



RÉPUBLIQUE
FRANÇAISE

*Liberté
Égalité
Fraternité*



**ANNUAL
REPORT**

2023

About this report

CNES's annual report features elements of our corporate social responsibility (CSR) strategy. It was coordinated by the Communication Directorate, supported by editorial correspondents at the agency's other directorates and Sustainable Development Office. The members of the Executive Committee also helped to produce the report, which was validated under the authority of the Deputy CEO, Chief Operating Officer and Chairman & CEO. We hope this report provides some insights into what CNES does and shows how we are benefiting and committed to society at large, the environment, citizens and our agency's people.

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CNES Chairmain & CEO

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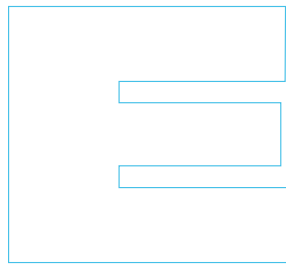
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"I'M INCREASINGLY PROUD EVERY DAY TO BE PART OF THIS AGENCY"

PHILIPPE BAPTISTE

CNES Chairman & CEO



At the end of last year, spacefaring Europe took key decisions together in Seville. What are France's space ambitions in this evolving European landscape?

P.B. The concrete decisions reached at the Seville Summit tie in with France's ambition to energize the space sector's efforts in support of climate science, play our full role in space exploration and sustain our strategic independence, notably in access to space with Ariane 6. While the summit was the scene for intense negotiations, resolutions were eventually approved unanimously, which shows that Europe is capable of uniting on these big issues.

While work to modernize the Guiana Space Centre continues, 2023 was marked by the final flight of Ariane 5 and above all preparations paving the way for the first flight of Ariane 6, scheduled this summer, and future space transportation systems. At this pivotal moment, what message do you have for the future?

P.B. We're currently experiencing an unprecedented crisis in space launch that requires us first and foremost to successfully ramp up Ariane 6 and restore our independent access to space. We'll also need to learn the lessons of this crisis to make our systems more resilient and accelerate the launcher sector's transition to a more competitive model.

With the launches of NÉSS and Syracuse 4B, and the AsterX exercise with Space Command, CNES is working to ramp up the nation's military space capabilities. How are the agency's missions going to evolve in this area?

P.B. Space has never been more dual-use than it is today. Security and defence issues are fundamental and I'm sticking fully to CNES's strategy in this domain, which has always favoured dual use. We've forged close ties with Space Command and the defence procurement agency DGA, notably through tight steering committees. Our activities in this area are evolving, as besides our traditional eavesdropping, surveillance and communication missions, we're now working to protect our space assets, which are crucial in an increasingly adversarial international context. And we must continue investing in ground cybersecurity.

Thanks to CNES, France is one of the first nations to have enacted legislation governing space operations, with the French Space Operations Act (FSOA). After amending it in 2023 in response to growing numbers of objects in orbit, do you think the FSOA can and must serve as a blueprint for an international space regulation?

P.B. Yes, I do believe that when it was enacted in 2008 the FSOA was ahead of other national and international regulations, and I'm glad to see it has since been implemented in exemplary fashion. However, the stakes are such that the issues must be addressed at supranational level. A draft European space law was thus initiated at the Brussels Summit to define a regulatory framework enabling European stakeholders to boost innovation and

competitiveness, while working to make space more sustainable. So the ambition is there and this new law should consolidate our European legal framework.

The launches of the fantastic JUICE and Euclid space exploration missions were among the highlights of 2023, both the result of close cooperation with our scientific partners. With robotic exploration now yielding unprecedented data about our universe, how can CNES further Europe's desire to be a prime player in crewed space exploration?

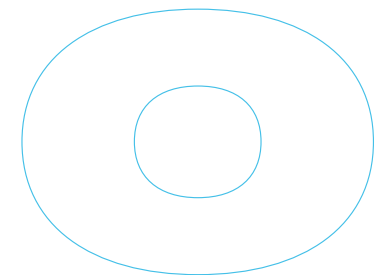
P.B. First of all, I'd like to congratulate Sophie Adenot on being selected for her first mission to the ISS in 2026. On the question of crewed exploration, we've made progress with the decision to buy European capacity to ferry cargo to and from the ISS, but we must admit there isn't a consensus on an independent human spaceflight capability. While many European nations have grasped the importance of this issue, others believe it isn't the number one priority. I believe that astronauts have a key role, particularly to raise public awareness of the fragility of our planet. Moreover, the current system has reached the end of the road. The United States has made clear its intention to replace the ISS with private space stations, which implies that in the future we'll have to pay top dollar to get our astronauts into space. That's why we must advance this debate in Europe and I hope we'll have the opportunity in the years ahead to get positions to change.

The Ministry for the Economy, Finance and Industrial & Digital Sovereignty recently mandated our agency to lead the decarbonization of France's space sector. What does this mission entail for CNES?

P.B. First of all, we have our own responsibility to accomplish this particularly important mission. Before decarbonizing the rest of the sector, we must prove ambitious in reducing our own carbon footprint. After that, the onus is on us to concert with all of the sector's stakeholders to outline a roadmap to be submitted to government.

A final word?

P.B. After three years with CNES, I'm increasingly proud every day to be part of this agency, to be working with incredibly talented people who are passionate about what they do and have a deep sense of civic duty. I'd also like to underline our high level of international cooperation, making us a go-to partner for the likes of NASA, JAXA and ISRO, for example, which for me is clear proof of CNES's excellence.





STRATEGY

FURTHERING FRANCE'S SPACE AMBITIONS

In line with the agency's Objectives and Performance Contract (OPC), CNES's role is to execute the national space policy to address strategic, geopolitical, environmental, economic and scientific stakes.

In 2023, we continued to support the national space ecosystem and extend our reach in Europe and around the world. To this end, we are adapting how we work to deep transformations in the space environment and nurturing new initiatives to serve citizens and society.

In this context, the renewed faith of our overseeing ministries and an increased budget afford us the ability to serve France's ambitions.

CNES'S VALUE CREATION MODEL

CNES INTENDS TO WORK PERSISTENTLY TO SERVE SOVEREIGNTY, COMPETITIVENESS, CLIMATE AND SCIENCE.

OUR MISSION

CNES IS THE GOVERNMENT AGENCY AND FIELD CENTRE THAT SHAPES AND EXECUTES FRANCE'S SPACE POLICY, WORKING FOR THE FUTURE AND FOSTERING THE SPACE ECOSYSTEM.

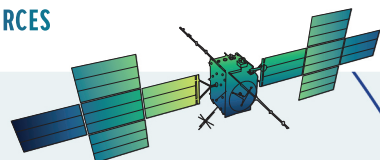


HUMAN RESOURCES

- **2,351** Employees, 39% women, working at 4 centres
- **5%** of payroll devoted to training
- **87%** Engineers and executives



RESOURCES



FINANCIAL, INTELLECTUAL & TECHNICAL RESOURCES

- **€2,370.5m** in subsidies and income
- **€427m** for innovation
- Dynamic subsidiaries and shareholdings policy
- **441** Doctoral and post-doctoral researchers
- **1** Space economy observatory
- **2** Field centres for orbital systems, space infrastructures and launch systems
- **1** Launch base, Europe's spaceport



STAKEHOLDERS

- Government, ministries (Economy, Finance & Industrial & Digital Sovereignty, Higher Education, Research & Innovation, Armed Forces)
- Space user communities - Industry partners
- Local and regional authorities
- ESA, European Union, international space agencies



SOCIAL & ENVIRONMENTAL RESOURCES

- **Space missions** for the environment, science and the military
- **Policies** to sustain industry, new space ecosystem players and jobs, to support the scientific community, develop the space ecosystem and foster international cooperation
- **Structures** to assure safety of space operations and aid military space strategy
- **Commitments** to reducing the carbon footprint of facilities and space projects
- **Commitments** to preserving the environment and biodiversity at facilities

STRATEGIC FOCUSES

- STRATEGIC INDEPENDENCE
- ECONOMIC DEVELOPMENT
- SUSTAINABLE DEVELOPMENT
- SCIENTIFIC & TECHNICAL EXCELLENCE

RESULTS



FOR STAKEHOLDERS

- **10** Data access hubs/infrastructures
- **3** Launches from Kourou in 2023
- **34** Space missions in development
- **14** VIP priority innovation vectors in development
- **346** Innovation proposals funded
- **866** Scientific research proposals
- **152** New entrants supported (start-ups, SMEs, mid-tier firms and large primes)
- **19** Agreements with authorities or organizations outside the space ecosystem
- **115** International cooperation agreements



FOR SOCIETY & THE ENVIRONMENT

- **63** Activations of International Charter Space & Major Disasters
- **47** Space agencies/organizations signed up to the Space for Climate Observatory (SCO)
- **61** SCO France accredited projects
- **658,000** Beneficiaries of educational actions
- **2,000** teachers trained
- **13** Biodiversity goals (Act4Nature)
- **2,184** species of flora and fauna recorded at Guiana Space Centre
- **17** Sustainable Development Goals (Agenda 2030)



FOR EMPLOYEES

- Policy emphasizing work/life balance and well-being at work
- **90/100** Gender equality score
- **55,426** Hours devoted to training

CNES HAS 4 FIELD CENTRES



Paris Les Halles



Paris Daumesnil



Toulouse



French Guiana

GOVERNANCE



PIERRE FOND
Chief Accountant



PAULINE PANNIER
Deputy CEO, Secretary General



PHILIPPE BAPTISTE
Chairman & CEO



LIONEL SUCHET
Chief Operating Officer



PHILIPPE STEININGER
Military Adviser to the Chairman & CEO



PIERRE TRÉFOURÉ
Chairman & CEO's Chief of Staff



JEAN-MARC ASTORG
Strategy



BERNARD CHEMOUL
Inspector General & Director of Quality



MARIE-ANNE CLAIR
Technology & Digital



CAROLINE LAURENT
Orbital Systems & Applications



CARINE LEVEAU
Space Transportation



PHILIPPE LIER
Guiana Space Centre



LAURENCE MONNOYER-SMITH
Sustainable Development Office



CHRISTOPHE VENET
Europe & International



JEAN AUSSAGUEL
Accounting*



GÉRALD DUPRÉ
Procurement & Sales



NICOLAS HENGY
Finance



THIERRY LEVOIR
Central Industrial Security & Safety



MARIE-CLAUDE SALOMÉ
Communication



LILIANE SEBAS
Human Resources

BOARD OF DIRECTORS

(AT 5 JULY 2024)

- + Mr Philippe Baptiste
CNES Chairman & CEO
- + Mrs Héléne Ben Aim Drieux
Employee representative for CFE-CGC
- + Mrs Corinne Borel
Ministry for Higher Education and Research
- + Mr Emmanuel Chiva
French defence procurement agency (DGA)
- + Mr Jonathan Collas
Representing the Prime Minister's Office

- + Mrs Evelyne Cortiade - Marche
Employee representative for CFDT
- + Mr Thomas Courbe
Government Commissioner - Director General for Enterprise
- + Mrs Françoise Delcelier - Douchin
Employee representative for CGT-UTG
- + Mr Daniel Galarreta
Employee representative for CFTC
- + Mr Benoist Grossmann
Senior Managing Partner Venture et Venture Digital – Eurazeo Global Investor SAS

- + Mr David Izzo
Ministry for Europe and Foreign Affairs
- + Mrs Sylvie Jousaume
IPSL
- + Mr Vincent Leudiere
Employee representative for CFDT
- + Mrs Étodie Morival
Ministry of the Economy, Finance and Industrial and Digital Sovereignty
- + Mr Jean-Philippe Murat
Employee representative for CGT-UTG

- + Mrs Amandine Reix
Ministry of the Economy, Finance and Industrial and Digital Sovereignty
- + Mr Bruno Sainjon
Chairman & CEO of ONERA
- + Mrs Alicia Saoudi
Ministry of the Economy, Finance and Industrial and Digital Sovereignty
- + Mrs Florence Verzelen
Executive Vice-President, Dassault Systèmes

*Reporting to State Controller

AUDIT COMMITTEE

- + Mr Benoist Grossmann
(Chair)
- + Mrs Amandine Reix
- + Mrs Alicia Saoudi
- + Mrs Florence Verzelen

Sophie Legrand, State Controller, and Pierre Fond, Chief Accountant and Administrator General of Public Finances, also take part in planning meetings with the agency's overseeing ministries and in Audit Committee meetings.



[PARTNERSHIPS]

SUSTAINING OUR INTERNATIONAL REACH

CNES is a pivotal player in space cooperation, pursuing bilateral and multilateral partnerships with 50 countries and international organizations. Our collaborations aim to serve the agency's programmes, further France's foreign policy and nurture the French space ecosystem.

The agency's international partnerships fall into three categories:

- **European partnerships** with the European Union (EU), European Space Agency (ESA) and bilateral partners, through which we intend to remain a prime player.
- **Historic and foundational partnerships** with leading space powers, in particular the United States, Japan and India, central to projecting CNES's international reach.
- **Partnerships with other space powers** like the United Arab Emirates, South Korea, Singapore and Brazil, whose ambition is to transform their societies and economies through space, offering CNES opportunities to support French industry and engage actions to serve France's diplomatic efforts.

2023 proved a particularly prolific year for CNES on the European and international front.

In Europe, our technical expertise and strategic and political insights were sought after to help lay the groundwork for and organize several key events for space:

- **The adoption of two key texts for the EU space programme:** the regulation for a secure connectivity constellation (IRIS²) and the communication on the EU Space Strategy for Security and Defence.

- **The ESA-EU summit in Seville in November**, where ministers in charge of space gave their political backing to three priority issues: combating climate change, space exploration and launchers.

Outside Europe, numerous cooperation agreements were signed with our strategic partners in space exploration (MMX rover with Japan and Germany), universe science (Roman Space Telescope with the United States) and Earth observation and climate science (Trishna with India and C³IEL with Israel).

Space cooperation was a key tool of diplomacy in a number of intergovernmental dialogues pursued in 2023 (first Space Dialogue with India, the United Arab Emirates and Japan). CNES also lent its support to French players operating in export markets, notably backing up major bilateral events with communication efforts focused on industrial and commercial relations (in the United States, Japan, India and Singapore).

+ FRANCE AND INDIA STEP UP STRATEGIC PARTNERSHIP

In 2023, French-Indian cooperation was in the spotlight with the state visit of India's Prime Minister for the national 14 July celebrations.

The visit lent a new dimension to this historic partnership and several agreements were signed, encompassing the operation of a joint satellite-based maritime surveillance system, construction of the French-Indian Trishna satellite and tracking of French-Indian satellites by CNES's COSE operational space surveillance centre.

The first Strategic Space Dialogue meeting between France and India also took place in 2023, bringing new prospects for cooperation between the two nations' ecosystems, notably confirming their partnership in the field of crewed spaceflight.

+ **13**
cooperation agreements signed in 2023.

+ **90%**
of space missions conducted today by France are with European or international partners.

[SEVILLE SPACE SUMMIT] FRANCE DRIVING SPACEFARING EUROPE'S TRANSFORMATION

On 6 and 7 November 2023 in Seville, ESA's 22 member states reached foundational decisions for Europe's space programme in the three key areas of climate science, space exploration and launchers.

At this summit, member states reaffirmed their commitment to making Earth observation for climate science a priority for future investment and unleashing the full potential of satellites to aid regional resilience.

Europe also affirmed its ambitions in space exploration. Echoing President Emmanuel Macron's call for greater European independence in this domain, ESA issued a request for proposals to supply a service capable of ferrying cargo to the ISS by 2028. In soliciting competitive bids from innovative European firms, spacefaring Europe is adopting a completely new procurement approach aimed at spawning industry leaders to build the future of space exploration.

Europe reached a key agreement to assure the future of launchers, vital to sustaining its independent access to space. This agreement provides for public funding to ensure stabilized operation of Ariane 6 and Vega-C. And to develop the most competitive launchers in the years ahead, ESA is going to organize a competitive challenge between private European players with €150 million on offer for each. Lastly, Avio, the Italian manufacturer of Vega-C, will now be in charge of commercial operation of the launcher in place of Arianespace.



[FINANCIAL]

CNES A KEY CONTRIBUTOR IN A CONSOLIDATED SPACE BUDGET

Independent access to space, diversification of Europe's family of launchers, strengthened military space capabilities and climate science are all receiving significant funding, confirming the priority that government is giving to space.

