



Ambition 2020

2015, space for the climate



Four centers of excellence

CNES employs some 2,500 men and women with a passion for space and its infinite innovative applications for society.

The Midi-Pyrénées region has hosted CNES since 1968. The Toulouse Space Center (CST) is the agency's biggest technical and operational center. Its engineers research, design, develop, implement, orbit, control and operate orbital systems.

Paris Daumesnil is home to the Launch Vehicles Directorate (DLA), which has been designing Ariane launchers for over 40 years. Its specialists are working tirelessly to secure the future of the European launcher within a joint team composed of CNES and European Space Agency personnel.

In French Guiana, the Guiana Space Center (CSG) is in charge of launching all European launchers. Ideally located near the equator, Europe's spaceport is a major asset for the European space program.

Finally, Paris Les Halles hosts CNES headquarters, responsible for mapping out French and European space policy and conducting CNES programs, whether national, European or international.



The Science Operation and Navigation Center (SONC), located at CNES in Toulouse

broadband telecommunications, positioning, environmental data collection or search and rescue.

- Defense: very-high-resolution optical observation, electronic intelligence, ultra-secure telecommunications and space situational awareness all help to assure citizens' peace and security.

Second space budget in the world

With slightly more than €30 per capita per year, France's civil space budget comes second only to the United States (€46), ahead of Germany (€16) and the United Kingdom (€6).

In 2014, CNES's government-allotted budget of €1,982 million was allocated as follows:

- Contribution to the European Space Agency: €763 million
- National program: €594 million
- Program for Investment in the Future: €300 million
- Own resources: €325 million

In 2015, CNES will have budget of €2,126 million:

- Contribution to the European Space Agency: €827 million
- National program: €734 million
- Program for Investment in the Future: €202 million
- Own resources: €363million

This budget testifies not only to the high priority given to space by French authorities but also the remarkable efficiency of CNES, whose programs guarantee the highest possible return on investments.

Five strategic focuses

CNES activities focus on five strategic areas covering all the expertise needed to conceive and implement French space policy:

- Ariane: independent access to space is an issue of national sovereignty, guaranteed by the full range of European launch vehicles.
- Sciences: space exploration seeks answers to the basic questions of humankind on the origins of the solar system, galaxies and life itself.
- Observation: our planet is under constant scrutiny by satellites that observe it, study its atmosphere and provide crucial meteorological, oceanographic and altimetry data.
- Telecommunications: satellites play a vital role in such areas as



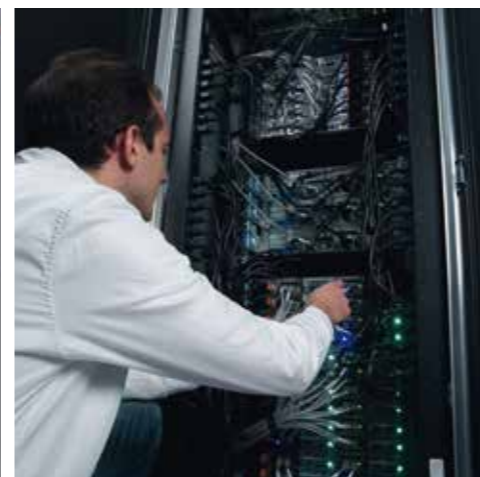
Sentinel 2A satellite from the Copernicus program undergoing testing at the IABG in Munich



Pilot in the clean room at the Toulouse Space Center



The futuristic concurrent engineering room at DLA



The Gaia high-density computer storage bay

Satellite Gaia illustration

CNES and Europe

Since 1975, the European Space Agency has been conducting European space policy on behalf of its member states. With 20 member states and 2,200 employees, its leading contributor is France, represented by CNES, which guarantees Europe's independent access to space and helps prepare new-generation space systems and develop international cooperation.

Since the Treaty of Lisbon in 2007, space policy has become one of the responsibilities of the European Union, which develops programs meeting Europe's institutional and commercial needs. The main two ongoing programs are Galileo for satellite positioning and Copernicus for environmental studies. CNES is participating in both, alongside the European Commission and the European Space Agency.



