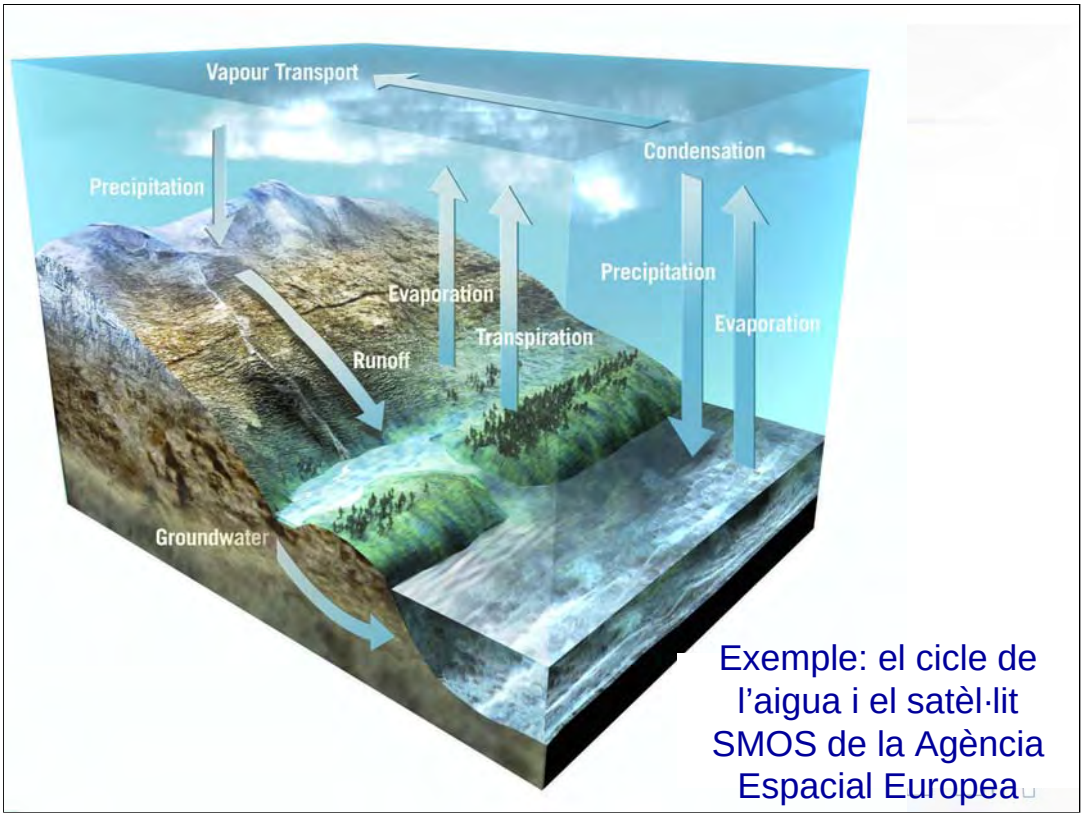
Centre de Tecnologia Aeroespacial
Aerospace Research & Technology Centre

Els satèl·lits artificials i l'espai com a temes inspiradors en l'ensenyament de les matemàtiques i les ciències

Societat Catalana de Física

Joan de Dalmau – 4 de novembre de 2009



Exemple: el cicle de l'aigua i el satèl·lit SMOS de la Agència Espacial Europea

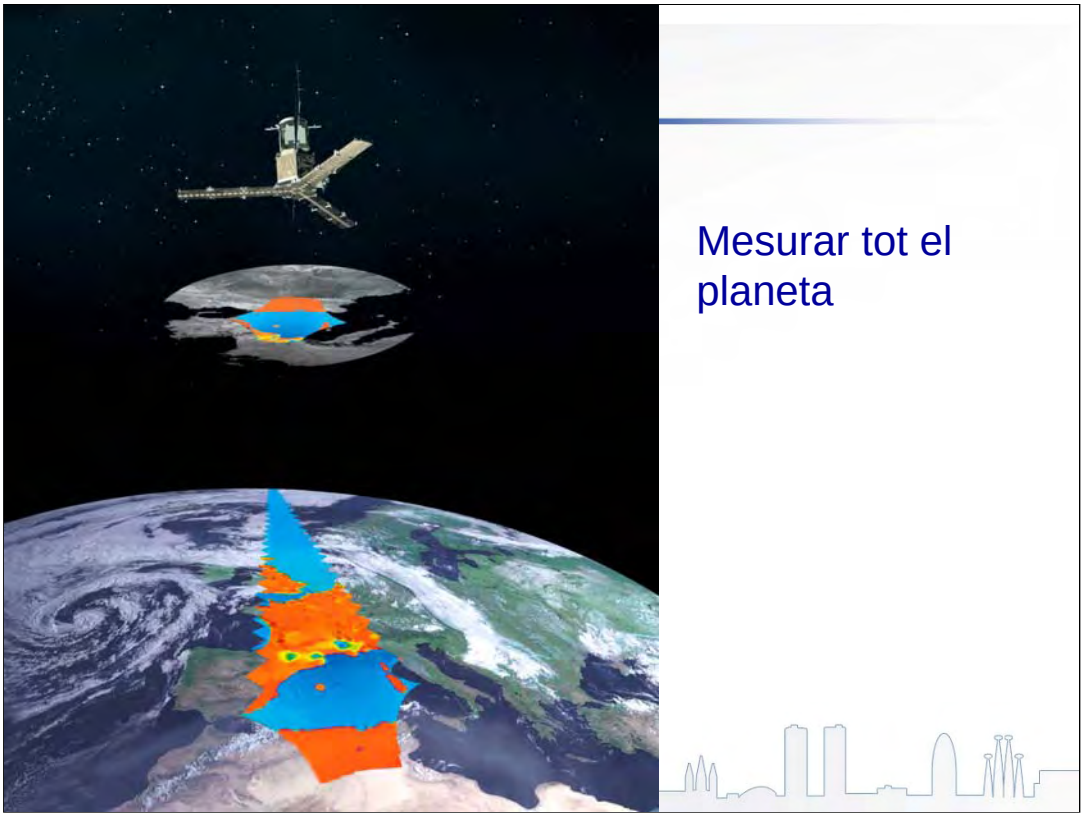
The total amount of water present on the Earth is fixed and does not change. Powered by the Sun, water is continually being circulated between the oceans, the atmosphere and the land. This circulation and conservation of the Earth's water, known as the water cycle, is a crucial component of our weather and climate.