Funding from the France 2030 investment plan and the research spending plan continued to support the agency's budget planning in 2023

The 2023 fiscal year, the second of CNES's new Objectives and Performance Contract (OPC), was marked by the ramp-up in funding from the research spending plan (LPR).

The space strand of the France 2030 plan saw a surge in activity, with seven decisions by the Prime Minister at the end of the year confirming the requests for proposals issued end 2022-early 2023. These mainly concerned:

- Six projects to procure hydrology demonstration services for managing water quality and resources

- Five projects for space surveillance and tracking services constituting an emerging market in response to growing demand from public and private users
- Three projects to develop an innovative commercial optimized positioning service for small satellites in low Earth (LEO) and geostationary (GEO) orbits
- A project to refurbish ground infrastructures at the ELM Diamant multi-launcher complex at the Guiana Space Centre (CSG). To stay competitive in the emerging market for European spaceports targeting the micro- and mini-launcher segment, this project aims to boost business for the CSG and its ecosystem and to fuel the development of a French offering
- A project to enable rapid acquisition of vital information on maritime regions of interest via a satellite constellation

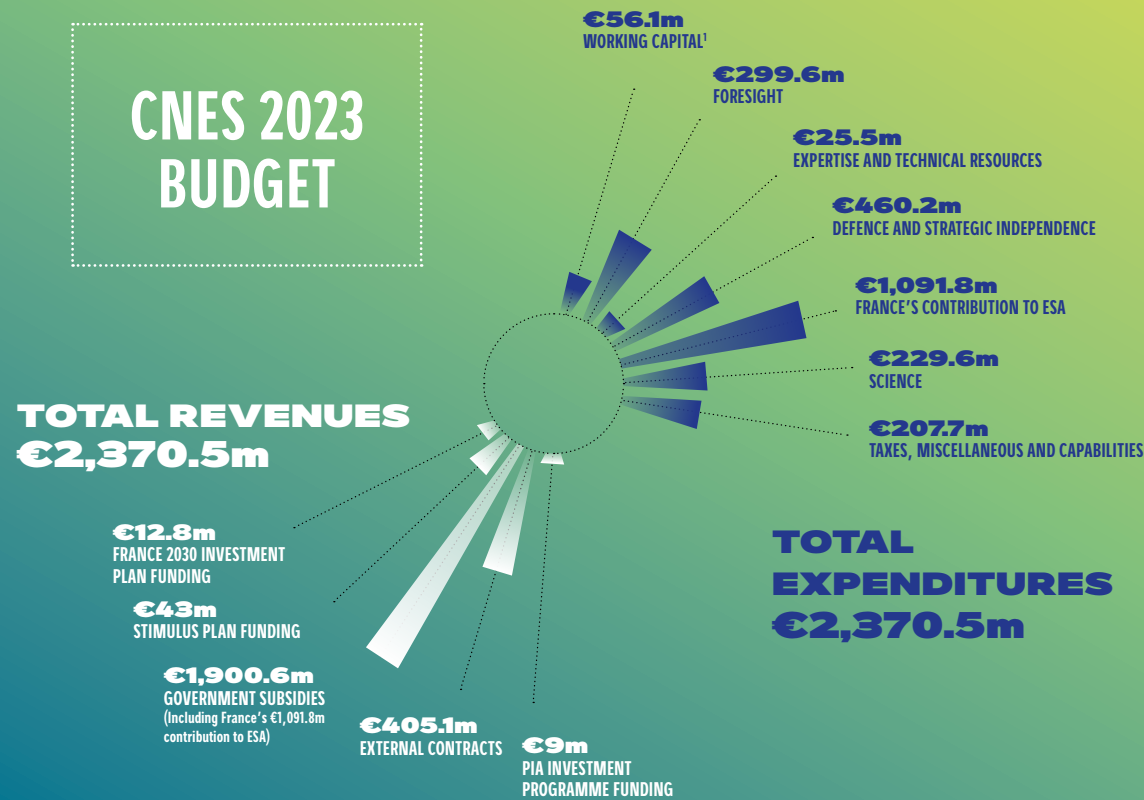
2024 will see a gradual build-up of France 2030 projects, with eight requests for proposals underway and ten more in the pipeline.

+ CNES BUDGET AND 2022 ESA MINISTERIAL CONFERENCE

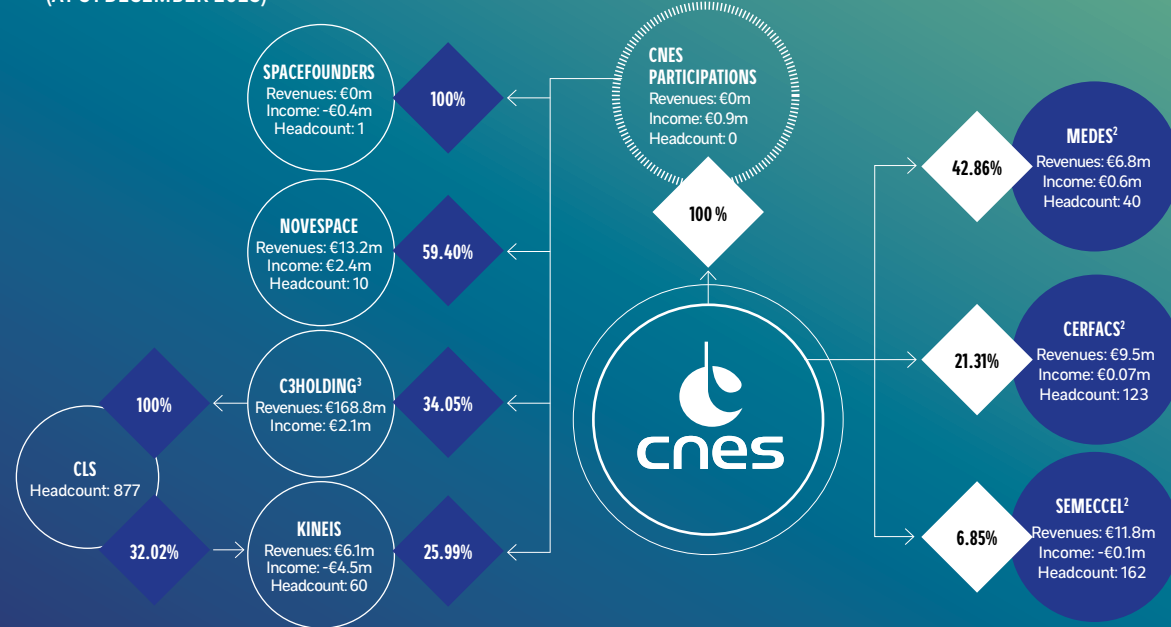
Fiscal year 2023 was marked by the first financial impacts for CNES of decisions reached at the November 2022 ESA Ministerial Conference, notably the kick-off of the Atmosphere Observing System (AOS), high-thrust engine and reusable first-stage technology demonstration projects.

FINANCIAL AUDIT

- + The Cour des Comptes, France's financial watchdog, controlled the agency's accounts and management processes in 2022 (for the 2018-2021 period). In its final report communicated in 2023, it underlined the quality of CNES's financial management.



MAIN SUBSIDIARIES AND HOLDINGS (AT 31 DECEMBER 2023)



1. Funding from the 2022 ESA ministerial summit (included in the 2023 budget) constitutes the main surplus for 2023, which translates into a working capital of €56.1m.
 2. Provisional annual accounts.
 3. IFRS consolidated figures.

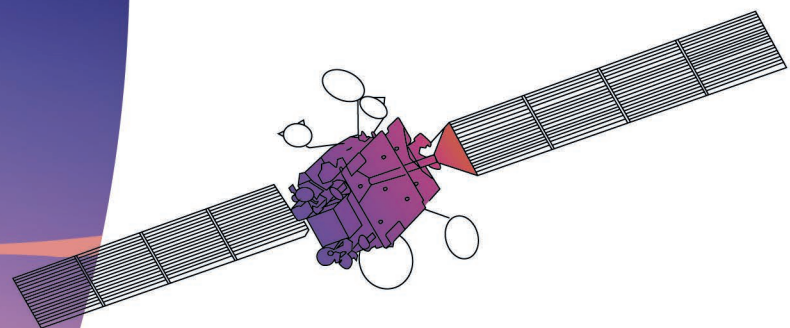
SPACE STIMULUS AND ENERGY REFRUBISHMENT PLAN

In May 2021, under the France Innovation strand of the space stimulus plan, CNES was appropriated a budget of €200 million to be rapidly implemented. Since end August 2022, all projects are underway, with 95 contracts awarded (worth €199.95m) for 84 projects to 118 awardees. At end 2023, more than €118m had been paid to CNES's partners.

Two projects were selected under the Ecology strand of the plan and allocated a budget of €9.9 million: the first for the refurbishment of the Ampère building at the Toulouse Space Centre and the second to a first solar field at the Guiana Space Centre (see page 53).



+ CNES and its European partners' number one goal is to launch Ariane 6 in 2024 and ensure its commercial success in a fiercely competitive market.



SOVEREIGNTY

ASSURING ACCESS TO SPACE, NOW AND IN THE FUTURE

With satellite-based services today essential to our daily lives and space becoming increasingly adversarial, CNES is contributing to:

- Europe's independent access to space through its spaceport in Kourou
- Strengthened military space capabilities, in accordance with the military space strategy adopted in 2019
- Implementation of the French Space Operations Act (FSOA) governing ground and space operations
- Space surveillance and tracking

OUR COMMITMENTS



PROMOTING SUSTAINABLE AND PROTECTIVE SPACE



REDUCING OUR ENVIRONMENTAL FOOTPRINT



CREATING SHARED VALUE THROUGH SPACE

CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



+ **SPACE TRANSPORTATION**
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+ **DEFENCE**
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+ **MANAGING SPACE TRAFFIC**
P. 24



**[ARIANE 6]
ALL GOOD
TO GO**

For the Ariane 6 programme, 2023 was the year of combined testing under CNES’s supervision to put the ELA-4 launch infrastructures and launcher through their paces, using a mock-up of Ariane 6 with four inert boosters and wired up with 850 sensors. Teams in French Guiana worked all out to run procedures rigorously, efficiently and with success.

A series of major tests were performed to verify the launcher’s electrical systems and power up its avionics for the first time, followed by software validation on the control station that handles the launch countdown up to T minus 13 seconds. After the successful filling—and then draining—of the liquid oxygen and hydrogen tanks, the Vulcain 2 engine was fired for 12 seconds, day and night, before running for a full seven minutes to simulate a complete mission for the first stage of the launcher. Lastly, on 15 December teams successfully ran through a final countdown covering degraded scenarios.

These tests qualified the ELA-4 launch complex, including the telemetry, radar tracking and range safety systems that CNES provides for all launchers operating from the Guiana Space Centre, which were called into action on each test countdown.

+ 5 combined test countdowns in less than six months, including three firings of the Vulcain 2 engine.

**SPACE
TRANSPORTA-
TION**

Ariane 5 has left the stage and spacefaring Europe is readying to launch its successor Ariane 6. All hands are on deck, particularly in French Guiana, while other CNES teams have their sights on the next generations of launchers.

**CNES COMPETENCIES
SERVING ARIANE 6**

As the conceptor of all the launch infrastructures at the Guiana Space Centre, CNES is the architect of ELA-4 in charge of combined testing. All of the agency’s teams—in Paris for system aspects, in Toulouse for hardware, and in Kourou for site acceptance and operations—had a hand in the successful completion of these tests.

Test conductor for Ariane 6 combined tests at CNES, Olivier Ryckebosch led an integrated project team of 150 to 200 people from the agency and ArianeGroup, the launcher’s future operator.



Olivier Ryckebosch

These tests lay the foundations and provide reassurance in terms of the maturity of the systems, launcher and process, and of course our teams! They’ve made us even more determined to launch Ariane 6 and see it successfully fly its first mission!



**+ [TOMORROW’S LAUNCHERS]
POWERFUL,
REUSABLE
AND LOW COST**

In a shifting space landscape, CNES is leading efforts to ready future space transportation systems and their associated technologies, working in particular with ArianeGroup and ESA to develop future generations of European engines for the 2030 timeframe. On Thursday 22 June 2023, the first full firing of the Prometheus engine was conducted on the Themis-1G test rig in Vernon, developed within a year thanks to the government’s France Relance economic stimulus plan. Burning oxygen and methane—cheaper and better adapted to reusable engines—rather than the usual oxygen/hydrogen combination, Prometheus will be throttleable and reusable five times. Now that this firing campaign has validated the concept and development choices for the next variant, tests will continue under ESA. At the same time, we are working on a high-thrust—2,500 kN, roughly twice the thrust of Vulcain and Prometheus—staged combustion engine designed for high-performance space exploration missions, with a range of manufacturers developing such engines and their component parts.



A MODERN AND GREENER SPACE CENTRE

Europe's spaceport at the Guiana Space Centre (CSG) is modernizing to stay competitive and meet ambitious environmental requirements. Earthworks for the new Operations Centre (CDO), given the go-ahead by CNES's Board of Directors in July 2023, are now underway for the CSG-NG programme. This fully reconfigurable digital CDO will enable quick turn-arounds between launches for different operators. With this in mind, CNES is refurbishing the legacy Diamant facilities to provide a new launch complex for micro- and mini-launchers. Work is underway to put in place the high-voltage grid designed to secure supply to the launch base and distribute green electricity generated by new renewable energy projects, including its first two solar farms. The agency is also supporting the HYGUANE project to generate hydrogen gas for launchers and help foster green mobility solutions in French Guiana.



LAUNCHER OPERATIONS GOVERNED BY FSOA

In France, the French Space Operations Act (FSOA) governs orbital systems (see page 24) and launchers. Mandated for each launch campaign in French Guiana to check all technical incidents likely to affect the safety of people, property or the environment, CNES's Launchers FSOA team is also working to a hectic schedule. For example, Ariane 5's final flight was

subjected to close scrutiny to detect any signs of hardware reaching life limits on the last production model. Another of the team's missions is to ensure compliance of the Vega launcher in readiness for its return to flight before the end of 2024. Lastly, it is tasked with verifying Ariane 6's qualification files, since the launcher must comply with the FSOA before getting the green light to fly.