ESA ministerial council meeting, Tuesday 2 December 2014 in Luxembourg

Moreover, CNES maintains an ongoing dialogue with most of the other space powers on the planet (Brazil, Canada, United Arab Emirates, Mexico, Thailand, etc.) for the benefit of the entire French and European space community.

International partnerships

CNES also leads numerous projects with international partners outside Europe. Partnerships reduce the cost per participant, making it possible to initiate major projects together, capitalize on France's scientific and industrial expertise, and acquire new skills.

Partnerships have led to many successes in the past. Today, numerous programs are underway with most of the world's space powers:

- United States: oceanography (Jason 3, Swot), search-and-rescue (Cospas-Sarsat), Mars exploration (Curiosity, InSight Mars 2020);
- China: oceanography (CFOSat), astrophysics (Svom), space medicine (Cardiospace);
- India: atmospheric research (Megha-Tropiques), altimetry (SARAL-AIika);
- Russia: launch system (Soyuz in Guiana), research and technology;
- Japan: research and technology, preparation of the future.

CNES and employment

By inventing tomorrow's space systems, CNES is stimulating technological innovation, economic development and France's industrial policy. CNES drives innovation to boost employment, 80% of CNES's budget returning to French industry.

In mainland France, the space sector generates 16,000 jobs, the French space industry representing 40% of Europe's space industry. The Guiana Space Center provides 1,700 direct jobs but generates five times more indirectly, accounting for 15% of all employment in French Guiana.

With €20 of economic spin-offs for every €1 invested, the commercial space sector leverages industry, the economy, research, society and public policies, making CNES a key player in economic diplomacy.



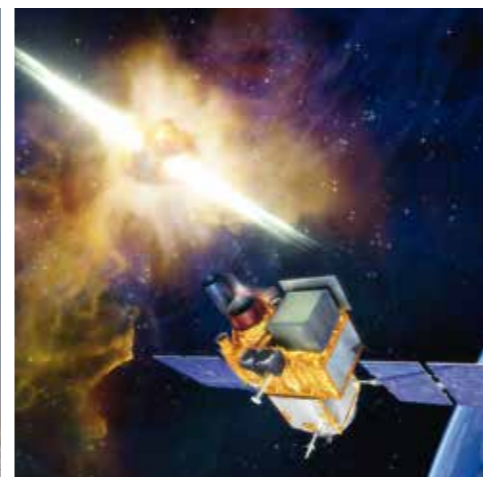
Swot



French Instrument Mars Operation Center (FIMOC), Toulouse



Soyuz at the Guiana Space Center



Svom

● A PPS[®]1350-G electric thruster developed by SNECMA (Safran) under a CNES contract

Ambition 2020

After the historic successes chalked up in 2014, 2015 and the coming years will be crucial for French and European space policy. CNES is therefore constantly adapting its roadmap, dubbed Ambition 2020, to develop its capacity for innovation and ensure France remains one of the leading space powers.

Supported by an ambitious, determined French space policy with a successful track record, the advantages of a budget that gives it the means to achieve its ambitions and by the dynamism of its experienced, enthusiastic employees, CNES will continue to invest in its five strategic areas of interest.



SEIS, the instrument on the InSight mission to probe the core of Mars

Ariane

CNES is continuing to operate European launch vehicles for large or small payloads, scientific research, Earth observation, telecommunications and defense. CNES also positions the satellites which it then operates.

At the same time, Europe is reinventing Ariane through the Ariane 6 program. This new launcher, designed by teams at CNES, the European Space Agency and in the space industry, will be more suitable for government and commercial satellite launches thanks to its two versions, Ariane 62 and Ariane 64, its upper stage re-ignition capability and reduced operating costs. The historic decision to develop it, made by Europe in Luxembourg, should enable its maiden launch to take place in 2020.



