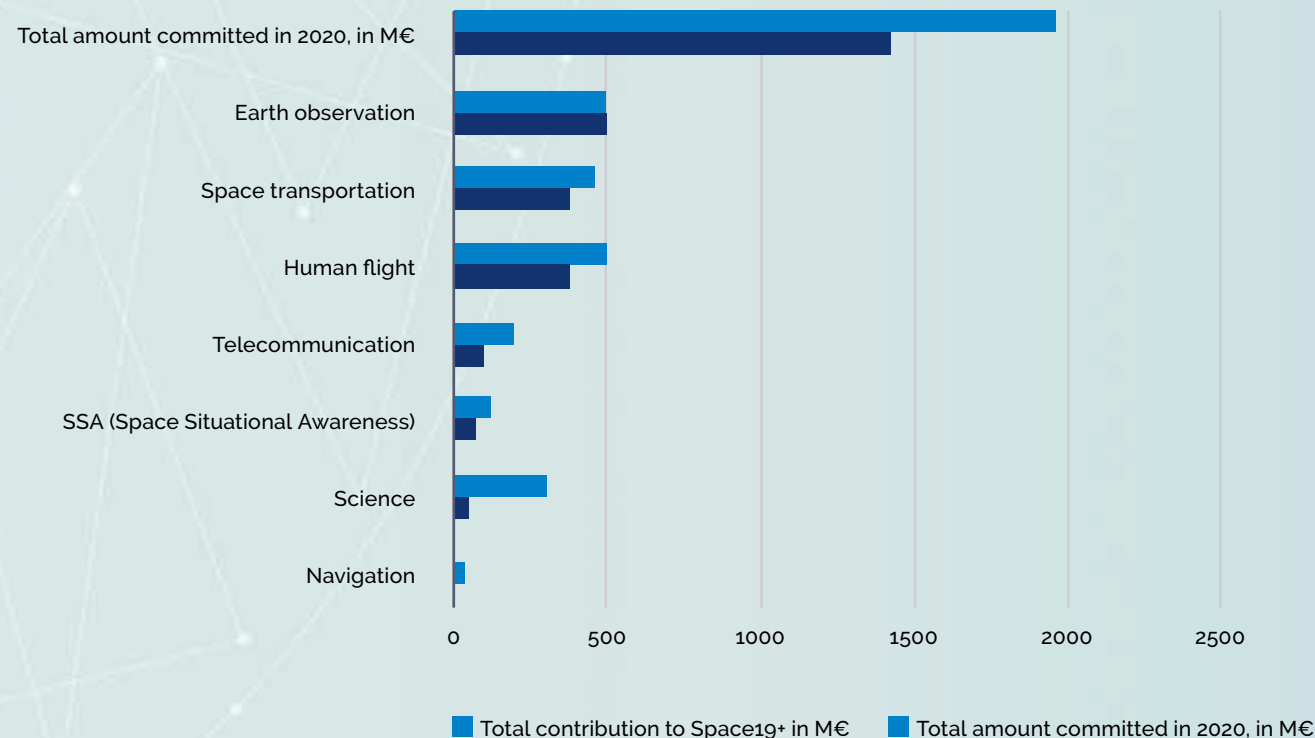
Based on the estimates provided by Morgan Stanley's Space Team, the nearly 350 billion US\$ turnover recorded by the global space industry may exceed 1000 billion US\$ by 2040, and contribute more and more to the national product. New space economy can play a key role also in a country like Italy, which has always focused on Space as a flywheel for growth and can boast a sector with over 200 companies (large system integrators, small and medium-sized enterprises and startup companies) involved in the entire value chain, for an overall turnover of about 2 billion euros and 7,000 employees. In Italy, the number of start-up companies which use space technologies and applications has been recording for a few years a constant growth rate of about 30% per year, the highest in Europe, confirming our country's commitment to innovation but also the resolve to make the most of the opportunities arising out of decades of investments. In this context, we observe the key role of the public sector in supporting the evolution dynamics of the entire national space sector.





## PARTICIPATION IN THE ESA PROGRAMS

Italy is a founding member of the European Space Agency and the Italian participation in the ESA programs is one of the main tools that play a role in implementing the strategic objectives established on the basis of the "Government strategy on space and aerospace". At the 2019 ESA Ministerial Council, Space 19+, Italy was confirmed as the third contributing country, after Germany and France, with an investment of about 2.3 billion euros, to the compulsory program, which includes the scientific program, the cost of infrastructures and the general activities, and to the optional programs. In particular, in regards to the optional programs, Italy confirmed its primary role in the field of launchers (Vega, Space Rider), Earth observation (Copernicus), Space Safety (NEO, Flyeye), and Exploration (Mars and cislunar orbit). No less significant are the investments in the Telecommunication program (ARTES) and in the development of integrated applications, as an effective tool for the development of applications and services. In 2020, such investments were followed by an affirmation of the national industrial expertise, which distinguished itself in tenders and generated a higher return compared to our country's contributions. Thanks to the ARTES BASS program, in 2020 it was also possible to activate call for tenders targeted at providing solutions for the COVID emergency, for a total amount of 20 million euros. The ASI represents the Government in the ESA Council and in subcommittees, and is in charge of all the requirements related to the national participation in programs by verifying the compliance with strategic guidelines, supervising decision-making committees, contributing to the development of the technical-program roadmap and favoring the bilateral and multilateral dialogue on the most interesting programs.



## IN FIGURES

**2.282**  
M€

Total Italian contribution to Space19+:

Optional programs

**1.785**  
M€

**497**  
M€

Compulsory program

Total amount committed by Italy in the ESA, as of December 2020

**1.3**  
B€

## European fundings for the 2021-2027 space program:

- **Galileo and EGNOS:**  
EUR 9,017 billion EUR
- **Copernicus:**  
EUR 5,421 billion EUR
- **SSA and GOVSATCOM:**  
EUR 0,442 billion EUR

## THE ASI AND THE EU SPACE PROGRAM

Since 2009, with the signing of the Treaty of Lisbon, allowed a different approach and commitment of the EU and its institutions in the space sector, with huge resource allocations. In particular, the European Union has developed two programs, Copernicus and Galileo, which allowed a different approach, at a global level, in regards to the use of space data, which are regarded as a strategic tool for the evolution of traditional productions. In 2020, the ASI and Italy were in the front line in finalizing the Regulation for the new 2021-2027 Space Program and establishing the European Union Agency for the Space Programme (EUSPA) as an evolution of the GSA, the Agency for European Satellite Navigation Programmes, which is in charge of managing the Galileo and EGNOS navigation systems.

The new EU fundings will allow to develop application and services and define the characteristics of society in the next decade, which provides for new forms of mobility, the use of geolocalization to monitor emergencies and cultural heritage, precision farming, satellite logistics, cybersecurity, telemedicine and space pharmacology, IoT, restructuring of production chains, management of climate changes and great global challenges, such as migration flows and pandemic.

Also at a European level, the national space industry has proven to be very competitive and has generated a return which has always been satisfying and above what is invested. In particular we should note the return, accounting for 13% of the total, in regards to the research activities funded in 2020 by the Horizon 2020 program, a higher value than the contribution to the EU budget (calculated on the basis of the national GDP) which is around 12%.

