

A-Z of CNES projects

Access to space



ARIANE European launch vehicle given the go-ahead by ESA in 1973. After a maiden flight on 24 December 1979, it was operational by late 1981. There have been four generations: Ariane 1 (basic version), Ariane 2 and 3, and Ariane 4.

ARIANE 5 ECA Enhanced version of Ariane 5 capable of launching two satellites weighing over 9 tonnes in total into geostationary orbit. Ariane 5 ECA performed six successful launches in 2009, and Ariane 5 GS a further one.

ATV (AUTOMATED TRANSFER VEHICLE) Fully automated, uncrewed resupply vessel designed to fly to the International Space Station. CNES is responsible for ATV development and operations. The ATV control centre is at the Toulouse Space Centre. The first ATV, Jules Verne, docked with the ISS on 3 April 2008. The second mission, Johannes Kepler, is slated for 2010.

FLPP (FUTURE LAUNCHERS PREPARATORY PROGRAMME) Looking ahead to 2020 and beyond, this programme is preparing a new generation of low-cost, reliable European launch vehicles.

P80 New-generation booster serving both as a technology demonstrator and as the first stage of the Vega launcher. P80 is a major challenge for Europe's solid propellant sector and is focusing on cost reductions. Soon to be qualified.

VEGA European light launcher development programme put forward by Italy, targeting the small satellite market. It is designed to boost a payload of up to one tonne into a 700-kilometre circular polar orbit. Scheduled for launch in 2010.

SOYUZ IN GUIANA Under the French-Russian agreement of 7 November 2003, a Soyuz launch pad is being built at Europe's spaceport in French Guiana. Soyuz, a medium-lift launcher, will lift off from Kourou for the first time in 2010.

Earth, environment & climate

ALTIKA CNES high-precision altimetry payload to be flown on the Indian SARAL satellite in late 2010. AltiKa and Jason-2 data will be combined to obtain new measurements of coastal waters and ice formations.

CALIPSO (CLOUDS AEROSOLS LIDAR AND INFRARED PATHFINDER SATELLITE OBSERVATION) French-US mission to study the radiative effect of clouds and aerosols at different altitudes in the atmosphere. Launched on 28 April 2006, Calipso has joined the A-Train. Its measurements have become a benchmark for climate models.

DEMETER (DETECTION OF ELECTROMAGNETIC EMISSIONS TRANSMITTED FROM EARTHQUAKE REGIONS) Launched in 2004, Demeter—the first mission to employ a Myriade microsatellite bus—is designed to investigate correlations between electromagnetic disturbances in the upper atmosphere and natural geophysical phenomena such as seismic or volcanic activity or tsunamis.

GOCE (GRAVITY FIELD AND STEADY STATE OCEAN CIRCULATION EXPLORER) ESA mission launched in 2009 to accurately model Earth's geoid. CNES is part of the GRGS consortium processing GOCE data to provide a reference geoid.

DORIS (DOPPLER ORBITOGRAPHY AND RADIOPOSITIONING INTEGRATED BY SATELLITE) Designed by CNES, GRGS and IGN, DORIS meets the need for accurate orbit determination and location of ground beacons. DORIS has flown on the SPOT, Jason and Envisat satellites. In 2010, DORIS will celebrate 20 years in service.

GMES (GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY) The first pre-operational services of this European mission were deployed in 2008. The aim is to provide fully operational services to meet user needs from 2014 on.

IASI (INFRARED ATMOSPHERIC SOUNDING INTERFEROMETER) Key payload instrument on the European MetOp polar-orbiting meteorological satellites. It is designed to establish temperature and humidity profiles in the atmosphere for weather forecasting purposes. IASI was launched on MetOp-A on 19 October 2006.

JASON Ocean-observing satellite mission to measure ocean circulation and determine the marine geoid. A joint CNES/NASA mission, Jason-1 was successfully launched on 7 December 2001. Eumetsat and NOAA stepped in as partners for Jason-2, launched on 20 June 2008. Satellite oceanography is now fully operational.

MICROCARB AND CHARM CNES has begun concept studies on two projects to measure carbon fluxes from space. Microcarb will measure carbon dioxide (CO₂) and CHARM, methane (CH₄).



Earth, environment & climate

PARASOL (POLARIZATION AND ANISOTROPY OF REFLECTANCES FOR ATMOSPHERIC SCIENCE COUPLED WITH OBSERVATIONS FROM A LIDAR) CNES microsatellite mission formation-flying with five other satellites in the French-US A-Train observatory. It has been providing global data on aerosols and clouds for five years now.

PLEIADES Multisensor Earth-observation programme to succeed the SPOT series using smaller, cheaper and more agile satellites. Its optical high-resolution component, Pleiades HR, is being developed in cooperation with Italy as part of the broader dual-use civil and military ORFEO programme. Pleiades 1 and 2 will be launched in 2010 and 2011 respectively.

SIFTI (STATIC INFRARED FOURIER TRANSFORM INTERFEROMETER) Pollution-monitoring instrument that will investigate ozone and carbon monoxide down to the lower layers of Earth's atmosphere.