The SMOS mission is a direct response to the current lack of frequent global observations of soil moisture and ocean salinity. These data are needed to further our knowledge of the water cycle, and to contribute to better weather and extreme-event forecasting and seasonal-climate forecasting.

ESA's Soil Moisture and Ocean Salinity (SMOS) mission will provide global maps of soil moisture and ocean salinity. Soil moisture data are urgently required for hydrological studies; data on ocean salinity are vital for improving our understanding of ocean circulation patterns. Together, these data will contribute to furthering our knowledge of Earth's water cycle, and help to improve climate, weather and extreme-event forecasting.

Although soil only holds a small percentage of the total global water budget, soil moisture plays an important role in the global water cycle. However, in-situ measurements of soil moisture are sparse but, if we are to better our understanding of the water cycle so that the forecasting of climate, weather and extreme-events can improved, more data are urgently required.

The same is true for data on ocean salinity. There are few historical measurement data, and only a small fraction of the ocean is currently sampled on any regular basis. Salinity and temperature determine the density of seawater, and in turn density is an important factor driving the currents in our oceans. Ocean circulation plays a crucial role in moderating the climate by, for example, transporting heat from the Equator to the poles. Ocean salinity is therefore one of the key variables for monitoring and modelling ocean circulation.



The SMOS Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) consists of a central structure and three deployable arms that carry 69 antenna receivers.

From an altitude of 758 km, the SMOS will view an area almost 3000 km in diameter. Due to the interferometry measurement principle and the Y-shaped antenna, the field of view is limited to a hexagon-like shape about 1000 km across. The orbit will result in global coverage every three days.

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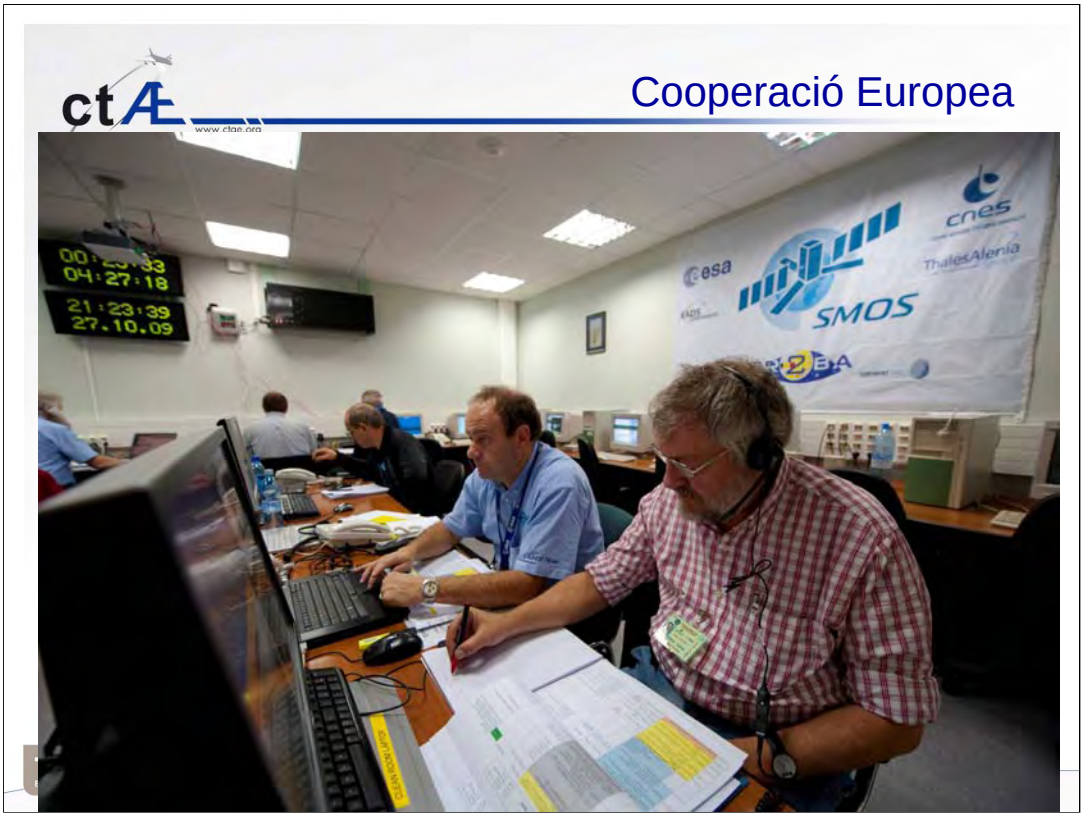


Looking for water exchanges

SMOS is a 658-kg satellite developed by ESA in cooperation with France's CNES and Spain's Centro para el Desarrollo Tecnológico Industrial (CDTI). It is based on the Proteus small satellite platform designed and built by Thales Alenia Space and its payload is composed of a single instrument, the Microwave Imaging Radiometer using Aperture Synthesis (MIRAS), developed by EADS CASA Espacio.