## The ASI in the ESA and in the European Union in 2020:

- **4 PRESIDENCIES:**
  - Board of Directors of the GSA
  - International Relations Committee of the ESA
  - Telecommunications Program Committee of the ESA
  - Audit Commission of the ESA
- **1 VICE PRESIDENCY:**
  - Earth observation program committee of the ES





# Science in space

Knowledge of the Universe

## FROM THE BIG BANG TO OUR SOLAR SYSTEM

BARBARA  
NEGRI

*Head of the  
Universe Exploration  
and Observation Unit*

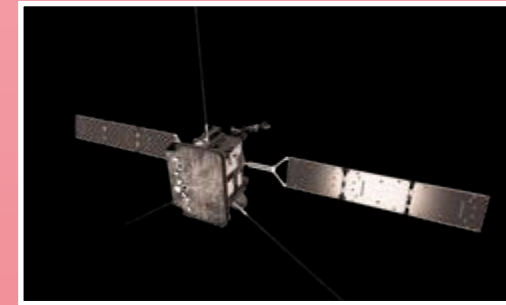
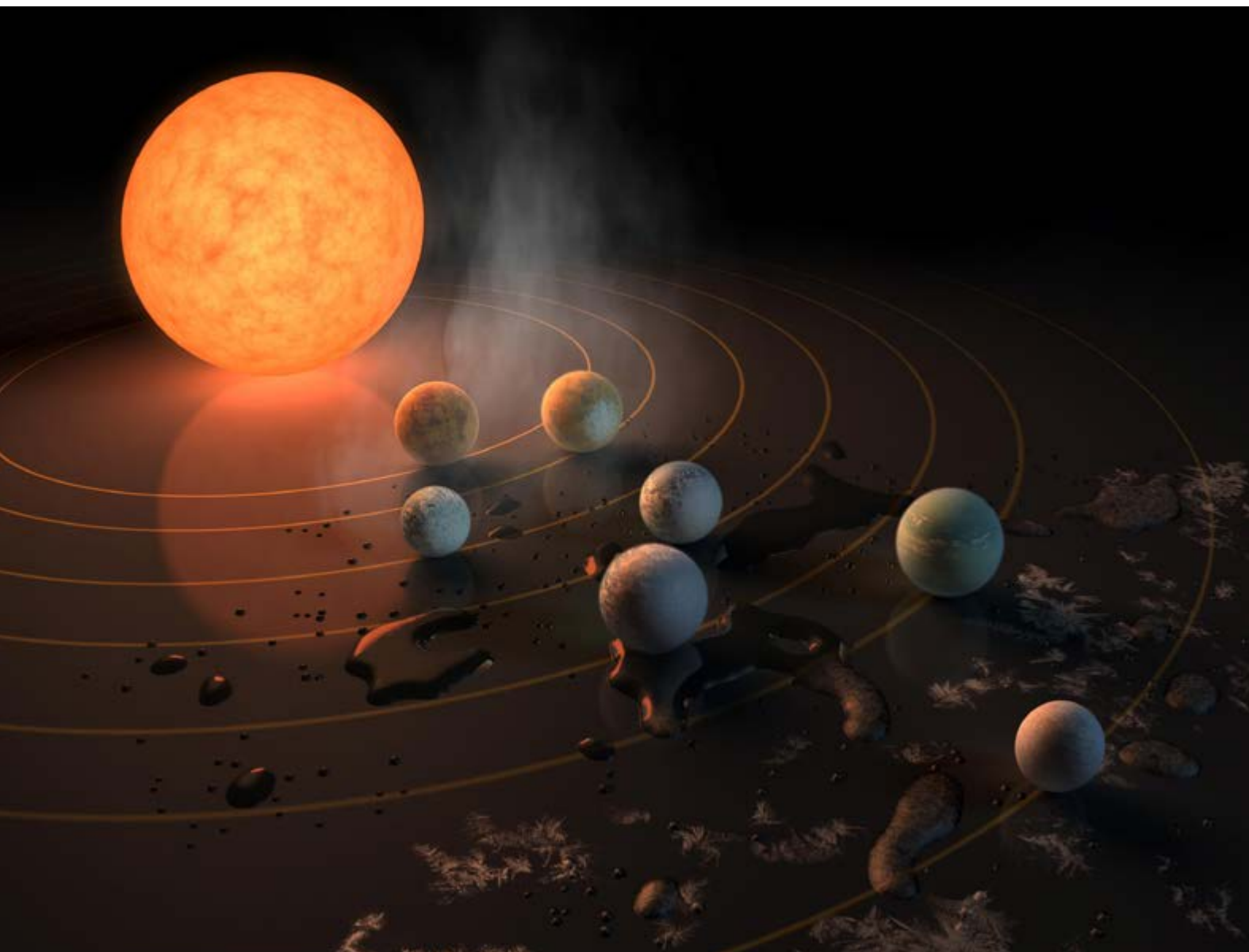


The key factor in the development of astrophysics in the last decades was the possibility to broaden the observable band to the entire electromagnetic spectrum and detect all the high energy particles coming from celestial objects. The arrival of the space era has also led to an impressive development of knowledge in the field of cosmology in regards, in particular, to the origin of the Universe and the formation of the first structures. The study of the Solar System was targeted at the closest, and most similar to Earth, planets, i.e. Venus and Mars, and progressively reached all the other planetary celestial bodies, Saturn and Jupiter, and minor ones such as asteroids and comets. The main goals are the study of the origin and evolution of the solar system and the bodies that compose it, and the complex interactions between the Sun and the planets. The research on the origin of life in our solar system has been added to such goals, with the aim of understanding under which conditions it can appear and evolve. In recent times, the research of exoplanets (planets which are similar to Earth and are located in other star systems, similar to our Solar System) has become very interesting from a scientific perspective.



## The ASI's role

The ASI has been contributing for over three decades, in a decisive way, to the biggest international challenges in the field of space science, through its continuous involvement in scientific missions in the field of astrophysics, study of the Solar System, research of exoplanets, cosmology and fundamental physics. The Italian scientific community and industry have a recognized leadership in the development and manufacturing of scientific tools and in terms of data processing and analysis. The ASI participates in all the ESA's "Scientific Program" missions and in several bilateral scientific partnerships, in particular with the NASA and the JAXA.



**SOLAR ORBITER**, ASI mission targeted at the study of the Sun. The satellite was launched in February 2020, with the Italian coronagraph METIS and the Data Processing Unit, created for the English tool SWA, aboard.

**EUCLID**, ESA mission targeted at the indirect observation of dark matter and dark energy through the study of their effects on the observable baryonic matter, with unprecedented accuracy. The launch is scheduled for 2022.



**CHEOPS**: the first ESA mission targeted at studying exoplanets, launched in December 2019, started its adventure by positioning itself in the predefined orbit and kicking off the observation program of over 7000 stars in its three years and a half of expected operating life.

**IXPE**: the ASI has delivered to the NASA the focal plane detectors for the three telescopes aboard the mission, targeted at measuring the polarization in the X-rays generated by astronomical sources, which will be launched at the end of 2021.



**JUICE**, ESA mission targeted at studying Jupiter icy moons (Ganymede, Callisto and Europa). The ASI manufactured and delivered the following tools to the ESA: RIME (ground-penetrating radar), 3GM (radio science tool) and HAA (accelerometer); JANUS (high-resolution camera) and MAJIS (image spectrometer) are currently being tested. The launch is scheduled for 2022.





# Earth

from another point of view

Italy recognized at an international level



## NOT ONLY EARTH, WATER AND ATMOSPHERE...

FRANCESCO  
LONGO

*Head of Program  
Office, Technology  
and Engineering Unit*



Earth observation is the most relevant space sector for our country, and is an irreplaceable resource which can contribute to reach multiple strategic, political and social-economic goals.

Through the activities conducted by the Agency in the industry, Italy has reached a prestige that has been recognized at an international level, thanks to the wealth of its space assets, such as the on-demand, dual-use SAR COSMO-SkyMed satellite constellation, one of a kind and now recognized worldwide due to the several, determining uses to the service of the major international institutions in scenarios of crisis, and the PRISMA hyperspectral satellite, the most advanced currently flying around our planet.

The solidity of the industrial assets, which are capable of covering the entire value chain, and the excellence of the scientific and application national Earth Observation community in facing new challenging goals, that can stimulate the definition of new space missions, are at the core of such records.




# Earth, our planet, our future


Research, development and innovation in the field of Earth observation are essential to understand and monitor the environment and climate changes, to reach sustainable development targets such as food and drinking water requirements, to build a resilient society and support a strong and competitive national economy in the international markets. The efforts of the agency are aimed at maintaining our country's leadership in the Earth observation domain through:

- the definition and implementation of national excellence programs and a coordinated participation in European space programs, as well as a bilateral partnership with strategically relevant partners
- the implementation of technological roadmaps, suitable to maintain currently consolidated positions
- the development of new architectures and tools for Earth observation to anticipate observation trends and the new challenges of remote sensing
- a solid policy to support the national scientific and application community during all the development stages of the national, European and international programs.


## OUR FLEET




6 operational satellites: 5 satellites from the COSMO-SkyMed constellation (X-band SAR) and 1 hyperspectral satellite (in the VNIR-SWIR bands).



Over 500 images of our planet per day acquired by each second-generation COSMO-SkyMed satellite.