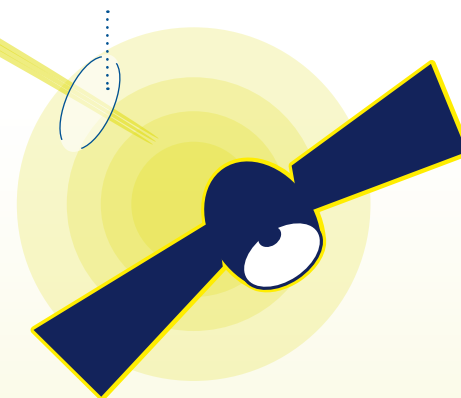
SMOS (SOIL MOISTURE AND OCEAN SALINITY) Joint ESA/CNES/CDTI mission devoted to measuring the surface moisture of land masses and ocean salinity on a global scale. Launched on 2 November 2009.

SWOT (SURFACE WATER OCEAN TOPOGRAPHY) Mission to map surface waters to clarify the evolution of freshwater surface reserves such as streams, rivers or lakes.

SWIM (SURFACE WAVE INVESTIGATION AND MONITORING) Instrument designed to measure the distribution on the ocean surface in terms of wavelength and wave propagation direction. SWIM will fly on the Chinese-French Ocean Satellite (CFOSAT) mission to be launched in 2014.

SPOT French programme in cooperation with Sweden and Belgium. System composed of a series of satellites—from SPOT 1 to SPOT 5—ground control and receiving stations, programming and image production centres.

VENUS (VEGETATION AND ENVIRONMENT MONITORING ON A NEW MICRO-SATELLITE) Joint French-Israeli Earth-observation mission using a 12-channel hyperspectral camera to monitor vegetation. This five-metre-resolution instrument is slated for launch in late 2010.



Civil applications

ALPHABUS

Satellite bus for very large telecommunication satellites. This very powerful bus is designed to meet the needs of European operators by offering a cheaper and broader range of services. It should be operational in 2010.

ARGOS

Satellite-based global location and environmental data collection system developed jointly by the United States, Russia, Canada and France. In service since 1978, several generations have followed in succession. Fourth-generation instruments are likely to be launched between 2013 and 2020.

COSPAS-SARSAT

Humanitarian satellite-based search-and-rescue programme using emergency beacons to locate people in distress on land, sea or in the air, anywhere in the world. Since the first satellite was launched in 1982, Cospas-Sarsat has saved 27,000 lives worldwide.

EGNOS (EUROPEAN GEOSTATIONARY OVERLAY SYSTEM)

Satellite navigation system initiated by CNES to augment the US GPS system over Europe. It is the first step in the Galileo programme.

GALILEO

Satellite navigation system co-funded by the EU and ESA to give Europe its own independent satellite positioning capability. The GIOVE-A and GIOVE-B trial satellites were launched in 2005 and 2008 respectively. The system is scheduled to be fully operational in 2013.

PSMA

The PSMA advanced medical rescue unit is an upgrade of the Emergesat humanitarian telecommunications telecommunication container. It is available to emergency medical services as it is designed to offer telemedicine solutions and emergency medical aid to disaster victims. It also features satellite telecommunication functions providing telephone, Internet and videoconference links. Both containers were deployed for the Haiti earthquake in January 2010.



Security & defence

ATHENA-FIDUS (FRENCH-ITALIAN DUAL USE SATELLITE) French-Italian project to provide broadband satellite telecommunications services for the French and Italian defence and civil protection teams and armed forces. It is planned to launch a high-capacity broadcasting satellite into geostationary orbit in late 2013.

ELISA (ELECTRONIC INTELLIGENCE SATELLITE) Project conducted jointly by CNES and the French defence procurement agency DGA. The ELISA demonstrator is a constellation of four formation-flying satellites designed to locate and identify radar and other transmissions anywhere in the world. It is slated for launch in 2010.

HELIOS Military observation system set up by France in partnership with Italy and Spain for Helios 1, and Belgium, Spain and Greece for Helios 2. The French defence procurement agency DGA has assigned CNES responsibility for the space segment and overall design. Helios 2B was successfully launched on 18 December 2009.

MUSIS (MULTINATIONAL SPACE-BASED IMAGING SYSTEM FOR SURVEILLANCE, RECONNAISSANCE AND OBSERVATION) European project to develop a new generation of optical observation satellites to increase image resolution and decrease satellite response time. MUSIS is a collaborative project between France, Germany, Spain, Belgium, Greece and Italy.



Space sciences & preparing the future

BEPI-COLOMBO

This mission has two major science goals: to reveal Mercury's internal structure and surface, and to investigate its magnetosphere. BepiColombo is cornerstone five of ESA's mandatory science programme, conducted in partnership with Japanese aerospace agency JAXA. The launch is slated for 2014 so the two probes will arrive in the vicinity of Mercury in 2020.

CARDIOMED

Equipment to monitor astronauts' cardiovascular system. It will be used to monitor the health of Russian crew members aboard the ISS. It will be flown there by a Progress supply craft in 2010.

CHEMCAM (CHEMISTRY CAMERA)

Instrument to analyse rocks on the Martian surface from its position on the MSL rover. ChemCam uses laser-induced breakdown spectroscopy to perform elemental analysis.