MIRAS is an interferometer that connects together 69 receivers mounted on three deployable arms to measure the temperature of the reflection of the Earth's surface in the microwave frequency range. This temperature is linked to both the actual temperature of the surface and its conductive characteristics, which are in turn linked to soil moisture for land surface and to water salinity for sea surface.

"The data collected by SMOS will complement measurements already performed on the ground and at sea to monitor water exchanges on a global scale. Since these exchanges – most of which occur in remote areas – directly affect the weather, they are of paramount importance to meteorologists" said Volker Liebig, ESA's Director of Earth Observation Programmes. "Moreover, salinity is one of the drivers for the Thermohaline Circulation, the large network of currents that steers heat exchanges within the oceans on a global scale, and its survey has long been awaited by climatologists who try to predict the long-term effects of today's climate change," Liebig added, witnessing the launch from the Plesetsk Cosmodrome.

SMOS is the second satellite launched under the Earth Explorer programme conducted by ESA to foster the acquisition of new environmental data for the science community. It follows the Gravity and steady-state Ocean Circulation Explorer (GOCE), also launched on a Rockot, in March 2009. More Earth Explorers are already undergoing preparation. Cryosat-2, which will measure the thickness of the ice sheets, is due for launch in February 2010. It will be followed by ADM-Aeolus to study atmospheric dynamics and the Swarm mission to monitor the weakening of the Earth's magnetic field, in 2011, as well as by the EarthCARE mission on clouds and aerosols in 2013.

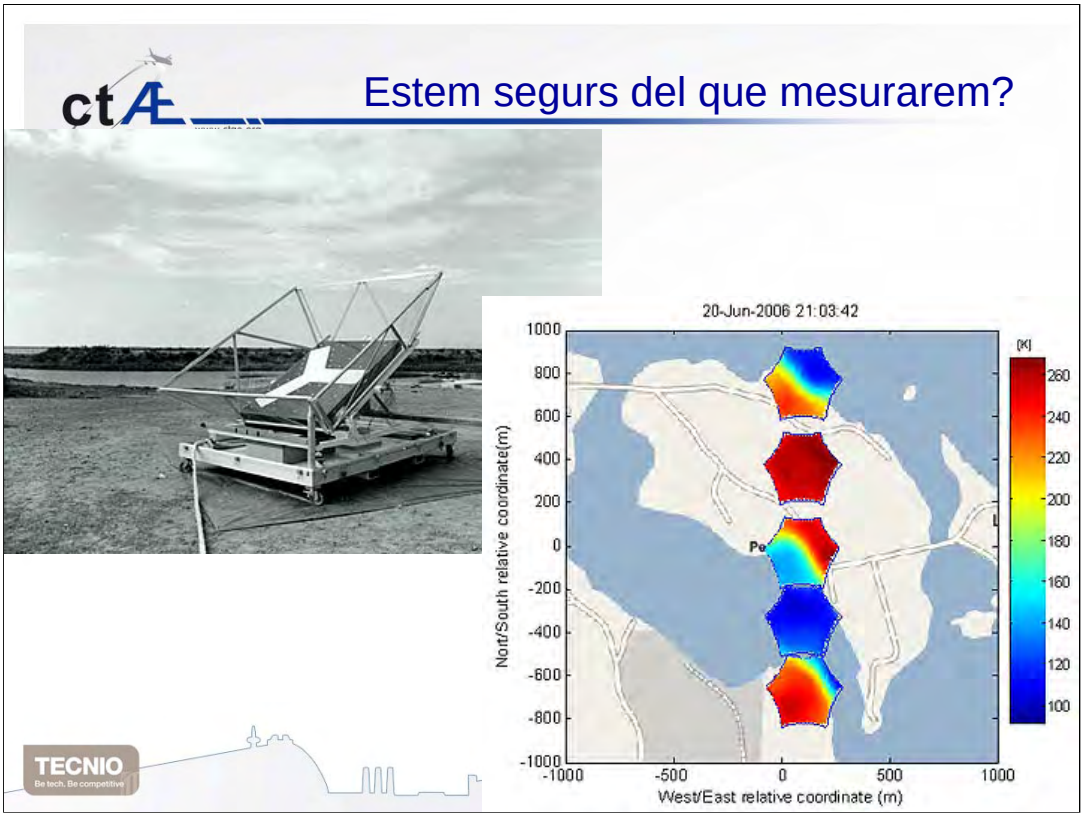
Cooperació Europea

SMOS Mission Mananger, Susanne Mecklenburg, at the SMOS Workshop (November 2007)

The Skyvan aircraft, which was used during the SMOS rehearsal validation campaign in 2008. It is operated by the University of Helsinki, Finalnd and has been used several times in the last three years to support the development of SMOS.

AMIRAS installed on the HUT Skyvan. It is tilted about 24° away from nadir in a similar configuration to that of SMOS.