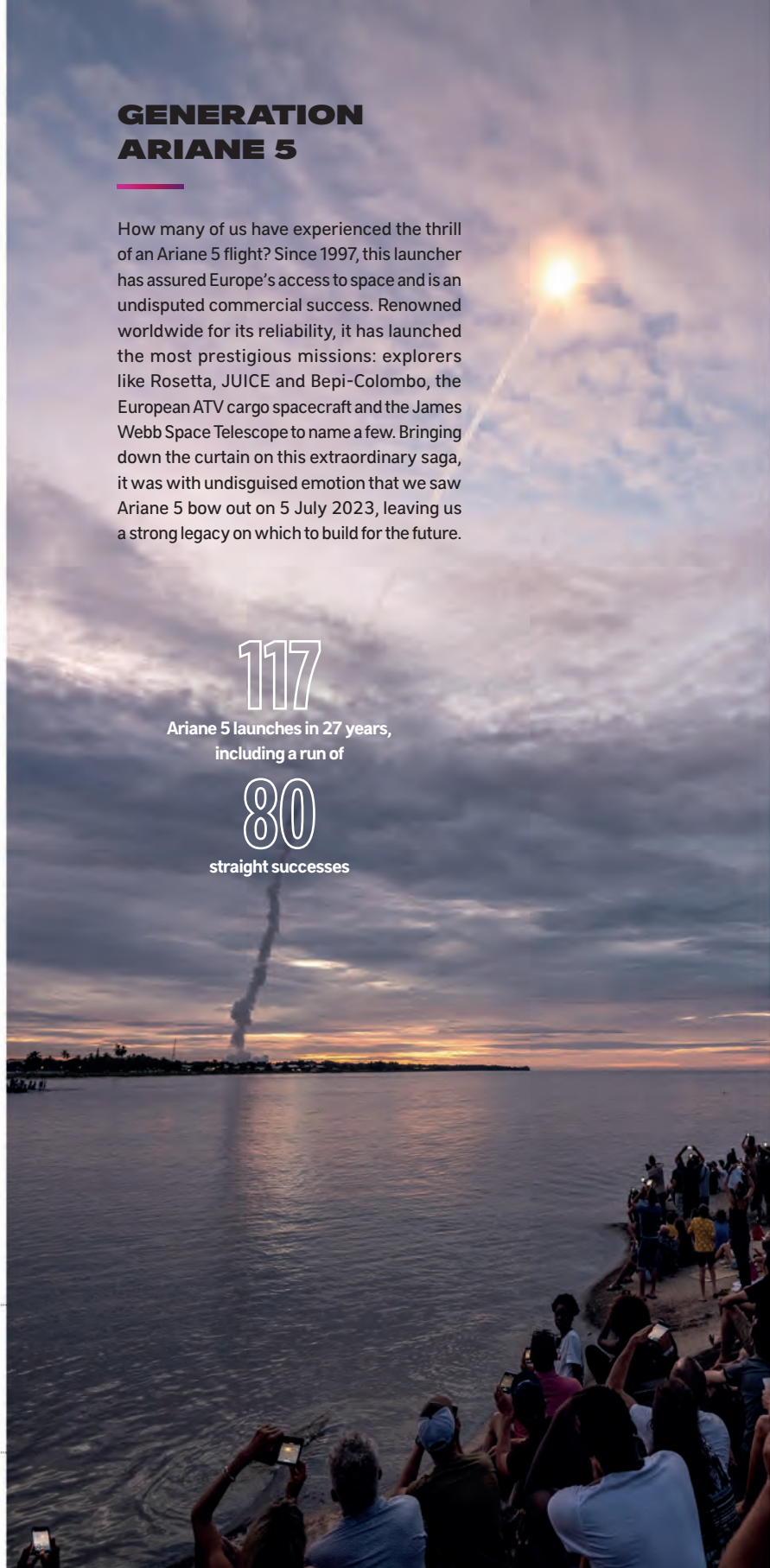
2024 HIGHLIGHTS

- 9 JULY**
maiden flight of Ariane 6 (FM1) carrying 10 cubesats for ESA
- AUGUST/SEPTEMBER**
last Vega flight
- END OF YEAR**
return to flight of Vega-C
- END NOVEMBER/EARLY DECEMBER**
Ariane 6 flight FM2

GENERATION ARIANE 5

How many of us have experienced the thrill of an Ariane 5 flight? Since 1997, this launcher has assured Europe's access to space and is an undisputed commercial success. Renowned worldwide for its reliability, it has launched the most prestigious missions: explorers like Rosetta, JUICE and Bepi-Colombo, the European ATV cargo spacecraft and the James Webb Space Telescope to name a few. Bringing down the curtain on this extraordinary saga, it was with undisguised emotion that we saw Ariane 5 bow out on 5 July 2023, leaving us a strong legacy on which to build for the future.

117
Ariane 5 launches in 27 years,
including a run of
80
straight successes



+ 3 LAUNCHES FROM CSG IN 2023

Delays to Ariane 6 combined with the halt to Soyuz operations as a result of the Ukraine crisis and the mishap of the Vega-C launcher at the end of 2022 meant that only three launches were conducted in 2023. However, the CSG made the most of this hiatus to ready itself for the big challenges ahead, notably a fast ramp-up in its launch rate.

14 APRIL

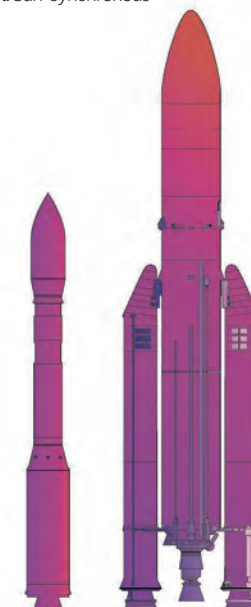
- Launcher: Ariane 5
- Payload: JUICE
- Mission: Exploration
- Orbit: Escape orbit

5 JULY

- Launcher: Ariane 5
- Payload: Heinrich-Hertz + Syracuse-4B
- Mission: Telecommunications
- Orbit: Geostationary

8 OCTOBER

- Launcher: Vega
- Payload: Formosat-7R Triton, Theos-2 and 10 nanosats (including NESS)
- Mission: Earth observation
- Orbit: Sun-synchronous





SYRACUSE 4B ADDS FINAL TOUCH TO FRANCE'S SOVEREIGN MILITARY SPACE TELECOMMUNICATIONS

Following a flawless launch by Ariane 5 on 5 July 2023, Syracuse 4B joined Syracuse 4A in geostationary orbit six months later. The twin satellites—identical apart from their electric spacecraft buses, one developed by Thales Alenia Space and the other by Airbus Defence & Space—feature numerous technological innovations that CNES's teams helped to build and guarantee ultra-secure communications due to their robust design. Alongside the French defence procurement agency DGA, we are also involved in monitoring positioning and in-orbit commissioning operations for Syracuse 4B.

- Eurostar electric spacecraft bus
- New-generation digital core
- PPS®5000 plasma thruster

DEFENCE

Helping the Ministry of Armed Forces to renew its space capabilities, CNES's Toulouse Space Centre is accommodating the Space Command newly formed in 2019 to execute France's military space strategy.

NESS TRACKS DOWN JAMMERS

Launched on 8 October 2023 by Vega from Kourou, the NESS demonstrator operated by CNES is now orbiting at an altitude of 564 kilometres, where it is successfully validating new technologies. With its ability to detect and locate radiofrequency sources in S and L bands, both widely used by civil and military applications, it can notably track down interference affecting satellite-based positioning systems like Galileo.

Built with dual-use funding, NESS is the government's first 3U nano-satellite. CNES, as system contracting authority, called on small French space firms like U-Space for the spacecraft bus and Syrlinks for the payload.

10 x 10 x 34 cm, weighing no more than 5 kg

AsterX, A UNIQUE EUROPEAN MILITARY SPACE EXERCISE



Space Command organized the third AsterX military space exercise from 20 February to 10 March 2023 at CNES's Toulouse Space Centre. Besides offering full logistical support, our teams were entrusted with a dual role on this occasion, some devising risk and threat simulations for the exercise's scenarios, while others worked alongside military personnel to conceive and conduct evasive actions.

2024 HIGHLIGHTS

MARCH
Fourth AsterX military space exercise

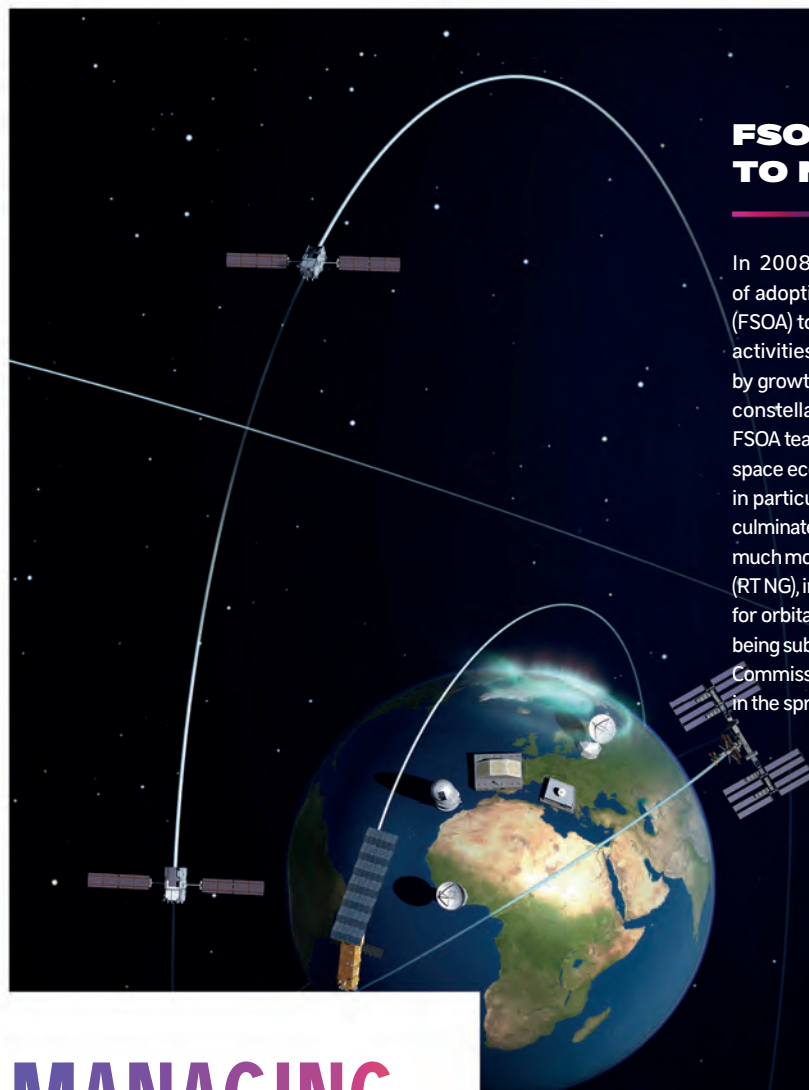
APRIL
Entry into operational service of the Galileo Public Regulated Service (PRS) for government-authorized users

[FOCUS] TRAINING MILITARY OPERATORS FOR SPACE

As the head of CNES's spacecraft operations sub-directorate, Denis Perriot is closely involved in operating military and dual-use satellites in low Earth orbit. This includes helping to hone the skills of Space Command teams.



Denis Perriot
Training covers three levels. First, we provide an overall induction for all military personnel coming to the Toulouse Space Centre; then, we focus on the state of the art and certain technical aspects like orbital dynamics, chiefly for officers; and lastly, we give them in-depth technical training at our satellite control centres. Some 20 officers and NCOs are already embedded in our teams operating the CSO, Pleiades and CERES missions. Civil and military personnel share a strong operational culture and cooperation is seamless, based on a perfect understanding of Space Command's need to be able to conduct operations autonomously, calling on CNES's know-how and expertise where needed.



FSOA ADAPTS TO NEWSPACE

In 2008, France took the pioneering step of adopting the French Space Operations Act (FSOA) to regulate and oversee national space activities. In a fast-moving landscape marked by growth in space traffic and new activities like constellations and on-orbit servicing, CNES's FSOA teams started concerting in 2019 with the space ecosystem with a view to revising the act, in particular its technical aspects. This process culminated in 2023 with the drafting of a new and much more comprehensive Technical Regulation (RT NG), incorporating more than 80 requirements for orbital systems (versus 20 previously). After being submitted for consultation to the European Commission end 2023, the RT NG will take effect in the spring of 2024.

MANAGING SPACE TRAFFIC

Faced with the proliferation—now and in the future—of objects in Earth orbit, CNES is updating the technical regulation accompanying legislation on space operations to cover Newspace activities and combat clutter, paving the way for a new European and international reference framework.

With
16 to 20
 requests per year since 2014
 (versus just four from 2008 to 2013),
 CNES has handled a total of
150
 orbital control authorization requests.

KEEPING WATCH OVER ORBITAL TRAFFIC

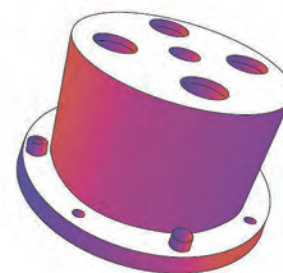
CNES's COSE operational space surveillance centre has a long record of surveying space and compiling the national catalogue of space objects. This catalogue provides a situational picture of space and in particular enables conjunction risks to be mitigated. Today, we are watching over more than 400 satellites on behalf of the EU-SST consortium, which grew from 7 to 15 member states in 2023. Faced with an expected rise in the short term of the number of objects in orbit and satellites to be protected (a two to fivefold increase), the COSE is going to need more and increasingly precise data. To this end, CNES solicited competitive bids in 2023 for two contracts to procure commercial data from French Newspace players operating private networks that supply space object trajectories. Another request for proposals issued under the France 2030 investment plan is inviting French space industry bids for innovative services and assets capable of observing space objects, both on the ground and in space.



Today, there are an estimated
35,000+
 objects of more than 10
 centimetres in Earth orbit,
 and 1 million of 1 to 10 centimetres

15 to 20
 conjunction risks handled
 every week by CNES

+ [FOCUS] DETUMBLER TO TAME ERRANT SATELLITES



The Tech for Space Care project set in train to enable industry to stay competitive as the FSOA imposes increasing constraints to curb orbital debris is testing a range of innovations. One of these is a "detumbler", co-developed by CNES and Airbus. This totally passive device consists of a small cylinder of magnets that prevents a stricken satellite from starting to tumble, thus easing future de-orbiting or refuelling operations. A detumbler was launched in November 2023 on the Exo-0 nanosatellite to observe its effectiveness in stabilizing the spacecraft until it re-enters the atmosphere.

Today,
space is fuelling
the creation of nearly

2

start-ups every day
in France.



ECONOMIC COMPETITIVENESS

MAKING FRANCE A TOP-TIER SPACE PLAYER

Space is a fast-moving sector driven by technology disruption. As global economic competition heats up, France's industry base can rely on CNES—backed by government—to support its development and export business.

Space telecommunications, today undergoing seismic shifts to meet growing demand for connectivity and data throughput, is a good case in point. With new private constellations shaking up the established ecosystem, CNES is helping French industry to consolidate its leadership in the unsure geostationary satellite market, to ready for future constellation bids and to establish it as a purveyor of future technologies.

Alongside these efforts, the Connect by CNES programme continues to ramp up in support of private players looking to develop their space business.

OUR COMMITMENTS



CREATING SHARED VALUE THROUGH SPACE



SUPPORTING REGIONAL RESILIENCE

CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION 	17 PARTNERSHIPS FOR THE GOALS
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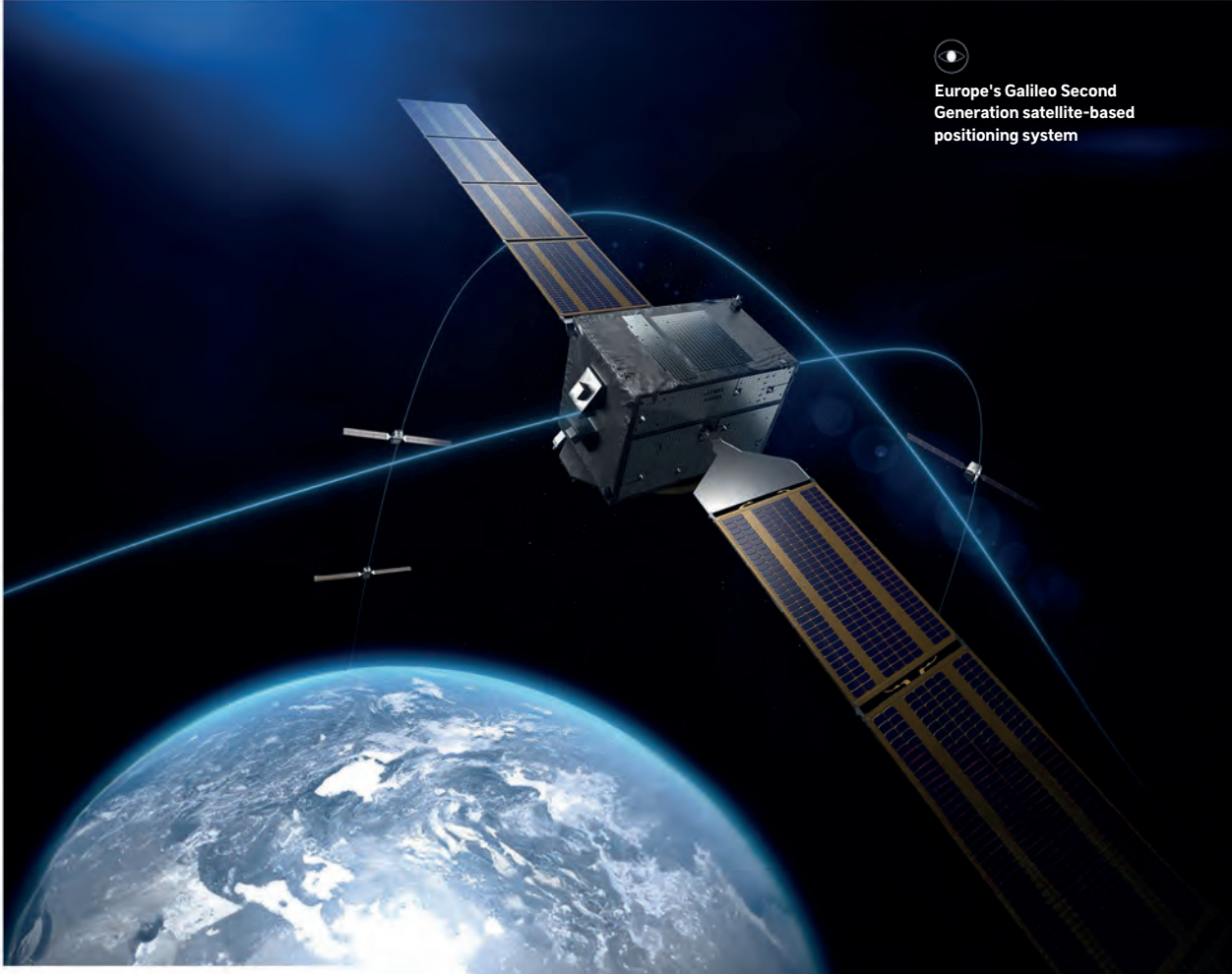
SPACE TELECOMMUNICATIONS