COROT (CONVECTION AND ROTATION OF PLANETARY TRANSITS)

CoRoT is a high-precision stellar photometry mission launched on 27 December 2006 to study the internal structure of stars and giant planets, and to detect extrasolar planets. CoRoT has already discovered several exoplanets.

EXOMARS

First mission in ESA's Aurora exploration programme. ExoMars aims to validate Europe's technological ability to reach the Martian surface, operating a planetary rover and a fixed station. The first mission is planned for launch in 2016, the second in 2018.



Space sciences & preparing the future

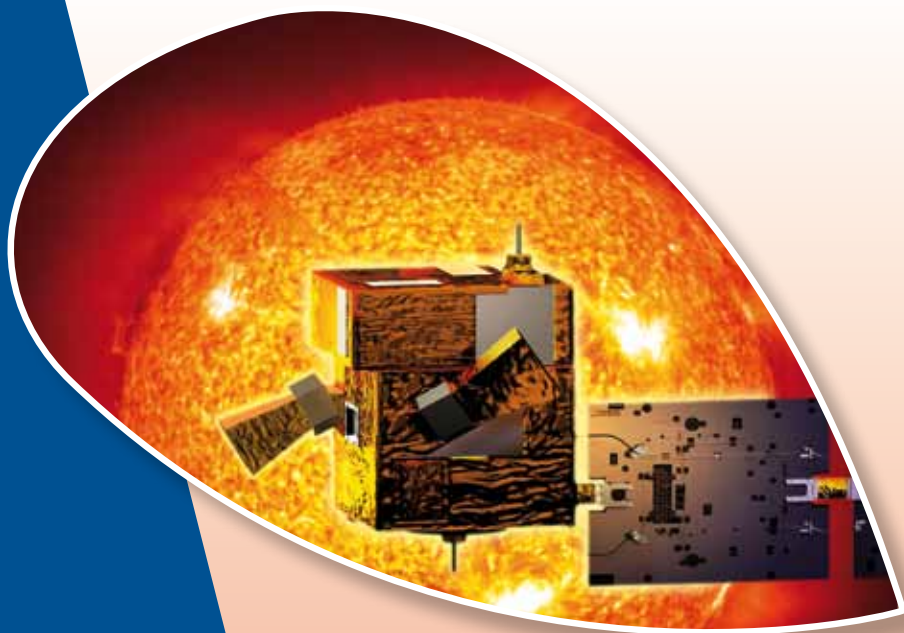
HERSCHEL ESA astrophysics observatory in the far-infrared and submillimetre spectra. Herschel aims to discover the first stars and galaxies formed some 12 billion years ago. Herschel was launched alongside Planck-Surveyor on 14 May 2009.

LISA PATHFINDER Technology precursor to the Laser Interferometer Space Antenna (LISA), the first space observatory to investigate low-frequency gravitational waves. LISA Pathfinder is slated for launch in 2010. It will trial new concepts and technologies for later use during the LISA mission.

MICROSCOPE Fundamental physics project devised by French aerospace research agency ONERA and the Côte d'Azur observatory to test the equivalence principle between inertial and gravitational mass, with an accuracy three orders of magnitude better than ground-based experiments. Launch scheduled in 2011.

MSL (MARS SCIENCE LABORATORY) Rover designed to detect traces of ancient chemistry of life on Mars. France is playing a key role in two instruments: ChemCam and SAM (Sample Analysis at Mars), scheduled for launch in 2011.

PHARAO (PROJET D'HORLOGE ATOMIQUE PAR REFFROIDISSEMENT D'ATOMES EN ORBITE) PHARAO is a laser-cooled atomic space clock based on a fountain model. Part of ESA's ACES project (Atomic Clock Ensemble in Space), it has been developed by French laboratories under CNES oversight. Slated for launch in 2013.



PLANCK-SURVEYOR

ESA mission carrying a high-angular-resolution instrument designed to map the cosmic microwave background (CMB) in the far-infrared and submillimetre spectra. These results will enable the parameters of cosmic evolution to be determined accurately. Successfully launched alongside Herschel on 14 May 2009.

PICARD Picard is a solar physics and climatology satellite with a twofold objective: to take precise measurements of the Sun's diameter and irradiance to learn more about the Sun's internal structure and the effects of solar activity on climate change. Launch scheduled for 2010.

SUOMI French-Chinese mission to investigate gamma-ray bursts. Three French research laboratories are involved: CEA/SAP, the French atomic energy agency's astrophysics unit; CESR, the space radiation research centre in Toulouse; and the LAM astrophysics laboratory in Marseille. Launch planned for 2014.

T2L2 (TIME TRANSFER BY LASER LINK) Laser instrument designed to synchronize remote clock signals on Earth or in space for fundamental physics and metrology purposes. The first time transfer campaign between the Paris Observatory and the Côte d'Azur Observatory was held in October 2009.

TARANIS The Taranis mission will investigate energetic phenomena above storms at the interface between the Earth's atmosphere, thermosphere and ionosphere. The definition phase was completed in 2009.