Credits: HUT (Helsinki University of Technology)



AMIRAS deployed at the Institute for Food and Agricultural Research and Technology (Institut de Recerca i Tecnologia Agroalimentàries) (IRTA) in the delta of the Ebro river, Catalonia, Spain. The instrument is pointed towards the culmination direction of Deneb (Cgnus-alpha).

Credits: IEEC (Institute of Space Studies of Catalonia) First images from airborne version of SMOS

Brightness temperature in the alias-free field-of-view during the AMIRAS maiden flight over Pensaari island in the Lohja lake west of Helsinki. The coastal lines appear sharp in the images and the brightness contrast between water and land is as expected.

Credits: UPC (Polytechnic University of Catalonia)

7 December 2006
A new airborne instrument called AMIRAS, which simulates data that is expected from the Soil Moisture and Ocean Salinity (SMOS) mission, has successfully delivered images from its maiden flight over Finland.

AMIRAS (Airborne MIRAS) is a new instrument that is similar to the MIRAS (Microwave Imaging Radiometer using Aperture Synthesis) radiometer that will be carried on the SMOS satellite when it launches next year. AMIRAS, however, is much smaller than MIRAS and designed to operate from an aircraft to provide scientists with data similar to those expected from the SMOS mission.

SMOS measurement principle The SMOS mission is adopting a completely new approach in the field of remote sensing in that the MIRAS instrument will be the first-ever spaceborne 2D interferometric radiometer that operates at 1.4 GHz (L-band). Since this is such novel technology, essential work in the field is necessary to ensure that the measuring technique is correct and to study various environmental effects on the signal received by the instrument.

Therefore, a number of field exercises are being carried out in support of the mission, such as the CoSMOS campaign in Australia and the CoSMOS activities over the North Sea to address the issues of retrieval of salinity data. In addition, instruments such as the Finnish HUT-2D, which is also an airborne L-band aperture synthesis radiometer, play major roles in fine-tuning the mission.

AMIRAS installed on the HUT Skyvan The AMIRAS instrument, though, is the closest instrument to SMOS ever flown on an aircraft. It consists of a Y-shaped array with four antennae elements per arm. The spaceborne MIRAS radiometer will be much larger, carrying a total of 69 antennae elements – the so-called LICEF receivers. Like MIRAS, this airborne instrument is able to measure in horizontal as well as vertical polarisations in both dual- and full-polarisation modes.

Milky Way as acquired by AMIRAS Since the instrument has been built it has so far been used in four experiments. Firstly, a ground test was carried out in April this year at the Institut de Reserca Tecnologica Agraria (IRTA) near the Ebro river delta in Spain. Here the instrument was tested by taking images of the Milky Way and the Sun. It had its maiden flight on-board the Helsinki University of Technology's (HUT) Skyvan in June covering both land and sea areas around Helsinki, Finland. Its second flight was similar to the first only extended to include an estuary east of Helsinki and flights over the sea. Finally, another ground test to image the Milky Way was carried out from a small airfield near Lahti, Finland.

The map shows the main sites (marked as green circles) used for the SMOS rehearsal validation campaign that took place during the spring of 2008.The yellow lines indicate where ocean salinity measurements were taken during transit flights over the Baltic Sea and Mediterranean Sea as well as the dedicated campaign flights off the coast of Spain.

Taking in-situ soil samples at night to measure moisture content as part of the SMOS rehearsal validation activities in Spain

Credits: University of Valencia, Spain

Taking calibration measurements over the sea just as the aircraft flies overhead taking measurements of sea-surface salinity as part of the SMOS rehearsal validation activities in the Mediterranean.

Credits: University of Valencia, Spain

The Weiguo Zhang team collecting soil samples in the Takla Makan desert. The samples are used for temperature and moisture profiling to support ESA's Soil Moisture and Ocean Salinity (SMOS) mission.

Credits: Weiguo Zhang, CSSAR

Participants of the Soil Moisture and Ocean Salinity (SMOS) Workshop 2008 in Beijing, China. Centre of front row (from left to right) starting 5th from left: Jordi Font, Yann Kerr, Ji Wu and Ignasi Corbella.

Jordi Font, who is one of the SMOS Mission Lead Investigators, at the 2008 SMOS Workshop in Beijing, China.

Credits: Jingye Yan, CSSAR

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MIER COMUNICACIONES is an outstanding company regarding high recurring production of Flight Models of RF & microwave equipments for space applications.

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S Band LNA for ICO Satellite

First Batch of LICEFs for MIRAS/SMOS

Proof of the capabilities and capacities of the company to cope with a high recurring production are MIRAS/SMOS Mission of the **ESA** and several S Band LNA for the ICO Satellite.

In the framework of the **LICEF/SMOS** phase C/D, 75 FM units of the complex receiver unit LICEF were produced in less than a year, delivering up to 12 FM units per month.