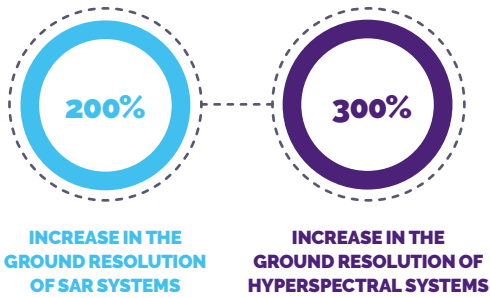


The COSMO-SkyMed constellation is an excellent tool to prevent and manage emergencies, with a revisit time of 2 hours in crisis areas



Over 200 acquisitions per day by the PRISMA satellite, each one made up of 240 different "spectral images".

## IN FIGURES



8  
SAR  
satellites

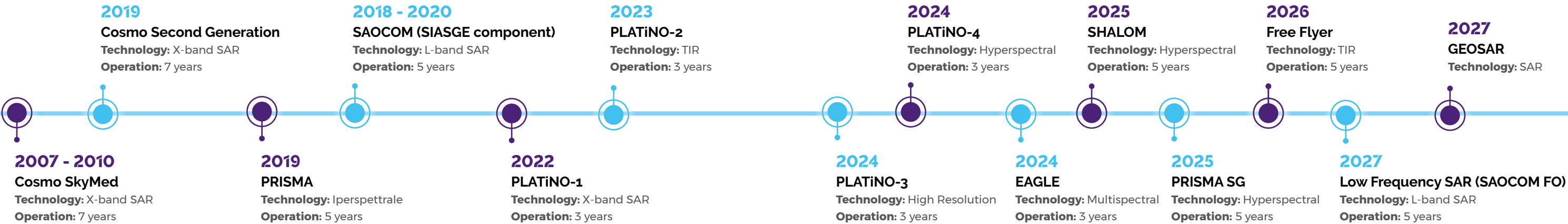
Continuità costellazione COSMO-SkyMed a 4 satelliti; satellite geosincrono in banda X; costellazione a bassa frequenza in banda P/L a 2 satelliti; minisatellite con SAR mono e bistatico in banda X.

Hyperspectral, second-generation constellation made up of 2 satellites; SHALOM hyperspectral mission; PLT-4 hyperspectral minisatellite; PLT-3 high-resolution optical minisatellite; EAGLE multispectral minisatellite.

6  
optical  
satellites

2  
satellites

In the thermal infrared: PLT-2 minisatellite and TIR mission with JPL-NASA in the thermal infrared.







# Two constantly evolving and spreading satellite capacities

Telecommunications and navigation

## SYNCHRONIZE AND NAVIGATE

ALBERTO TUOZZI  
*Head of the Telecommunications and Navigation Unit*



The telecommunications and navigation services significantly support each human activity and allow to transfer, in an increasingly effective and reliable manner, data, voice, images, parameters and any other information, from the simplest to the most complex, through real-time or deferred connections between two or more separate points that can even be distant, or send them to several users and people. The management and exchange of data is key in present time, and will be even more essential in the future. The Internet of Things, the virtualization of networks and databases and the huge quantity of data needed to make decisions and move depend on how capable we are of ensuring data send, their reception and protection in terms of safety, integrity and confidentiality, particularly when they are essential.

For a few decades, Italy has been one of the most advanced countries in terms of development of telecommunications satellite systems, both for defense purposes and for commercial and institutional uses. In the field of satellite navigation, where the infrastructure is European, our country contributes to the EGNOS and Galileo European programs with primary roles, both in terms of "governance" and in terms of industrial activities and operations. These initiatives, both national and within the EU/ESA, contribute to increase all the technological, service and application capabilities, which optimize and extend the use of EGNOS and Galileo satellite services to all potential sectors, ranging from smartphones to space navigation of interplanetary probes.



## IN FIGURES



**100+**  
project proposals

by Italian companies, received to address the COVID-19 emergency (within the ESA ARTES program).

optical fiber connection, connecting Turin (INRIM, National Institute for Metrological Research) – Fucino – Rome and Matera (ASI) for applications in the time and frequency field.

**1.800**  
Km

**15+**  
research  
and development

tenders for innovation in the field of technology and strategic applications and infrastructures for public and private services.

and development contracts with great companies, small and medium-sized enterprises and Italian research centres.

**10+**  
research

**18**  
2

the acceleration sustained by an Italian SDR/GPS Galileo satellite receiver aboard a NASA sounding rocket during a first experimental flight.

the distance at which it is planned to use the GPS and Galileo signals and satellite telecommunications for the future cislunar missions, thanks to the ASI/NASA partnership ARTEMIS.

**400.000**  
Km

**25+**  
European

partners involved with the ASI in the ENTRUSTED project, to define the characteristics of the GovSatCom program based on the needs of institutional users.



## KEYWORDS IN 2020

### TELE- COMMUNICATIONS OF THE FUTURE

Activities carried out and aimed at using the 5G broadband in mobile and automotive systems and defining protocols, procedures and algorithms.

### FIRST

SpaceEconomy initiative in Italy, commissioned by the Ministry of Economic Development and managed by the ASI; its name is Ital-GovSatCom. Its target is the creation of a public-private partnership to define the Italian contribution to the European program.

### INTEGRATED

It's the aim of a few ASI/ENAV projects, started in 2020, which are testing the use of GALILEO/GNSS to improve the integration of drones into airspace control, scheduled in the near future.

### SAFE AND OPERATIONAL

The aim of a few initiatives, guided by the national PRS authority (Presidency of the Council of Ministers), to equip our country with the skills, technology and expertise needed to use the Galileo PRS service.

### OPTICAL AND QUANTUM

This is the ongoing revolution in the field of safe satellite telecommunications. Several initiatives have been launched by the ASI to develop technology, experiment and validate in-orbit this new way of communication.

## The ASI activities in 2020

At a European level, the current scenario sees the active involvement of the ASI in the Galileo and EGNOS programs for satellite navigation, including their next generations, and the future satellite telecommunications systems, which are increasingly sophisticated and diversified in terms of frequencies used, orbits and constellations, great and small satellites, types of users and levels of safety and reliability.

## Italy's proactive and innovative role

- Ital-GovSatCom, which is the first Space Economy initiative in Italy, contributes to the EU vision for institutional communications, by defining a satellite system and a new pattern to deliver cutting-edge services in the field of institutional satellite telecommunications, capable of enhancing the entire national chain for the future European program.
- Italy is the second contributor to the ESA's ARTES program and allows the funding of several innovative projects, which are proposed and carried out within the national network and allow the country to maintain a primary role at a European level and be continuously updated.
- Manufacturing, in partnership with the INRIM, of the 1739 km optical fiber network for the distribution of the time and frequency signals generated by Altec-Turin's atomic clocks to Medicina and Matera, to strengthen the Galileo satellite system, carry out gravitational, seismological and space geodesy campaigns and quantum communications, as well as optical and quantum telecommunications.



### ITALY, ACTIVE AND PRESENT IN THE EUROPEAN NAVIGATION PROGRAMS

2020 was a key year for the preparation activities aimed at allowing the transition from the current European GNSS Agency (GSA) to the European Union Agency for the Space Programme (EUSPA), which will be in charge of managing the European space programs in agreement with the provisions of the recent Space Regulation. The new generation of Galileo satellites sees the Italian space industry in the foreground, as our country was commissioned by the European Commission to manufacture some particularly innovative satellites to ensure Galileo's global leadership also in the future.

### IMMEDIATE RESPONSE FROM SPACE SERVICES TO THE COVID-19 EMERGENCY

The ASI and the ESA involved the national industrial chain in an initiative aimed at providing concrete solutions to address the COVID-19 emergency. Such initiative ended with the approval of a few innovative projects, which can be immediately used to support the emergency situation. Over 100 projects related to the sector of medicine and education were approved; they take advantage of the benefits offered by the telecommunications, navigation and Earth observation services.

### CONTINUOUS INNOVATION AND EXPERIMENTATION OF INTEGRATED TECHNOLOGY, SERVICES AND SPACE APPLICATIONS

2020 saw the ASI increasing its efforts in the research and development activities in the field of navigation, through several tenders aimed at supporting the national ecosystem required to create sustainable and innovative applications and services based on EGNOS and Galileo, and their integration with other emerging technologies and sectors in expansion, such as drones, artificial intelligence and professional receivers.