P. 28



NEWSPACE

P. 32

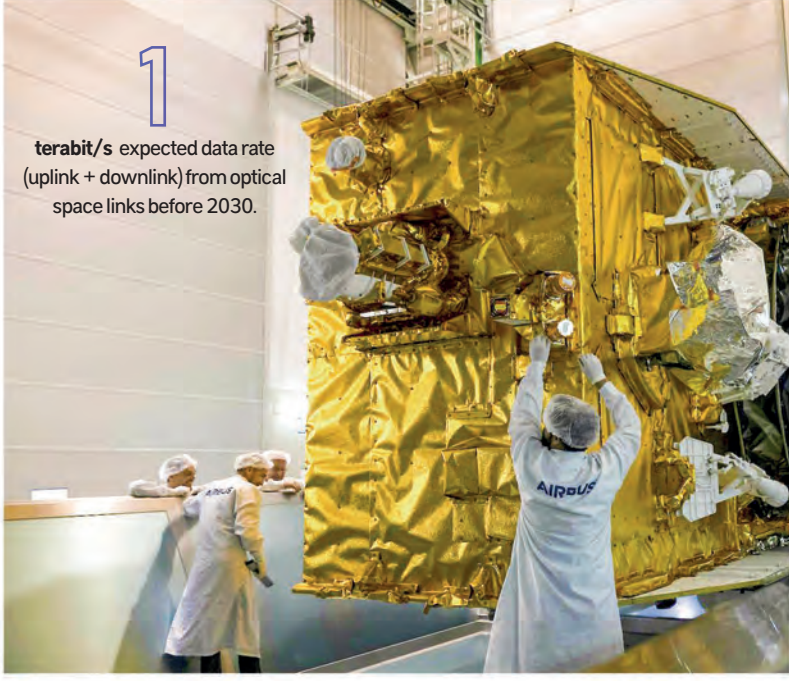


Europe's Galileo Second Generation satellite-based positioning system

SPACE TELE-COMMUNICATIONS

After all-electric and digital satellites, CNES is developing new technology building blocks with and for industry, including optical links. As constellations increasingly become the norm, we are also the interministerial coordinator for Europe's first secure connectivity network, IRIS².

TELEO DEMONSTRATING THE POWER OF OPTICAL LINKS



1 terabit/s expected data rate (uplink + downlink) from optical space links before 2030.

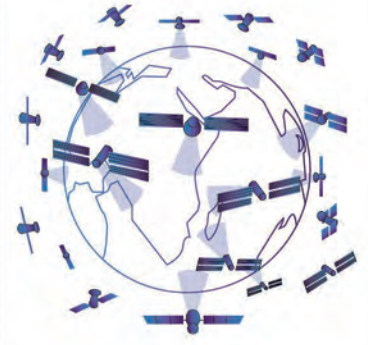
An optical laser beam from geostationary orbit (36,000 km) "illuminates" an area on the ground of a few hundred metres, versus tens to thousands of kilometres using conventional solutions.

Riding on the Arabsat Badr-8 telecommunications satellite launched on 27 May 2023, the TELEO demonstrator is designed to validate the first optical laser links in orbit. Co-funded by CNES as contracting authority and Airbus Defence & Space, its design and integration were completed in 30 months. CNES is also providing ground support equipment through its FrOGS station.

One of TELEO's advantages is that its optical beam is very directive, protecting it from interference and jamming. This experiment feeds into the CO-OP project to develop full-power operational optical communications technologies before the end of the decade.

+ GEARING UP FOR BROADBAND CONSTELLATIONS

In response to growing demand for broadband connectivity, CNES is working with prime contractors Airbus Defence & Space and Thales Alenia Space, and with telecommunications manufacturers, to gain a foothold in the broadband constellation market. Fleets of small comsats in low Earth orbit are set to bring broadband speeds and low latencies to anywhere on the planet. Work to retire risks got underway in 2023, focusing on miniaturization, integration and improving power consumption to enable cost-competitive services.



MONITORING GALILEO AND EGNOS PERFORMANCE

Geolocation data are today part and parcel of our daily lives. The European Galileo and EGNOS systems offer the best performance in this domain and are maintaining it through the GEMOP programme (Galileo and Egnos Monitoring of Performances). On 30 June 2023, the EU Agency for the Space Programme (EUSPA), in charge of operating Galileo, renewed its faith in CNES to lead the GEMOP programme for the next seven years. Coordinating a consortium of 27 bodies from 15 European nations, our task is to analyse GNSS system performance on a daily basis and to issue alerts where necessary, providing as much information as

possible to resolve anomalies. As the programme's chief coordinator, we are overseeing maintenance and modernization of monitoring tools in the broadest sense, from data processing algorithms to France's REGINA network of 40 ground stations. As EUSPA's longstanding partner, we also provide independent expertise on EGNOS and Galileo open services.

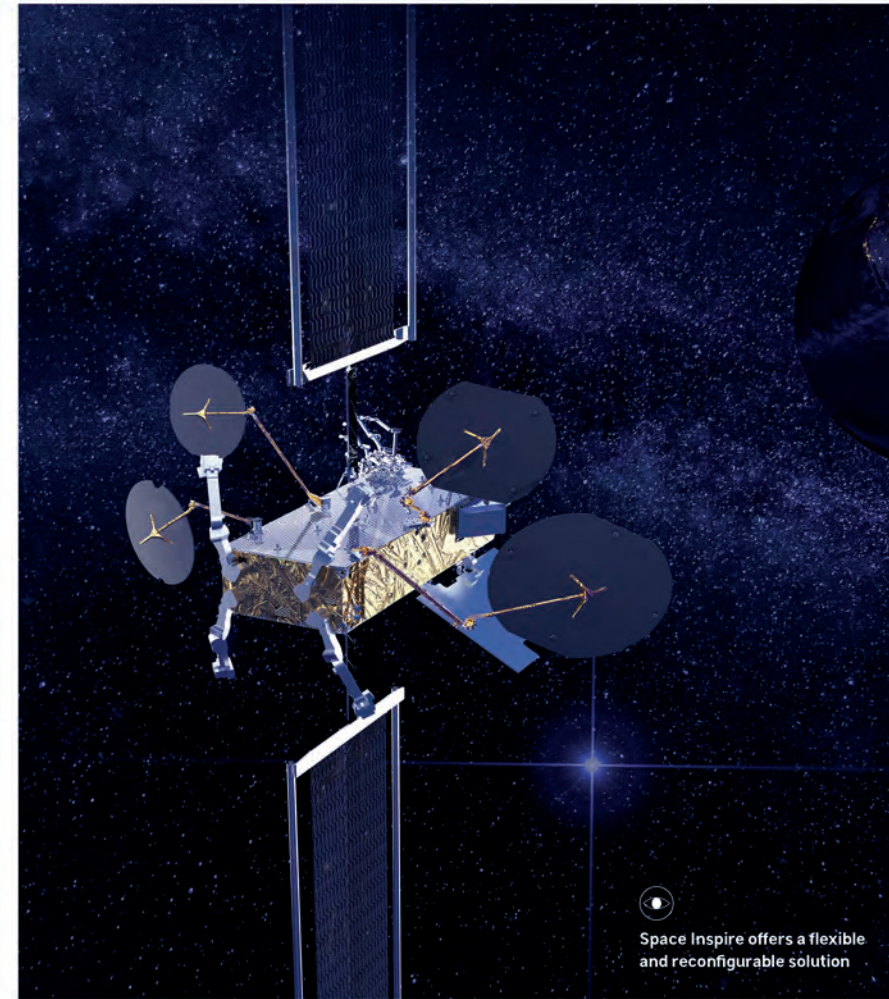
GALILEO OR EXCELLENCE IN GEOLOCATION

- Accuracy of a few metres (Open Service) to 20 centimetres (High Accuracy Service)
- Four operational services:
 - > Open Service (OS), free for all
 - > High Accuracy Service (HAS), for value-added applications
 - > Public Regulated Service (PRS), for government-authorized users
 - > Search and Rescue Service (SAR)



2024 HIGHLIGHTS

- Q2**
Operational qualification of TELEO and its ground segment.
- APRIL TO SEPTEMBER**
Launch of four Galileo satellites.
- 20 JUNE**
First of five launches for the European Kineis constellation dedicated to the Internet of Things (IoT) and carrying latest-generation Argos instruments.



Space Inspire offers a flexible and reconfigurable solution

FLEXSATs TO EASE THE TRANSITION

Large telecommunications satellites are designed to operate for 15 years in geostationary orbit. To help comsat operators transition to a market trending increasingly towards more Internet and fewer TV services, CNES is supporting development of two so-called flexsat families—OneSat with Airbus Defence & Space (under ESA's ARTES programme) and Space Inspire with Thales Alenia Space (with PIA future

investment programme funding)—capable of adapting their coverage and services to demand. Although some of the obstacles inherent to introducing new technologies still need to be overcome, 15 orders have already been signed, two in 2023.

[FOCUS] IRIS² SIGNALS AMBITION FOR A EUROPEAN COMMUNICATIONS CONSTELLATION

In March 2023, the EU issued an invitation to tender for a concession contract to operate IRIS² (Infrastructure for Resilience, Interconnectivity and Security by Satellite), the first multi-orbit constellation in Europe, consisting of some 100 satellites in low Earth orbit and 20 in medium Earth orbit, complemented by existing large geostationary comsats.



Jean-Pierre Diris
IRIS² programme interministerial coordinator for France
CNES is going to contribute its expertise to the programme and, where needed, develop technologies for future applications. Offering fast broadband speeds and low latency, IRIS² is notably expected to support government-authorized applications and go a long way towards bridging the digital divide through commercial services backed by a shared infrastructure.



A COMMITTEE FOR NEW SPACE ENTRANTS

- Ideation
- Incubation
- Booster
- Technical expertise
- Patents and software
- Funding
- Training
- Promotion and mediation

The space sector is attracting emerging start-ups and legacy primes alike. To handle the glut of support requests, CNES has set up an agile and responsive committee for new entrants. Each request is matched to one of eight services, including the agency's trademark technical support.

NEWSPACE

Riding on the digital revolution, innovation and seed funding, Newspace is moving forward apace. In France, Connect by CNES is the one-stop shop for new entrants to the space sector, with a full gamut of support services.

250+

firms have benefitted from the Connect by CNES programme since its inception.

<https://www.connectbycnes.fr>

SPACELY BOOSTING INVESTMENT IN FRENCH SPACE

With our finger on the pulse of the French space ecosystem, we know that our start-ups' funding needs can only grow. Created end 2022 on CNES's initiative, Spacely defines itself as a club of investors (Investment funds, venture capitalists, business angels, corporate funds, etc.) with an interest in space to which we give the keys required to acquire a broad strategic vision of space markets and French firms' potential.

CNES put on a number of events for this new community in 2023—Space and Automotive, Space and Defence and THE AFTER at the Parc de La Villette in Paris—where 40 start-ups got the opportunity to pitch their projects. Spacely thus offers a forum for discussion and meet-ups, as well as co-funding, including with prospective international partners.

ActInSpace® FINAL MOVES TO CANNES

Created by CNES in 2014, co-organized by ESA since 2016 and operated by Aerospace Valley, the ActInSpace® hackathon invites people from all over the world to imagine the products and services of tomorrow made possible by space data and technologies. The fifth edition of the event attracted 1,700 participants from 65 cities in 34 countries on all five continents. After reviewing 410 projects, the judging panel awarded its International and France prizes at the Palais des Festivals in Cannes on 13 and 14 February 2023.



2024 HIGHLIGHTS

24-25 JUNE
Assises du Newspace summit at La Défense, Paris

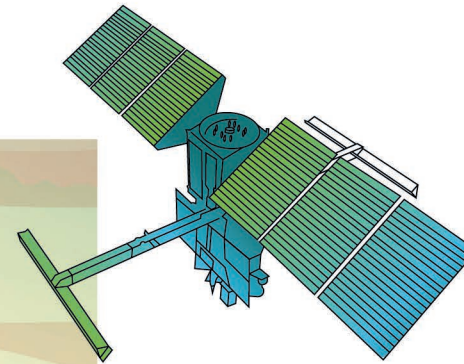
NOVEMBER
Sixth ActInSpace® hackathon, marking its tenth anniversary

+ [FOCUS] SPACEFOUNDERS SPARKING START-UPS' GROWTH

Created in 2021 by CNES and Bundeswehr University Munich (UniBw) to support the growth of the Europe's best and brightest space start-ups in the international arena, the SpaceFounders programme is gearing up with the arrival of the Italian (ASI) and European (ESA) space agencies. In 2023, no fewer than 20 start-ups received high-level mentoring to accelerate their execution strategies and fundraising. Such coaching is producing results, since 20 firms from the first two cohorts are enjoying average revenue growth of more than 492%. In total, SpaceFounders has enabled €74 million in funding to be raised, €50 million of this sum for French firms.

SHORT TAKES

- At the Space for Overseas Territories event on 27 April 2023, CNES and Outre-Mer Network signed a partnership agreement to step up the economic development of overseas territories through space.
- On 5 and 6 July, 800 attendees came together at Station F in Paris for the Assises du Newspace summit event



30% +

Total volume of freshwater on Earth. CNES is stepping up its efforts and those of the national space hydrology ecosystem to preserve this scarce resource.



CLIMATE

SPACE SERVING CLIMATE SCIENCE

As the impacts of climate disruptions grow more intense, Earth observation is becoming vital to gain insights into the changes underway, help preserve ecosystems and support regional resilience.

For more than 40 years, CNES has been working with scientists to develop cutting-edge space missions and infrastructures that deliver data for operational systems like Copernicus and inform analysis by the International Panel on Climate Change (IPCC). Through the international Space for Climate Observatory (SCO) initiative, set in train by our agency in 2017, such data are also increasingly feeding into climate services designed to help local authorities craft coping strategies.

In 2023, the eagerly awaited SWOT mission sent back its first unprecedented images. In the fields of space oceanography and hydrology, it will notably help to better manage freshwater stocks and mitigate the effects of rising sea level around the globe.

OUR COMMITMENTS



REDUCING OUR ENVIRONMENTAL FOOTPRINT



SUPPORTING REGIONAL RESILIENCE

CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS



[EARTH OBSERVATION]

THE SWOT REVOLUTION

The international SWOT mission (Surface Water and Ocean Topography) unveiled its first pictures of Earth's surface waters in March 2023, and the results exceeded all expectations. Offering a degree of precision far superior to other altimetry satellites thanks to its innovative French KaRIn altimeter, SWOT is able to reveal fine detail of oceans and measure rivers with a span much smaller than the mission's initial 100-metre specification. It is also surprising us with its ability to gauge water height in complex areas of interest, especially estuaries and polar regions. With this level of performance, it has huge potential to serve applications, both for gaining new insights into the role of the oceans in climate change and managing the planet's water resources. Developed jointly by CNES and NASA, with contributions from the Canadian (CSA) and UK (UKSA) space agencies, the SWOT mission can call on an international team of some 300 scientists to process and validate its data. The first results have already convinced ESA to adopt its wide-swath altimetry concept for the Sentinel-3 Next Generation Topography (S3NG-TOPO) satellites.

As the operator of the satellite's control centre in Toulouse, CNES is also processing eight terabits of KaRIn data every day. These data are distributed through the Data Terra research infrastructure's ODATIS/Aviso hubs for ocean and coast products, and Theia/Hydroweb Next hubs to centralize

hydrology, satellite and in-situ data as far as possible.