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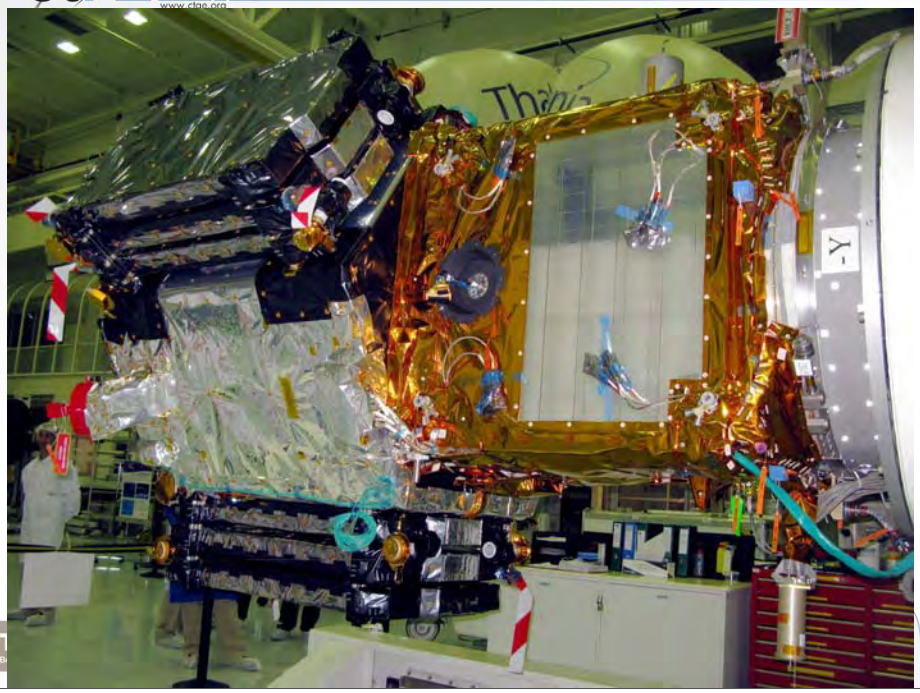
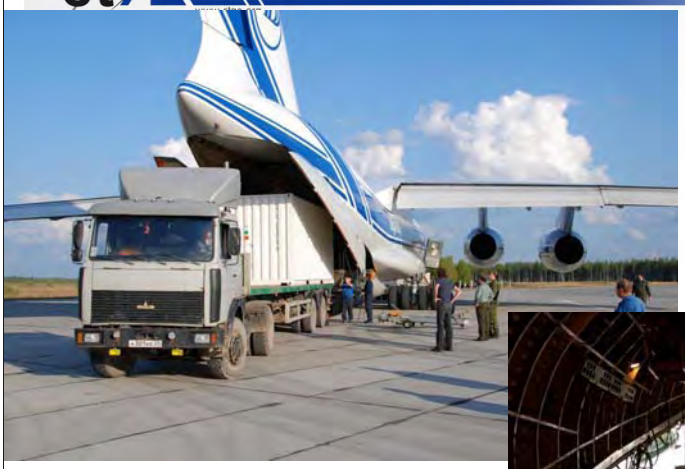
- Una vintena de doctorats

A punt per a ser enviat al Cosmòdrom de Plessetsk



Arribada a Plessetsk



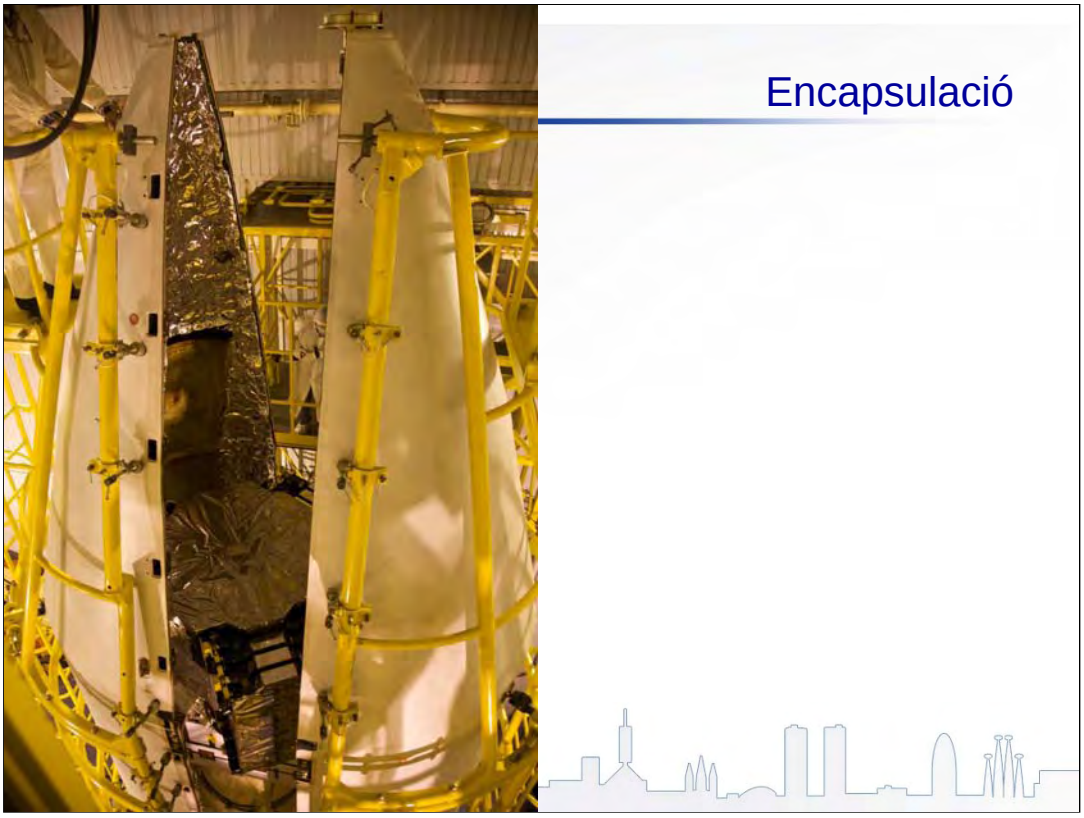
TECNIO
Be tech. Be competitive

With a launch mass of 135 kg, Proba-2 is a much smaller satellite, "but like its predecessor Proba-1, it is aimed at demonstrating a wide range of technologies, both for future satellite systems and for space science instruments. Among these is a demonstration model of a miniaturised startracker developed for ESA's BepiColombo mission to Mercury and the future Solar Orbiter probe," said Michel Courtois, ESA's Director of Technology and Quality Management, from Plesetsk.