### EXTENDING THE USE OF SATELLITE NAVIGATION TO THE SPACE SECTOR (GNSS SPACE VOLUME)

Among the initiatives related to the use of Galileo for space applications, we must highlight the successful experimentation of an Italian GPS/Galileo receiver which, thanks to the partnership with the NASA, flew aboard a "sounding rocket", showing the Italian industry's capability to build particularly robust space receivers; during the launch, the receiver underwent a very high level of stress, with an acceleration of up to 18g, and successfully ensured the expected performance without interruptions and degradations.

### PREPARING ITALY TO THE USE OF GALILEO REGULATED SERVICES

The Galileo PRS (Public Regulated Service) were the object of several initiatives, carried out by the ASI under the guidance and supervision of the National PRS Authority, to test this innovative Galileo service with the interested institutional users by performing demonstration activities. We are currently working on a national centre for the PRS, which will allow our country to be prepared and at the forefront for the operational use of the PRS.





# Access to space

Launchers made in Italy

## VEGA RETURNS TO FLY

ALESSANDRO GABRIELLI  
*Head of the Space Transportation Unit and the PRORA Program*



In the first part of the year, VEGA activities were focused on the return to flight under safety conditions, by addressing the issues that had been highlighted by the Independent Commission of Inquiry following the failure of the VV15 flight in July 2019. In fact, after 14 successful launches, the VEGA launcher failed at flight 15, due to a thermo-structural issue in the second-stage engine, which has been finally solved thanks to scrupulous investigations which allowed to identify the causes and adopt the corrective actions. This allowed VEGA to successfully return to flight, with the important and complex flight 16 mission, which orbited as many as 53 payloads with a single launch, a record for a European launcher. The launch campaign for the VV16 flight underwent several vicissitudes and postponements, due both to the completion of return to flight activities and to the impact of the COVID-19 pandemic, which forced to shut down the Kourou Space Centre in March, a few days before the scheduled launch. Later on, following the reopening of the space centre, the launch was postponed several times due to adverse weather conditions, which imposed limitations on the safety of the launch. Finally, the launch successfully took place on September 3rd, with the complex SSMS PoC (Small Satellite Mission Service Mission Proof of Concept) mission which saw the use of a specific dispenser to



carry out the first European rideshare mission. The success of this mission, with 53 satellites aboard, marked the European record in terms of number of orbited payloads in a single mission, and showed the feasibility of this type of missions with the VEGA launcher, as well as its full return to flight.

Unfortunately, in November, the subsequent VV17 flight was terminated early after successfully completing the propulsion step of the first three stages, due to an issue in the AVUM fourth-stage engine. The cause, promptly identified, was the integration of the fourth-stage AVUM Thrust Vector Control (TVC). The return to flight activities are ongoing and include all the corrective measures identified by the Independent Commission of Inquiry; they will lead to the launch of VEGA flight 18 at the end of April 2021. The development of the new versions of VEGA continued throughout the year: in December 2020, despite the difficulties imposed by the COVID-19 emergency, the GQR (Ground Qualification Review) was started to complete the qualification program for VEGA-C, the "consolidated" version of VEGA, which will allow a 60% increase of launch performances. As of today, the maiden flight is scheduled for the end of 2021. The development activities for the "evolved" VEGA-E version are continuing: it will see the introduction of an upper stage, equipped with an engine fueled by methane / oxygen.

The activities are now focused on the development of such M10 motor, successfully completed in March 2020 at the NASA Marshall Space Flight Center in Huntsville, the first fire test campaign of the combustion chamber conducted with additive layer manufacturing, ALM (3D printing).

Also the qualification program for the development of the P120C engine, the biggest monolithic, solid-propellant engine in the world, was carried out in 2020, with the completion of the GQR-2, and therefore the engine is ready to be used both as VEGA-C first stage engine and as Ariane 6 booster, in its 2 or 4-booster versions (A62 and A64), guaranteeing high production rates that will contribute to reduce its costs. The space transportation capabilities will also be completed by the Space Rider space vehicle, which will be launched by VEGA-C and will serve as an unmanned robotics laboratory in low terrestrial orbit, offering a volume of 1200 liters for payloads up to 800 kg and then returning to Earth with its useful load, to be reused in subsequent missions.



Italy contributes to this ESA program with 150 M€ (77%) for the 2.2 stage, approved at the 2019 Ministerial Council. The related development contract with the industry (TAS-I and AVIO, with the role of co-prime), which will lead to the flight of the first model, was signed at Palazzo Chigi, Roma, in the presence of representatives of the Italian government.

At a national level, the Unit carries out several technologic development programs, necessary to build the required skills in Italy and inject them within the ESA, to develop the European launchers and guarantee a position of high international competitiveness to the Italian industry and research.

For example, the development activities of national skills in the field of liquid oxygen / methan propulsion are continuing, within the LYRA program and through a partnership with the Japanese Space Agency (JAXA), whereas new initiatives (technologies for cryogenic stages, thrust modulation, high trust engines, etc.) have been proposed for the next few years. The PHAEDRA (Paraffinic Hybrid Advanced Engine Demonstrator for Rocket Application) started in January, for the development of hybrid propulsion, paraffin-based technologies (combustible and oxidizing in different stages), which involves the main national realities active in the industry and aims at manufacturing a demonstrator that may find application on small launchers or sounding rockets.

Since November 2019, a program for the development of technologies for solar-photon propulsion (solar sails) has been active too, in partnership with Universities and Research Centres. The development program for technologies for segmented shells in filament-wound composite, for solid propulsion, was completed in August, with the successful test of a large scale demonstrator (1.1 m diameter).

We should also mention the beginning of the preliminary activities which will lead to the start of development programs related to additive layer manufacturing for copper combustion chambers for rocket engines (CARMA) and innovative avionic equipment and architecture for application on next-generation launchers (e.g. sensors and wireless telemetry system, GNC systems for stage reentry and onboard neutralization systems).



# Exploring space

The contribution of the ASI to human exploration

## PROTAGONISTS OF EXPLORATION, ALONG WITH THE BIG AGENCIES

GABRIELE  
MASCETTI  
*Head of the  
Microgravity and  
Human Flight Unit*



Space exploration consists of the human presence beyond the terrestrial domain. It's a long-term path, where research and technological development activities on Earth and on the different space platforms are regarded as a necessary, essential step of knowledge towards life beyond Earth. In an extremely relevant historic phase for space exploration, the first time since the Apollo missions that we are planning to bring man back to the Moon, Italy plays a leading role. As well as guaranteeing the national supervision of the International Space Station program, where Italy is the only participating European country, the ASI supports the major space agencies, first of all the NASA, in coordinating the exploration activities and the Artemis return to the moon program. Italy boasts industrial (pressurized modules, robotics for exploration, biotechnologies) and scientific expertise which are recognized at an international level; the ASI favors the growth of the national industry, through international agreements, for the access to human rated space platforms, by supervising the ESA exploration boards, and through national industrial policies to support scientific research.





## 2020 events

2020 was an important year for space exploration. On February 6th the astronaut Luca Parmitano, the first Italian commander of the ISS and our only compatriot to have carried out extravehicular activity, returned to Earth from the International Space Station. Parmitano conducted six Italian experiments on the ISS, two of which are currently still on board to collect data. As of today, 74 Italian experiments and 7 Italian astronauts have flown to space, for a total of 13 flights, 5 of which are long-duration flights. Throughout the year, the ASI published two national tenders for research on the International Space Station and support to Italian researchers who had access to experimentation opportunities in the ESA. On April 30th, the NASA announced the selected projects for the development of a Human Lunar Lander: a major Italian company participates in one of the three involved industrial consortiums and will have to create the structure of the system. The ESA has signed two key agreements with the NASA: one of them is related to the participation in the Gateway program, the first station that will orbit in cislunar space. Italy is the country with the most important participation and the company in charge of the development of the housing module is Italian, as well as the windowed part of the gateway. The other agreement is related to the European participation in the Mars Sample Return campaign, where Italy will manufacture some key elements of the orbiter which will return the Martian samples to Earth. The manufacturing activities of Argomoon, the only European cubesat aboard the NASA's Artemis 1 mission and the first Italian cubesat that will be orbited around the Moon, are nearly completed. The procedure was started to commission a study of space exploration systems, with the very-much awaited participation of national small and medium-sized enterprises, with the aim of starting further partnerships with the USA in regards to the Artemis program.