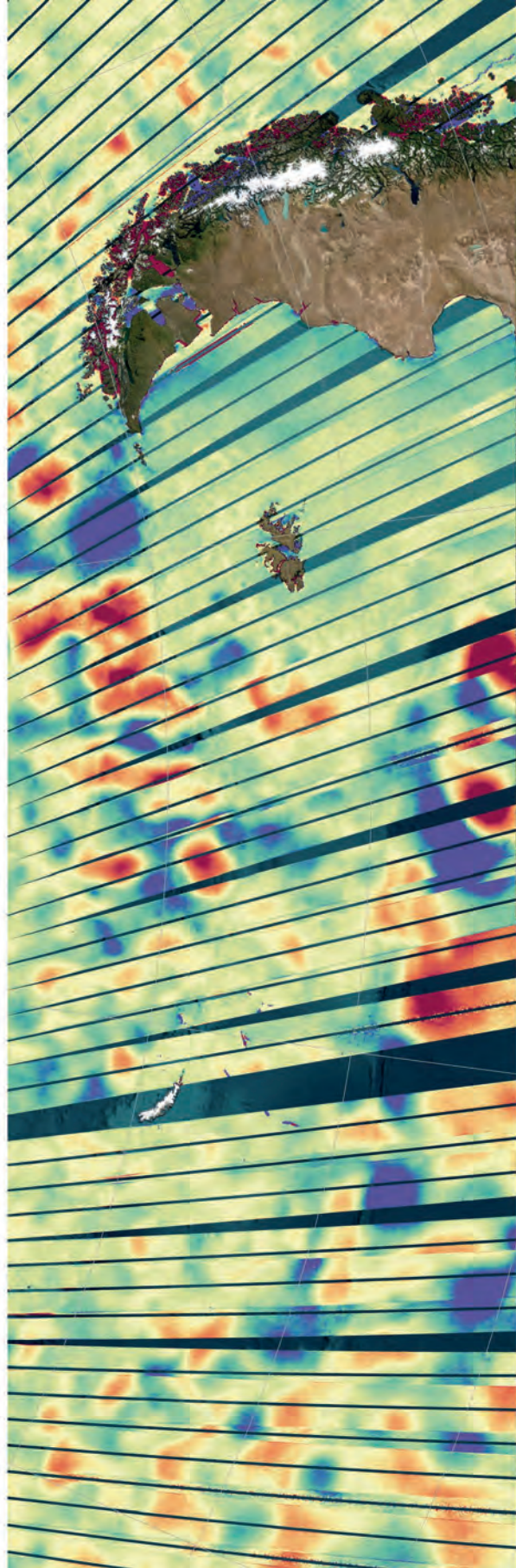
Developed under the SWOT Early Adopters programme and on line since December 2023.

60+

In-situ survey campaigns conducted over three months covering the open ocean, coastal and surface waters to validate SWOT data.



Sea-surface heights measured by the SWOT satellite over the Southern Ocean and Cape Horn in August 2023.



A BOOST FOR SPACE HYDROLOGY

With water today an increasingly pressing concern, CNES organized two workshops on space hydrology in 2023, the first in May, attended by 70 scientific and institutional representatives, and the second in October, with 55 new space entrants. The aim was to bring all stakeholders up to speed with the scientific, programmatic and strategic challenges facing space hydrology, with a view to exploring shared interests between science and industry, as well as identifying priority services to support the ecological transition.



[FOCUS]

FOUR SPACE HYDROLOGY SERVICES SUPPORTED BY FRANCE 2030

Through its France 2030 investment plan, the government is inviting proposals for satellite data applications, focusing initially on water. Four demonstrators were thus selected in 2023 to deploy operational services to track surface water and reservoir stocks, monitor water quality, detect irrigated crops, and offer access to, exploitation and analysis of space hydrology data. Two of these services are the direct result of work undertaken through the SCO to develop an operational capability. One of them is Stock Water, a tool which uses satellite data to estimate reservoir water stocks and levels, often poorly documented yet vital to manage resources effectively. Developed by CNES thanks to R&D work supported through the SWOT Early Adopters programme and subsequently made available to the private sector, it now underpins a service monitoring 5,000 reservoirs in France every day.



BANKING ON BALLOONS

Scientific ballooning remains a core CNES competency and is the only way to collect in-situ atmospheric measurements at high altitude. Four scientific balloons were released from the Timmins base in Canada in August 2023 for the international Stratosciences programme. One of them successfully demonstrated the feasibility of a transatlantic flight planned for 2024. Looking further ahead, our agency is working with French firm Hemia on a manoeuvrable balloon project.



GENERATING AND DISSEMINATING HIGH-QUALITY DATA

All of CNES's Earth-observation missions deliver high-quality data as a result of the unique know-how we have developed and sustained over the years, working closely with the scientific community and industry. Processed to the highest level, these data are pooled and made freely available via the Data Terra research infrastructure and its five data and services hubs. With a view to sharing resources, at the end of 2023 CNES rolled out the beta version of GEODES, a hub that centralizes all remote-sensing data distribution tools and services. Ultimately, this hub will be incorporated in Data Terra, whose complementary DINAMIS portal offers access to very-high-resolution satellite imagery like Pleiades and SPOT 6-7.

+
ODATIS (ocean),
AERIS (atmosphere),
Theia (land surfaces),
ForM@Ter (solid and inner Earth) and,
from 2024, PNDB (biodiversity).

CALIPSO, A PIONEER IN THE STUDY OF CLOUDS AND AEROSOLS

In 2023, the French-U.S. Calipso mission took its final curtain call after 17 years operating within the A-Train constellation. Featuring one of the first ever space lidars, the mission played a crucial role analysing how clouds and aerosols affect climate change. Two missions are now set to take over Calipso's mantle: ESA's EarthCare in 2024, and NASA's Atmospheric Observing System (AOS), successor to the A-Train, in 2030. CNES and French research laboratories are naturally intimately involved in both missions.

The exceptional longevity of our missions enables them to collect long time-series vital for climate science. Their data are yielding a rich harvest of research results for French scientists, who have submitted the highest number of publications.

4,000+

scientific publications based on data from Calipso (2006-2023)

2

publications per week based on data from SMOS (active since 2009)



+ BEHIND THE SCENES OF UPCOMING MISSIONS

CO₂

After devoting 2023 to assembly, integration and a series of tests, the French-UK MicroCarb satellite is ready for launch on its mission to establish a global map of sources and sinks of carbon dioxide.

WATER STRESS

Designed to measure the temperature and thermal radiation of land surfaces, the French TIR (Thermal InfraRed) instrument also spent the year undergoing numerous tests in readiness for its integration on the French-Indian Trishna satellite. Its data will notably help to gauge planet water stress and water requirements.



CLOUDS

CNES's Board of Directors officially gave the go-ahead on 15 December 2023 for the French-Israeli C³IEL mission to study clouds and the development of convective systems, a priority for our scientific community.

SCO ACCELERATES ROLL-OUT OF CLIMATE SERVICES

With 47 members from 25 countries and 13 new signatories in 2023, the Space for Climate Observatory (SCO) is fast becoming a flagship for cooperation. Officially founded in 2019, the SCO combines a vast range of talents and capabilities in Earth observation, serving regions and their needs, to boost local and transposable operational climate services.

CNES was the inspiration behind this initiative and has founded SCO France, which today federates and leads a community of 311 scientific, institutional, public and private bodies. Our agency has 25 people supporting 61 SCO-accredited projects, guaranteeing the added value that space offers. Use cases and testimonials at the second SCO France Congress held at the Paris Bercy venue on 30 May 2023 highlighted space's potential to spur government action, where the SCO can help construct a clear offering tailored to needs. Buoyed by this recognition, the SCO programme underpins what our agency is doing to meet the commitments the

French government has entrusted to us in the battle against climate change.

CNES is a prime mover working to amplify these efforts with its international partners and raise the SCO's profile on the international stage. To this end, it was on hand at a range of events in 2023 like the COP28 conference, the first Global Space Conference on Climate Change (GLOC) and the One Forest Summit. After validating its first three-year work schedule, the SCO issued its first international call for projects in September 2023.

20+

operational services and demonstrators delivered by SCO France projects



Célie Losada

SCO project officer

Thanks to CNES, the SCO is a catalyst for climate innovation promoting new players in space and research. It's working at the global scale to provide a crucial response to the impacts of climate change and to preserve the planet.

Sentinel-2 view of 11 January 2024 of the Bay of Mont Saint-Michel, between Brittany and Normandy, with snow to the north.

www.spaceclimateobservatory.org

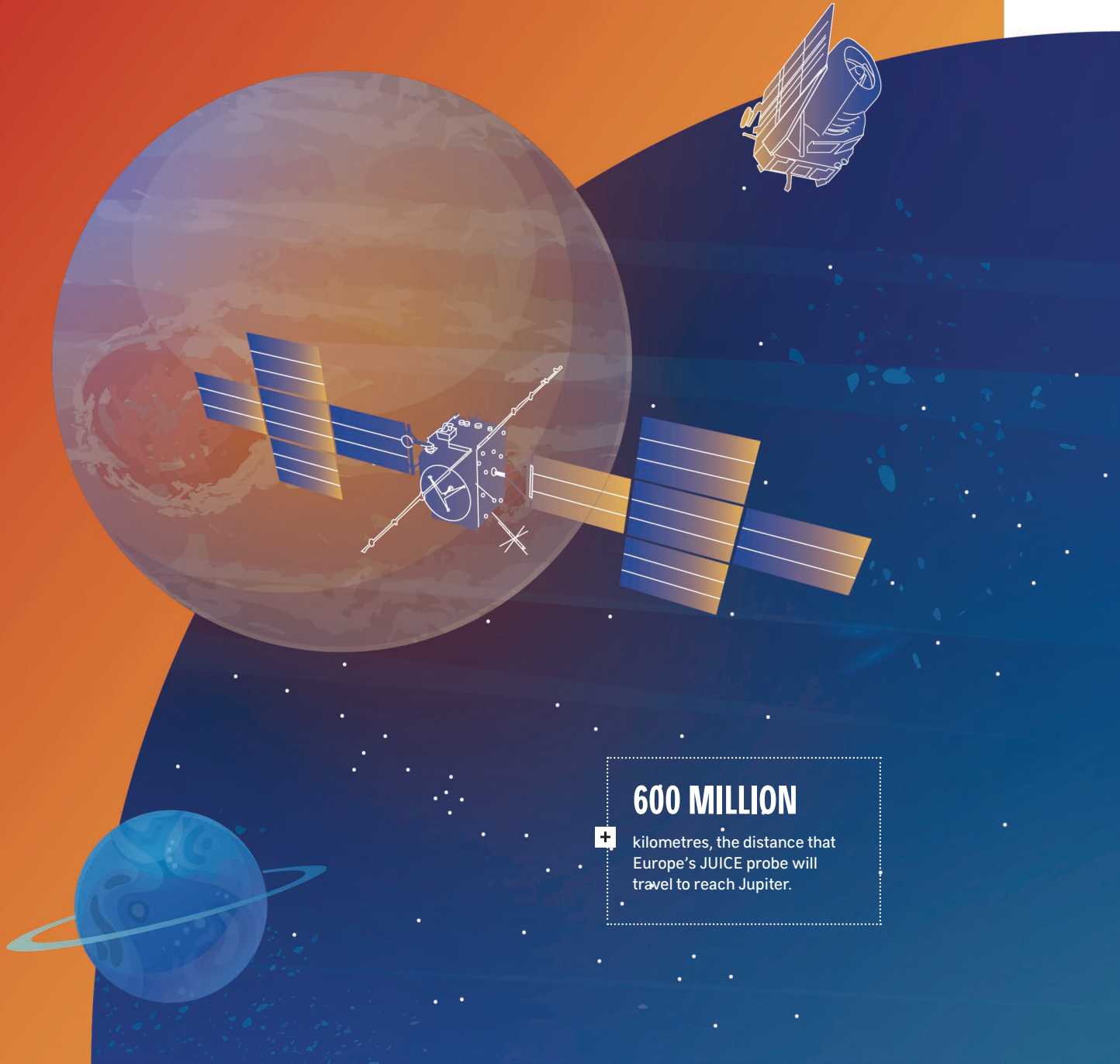
COP28 MARKS MILESTONE IN SPACE FOR CLIMATE EFFORTS

The COP28 conference in Dubai from 30 November to 12 December provided the first Global Stock Take of progress made towards climate targets by the Paris agreement's signatories. At the same time, this COP featured for the first time a Space pavilion and a Heads of Space Agencies summit. Bringing together more than 20 agencies, several of which name-checked the SCO in their statements to the conference, this summit laid the foundations for closer cooperation to boost space for climate initiatives. CNES was closely involved in this event, with multiple discussions and presentations, highlighting French excellence in Earth observation and the effectiveness of the SCO and local and international collaboration.



2024 HIGHLIGHTS

- +** **SPRING**
Announcement of fifth cohort of SCO France accredited projects
- +** **JUNE**
Meeting of SWOT Science Team in the USA on SWOT data validation
- +** **JULY**
AOS programme go-ahead decision
- +** **SEPTEMBER**
One Water Summit in New York
- +** **Q4**
Launch of the third Copernicus Sentinel-1C satellite



600 MILLION
 + kilometres, the distance that Europe's JUICE probe will travel to reach Jupiter.

SCIENTIFIC COOPERATION

EXPLORING AND UNDERSTANDING OUR UNIVERSE

How did life take hold on Earth? How is our planet set to evolve? And, beyond our galaxy, what laws govern the ever-expanding universe? Space is the place to look for answers, and where we are sending ambitious missions in partnership with other space agencies.

CNES is coordinating consortia of French research laboratories to supply instruments for the most prestigious exploration missions, and to process and disseminate the data they acquire. With priority access to data from instruments it has designed, the French space science community is renowned for its excellence worldwide.

Working alongside ESA, we are also readying—technically and physiologically—for future crewed spaceflight missions that will bring big benefits here on Earth.

OUR COMMITMENTS



CREATING SHARED VALUE THROUGH SPACE

CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

<p>8 DECENT WORK AND ECONOMIC GROWTH</p>	<p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	<p>17 PARTNERSHIPS FOR THE GOALS</p>
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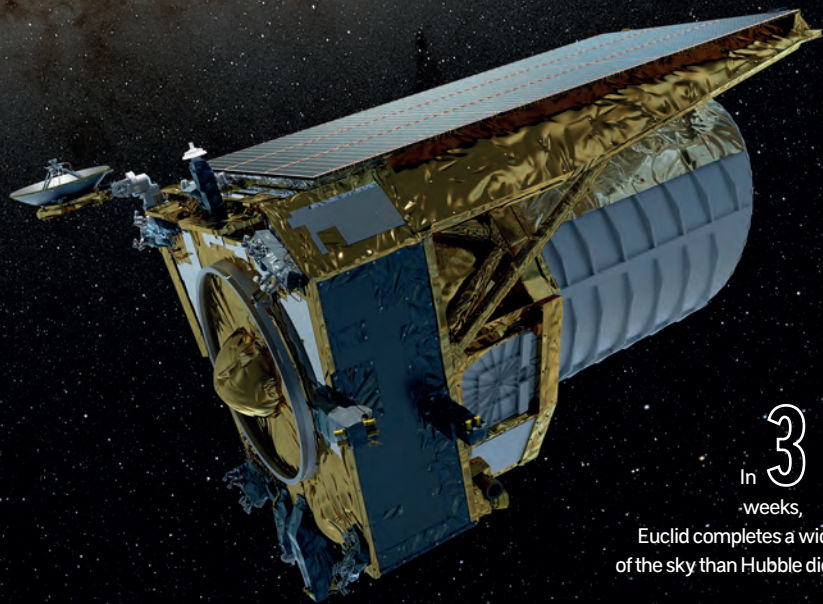
EUCLID, A LEAP IN THE DARK

Dark matter and dark energy make up 95% of the universe, so the fact that we can't actually see them is something of a mystery. That's why we need a wide-angle telescope like Euclid, to step back and give us the perspective required to see the large structures of the universe. In just one hour, Euclid can take pictures of the equivalent of a full Moon (0.5 degrees²), and will continue to do so for at least six years. It will thus enable us to map the universe in 3D, exploiting unique data from which astronomers will be able to deduce the properties of gravity, dark matter and dark energy.