Other technologies to be demonstrated include a digital sun sensor, miniaturised wide angle camera, fibre sensors, a high-precision magnetometer, a dual frequency GPS space receiver, a xenon-fed resistojet thruster, a cold gas generator and many more.

In addition, Proba-2 carries two Belgian solar physics instruments and two Czech plasma physics experiments.

Two more Proba missions are already in the design and development phase. Proba-V will carry a vegetation multispectral sensor to monitor vegetation cover, and Proba-3 is due to demonstrate formation flying.



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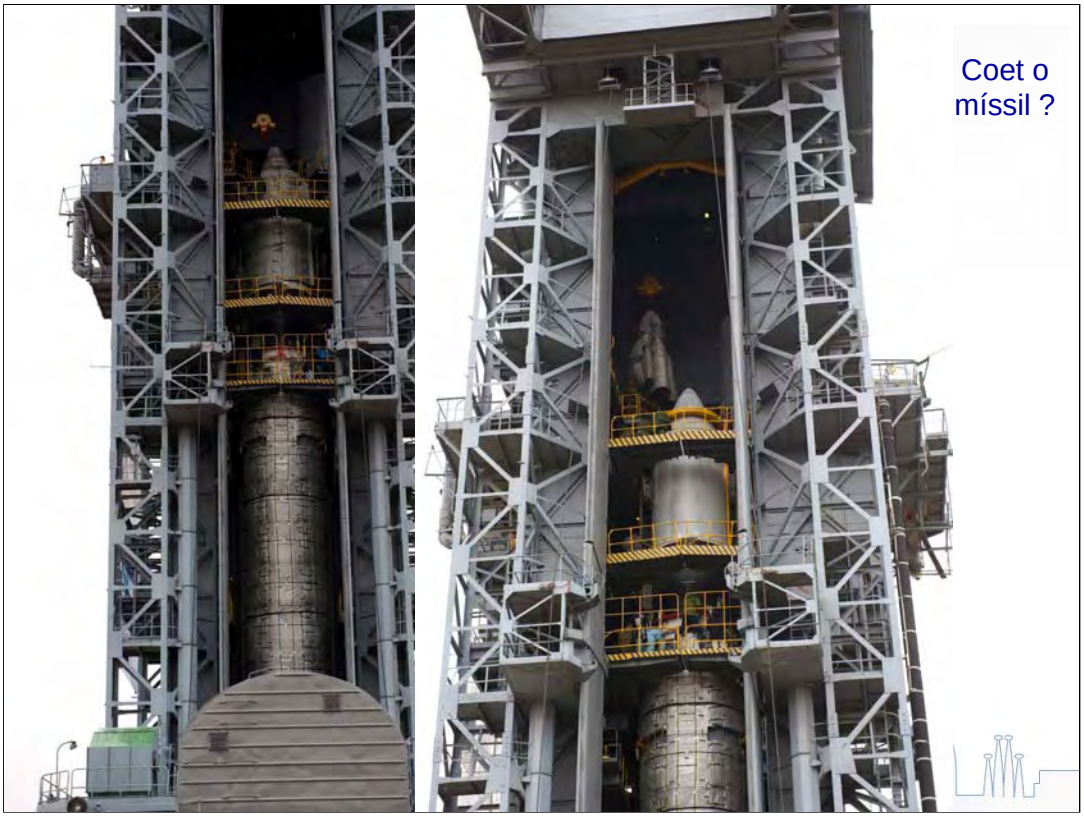
Coet o
míssil ?

Diàleg entre persones i robots

Two new ESA satellites successfully lofted into orbit

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Two satellites on two orbits

The satellites were launched atop a Rockot launch vehicle provided by Eurockot GmbH. Liftoff from the Plesetsk Cosmodrome in northern Russia took place at 01:50 UTC (02:50 CET) on Monday 2 November.

SMOS separation from Breeze Some 70 minutes after launch, SMOS successfully separated from the Rockot’s Breeze-KM upper stage. Shortly after, the satellite’s initial telemetry was acquired by the Hartebeesthoek ground station, near Johannesburg, South Africa. The upper stage then performed additional manoeuvres to arrive at a slightly lower orbit and Proba-2 was released too, some 3 hours into flight.

Both satellites are currently circling the Earth on their respective sun-synchronous orbits, at an altitude of some 760 km in the case of SMOS and 725 km in that of Proba-2. The Proteus mission control centre operated by the Centre National d’Etudes Spatiales (CNES) in Toulouse, France, is in control of SMOS on behalf of ESA, while the Proba control centre, at ESA’s tracking station in Redu, Belgium, has taken over Proba-2.

Early in-orbit operations have begun to check the satellites before commissioning them for operations. Proba-2 is planned to reach operational status in two months' time. The highly innovative payload onboard SMOS will take longer to check and calibrate, and the spacecraft will enter fully operational mode within six months.