Cosmic Vision: Juice Mission

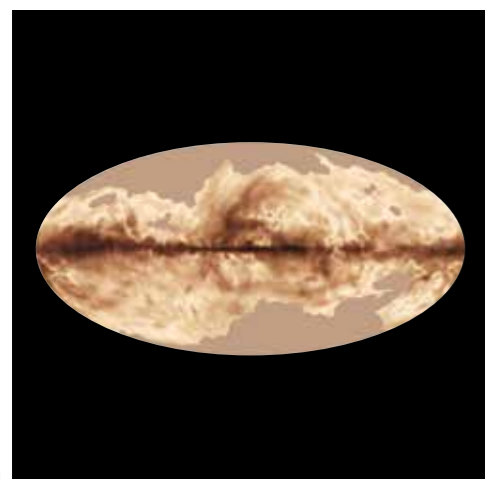
Sciences

2014 will obviously be remembered as the year that saw the global triumph of Rosetta and the successful landing of Philae on the comet Churyumov-Gerasimenko. With the data collected, a major breakthrough is expected in our knowledge of the origins of life.

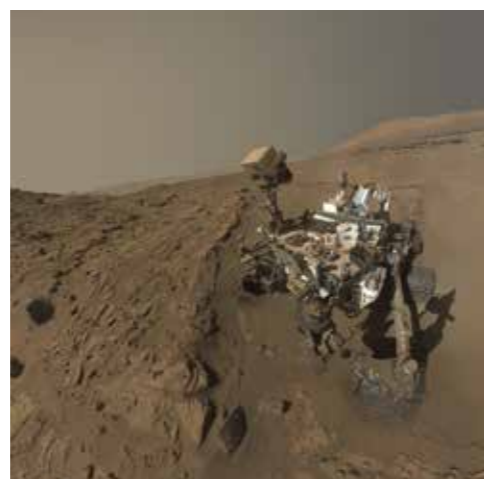
Just as spectacular are the results from observations by the Planck satellite, a mission in which the French scientific community played a leading role, and the success of Curiosity, the Mars rover carrying the CNES-developed ChemCam and SAM instruments. CNES was also responsible for developing the InSight seismometer. A little later, French scientists will be kept busy on the ExoMars and Mars 2020 programs.



Lift-off the future Ariane 6 launcher, version 64



Planck reveals the magnetic fingerprint of our Galaxy



The MSL Curiosity rover on Mars



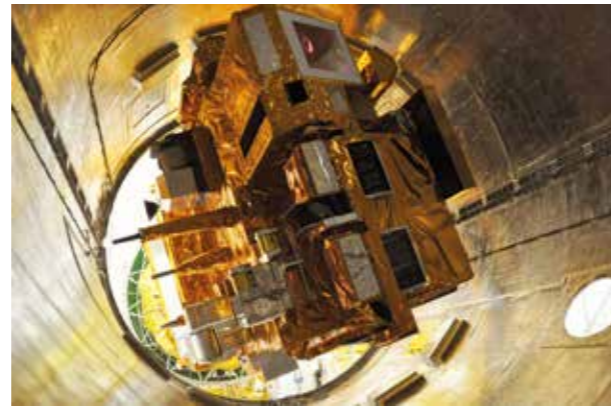
The accelerometers for Microscope, at the TSC



ExoMars mission

In other fields, Microscope will be the first attempt to use a satellite to test the equivalence principle in the theory of general relativity, while Taranis will be studying X and gamma rays. CNES is strongly committed to Euclid, a mission scheduled for 2020 to determine the origin of the expansion of the Universe and the nature of mysterious dark energy. In 2022, the Juice probe will leave on its eight-year journey to Jupiter.

Finally, to meet the needs of scientific users, CNES designs, develops and operates aerostat systems. Balloon campaigns are used for various purposes, ranging from measuring industrial pollution to studying the water cycle—alternating between drought and torrential rain—in the Mediterranean region.



MetOp-B under the Soyuz launcher fairing

Observation

Since 2013, Saral-AltiKa joined ocean surveyors Jason 1 and 2. Its high-resolution Ka-band radar altimeter is an innovation in satellite altimetry. MetOp-B, flying the IASI interferometer, has already improved weather forecasts out to 72 hours, while Swarm is mapping the Earth's magnetic field.