For this ESA mission, CNES supported 11 French research laboratories to design and deliver the NISP infrared spectrometer and the focal plane of the VIS visible spectrometer. We also provided a third of the processing algorithms and one of the nine data centres, which alone will be handling about 30% of Euclid's data. The "first light" pictures revealed on 7 November 2023 are already yielding unprecedented information.

“Concentrated” matter that generates gravity, which itself induces rotation, which would explain why solar systems are spinning too fast compared to their galaxies.

A “repelling” force opposing gravity, which could explain why the universe is expanding at an accelerating rate although, as a general rule, the particles of an explosion, in this case the Big Bang, eventually slow down and fall.

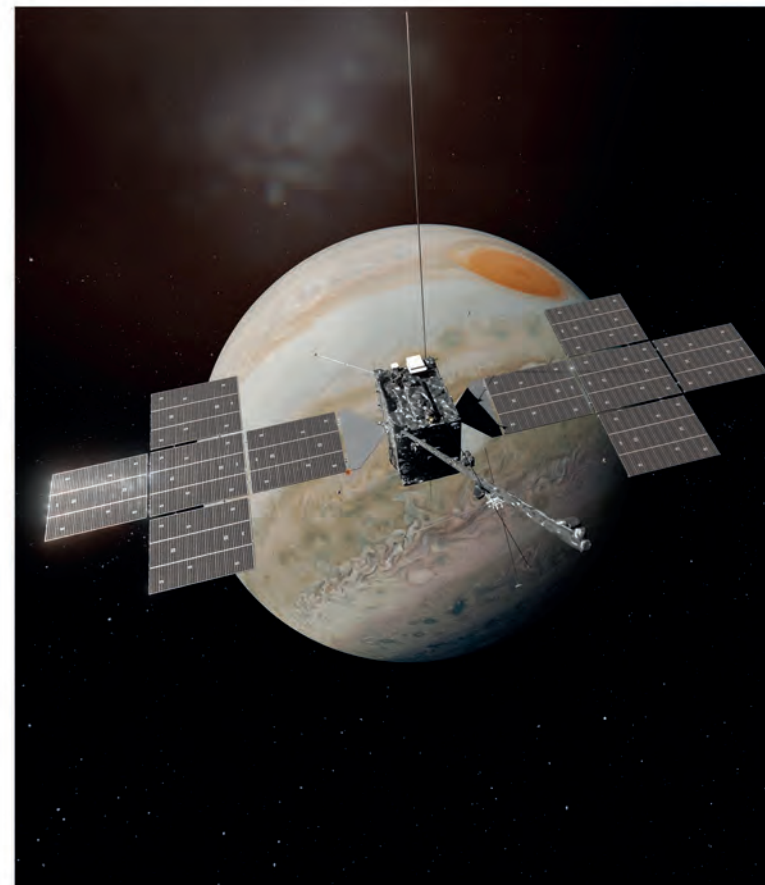


In **3**
weeks,
Euclid completes a wider survey
of the sky than Hubble did in 30 years!

JUICE, A LEAP INTO THE UNKNOWN

ESA's JUICE (JUperiter ICy moons Explorer) mission is embarked on a seven-year voyage of 600 million kilometres, taking it further into our solar system than any other European mission before. Launched by Ariane 5 on 14 April 2023, it is on its way to explore the gas giant planet Jupiter and three of its main icy moons, Callisto, Europa and Ganymede.

JUICE is carrying ten instruments to characterize the Jovian environment and its mechanisms. France has contributed to five and supplied the complete MAJIS spectrometer, which will analyse the moons' surface. CNES oversaw the work of 15 research laboratories, notably to ensure that components are able to withstand Jupiter's glacial temperatures and punishing radiation. In-orbit checkout was completed on 19 July 2023 and everything is nominal. The instruments will be tested twice a year until reaching their destination.



+ SVOM, A LEAP IN TIME

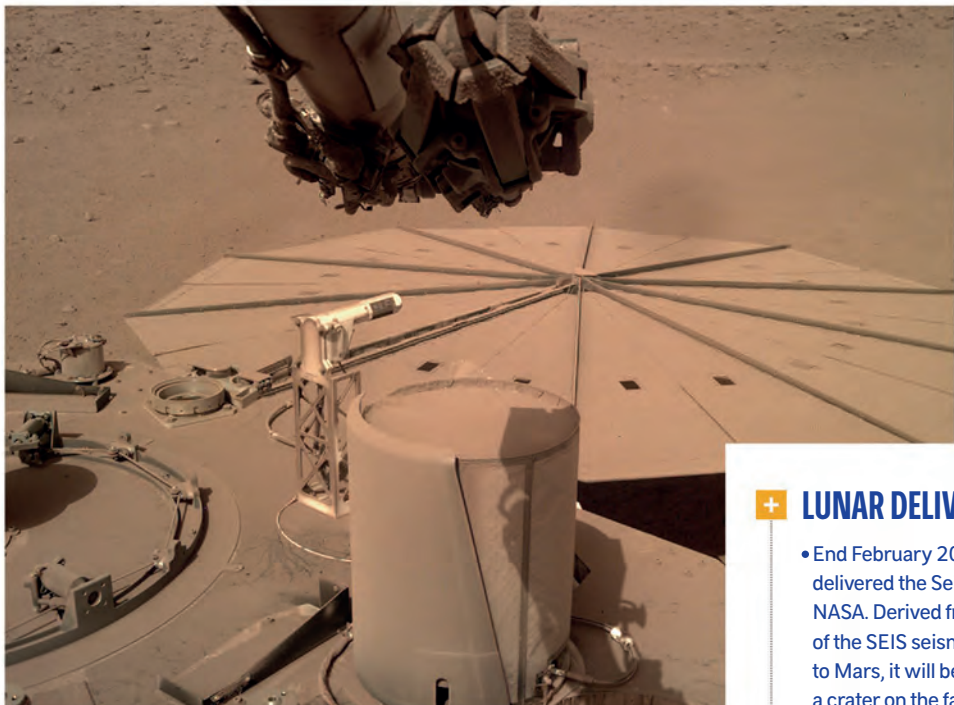
The Chinese-French SVOM astrophysics mission is set to probe gamma-ray bursts (GRBs), the most distant and powerful star explosions in the universe.

In readiness for its launch in 2024, 23 containers were shipped to Shanghai in 2023, carrying the French instruments and all their logistics and test equipment: the ECLAIRs X- and gamma-ray camera, and the MXT Microchannel X-ray Telescope, both designed by CNES working with ten national research laboratories. Fifteen French experts have worked with Chinese teams to assemble the instruments with the satellite and conduct a range of environmental and performance tests. The back office team at CNES's Toulouse Space Centre kept track of testing remotely in real time. At the same time, our teams conducted several system test campaigns to validate operating modes for the mission scenario.



François Gonzalez
SVOM project leader, CNES

With SVOM, we're going to explore the early years of our universe! After a fantastic team effort in France and China, the final acceptance review—involving more than 100 people—has confirmed that all the instruments and associated ground segments are in perfect order.



MAYBE NOT THE LAST WORD FROM INSIGHT

After operating for four years on Mars, the InSight lander shut down at the end of 2022, before its batteries became completely drained. But should a passing dust devil clear the lander's solar panels, it could be able to generate power again. This mission has achieved so much that at NASA's request, CNES geared itself up in early 2023 to maintain the French SEIS seismograph's operations centre ready to be restarted at short notice. Our teams worked hard through to the autumn to process data to the required level for science teams.

InSight has lifted the veil on the red planet's deep interior, notably the nature and size of its core.



1,400 "marsquakes" detected in some 1,400 days, ten of them large, and a large meteorite impact.

100

science publications based on SEIS data have been co-written with French authors, with one winning the 2023 prize for the best article in the review *Sciences*.

+ LUNAR DELIVERIES

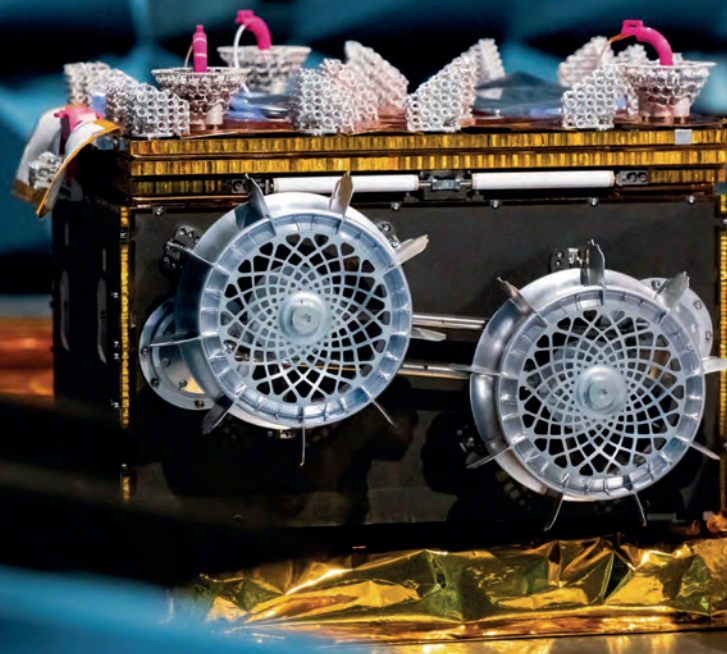
- End February 2023, France delivered the SeisMoBox to NASA. Derived from the spare of the SEIS seismometer sent to Mars, it will be set down in a crater on the far side of the Moon by the U.S. Farside Seismic Suite mission (FSS).
- The French DORN instrument was also delivered to China in 2023 for the Chang'e 6 lunar lander mission, to investigate outgassing of radioactive radon from the Moon's surface.



CNES'S FIRST ROVER NAMED IDEFIX

Measuring 40 x 25 centimetres and tipping the scales at 25 kilograms, IDEFIX is the size of a microwave oven on wheels. This first rover developed by CNES in partnership with Germany taps into everything we've learned with cubesats to attempt to drive on a body with 1,800 times less gravity than Earth—because IDEFIX is set to land on Phobos, one of Mars' two moons, with the Japanese Martian Moons Exploration mission (MMX). Seen from Earth, the surface of Phobos appears to be covered by a thin layer of dust, but could there be hard or loose soil beneath? Adventure beckons!

Mid-2023, our teams completed assembly of the rover and put it through a battery of tests to demonstrate its ability to withstand the extreme conditions it will encounter. Along with the French MIRS instrument that will characterize soil on the two moons, IDEFIX is now ready to depart for Japan.





SHORT TAKES

- The FPR (Focused Product Release), the new interim catalogue from the Gaia mission, was published on 10 October 2023.
- With the close involvement of CNES, as coordinator of the scientific consortium for the X-IFU instrument, Europe's Athena X-ray astronomy mission has been rescoped with a smaller budget and its high science value confirmed.
- For ESA's rescoped ExoMars mission, CNES and the research laboratories involved started work to upgrade the four French instruments the Rosalind Franklin lander will be carrying to probe the shallow subsurface of Mars.

CONCEIVING A SPACE BASE

Initiated by ESA in 2012, the SpaceShip project is working to build the space base of the future. France, led by CNES, is focusing in particular on habitats. In 2023, construction of a dedicated building at our Toulouse Space Centre was confirmed, near the Mars rover test area. Different modules will accommodate scientists, students and start-ups.



2024 HIGHLIGHTS



JANUARY

Go-ahead from ESA for LISA, to detect gravitational waves from the most violent events in the universe, and EnVision, to study the atmosphere and geology of Venus



3 MAY

Launch of the Chinese Change'6 lunar mission, carrying DORN



22 JUNE

Launch of SVOM



20 AUGUST

First gravity assist for JUICE

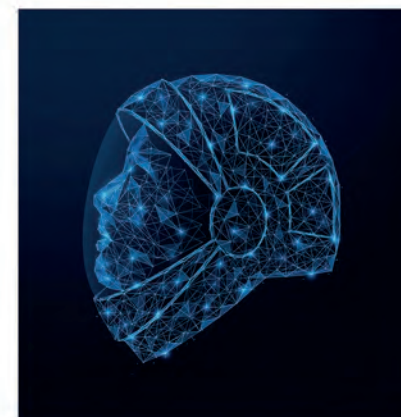


STUDYING CEREBRAL AGEING IN SPACE

Conceived under the leadership of CNES's CADMOS, in partnership with the Institut Pasteur foundation and SupBiotech engineering school, the Cerebral Ageing experiment departed in 2023 for the International Space Station. This experiment uses cerebral organoids grown in vitro to study the ageing process of brain cells. Such research could help gain new insights into genetic illnesses linked to premature ageing of the brain and assess the effects of microgravity and cosmic radiation on astronaut brain health.



Centre for the development of microgravity applications and space operations.



TOWARDS AN ASTRONAUT DIGITAL TWIN

With an eye on future long-duration crewed space missions, CNES challenged French innovators to come up with ideas on the theme of a "digital health twin" to help monitor astronauts' health and give them maximum autonomy. Results have been encouraging, with eight candidates signing contracts with us to further develop their solutions.

OUR FIVE CORPORATE SOCIAL RESPONSIBILITY COMMITMENTS

CNES has an ambitious corporate social responsibility (CSR) policy aligned with the UN's Agenda 2030 and 17 Sustainable Development Goals (SDGs), which constitute a universal call to action to eradicate poverty, tackle inequalities and protect the planet while working towards a sustainable development social model. This policy revolves around five commitments guiding our roadmap.

BEING A SOCIALLY RESPONSIBLE EMPLOYER

CNES pursues a pro-active human resources policy based on fostering technical competencies, promoting gender equality and nurturing a work environment that favours diversity, well-being and inclusion, as well as constructive labour relations. The agency's governance is built on values of exemplarity. Ethical behaviour and transparency define how we go about our daily work and form the foundation of our relationships with stakeholders.



PROMOTING PROTECTIVE AND SUSTAINABLE SPACE

CNES is striving to keep space as the province of all humankind. To this end, we are seeking to reduce or eliminate space debris generated by our missions or those we operate. We are also helping to prevent conflict situations by supplying space and processing systems to meet the government and the military's space surveillance, eavesdropping and action needs.



CREATING SHARED VALUE FROM SPACE

CNES is supporting the competitiveness and sustainable growth of French industry, research laboratories, start-ups, SMEs and smaller firms through incubators, accreditation schemes for SMEs, activities boosted by Connect by CNES and social integration and insertion clauses in our contracts. And we are fostering partnerships to further sustainable development through our international relations policy.



REDUCING OUR ENVIRONMENTAL FOOTPRINT

CNES is engaging the ecological transition. To this end, we are working to achieve energy efficiency and transition to renewable energies at our field centres. We are pursuing a proactive approach with a view to achieving net-zero emissions by 2050, taking action across the value chain to reduce the environmental footprint of our projects and activities. We are also preserving biodiversity through our Act4Nature conservation commitments.



SUPPORTING REGIONAL RESILIENCE

CNES is also mobilizing its expertise to help territories and their populations adapt to a changing climate. We are doing this by fostering uptake of risk prevention and emergency management tools, and leading Earth-observation and oceanography projects to improve resource management (surface waters and oceans).