"We are extremely pleased with this double 'lucky strike' that will provide Europe with new tools to better understand our planet and climate change, as well as new technology breakthroughs that will enhance the competitiveness of European industry on the world-wide market, thus contributing to the global economy," said Jean-Jacques Dordain, ESA’s Director General, witnessing the launch from Plesetsk.

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La separació del Proba 2

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Un altre exemple: Catalunya a la Lluna


CATALUNYA
A LA LLUNA
1 LLANÇAMENT I SEPARACIÓ DE LES ETAPES DEL COET
2 ENCESA DEL MOTOR DEL MÒDUL DE CREUER EN ÒRBITA TERRESTRE
3 DE GAMI GAP A LA LLUNA
4 GIR DE 180º I INICI DEL FRENAT DEL MÒDUL DE CREUER I ENTRADA EN ÒRBITA LUNAR
5 SEPARACIÓ DEL MÒDUL DE DESCENS DEL MÒDUL DE CREUER I MANIOBRA DE DESCENS
6 ALLUNATGE DEL MÒDUL DE DESCENS
7 SEPARACIÓ DEL MÒDUL ROVER
8 OBJECTIU 1 DEL MÒDUL ROVER: RECORRER 500m
9 OBJECTIU 2 DEL MÒDUL ROVER: TRANSMETRE 2 "MOONCASTS" (FOTOS I VIDEO EN ALTA RESOLUCIÓ)
500m


EARTH

Thank you very much for your attention

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For more information, please visit us at www.ctae.org

COMMUNITY of ARIANE CITIES

The Community of Ariane Cities (CVA),

a network for Europe's space transportation

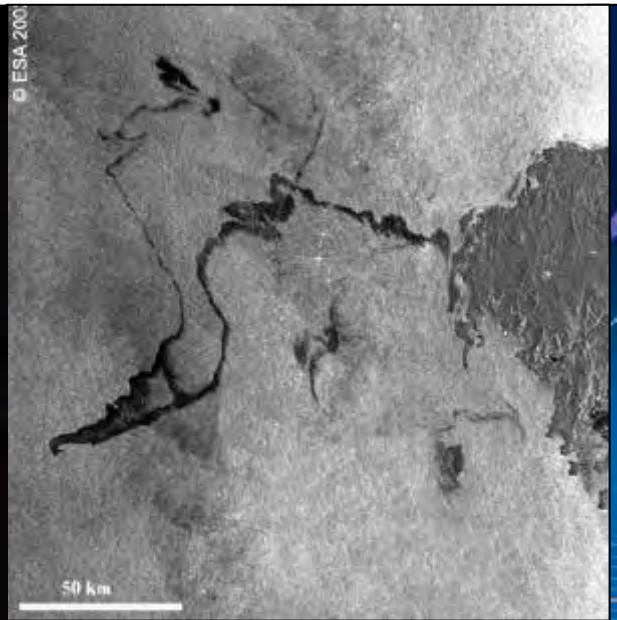
www.ariane-cities.com www.villes-ariane.org

Last updated: 2 August 2009

COMMUNITY of ARIANE CITIES

Objectives of our association (1/4)

- Strengthen the cooperation among cities and industrial organizations involved in the Ariane space transportation programmes
- Inform citizens about the advantages of space activities:
  - social and economic impact
  - satellite applications
  - importance of access to space



Objectives (2/4)

Taking the Ariane programme as a precursor example of European cooperation:

- Inspire the younger generations
- Promote space education
- Spread awareness of intercultural aspects

COMMUNITY of ARIANE CITIES

Objectives (3/4)

- Build long-term relations among Ariane cities and their schools, universities, companies, citizens
- Main tool: organization of joint programmes of technical, cultural, educational and outreach nature

Objectives (4/4)

Inform on:

- French Guiana as an integral part of Europe
- Europe's Spaceport in Kourou, a centre of excellence

COMMUNITY of ARIANE CITIES

Who makes what for Ariane 5, and where?

Communauté des Villes Ariane

Une communauté européenne au service d'un programme exemplaire

www.villes-ariane.org

Community of Ariane Cities — Members

- 18 cities in 6 countries, with a rotating presidency:
  - 2007: Toulouse
  - 2008: Liege
  - 2009: Lampoldshausen
  - 2010: Madrid
- Latest memberships:
  - Madrid & EADS CASA Espacio
  - Zürich & Contraves Space
- 3 space agencies
- 18 companies and industry associations
- Cooperating partners:
  - Académies de Guyane et de Toulouse
  - Deutsch-Französischer Jugendwerk (DFJW-OFAJ)
  - Euroavia
  - ISSAT Toulouse
  - Peuple et Culture
  - Planète Sciences
  - Universities in 9 member cities

Last updated: 2 August 2009

The Community of Ariane cities is supported by the European Space Agency and by the following members:

Augsburg

Barcelona

Bordeaux

Bremen

Charleroi

Colleferro

Essonne-Evry-Courcouronnes

Guyane Française & Kourou

Lampoldshausen

Les Mureaux

Liege

Madrid

Mulhouse

Ottobrunn-Taufkirchen

Toulouse

Vernon

Zürich

Espace Guyane Entreprise - EGE

Liège Presidency CVA 2008

COMMUNITY of ARIANE CITIES

CVA programmes

- City-launcher partnerships
- Ariane Cities Educational Network (REVA)
- Intercultural seminars & scientific holidays (high-school students)
- Summer school (university students & young graduates)
- Specific activities in each member city

City - Launcher Partnership

- «The city's name» on the launcher's fairing
- Activities in French Guiana
- Activities in the partner city
- Live video broadcast of the launch

City - Launcher Partnership in 2006

- «Ciutat de Barcelona » Ariane 5 launch in December of 2006
- Open-doors day and live launch event at the Cosmocaixa museum (11 000 visitors)
- Barcelona delegation in Kourou included two CVA Summer School alumni

ÀLEX GARCIA

LANZADO CON ÉXITO EL COHETE 'BARCELONA'

El lanzamiento desde la Guayana Francesa del Ariane 5, bautizado como *Ciutat de Barcelona,* fue seguido por numeroso público que aprovechó la jornada de puertas abiertas en CosmoCaixa.