### IN FIGURES

**73**  
experiments

aboard, a number which has increased thanks to the agreements with the ESA and ROSCOSMOS, as well as with the NASA, in 2019-2020.

hours of operations carried out with the NASA.

**100**  
total

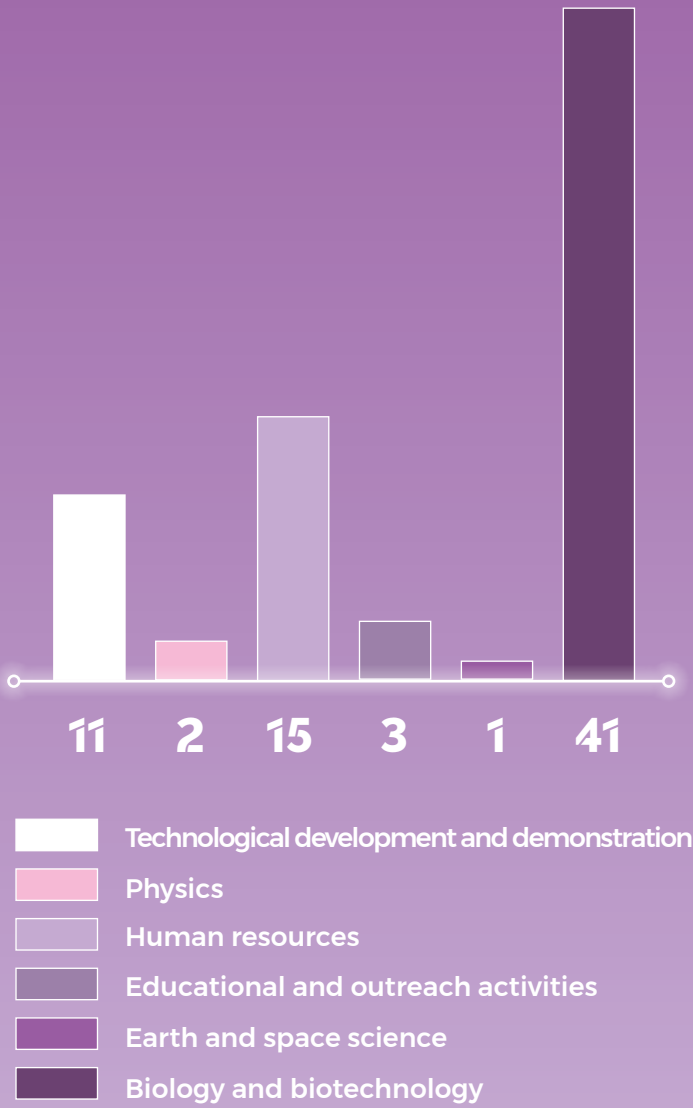
**27**  
total hours

of operations carried out with the ESA.

of overall astronaut time used by the ASI during the Beyond mission.

**30**  
hours

### INVESTIGATIONS BY THE ASI FOR THE DOWNSTREAM REGULATION OF THE BEYOND MISSION



#### February 2020

Reinstatement of the Italian presence at the European Astronaut Centre in Cologne, where we had been absent since 2003.

#### July 2020

Publication of a tender for the Italian researchers selected by the ESA

#### October 13<sup>th</sup>, 2020

Signing of the Artemis Accords

#### January 2020

Publication of a market survey for technological research and demonstrations on the ISS

#### February 2020

End of the Beyond mission

#### September 2020

Publication of a market survey for support services to the national use of the ISS

#### November 20<sup>th</sup>, 2020

Signing of the NASA ASI Study Agreement





# Broglia Space Center

Malindi, Kenya

## THE SITE HEAD UNIT IN MALINDI

FRANCESCO  
DOMINICI  
*Head of the BSC  
Office in Malindi*



The San Marco/Luigi Broglia Space Centre (BSC) program in Malindi (Kenya) is a joint space cooperation program between Italy and Kenya. Since 1964, the existence of the BSC in Kenya had initially been regulated by an intergovernmental agreement on partnership in space activities between Italy and Kenya. The first renewal of the agreement was signed in 1995, for a duration of 15 years. Later on, a new intergovernmental agreement was signed on October 24th, 2016 in Trento, for a duration of 15 years: such agreement has recently been ratified by both Parliaments.

The agreement provides for the conclusion of implementing arrangements between the two governments, through their enforcement agencies or ministries, to regulate the activities in the cooperation areas. The contents of the five agreements to be developed are in the following fields: "Education and training", "Access to Earth observation and scientific data", "Establishment of the Regional Earth observation centre", "Support to the establishment of the Kenya Space Agency" and "Telemedicine".



## Activities at the BSC

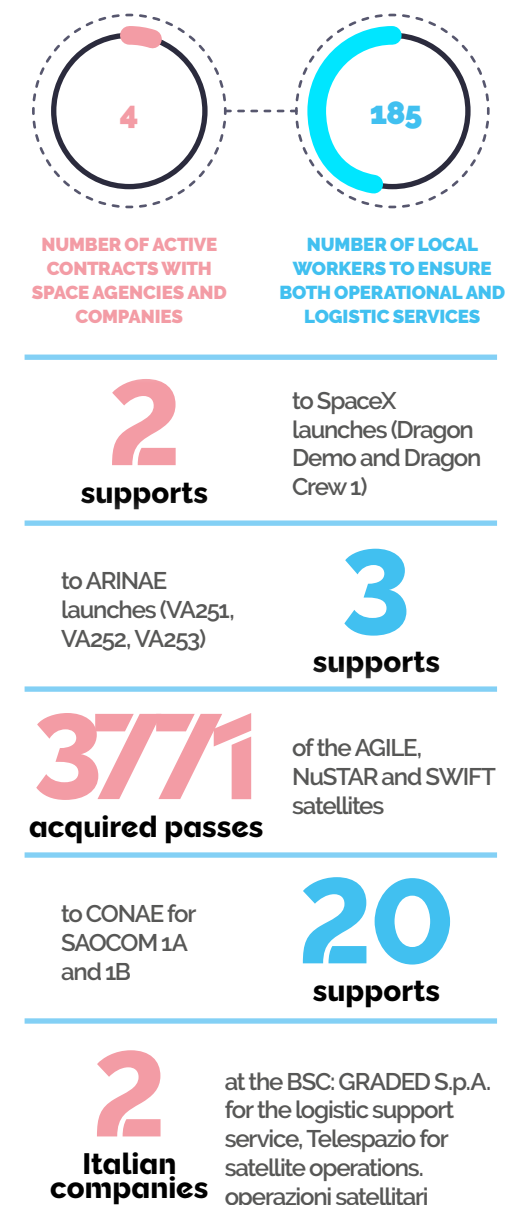
Operation management and operation support activities for scientific and technological programs by using the TT&C and remote sensing stations. Routine services to support the three AGILE/ASI, Swift/NASA and NuStar/NASA missions, which unravel their (remarkable) results by relying, almost exclusively, on the ground segment activity in Malindi. Furthermore, Malindi has already been selected as "ground station" for the next NASA's IXPE mission, whose preparatory and preliminary activities already started last year:

- scientific and technological activity in partnership with several international organizations and players (ESA, NASA, CNES, CLTC, SpaceX, CONAE);
- support to launches from Korou (Ariane, Soyuz and Vega carriers), which take place thanks to the aid of the BSC in Malindi (this is a binding support, which means that it wouldn't be possible to perform a launch if Malindi wasn't operational);
- support to the CNSA (Chinese Space Agency) in the missions of their human flight program;
- support to the Launch and Early orbit phase (LEOP) at the request of the ESA (next support to the NASA's JWST mission);
- support to part of the U.S. company Space X's launches (Crew Dragon Demo2, Crew Dragon 1);
- several research activities in partnership with Sapienza-University of Rome, University of Kenya and Kenya Space Agency

## THE ASI NETWORK AGREEMENTS AND CONTRACTS



## IN FIGURES



**12.12.1970**

**Launch of the UHURU satellite**  
The launch of the UHURU satellite (the first satellite for the purpose of X-ray astronomy), with the Scout B carrier.