IASI will be followed by IASI-NG aboard the MetOp SG (second-generation) satellites. Then around 2017 it will be the turn of Merlin, a joint mission developed by CNES and Germany's DLR to study greenhouse gases and methane. In 2020, Swot will begin investigating freshwater resources, a source of life on Earth.

Telecommunications

CNES will continue to deploy and position Europe's satellite navigation system, Galileo. When completed, this constellation will give Europe real independence in satellite-based navigation. Argos instruments are also playing a vital role in locating people in distress. Argos 3, to be flown on Saral-AltiKa, is already operational and Argos 4 under development.

New telecommunications satellites offer innovative services, including broadband internet, high-definition television and increased mobility. This explains why payloads are becoming more powerful, heavier and more flexible.

For this reason, CNES is investing heavily in the development of electrically-propelled satellites, and has teamed up with its European partners to develop Neosat, a new-generation electric satellite bus. At the same time, work continues on the fast-broadband telecommunications satellite THD-SAT.

Defense

The two Pleiades satellites continue to provide high-resolution satellite images to an accuracy of within one meter. Pleiades was designed as a dual-use military and civil Earth observation system. Defense needs take priority, but civilians also benefit from this very accurate source of information for civil protection, mapping and precision farming, for example.

This dual-use nature also characterizes the Athena-Fidus telecommunications system which will complement the capacities of the Syracuse satellites and provide broadband services for the armed forces and emergency relief teams. The Syracuse system will then be replaced by Comsat-NG, currently in the design phase.

The future Musis observation system, which includes the CSO optical segment, will focus on specific targets with a high degree of precision. The first satellite is to be launched in 2017. Finally, the military space sector's electronic intelligence program is leading into the operational CERES program.



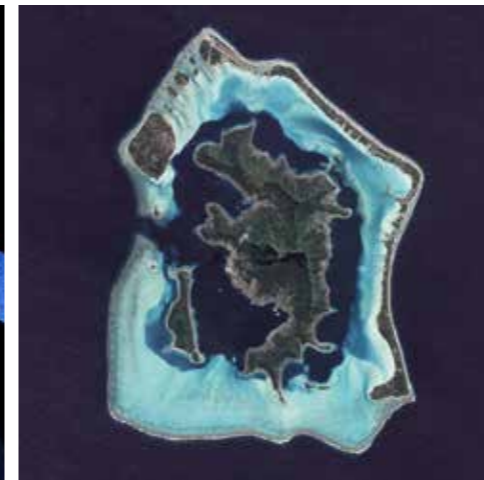
CESARS, the Center of expertise and support for satellite-base telecommunications, at CNES Toulouse



Alphasat



THD Sat



Island of Bora-Bora seen by Pleiades



The Musis-CSO, constellation of Earth-observation satellites

CNES Centers



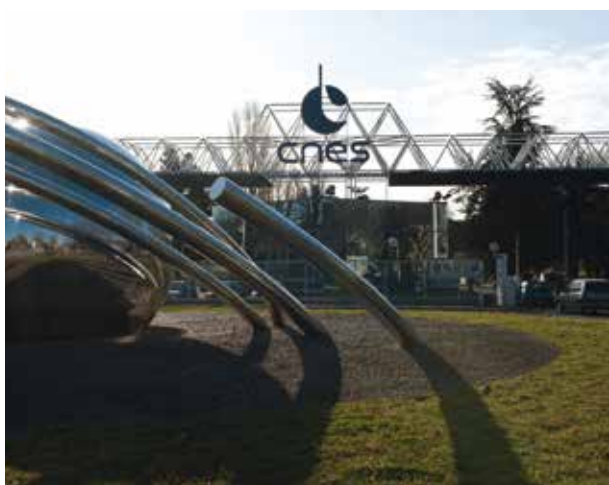
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Cover: Islands in French Polynesia seen by Pleiades, from left to right: part of the Tuamotu archipelago, Rapa Island, the Bora-Bora lagoon

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