CNES CSR IN ACTION

REDUCING THE ENVIRONMENTAL FOOTPRINT OF SPACE MISSIONS

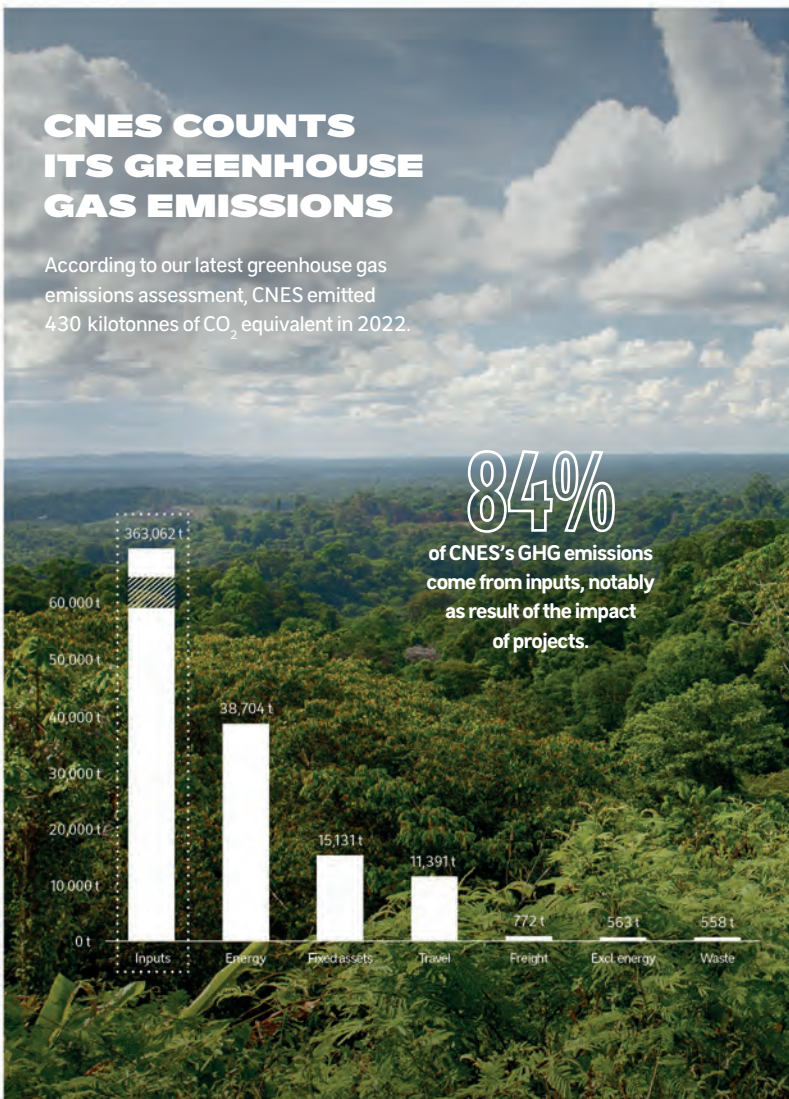
In 2023, CNES upgraded its in-house tools to better estimate the environmental footprint of orbital and balloon missions, notably through more reliable modelling results.

At the request of Bruno Le Maire, the Minister for the Economy, Finance and Industrial and Digital Sovereignty, we engaged a wide-ranging effort aimed at helping the space sector curb its environmental footprint, starting with a decarbonization roadmap for 2050, to be submitted to the minister in autumn 2024. To this end, we are involved in leading the sustainable development group of the CoSpace government-industry space coordination committee.



DRIVEN BY SUSTAINABILITY

Our Sustainability Committee, set up in 2023 and reporting to the Board of Directors, is tasked with ensuring the proper execution of our CSR policy as defined in the agency's Objectives and Performance Contract (OPC), and its compliance with the commitments set out in the government's ecological transformation policy. The committee will advise CNES on how to improve our performance and promote exemplary actions with our member networks, and will submit an annual report to the Board of Directors.



+ LOW-CARBON ENERGY FOR THE CSG

As part of efforts to green the Guiana Space Centre (CSG), CNES is deploying a new grid to connect all industry contractors at the base, supplied by national electric utility EDF and in-house generating resources, including solar power.

In 2023, construction of solar farm n°2, with a subsidy of €4.98m from the government's economic stimulus plan, made good progress and is now 70% complete. Delivery and commissioning are planned for end 2024.

CHARACTERISTICS:
 Energy generated annually: 7 GWh
 Power: 4,202 kWc
 Surface area: 5 hectares
 Modules: 9,144

+ CSG STAKEHOLDER CONSULTATIVE COMMITTEE

Launched in November 2023, this committee is intended to bring together stakeholders and entities in French Guiana to show them the economic spin-offs of the Guiana Space Centre. It is focusing on two themes: sustainable development (environmental actions) and economic development (actions undertaken by contractors at the base that are benefitting the region).



CNES SHOWS ITS COMMITMENT

A lot of effort is expended every month on CSR awareness-raising and internal communication actions towards our people. The goal is to hone their skills and encourage them to take action, both as citizens and in the workplace.

Events, conferences and promotion of training actions are organized every quarter. In 2024, these actions are being pursued, backed by a communication plan dedicated more broadly to the sustainability of space activities.

SUSTAINABLE PROCUREMENT POLICY



With 84% of our GHG emissions linked to purchasing, CNES drafted in 2023 its SPASER socially and environmentally responsible purchasing plan. This strategic document, mandatory for government agencies, sets targets for the agency's sustainable procurement policy.

Alongside this document, the matrix of prescribed CSR clauses has been updated to reflect feedback from users and new regulatory requirements. This new matrix sets new targets to further develop social aspects.

EFFECTIVE MANAGEMENT SYSTEM

In 2023, CNES started a new three-year audit cycle encompassing all directorates and processes, with interviews and site visits conducted over two weeks. Our ISO 9001 quality and ISO 14001 environmental certifications were renewed by AFNOR Certification and the results for 2023 were excellent, highlighting numerous strong points, such as the robustness of management processes or the partner satisfaction survey enabling broad coverage of the agency's ecosystem.

With regard to environmental certification, the auditors' findings underlined our consistent efforts notably in:

- Protecting biodiversity
- Low-carbon strategy
- Sustainable procurement
- Optimized mobility solutions (car sharing, cycling, etc.)

CNES SUPPORTING SDGs

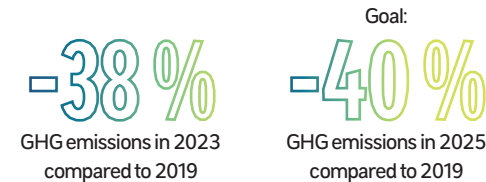
CNES's CSR strategy is built around the 17 UN Sustainable Development Goals (SDGs). We are contributing directly or indirectly through our missions and management practices to the 17 SDGs, making us a top-tier sustainable development player.

TWO OF THE AGENCY'S ACTIVITIES CONTRIBUTING TO THE SDGs STAND OUT IN PARTICULAR:

MORE RESPONSIBLE BUSINESS TRAVEL

We measure our emissions from business travel (plane and train) every three months, using our travel agency's database and emission factors defined by ADEME, the French agency for the ecological transition (SDG 13).

In 2023, CNES emitted 8,756 tonnes of CO₂e from business travel, versus 14,168 tonnes in 2019, a reduction of 38%. These emissions are now offset. To set an example, CNES instituted a carbon contribution in 2023 of €100 per tonne, based on offsetting through accredited projects and investment. Two Verified Carbon Standard projects were thus funded and an investment call for projects was issued in December. This is the first initiative of its kind by a French government agency.



FOSTERING FUTURE CITIZENS



In 2023, we formally set out our education policy for the next three years, in line with our Objectives and Performance Contract (OPC) and Ministry of Education guidelines.

Climate change (SDG 13), scarcity of resources (SDGs 6 and 7) and preservation of biodiversity (SDGs 14 and 15)—subjects covered in the national school curriculum—all feature strongly in the agency's educational projects and materials. We have added new material to our catalogue to show youngsters how space is vital to tackling the big challenges facing us, enabling them to take responsibility as future citizens. For example, we produced three short videos for young people to raise awareness of key climate change issues (adapting cities, building flood resilience, preserving ecosystems), presenting solutions implemented by Space for Climate Observatory projects using satellite imagery.

From a broader social perspective, our aim is also to develop a more inclusive policy ensuring better accessibility, particularly for priority regions, and actions for women and people with special needs.

2023 CSR ROADMAP RESULTS

This unique roadmap addresses CSR issues across the agency, as set out in our 2022-2025 Objectives and Performance Contract (OPC).



PROMOTING SUSTAINABLE AND PROTECTIVE SPACE

+ SPACE DEBRIS:

- 35,000 manoeuvrable or drifting objects larger than 10 centimetres tracked daily to prevent collisions with operational satellites.
- "MOOC CNES" training course on space techniques and applications in a shifting economic landscape, covering sustainable development challenges and the limits of what the planet can support.



BEING A RESPONSIBLE EMPLOYER

+ DIVERSITY & INCLUSION

- Women's leadership support programme: two pilot sessions
- Gender equality index: 90/100.

+ EDUCATION

- Awareness raising for 657,590 youngsters (including 6,000 schoolchildren visiting the Guiana Space Centre), up 10% on 2022.
- Direct involvement of 39,266 youngsters in educational projects.
- 2,000 teachers trained
- 130 ninth-grade students completed a one-week internship at one of CNES's four field centres.
- Connecting French Guiana - Bridging the gap: three small lower secondary schools connected in the Ameridian region of Haut-Maroni.

+ EMPLOYEE TRAINING & AWARENESS

- 28% of employees completed CSR training.
- Four new training courses followed by 360 employees (fundamentals, sustainable procurement, eco-gestures, eco-design) and two fresks (climate and biodiversity).

+ EMPLOYMENT

- One job in six in the private sector in French Guiana is linked to space (more than 4,000 direct and indirect jobs).



CREATING SHARED VALUE THROUGH SPACE

+ FRANCE 2030 GOVERNMENT PROGRAMME, SPACE AND RESOURCES STRAND

- Surveying and protecting the oceans' health and resources (contract with Unseenlabs).

- Service demonstration to manage water volumes and quality for soil irrigation (contracts with CS, Thales, Magellium and Kermap).

- Service demonstration to supply space surveillance and space operations safety data (contracts with U-Space, ShareMySpace, Infinite Orbit and other firms).

+ INNOVATION & NEWSPACE

- Strengthening of New Entrants Committee (CNE) CSR criteria.

- 1st Sustainable Space Challenge: technical support and funding for five laureates working on sustainable space themes, e.g. recyclable nanosatellites, eco-design decision-support software.

- Digital & Health Twin Challenge: meet space challenges (astronauts) while fostering health solutions on Earth for citizens' well-being; technical support and funding for three laureates.



REDUCING OUR ENVIRONMENTAL FOOTPRINT

+ BEGES

CNES GHG assessment in 2022: 430 kt CO₂e, i.e. 102 t CO₂e/FTE per person on site (CNES and other personnel).

+ SUSTAINABLE PROCUREMENT:

52.5% of contracts awarded in 2023 include at least one environmental consideration (target of 100% by 2025).

+ SUPPORT

for development of plasma thrusters: total satellite mass about 20% lighter, reduced environmental impact of launch.

+ FRIGORIE STORAGE

Start of project to demonstrate frigorie storage at the CSG to reduce energy consumption for cooling.

+ LAUNCH OF HYGUANE

project at the CSG: first project to produce green hydrogen in a French overseas territory.

+ CONSTRUCTION UNDERWAY

of 2nd solar farm at the CSG.

+ BIODIVERSITY

Act4Nature EEN conservation accreditation, level "Improved".



SUPPORTING REGIONAL RESILIENCE

+ SCO

61 SCO France accredited projects, e.g. ALTELYS project to monitor heat islands with connected sensors and multisource satellite data in the city of Rennes, in partnership with the city of Presidente Prudente in Brazil.

+ INTERNATIONAL CHARTER SPACE AND MAJOR DISASTERS

63 activations, notably for 18 floods, 18 hurricanes/typhoons, 7 earthquakes, 7 landslides, 2 wildfires and 1 volcano eruption.

+ OVERSEAS TERRITORIES

Establishment of a roadmap to provide space solutions for these territories' local requirements (fisheries, transport, pleasure boating, agriculture, tourism, etc.); signature of an agreement with New Caledonia.

+ TERRITORIES AND DECARBONIZING ENERGY

Agreement with French utility Engie, notably its Siradel and Tractebel units, on themes like 3D modelling of territories, deployment of high-added-value services, decision support and planning.

MOVING UP THE GEARS ON GENDER EQUALITY

Gender equality is a vital facet of corporate social responsibility and has been a constant focus of attention for CNES, our senior management team and union representatives for many years. In 2023, the agency stepped up its efforts in this regard with new measures.

In 2019, CNES signed a fourth gender equality agreement with the twofold priority of changing behaviours and working to break the glass ceiling for women aspiring to senior positions, still perceptible in an agency where engineering jobs have long been a male preserve. At the same time, to step up our commitment in line with the new Objectives and Performance Contract (OPC) signed with the government in 2022, the agency's senior management team established a gender equality action plan.

In 2023: **Nearly 80%** of the actions in CNES's gender equality action plan had been accomplished by year end. **70%** of these actions are now recurrent. A few cases in point: webinars to raise awareness about gender, bias and stereotypes; training module for managers on the theme of taking discrimination out of recruitment.

AMENDMENT AND NEW MEASURES

On 15 November 2023, CNES senior management signed with union representatives an amendment to the gender equality agreement, pending completion by 2025 of future more wide-ranging negotiations on diversity.

The agreement's scope has also been extended, notably with new measures concerning paternity leave, extended to 45 days, work conditions for women breastfeeding their child during pregnancy and efforts to combat domestic and family violence.



Laurène Gillot
CIEL project leader

Women in engineering posts are still in the minority at CNES, but I really believe that a good gender mix is key to performance. This training module is a great experience: we got the chance to ask questions about ourselves, what we want, how we see ourselves evolving and how to increase our impact. It's a huge success.

+ [FOCUS] TARGETING SUPPORT FOR WOMEN

CNES has created a leadership support process for women, at all stages in their career.

Highlighting the obstacles and stereotypes that women still face when aspiring to leadership positions, it provides a forum for discussion and thinking about workplace gender equality.

More than 40 of our people took part in two pilot sessions at the end of 2022, which closed with a conference in April 2023.

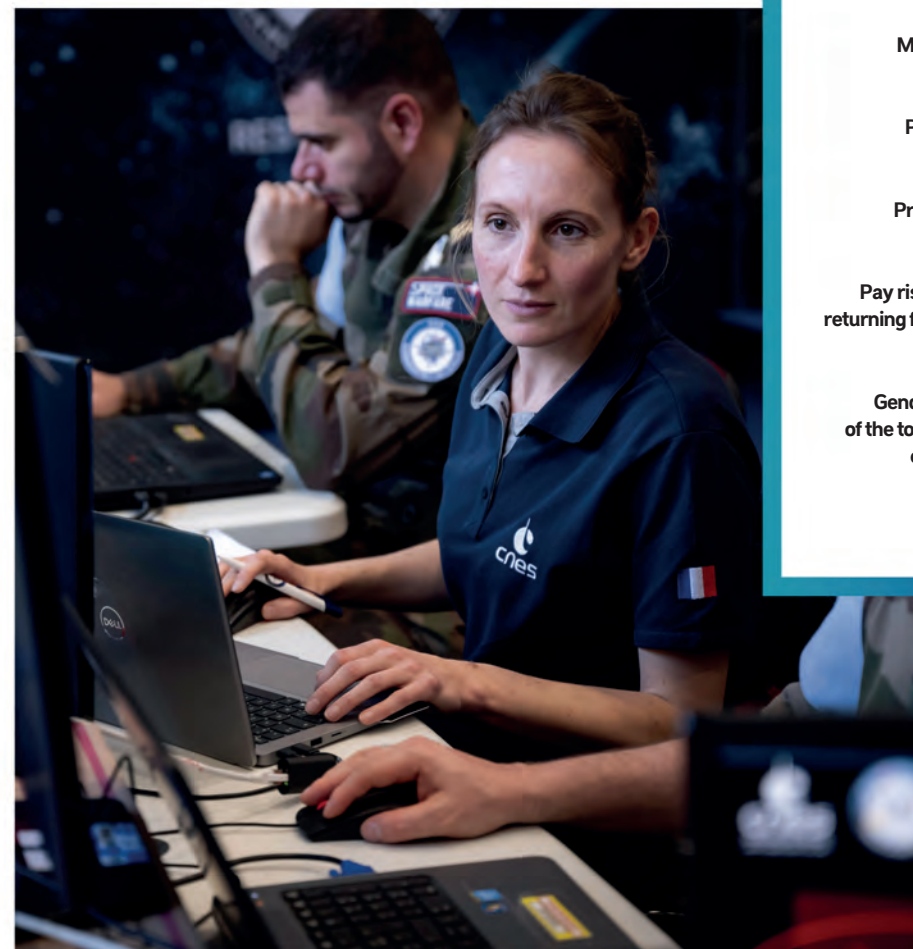
Feedback has been positive and new sessions are already planned at each of the agency's field centres in 2024.

30

training sessions on preventing moral and sexual harassment, at 30 November 2023.

COMMITTED TO ADVANCING WOMEN'S CAREER AMBITIONS

Alongside the gender equality agreement, CNES is working hard to promote space careers to women. Stand-outs in 2023 included visits to the agency's Toulouse Space Centre for young girls to learn about space careers and talk with female engineers. In February, our Director of Human Resources took part in a masterclass for the Elles Bougent women's association to highlight what we are doing to support careers for women. We also attend job forums and take part in webinars throughout the year, where our teams share gender equality actions and indicators.