**04.24.1971**

**Lancio del satellite San Marco 3**  
Launch of the San Marco 3 satellite.

**02.18.1974**

**Launch of the San Marco 4 satellite**  
The launch of the San Marco 4 satellite, with the Scout D-1 carrier.

**1995**

**Italy-Kenya intergovernmental agreement for the BSC**  
Signing of the fifteen-year agreement between Italy and Kenya for the BSC, which foresees the possibility to perform launch, satellite acquisition, remote sensing and training activities both on-site and in Italy.

**04.26.1967**

**Launch of the San Marco 2 satellite**  
The launch, with the Scout B carrier, was performed from the Italian launch site, Broglio Space Center-BSC, located in the Indian Ocean, in international waters off the Kenyan coast, 2° 56' south of Equator, made up of ocean platforms fixed to the ocean floor: platform for the assembly and launch of the Scout rocket (San Marco platform); control platform for the launch and orbiting operations (Santa Rita platform); a small platform where radars had been placed; a ground-based telemetry station and other ground-based infrastructures, in the territory of Kenya. The San Marco 1 satellite was launched on 12.15.1964 from Wallops Island, Virginia.

**03.25.1988**

**Launch of the San Marco D/L satellite**  
Last launch performed from the space centre with the Scout G-1 carrier

**2004**

**Change of management of the BSC, from Sapienza to the ASI**

**2016**

**New Italy-Kenya intergovernmental agreement for the BSC**  
Signing of the new fifteen-year agreement between Italy and Kenya for the BSC, which foresees the possibility to perform launch, satellite acquisition, remote sensing and training activities both on-site and in Italy.



# G. Colombo Space Centre

Matera, Italia

## FROM QUANTUM TELECOMMUNI- CATIONS TO METROLOGY

GIUSEPPE  
BIANCO  
*Director of Matera  
Space Centre*



The Matera Centre for Space Geodesy, dedicated to Prof. Giuseppe ("Bepi") Colombo, was opened in 1983 thanks to the joint efforts of the National Research Council (CNR)'s National Space Plan (the ASI took over in 1988), the Basilicata Region and the NASA.

The centre is the main ASI operation centre. The Centre, which focuses mostly on space geodesy and remote sensing, is recently directing its attention to other fields, such as free-space quantum telecommunications, metrology of time and frequency, and tracking of space debris. All the activities are performed in the context of national and international partnerships.

The Centre operates in Matera 24/7, and combines in one site both the infrastructures for acquisition and processing of satellite remote-sensed data and all the space geodesy techniques. In fact, the Centre is one of the very few multi-technical core stations of the Global Geodetic Observing System (GSOS), in charge of defining and maintaining terrestrial and celestial reference systems.



The equipment available at the Centre is the following:

- Core Station GGOS:
  - Matera Laser Ranging Observatory system
    - MLRO for satellite and lunar laser telemetry;
    - VLBI S/X radio astronomy antenna, with a diameter of 20 m;
    - National network of GNSS receivers;
    - A high-precision absolute gravimeter;
    - The GEODAF portal for data distribution;
    - Equipment for optical communication and quantum free-space experiments;
    - Equipment for the observation and monitoring of passive, and in the near future active, space debris (SPADE telescope);
- The acquisition and processing chain of civil data related to the Italian Earth observation missions (COSMO-SkyMed, PRISMA);
- Acquisition capabilities for other agencies' missions (such as Copernicus, ALOS, SAOCOM);
- Laboratories and equipment for optical fiber synchronization (laser comb) and metrology of time and frequencies.

In the 2020-2022 three-year period, all the operational and data analysis activities carried out by the Centre will be maintained and updated.

Among these are space geodesy operations which, starting from 2018 and for a period of 4 years, are carried out within a contract awarded through open procedure.

Therefore, it will be necessary to ensure the continuation of such operations also upon expiration of the contract.

However, the Centre needs significant technological adaptation interventions to remain competitive at an international level. It is hardly necessary to mention that the equipment has been operating for several years (over 25 years in the case of the VLBI station, over 15 years as regards the MLRO). Furthermore, the significant development of new activities at the Centre (including "quantum communication", lunar laser ranging (LLR) campaigns and space debris tracking) requires new technological infrastructures and an enlargement of the Centre's spectrum of operational activities.

Therefore, a few activities for the evolutionary maintenance of systems and the development of a new system will be completed or started:

- completion of the GNSS New National Fiduciary Network;
- upgrade of the MLRO system for satellite and lunar laser ranging (SLR/LLR);
- development of a new VLBI antenna, compliant with the VGOS (VLBI Global Observing System) standard;
- purchase of a superconducting gravimeter, to support the absolute gravimeter, which has been in operation for several years at the Centre;
- development of a new SLR station (modular design, off-the-shelf components) aimed at routine satellite laser telemetry activities, to reduce the operating load of the MLRO system;
- upgrade of the SPADE observatory (SST) + operations;
- connection with the National Institute of Metrological Research (INRIM) for the distribution of sample optical fiber frequencies;
- adjustment of the MLRO systems for Secure Quantum Communication experiments;
- start of forecasting and monitoring activities related to the re-entry of satellites. Such activity may be funded by the Ministry of Foreign Affairs and International Cooperation (MAECI) as a support to the development of space surveillance and tracking (SST) infrastructures.

Furthermore, it is expected to continue the partnership with the INFN-LNF and the School of Aerospace Engineering of "Sapienza – University of Rome" (scientific support to the LARES2 satellite).

As regards remote sensing, the Centre acts as a national centre for the reception, storage and distribution of data related to national missions (COSMO-SkyMed, Cosmo Second Generation (CSG) and PRISMA) and third party missions regulated by international agreements, such as SAOCOM 1A (currently operating) and 1B. In this context, the range of missions that the Centre is preparing to serve will soon expand to include also Platino, Platino+ and SHALOM (starting from 2022).

Such activities are currently carried out through the I-CUGS (the ground segment of the CSK and CSG missions) and the Multimission National Centre (the user ground segment of the PRISMA mission).

Each of these systems is equipped with its own antenna, data processing centre and storage.

However, it is evident that such systems must be interconnected to allow the appropriate

operational synergies; for example, the integrated management of the antenna fleet would allow to reduce the downtime caused by failures or, even worse, by the interference between the acquisition of satellites which are simultaneously in view of Matera Space Centre. Such need will be even more evident with the arrival of the new above-mentioned missions. In this field, the Centre is in charge of the management of the MCO (Maintenance in Operational Condition) contract. Last, but not less important, is the modernization of plants, which will allow to face the obsolescences that arise due to the over ten-year operating life of the activities and the rapid evolution of technologies, among which we mention the transcription of stored data from media which are no longer available, the adjustment of antennas and software porting on next-generation computers. An agreement was recently signed between the ASI and the Municipality of Matera to carry out an intervention at the Centre, named "Park of the History of Man – City of Space". It will be an innovation and dissemination centre for educational activities related to the Centre of Space Geodesy, as part of "Matera – European Capital of Culture 2019". Furthermore, the Centre successfully submitted a project application for a co-financing, within the Basilicata Region's PO FESR program, aimed at improving the equipment for the reception of space geodesy data. The temporary installation of the FlyEye telescope is also scheduled at the Centre; every night, it will automatically observe the sky to detect the smallest and most unpredictable asteroids that might soon collide with Earth. Again with regard to the SSA/SST activities, technological evolution will allow, already in the next few years, to define new mission concepts that may favor the miniaturization of platforms and subsystems (micro and mini-satellites), aimed at studying planetary defense strategies against asteroids. *piccoli e imprevedibili a rischio di impatto imminente con la Terra. Sempre per quanto riguarda le attività di SSA/SST, l'evoluzione tecnologica permetterà, già nei prossimi anni, la definizione di nuovi concetti di missione che favoriscano la miniaturizzazione delle piattaforme e dei sottosistemi (micro e mini-satelliti) allo scopo di studiare strategie di difesa planetaria contro gli asteroidi.*





# The Sardinia Deep Space Antenna

A door to Space

## SPACE EXPLORATION PASSES THROUGH EARTH

SALVATORE  
VIVIANO

*Head of the URT-  
SDSA Research Unit*



Italy takes part in the most important robotic and human space missions, in the context of the international cooperation with the ESA, the NASA and other space agencies, and manages its own missions.