GENDER EQUALITY INDEX

For its 2023 index, CNES obtained a score of

90/100

This index factors in five indicators:

- 1 Mean pay gap
- 2 Pay rise gap
- 3 Promotion gap
- 4 Pay rise for employees returning from maternity leave
- 5 Gender distribution of the top ten highest-paid employees

SKILLS MANAGEMENT: NEW METHOD AND GO-AHEAD HR POLICY

In a fast-moving space environment, what strategic skills is CNES going to need over the next five to ten years? To answer this question, the agency's Human Resources teams are innovating with the ambition of developing a vision for the future through Strategic Workforce Planning (SWP).

Some **200** key competencies identified, **40%** of them emerging (where expertise needs to be rapidly acquired).

Our SWP method finalized in 2023 consists of five key steps:

- Precisely map all current skills within the agency. In total, 18 job families, divided into 61 job segments and more than 400 functions have been identified.
- Model demographic changes, notably retirements, by job family, segment and function to anticipate requirements five to ten years in the future.
- Assess role and skills requirements for the next five years, according to different change scenarios.
- Identify strategic competencies to be acquired, developed and sustained, pinpoint potential skills gaps.
- Build an action plan from this assessment, based on training, recruitment, mobility and coaching programmes, etc.

Outputs from the SWP process are a compass guiding recruitment, training, mobility and career management, feeding into annual recruitment plans and multi-year skills development guidelines.

The SWP process is updated every two years to align with the agency's strategy, chart an overall course and retain a broad picture of key competencies.



Valérie Clery
Deputy Head, HR development sub-directorate
This strategic initiative shows our commitment and our ability to anticipate developments in our fast-moving sector, by adapting our HR practices to attract, nurture and retain the best and brightest talents while planning for future needs in close collaboration with line managers.

HUMAN RESOURCES IN FIGURES

Data at 31/12/2023

2,351
PERMANENT HEADCOUNT

152
Permanent hires in 2022

48
Mean age of CNES employees

35
Mean age of permanent hires

182
♀ PARIS DAUMESNIL + 3 NFSE*

180
♀ PARIS LES HALLES

253
♀ KOUROU + 1 NFSE*

1,736
♀ TOULOUSE & AIRE SUR L'ADOUR + 4 NFSE*

MEN/WOMEN HEADCOUNT

911
WOMEN + 3 WOMEN NFSE*

1,440
MEN + 5 MEN NFSE*



INTERNS AND WORK/STUDY PLACEMENTS

198
INTERNS
165 in mainland France
33 in French Guiana

93
WORK/STUDY PLACEMENTS
84 in mainland France
9 in French Guiana

INTERNAL MOBILITY

12.55%
OVERALL MOBILITY RATE

0.9%
22 Moves outside agency

2.6%
60 Relocations

9.1%
213 Functional moves**

*Non-French-speaking Europeans
**Not including end-of-career leave

A HECTIC PACE OF EVENTS

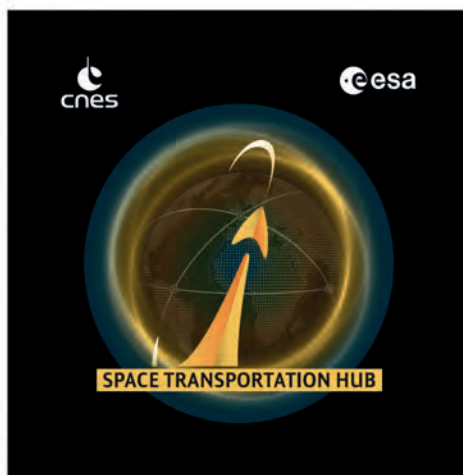
New equipment, new workspaces and soft mobility initiatives were just some of the many developments that marked 2023 at our four field centres.



📍 GUIANA SPACE CENTRE

ARIANE 6 ON VIEW FOR ALL THE FAMILY

Since July 2023, employees at the Guiana Space Centre have been visiting the new ELA-4 launch complex with their families. More than 500 people have so far taken the opportunity to (re)discover the launch pad, the test mock-up under the mobile gantry and the assembly building, as well as see how combined tests are going and bag a souvenir picture.



📍 PARIS DAUMESNIL

SPACE TRANSPORTATION HUB SETS UP STORE IN DAUMESNIL

Imagined by CNES and ESA, the space transportation hub officially opened in March 2023 with the goal of bringing together a community of European experts with an interest in this field. Workspaces have been modernized to spark new ways of working for ESA's and CNES's people at the field centre.



📍 TOULOUSE

NEW ANTENNA FOR AUSSAGUEL

The new STC telecommand station inaugurated in September 2023 at the Issus-Aussaguel site south of Toulouse might be smaller than existing stations, but with its blue LED lights and profiled design it certainly stands out. Signalling a turn in a different technical and operational direction, the antenna is the first in a series of five stations to be rolled out between now and 2029 to round out CNES's multi-mission network.



📍 PARIS LES HALLES

NEW STEPS FOR FUTURE HEAD OFFICE

Following the signing of a new lease in July 2023, CNES will remain in its current premises at Paris Les Halles. As the main tenant, we will be occupying part of the building and sharing it with new partners. As this decision to stay at Les Halles will require some refurbishments, tenders have been put out for design and construction work to run from July 2024 to December 2025. During this transition period, our people will be moving to a co-working site in Rue de la Verrerie, near the current premises.



📍 TOULOUSE

TOULOUSE SPACE CENTRE WINS GOLD FOR CYCLING

Led by the French bicycle users federation FUB and supported by ADEME, the French agency for the ecological transition, the pro-cycling employers label highlights facilities pursuing ambitious actions to encourage people to cycle more. CNES has been doing this for several years now at its Toulouse Space Centre, where it sought FUB accreditation. The numerous actions undertaken include more bike shelters, monthly bike maintenance workshops, repair tutorials, showers, dressing rooms and lockers in certain buildings, themed events and the development of a community of cyclists. Our teams' efforts and commitment have brought real results, as the field centre has been awarded a gold label.

Between

250 and 500

bikes are ridden every day at the Toulouse Space Centre.



2023 PARIS AIR SHOW: A RECORD YEAR

After a four-year hiatus, the Paris Air Show was back at the Le Bourget exhibition centre from 19 to 25 June 2023, with a packed programme of conferences, contract signatures, visits and aerial demonstrations. The 54th edition of the show gave the sector's players the chance to come together and welcome enthusiasts from all horizons.

JAPAN AS CNES'S GUEST OF HONOUR

Following his visit to the CNES/ESA Space Pavilion, President Emmanuel Macron was welcomed to the CNES Pavilion by Philippe Baptiste and his counterpart from JAXA Hiroshi Yamakawa, marking the close partnership between France and Japan in space.

After the signature of an agreement consolidating the tripartite collaboration between Japan, France and Germany on the MMX exploration mission (see page 47), a panel session was held on the sustainability of space activities. This session provided the opportunity for Japanese space debris removal start-up Astroscale to announce the opening of a facility in France and the signing of a contract with CNES.



Philippe Baptiste CNES Chairman & CEO

Japan and France have accomplished great things together in space in the past and the years ahead are going to prove very prolific for us.

+ IN FIGURES

+ 2,500
exhibitors from
46 countries

+ 2
full-scale mock-ups
of Ariane 1 and 5

+ 30,000
visitors to the CNES
Pavilion



FOUNDATIONAL MEETINGS AND AGREEMENTS

The Paris Air Show is a must-attend event for the space community, where new partnerships are forged, like the signature of a letter of intent by CNES and Brazilian space agency AEB to build a stratospheric balloon launch base in Brazil.

Also worth mentioning is the signature of the mandate of the space mission ethics committee by CNES and Edouard Geffray, the committee's first chair. And pursuing our efforts to disseminate science and space culture, we renewed our collaboration with Universcience and the Air & Space Museum, and sealed a new partnership with the National Naval Museum.

+ LIMITING THE IMPACTS OF OUR EVENTS

For the last two years, CNES has evolved its processes to make the agency's communication actions more responsible. In particular, we have instituted a proactive approach towards our people regarding the organization of events. A practical guide and a pilot approach was put in place across the agency to transform how we conceive events from top to bottom.

Our presence at the Paris Air Show fully reflected this approach, as we reduced printing, limited the number of screens, employed more sustainable or reusable materials and took the train wherever possible to get to the event.

CNES cut its greenhouse gas emissions by
47%
compared to the 2019 Paris Air Show.

INSPIRING CAREERS

The public open days at the Paris Air Show put on a range of events to spark visitors' curiosity and inspire careers. For example, the Elles Bougent association was on hand to encourage more women to take up careers in STEM sectors. In the CNES Pavilion, the finalists of the Launch the Future student competition exhibited their innovative space transportation concepts at a special pitch day. The laureate selected by a topflight judging panel with representatives from the defence innovation agency AID, the French enterprise agency DGE, ESA, the Ministry for Higher Education, Research & Innovation and CNES will get the chance to take part in a microgravity science experiment aboard the Zero-G parabolic flight aircraft.



2023 HIGHLIGHTS

CNES pursued its outreach efforts in 2023, notably finding new ways to underline its commitments to education, furthering space culture and preserving the environment.

C'SPACE AT 60

Organized by CNES at the Camp de Ger military base with the 1st Parachute Hussar Regiment as host, the 2023 edition of the C'Space student space project event celebrated its 60th anniversary. The event in July saw launches of experimental rockets and cansats, in the presence of ESA reserve astronaut Arnaud Prost. For the anniversary celebrations, participants were treated to an exhibition retracing the history of C'Space and testimonials from student club representatives recounting their projects, adventures and subsequent careers, and their current connection to the event. No fewer than 300 youngsters were in attendance this year.



[KERBAL CHALLENGE] A WINNER FOR LAUNCHERS AND GAMERS

CNES teamed up with content creator Frédéric Molas, alias JDG, to organize a challenge on the Kerbal Space Program video game. The idea is to get gamers to replicate the flight of a reusable launcher similar to Callisto, the goal being to educate people in a fun way on what building and operating launchers is all about. The challenge, with JDG as host flanked by two engineers from CNES, has been viewed by more than 600,000 people.



See the Kerbal Space Challenge on replay

+ 63,000 Subscribers to the agency's LinkedIn newsletter. The new two-monthly format turns the spotlight on current events in which CNES is closely involved, such as the JUICE mission, the final flight of Ariane 5, the role of range safety and Ariane 6 combined tests. It also details future events and CNES job offers.

CNES OPENS ITS DOORS TO THE PUBLIC

For the first time, CNES is taking members of the public behind the scenes with guided tours of its Toulouse Space Centre (CST) on one Thursday every month. Since February, visitors are able to discover the Space room, the CADMOS control room, main control room n°4, the Mars rover testing ground and the French Cospas-Sarsat mission control centre. To conceive the tour and guide visitors, we teamed up with the Cité de l'espace space theme park, a standard bearer in the Occitanie region for space education and outreach. Companies, groups of students and associations can visit just the CST or combine it with the Cité de l'espace.



Book your visit



RESHAPED EDUCATION POLICY

Since the start of the 2023 school year, we have given new impetus to our education efforts and formally set priorities for the next three years. Our actions aimed at younger generations are now guided by four main focuses:

- Extending the scope of our education actions nationwide
- Engaging a more inclusive education policy
- Concentrating more intently on sustainable development
- Making space careers more attractive

Numerous actions are already underway, like for example broadening our public portfolio to include children under six years old. At the request of the Ministry of Education, we also initiated an AI project to raise young people's awareness of the technology's potential.

657,590

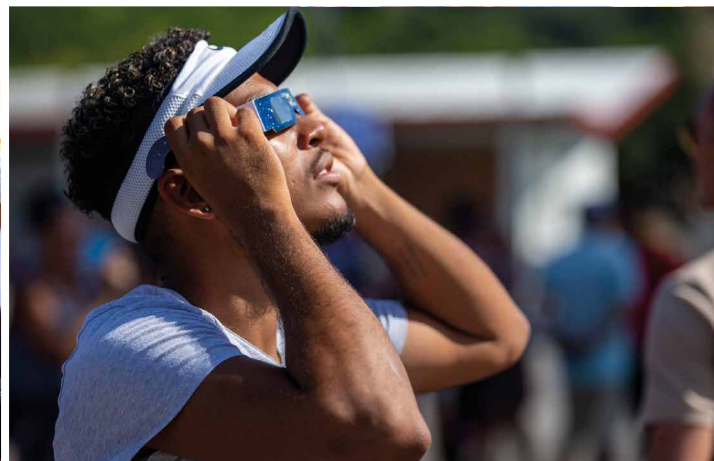
youngsters reached by CNES's awareness-raising actions

39,266

youngsters directly involved in the agency's educational projects

SPACE FESTIVAL AT THE GUIANA SPACE CENTRE

Last October, the Guiana Space Centre's first Space Festival proved a huge success, with more than 10,000 visitors over the three-day event celebrated simultaneously around the globe. The packed programme included the chance to meet contractors working at the base, scientific and robotic workshops, demonstrations with the armed forces and fire service, a virtual-reality experience, planetarium, documentary showings in the Jupiter control room, projections on the mock-up of Ariane 5, and even a solar eclipse.



10,000
visitors over the three-day event



+ SPACE PODCAST SEASON 2

Our podcast fielding questions about space from children was back for its second season, with 20 new episodes streamed during the final quarter on podcast.cnes.fr, Spotify, Deezer and Apple Podcast. Subjects covered included Earth observation, exploration of the universe, how launchers and satellites work, and international cooperation. The show has been a great success, shared on 20 local radio stations all over France.



Listen to our podcast!



FIRST TECHNOLOGY & DIGITAL DAY

On 10 October 2023, more than 450 participants from all horizons came together for CNES's first Technology & Digital Day. This event put on plenary presentations, poster sessions and technology demonstrations throughout the day, with the emphasis on interaction between participants. As guest of honour, French aerospace research centre ONERA outlined its space technology strategy and contribution to research and experimentation in partnership with CNES. The event illustrates our agency's ambitions in sustaining technical excellence and is a testament to our continuing commitment to forging close partnerships and paving the way for future space systems and applications.



SPACE & DIGITAL INNOVATION DAY

On 31 January 2023, CNES brought together more than 500 stakeholders from the French space ecosystem in Toulouse for its Innovation Day, on the theme of "Space and Digital". At this eighth edition of the event, the various facets of the space sector's digital transformation were addressed by presentations from the agency's partners. We also took this opportunity to promote our foresight activities, focusing on the place of digital technologies in the agency's technical policy, the CSG-New Generation project to refurbish the Guiana Space Centre, digital simulations for cryogenic launcher engines and the Data Campus.

2023 SOCIAL MEDIA REVIEW

2023 saw a major effort in audiovisual production, as we posted more than a hundred videos across all of our social media channels. There were numerous livestreams on our Twitch channel, including gaming evenings, theme-based lunches and several special events like the JUICE mission outreach evening, the (almost) last roll-out of Ariane 5 and the K-Listo challenge in partnership with streamer Joueur du Grenier. Our LinkedIn account continues to grow, with now more than 60,000 subscribers to our monthly newsletter.



FACEBOOK

144,110 FOLLOWERS
+ 2,900
+ 2%



YOUTUBE

100,560 FOLLOWERS
+ 2,760
+ 2.8%



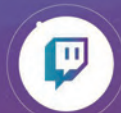
X

192,300 FOLLOWERS
+ 15,900
+ 9%



INSTAGRAM

156,860 FOLLOWERS
+ 11,500
+ 8%



TWITCH

22,722 FOLLOWERS
+ 4,000
+ 21.3%



TIKTOK

6,600 FOLLOWERS
+ 2,020
+ 44%



LINKEDIN

149,800 FOLLOWERS
+ 22,300
+ 17.4%

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HEAD OFFICE PARIS LES HALLES

2, place Maurice Quentin
75039 Paris Cedex 01
Tel. +33 (0)1 44 76 75 00



PARIS DAUMESNIL

52, rue Jacques Hillairet
75612 Paris Cedex
Tel. +33 (0)1 80 97 71 11



TOULOUSE SPACE CENTRE

18, avenue Edouard Belin
31401 Toulouse Cedex 9
Tel. +33 (0)5 61 27 31 31



GUIANA SPACE CENTRE

BP 726
97387 Kourou Cedex
Tel. + 594 (0)5 94 33 51 11