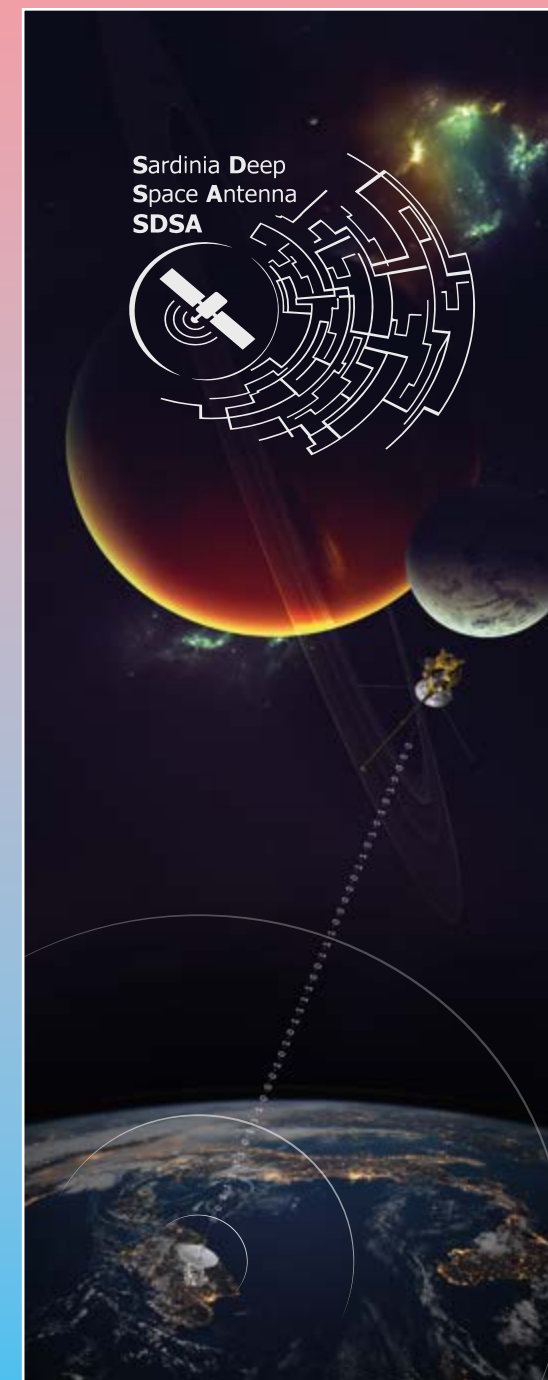
The value of a robotic space mission is linked to the images and scientific data collected by the spacecraft, which can be received on Earth thanks to sophisticated antennas, an essential support for remote observation and exploration of the Universe. Through these antennas, the position and speed of spacecrafts can be established to allow them to navigate and, through remote controls, prepare them to conduct the planned mission, seize the scientific opportunities that may arise and solve any potential malfunctioning.

Human exploration, starting from lunar exploration to Martian exploration, requires a strengthening and evolution of the communications with Earth, to cover the growing number of space missions, the amount of scientific data collected and ensure capacities also in emergency situations.



# SDSA: Distinctive Contribution to Space Exploration

In Sardinia, Italy has available the big SRT radio-telescope, equipped with a 64-meter antenna, manufactured by the National Institute for Astrophysics (INAF), in partnership with the ASI, Sardinia Region and Ministry of Education, University and Research (MIUR). The ASI is completing the adjustment of such research tool, used by the INAF to perform radio astronomy activities, and is preparing it to perform an additional task which is specific to space, by enhancing investments and its impressive antenna, a "Door to Space" from which we can communicate. It's the Sardinia Deep Space Antenna - SDSA, which was born in 2017 to provide navigation and communication services for interplanetary and lunar robotic and human exploration missions, and support ambitious scientific experiments. The SDSA is used for "distinctive", non-routine activities, and its capacities will be expanded to ensure the availability of a versatile station, characterized by a high performance which is essential for research, in full compliance with international standards.



The SDSA is capable of operating spacecrafts which may be even a billion miles away from Earth. It's a research tool in the field of telecommunications, with which core capacities for the evolution of robotic and human space exploration can be tested.

The SDSA allows to conduct ambitious scientific experiments, during which antennas and space vehicles constitute a single tool which can be used to measure, for example, planets' gravitational field, their internal composition and atmosphere, etc. and conduct fundamental physics experiments and measurements (such as general relativity tests)

The SDSA allows Italy to participate in the NASA's Deep Space Network and the ESA's ESTRACK which follow the main space missions, strengthening their partnership and taking advantage of the support provided

The SDSA is used for the ASI, NASA, ESA and other space agencies missions, for joint research activities with the INAF, University and scientific community, and offers several partnership opportunities at an international level.

**09.2017**

International debut: the SDSA follows the Cassini probe into Saturn system, during the key "The Grand Finale" stage, which ended with the probe's final dive into the planet.

**05.09.2018**

Signing of the NASA-ASI agreement on a partnership for the development and employment of the SDSA.

**09.29.2020**

Authorization to open an ASI branch in Sardinia, named "Sardinia Deep Space Antenna Research Center". Such branch hosts the ASI personnel in charge of space activities and favors the partnership with Universities, by welcoming students, PhD students and researchers and providing an adequate scientific and logistic support, the availability of the SDSA data, tools, computing capacity and use of its laboratory.

**2017**

The ASI prepares the SDSA equipment and operations to perform the first space activities.

**05.09.2018**

Opening of the Sardinia Deep Space Antenna.

**11.26.2018**

The SDSA participates in the InSight Lander's Enter, Descent and Landing stage on Mars' surface.





# Teamwork

ASI's investee companies

## THE FUTURE OF SPACE

MAURO  
PIERMARIA  
*Head of the  
Innovation & Space  
Economy Unit*



The ASI holds participating interests to pursue its institutional purposes. Such participating interests are periodically reviewed to assess their relevance and economic-financial sustainability, in compliance with the current regulations on this matter.

The ASI holds full control of the CIRA (Italian Aerospace Research Centre) S.C.p.A and non-controlling interests in ALTEC S.p.A, SpaceLab (previously ELV S.p.A) and e-GEOS S.p.A. Furthermore, the ASI is a co-founding partner of a participatory foundation, named "E. Araldi Foundation".

During its history, as part of the management activities of its participating interests, which provide also for their rationalization as needed, the Agency took steps to divest its direct shareholding in ASITEL S.p.A and in the GEOSAT Molise Consortium, as it was no longer deemed in line with the Agency's strategic interests.

The ASI is constantly monitoring its participating interests, to ensure the adequacy of the related strategic plans, economic results and employment levels, as well as to guarantee the compliance with the current regulations on this matter and the guidelines of its political organs, and acts promptly by taking the most appropriate measures, as needed.



# Data in a nutshell

**CIRA S.c.p.A.:** is in charge of implementing the national Aerospace Research Program. The ASI holds full control of the CIRA and owns 47.18% of the share capital. The 2019 financial statement closed with a profit of nearly 5.2 M€ and a 15% increase in the total production value vs 2018.

**e-GEOS S.p.A.:** established in 2000 by the ASI to develop the commercial applications and services in the field of Earth observation, it's the entity which manages the utilization activity of the COSMO-SkyMed satellite constellation. The ASI owns 20% of the share capital, whereas Telespazio owns the remaining 80%. e-G EOS S.p.A closed 2019 with a profit of 10.5 M€ and revenues of nearly 68.6 M€, with a 23% increase vs 2018. The overall profit generated by the company in the last three years amounts to nearly 27 M€.

**Altec S.p.A.:** the ASI has a 36.25% interest in ALTEC, which today is a Space Company specialized in providing engineering and logistic services to support the operation and use of the International Space Station and the development and undertaking of current and future planetary exploration missions. The financial statement closed on December 31st, 2019, showed a net profit of 261.000 €.

**Spacelab S.p.A.:** SpaceLab S.p.A., involved in research and development activities for new technologies and testing infrastructures in the field of space transportation, was born from ELV S.p.A, following a complex and profitable extraordinary sale transaction of a branch of the company. The ASI owns 30% of its share capital. The 2019 financial statement of the new and smallest company closed with a net profit of 74.000 €.

**Fondazione E. Amaldi:** established in 2017 by the Italian Space Agency and the Hypatia Research Consortium, it works to promote and support scientific research aimed at non-profit technological transfer. It's also in charge of advisory and scouting activities for the "Primo Space" venture capital fund.

## THE ASI NETWORK COMPANIES AND FOUNDATIONS



CIRA (Italian Aerospace Research Centre) Consortium S.C.p.A.  
Located in Capua.  
Compound Annual Growth Rate (CAGR) in the last 5 years: +1.5% per year



e-Geos S.p.A.  
Located in Rome and Matera.  
Compound Annual Growth Rate (CAGR) in the last 5 years: +6.8% per year



Aerospace Logistics Technology Engineering Company S.p.A.  
Located in Turin.  
Compound Annual Growth Rate in the last 5 years: +9.1% per year



SpaceLab S.p.A.  
Located in Rome.  
It was born in 2018, following a complex sale transaction of a branch of the company.



E. Amaldi Foundation  
Located in Rome.  
It doubled its revenues (x2) from 2017 (year of foundation) to 2019.



### IN FIGURES



**TOTAL 5-YEAR  
COMPOUND  
ANNUAL GROWTH  
RATE (CAGR) OF  
THE 5 INVESTEE  
COMPANIES**

**OVERALL  
TURNOVER OF  
THE 5 INVESTEE  
COMPANIES IN  
2019**

**5  
companies**

in which the  
ASI holds  
a direct  
shareholding.

who worked  
for the five  
direct investee  
companies in  
2019.

**711  
employees**

**15.7  
million euros**

The overall  
profit  
generated by  
the five investee  
companies in  
2019.

#### 2016

**Liquidation of ASITEL S.p.A. and withdrawal from the GEOSAT Molise Consortium**  
Start of the liquidation process of ASITEL, a company operating in the field of satellite telecommunications, and withdrawal from the GEOSAT Consortium, with a view to an efficient rationalization of its participating interests.

#### 2015

**Redefinition of ALTEC company structure**  
Thales Alenia Space Italia S.p.A. now owns 63.75% of the share capital, whereas the Italian Space Agency now owns the remaining 36.25% of the share capital.

#### 2017

**Establishment of the E. Amaldi Foundation**  
Participatory foundation, in charge of promoting and supporting scientific research aimed at technological transfer.

#### 2018

**Establishment of SpaceLab S.p.A.**  
The Spacelab S.p.A. company was born following an extraordinary sale transaction of a branch of the ELV S.p.A. company to AVIO S.p.A.

#### 2017

**The Legislative Decree 175/2016 (TUSP) and the review of participating interests**  
With the entry into force of the TUSP (Consolidated Law on publicly owned companies), the ASI carries out on an annual basis the required analysis and review of its shareholding system.

#### 2020

**Approval of CIRA S.c.p.A's new PRORA**  
Prora (National Aerospace Research Program), launched and funded by the Ministry of Education, University and Research (MIUR) with a contribution of 113 million euros.

#### 2020

**Approval of SpaceLab S.p.A's new three-year strategic plan**  
The ASI and AVIO S.p.A jointly defined the new three-year strategic plan of the newborn Spacelab S.p.A.





# Communicating space

Storytelling, social and new media

## 2020: A YEAR OF TRANSFORMATION

FABRIZIO  
ZUCCHINI  
*Deputy Head  
of the External  
Relations and  
Public Relations Unit*



2020 was a complicated year for communication activities. Events, dissemination activities and press conferences underwent a radical transformation due to the new rules imposed by the pandemic. However, the External Relations and Public Relations Unit managed to develop new methods to communicate and disseminate the aerospace culture to the general public, creating new projects and continuing the activities that had received an excellent feedback.

Along with its usual institutional and media communication activities, the ASI decided to pursue a different strategy aimed at expanding the audience of experts or those interested in the space sector, both at a national and international level, through the language of the different forms of art, as part of what was rightly defined as a new scientific humanism and, specifically, a new space humanism.

At the same time, the ASI revamped the image of its own brand by creating a new logo and, along with it, by launching the merchandising of the Italian Space Agency. All this was accompanied by the choice to optimize the potential of the web, making the information related to institutional activities and space astrophysics



directly available to citizens, through the institutional website, the Global Science website and newspaper and ASI TV.

As part of this strategic choice, the ASI produced and/or supported exhibitions, documentaries, theatre and music events, editorial products and comics among which we mention "The Space told by Mickey Mouse", a collection of 8 stories on space and "Nathan Never: mission to the Moon", a graphic novel born from a partnership between the ASI and Bonelli. The ASI also organized virtual events of cultural, scientific and participative characters, as well as institutional thematic workshops and webinars of scientific and technological-practical character.

Two institutional short films were shot, and the "Italian Space Industry Catalogue" was published in partnership with the Ministry of Foreign Affairs and International Cooperation (MAECI), to represent the Italian space system at our embassies abroad.

In partnership with De Agostini, the ASI created the TV show for kids Rudy on Mars, a project that involves the production of a sketch-comedy made up of 15 episodes; each episode lasts about 3 minutes and can be watched for free on the ASI/ASITV website.

The background theme of the episodes is the human colonization of Mars and the age of the target audience is 6-9 years old. The concept is designed to draw the attention of young people on space conquests and, in particular, adaptation conditions on other planets, particularly on Mars, destination of the current scientific conquests.

The ASI organized a few successful online events on the topic of space, along with the embassy of the United

States in Italy and participated, along with other research bodies, in the project promoted by the INDIRE (National Institute for Documentation, Innovation and Educational Research) to make some video contents related to the different scientific disciplines available to schools and students during the lockdown period. In a difficult year for press communication activities, we still managed to obtain positive results by expanding the use of digital channels to keep media connected with our top management and transmit the information on the activities of the new programs through webinars, short information videos and online press conferences, as well as the rare in-presence events allowed during these months of pandemic.

Among them is the event for the presentation of the Italian Day of Research and the ASI website dedicated to such event, a showcase on the future aimed at creating a community of excellences from all over the world, which focuses on space research.

A traditional communication channel, such as press release, was also used even more frequently, with a significant increase in the number of communications issued. Following the reorganization of the Directorate for Communication (November 2020), we report below the data related to the users of ASI TV, which recorded an increase in the gross number of visitors, switching from 5.696 in October 2020 to 16.637 in December 2020.

The Education Office was established within the Directorate for Communication: it's in charge of initiatives, programs and events for students and teachers from schools of all levels, aimed at promoting the role of the ASI, encouraging the study of STEM subjects and the creation of

synergies between schools and scientific research. Furthermore, it works with the ESA in the ESERO Italia program, in the organization of School Days and in the management of educational activities on the occasion of Italian astronauts' missions aboard the ISS.

The Direction paid special attention to the dissemination of the ASI activities to non-specialized users; to this aim, every year we organize in-house events such as the European Night of Researchers, targeted at people of all ages and families, the Open Day, which sees the ASI opening its doors for a weekend and guiding group of visitors through its premises, with experts who describe both the architectonic part and the scientific part of the charming headquarters, and weekday visits to the ASI by students from schools of all levels and private citizens.

In 2020, to overcome the impossibility of organizing in-presence events, both the European Night of Researchers and the Open Day were broadcast online, the first one with a virtual tour of the headquarters and the second one, in partnership with the ESA, with live connection with schools and an afternoon dissemination event on different topics.

Finally, since the ASI is a public administration body, it follows the laws laid down by the rules on transparency through several activities. Among the activities which come within the remit of this Direction, we find the activities of the Public Relations Office, which are performed by receiving the requests for access to documents submitted by citizens for various reasons.

Furthermore, such office is in charge of sending such requests to the relevant units and offices and promptly starting the body's response process to citizens.

## Website:

over 500.000 users

## ASI TV:

over 16.000 visitors

## ASI press review:

over 5.000 news

## Press releases:

51

## Facebook target:

60.500 users

## Twitter target:

160.000 users

## Instagram target:

44.000 users

## Night of researchers:

over 8.000 participants

## Virtual events:

over 20.000 spectators

## Global Science:

over 1.597.166 users







[www.asi.it](http://www.asi.it)