Ariane Cities Educational Network
(REVA)

Objective: share best practices and develop cooperative programmes in space education

Web portal, pointing to space education programmes, addressed to students, teachers & professors:

www.education-cva.eu

Teacher's training seminar for high-school teachers:

- Gathered 31 teachers of math and science from 10 Cities
- At "Cité de l'Espace" in Toulouse, from 9 to 11 July 2008
- Will probably become a yearly itinerant programme

Ariane Cities Educational Network (REVA)

Online catalogue of space-related training programmes:

- Lists and describes programmes at university or vocational training level
- Since 2007, students, teachers and educational planners can search among:
  - 127 space related training programmes
  - delivered by 63 organisations
  - in 11 CVA cities

www.cva-space-training.eu

Intercultural Seminars

The CVA Intercultural Seminars are titled

"Space at the Service of Humankind"

The program consists of three seminars with one week duration each.

Participants from three (or more) cultures have the opportunity to investigate and to reflect the use of space applications in our life - be it in the past, at present or in the future.

The **participants, 15-17 years of age**, are instructed to continue their work by staying in touch throughout the whole year which is spanned by the three individual seminar weeks.

WHEN:	3 separated weeks spread over one to two years
WHERE:	CVA member cities, each seminar week being in a different city and culture
HOSTS:	Participating CVA cities
CO-SPONSORS:	CVA, German-French Youth Organization DFJW. Industrial and local sponsors.
ORGANIZERS:	CVA, *Peuple et Culture*, the hosting cities

Scientific Holidays

ABOUT:	The Scientific Holidays are an annual programme organized by our cooperation partner Planète Sciences. In the past CVA participated in the programme with a group of **20-30 international students at high school level, 15-17 years of age**. The programme includes a 2 week camp in which the participants are trained to build miniature rockets. Highlight of the camp is the **"International Rocket Day"** during which miniature rockets and balloons are launched by the students. The CVA group named "The Children of Ariane" is guided by experienced facilitators.
WHEN:	2 weeks programme during summer (July/August).
WHERE:	A city in France: in year 2002 Millau, in year 2003 Sissonne, in year 2004 Paris'aera...
CULTURAL AND SOCIAL EVENTS:	Diversified sightseeing and intercultural interaction programme included.
CO-SPONSORS:	German-French Youth Organization DFJW. Industrial sponsors.
MANAGED BY:	*Peuple et Culture* and *Planète Sciences* associations

Summer School

ABOUT:	The CVA Summer School is an yearly programme, started in 2000, designed for: **36 university students** (3d-4th year) **and young engineers from space industry** Over 200 alumni to date
FOCUS:	Each year, a theme related to space transportation is chosen. Technical lectures Technical visits Language training Intercultural teamwork Cultural events and leisure Work presentations, contest, jury and award
WHEN:	Four weeks July/August
WHERE:	A CVA member city
HOST:	A university or educational institution
CO-SPONSORS:	Industrial and local sponsors

2008 Summer School in Madrid, July 6th to 31st

- **Hosted by Escuela de Ingenieros Aeronáuticos - UPM**
- **Programme included visits to EADS CASA Espacio, ESA European Space Astronomy Centre, INTA – Astrobiology Centre**

Summer School calendar

- Sponsored by ESA, CNES, Arianespace, Avio, EADS, and many other Ariane industrial companies
- In total, more than 300 participants since the year 2000:
  - 2000: Bremen
  - 2001: Toulouse
  - 2002: Turin
  - 2003: Liege
  - 2004: Bremen
  - 2005: Barcelona
  - 2006: Toulouse
  - 2007: Heilbronn-Lampoldshausen
  - 2008: Madrid
  - 2009: Augsburg
  - 2010: Bordeaux
  - 2011: Zurich ?

2009 Summer School in Augsburg, Germany

- Hosted by University of Applied Sciences Augsburg
- Sponsored by City of Augsburg, by MT Aerospace and others
- From August 1st to 28th, 2009 (student arrival and departure dates)
- Programme includes visits to MT Aerospace, DLR Oberpfaffenhofen, EADS Astrium Friedrichshafen
- Team project: (see next page)

Fachhochschule Augsburg
University of Applied Sciences

Stadt Augsburg

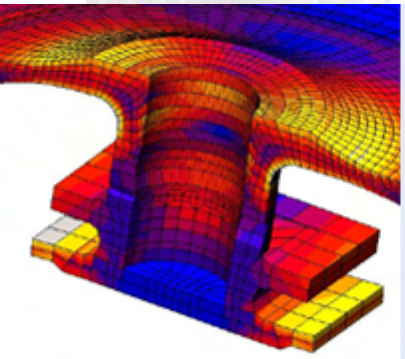
MT AEROSPACE

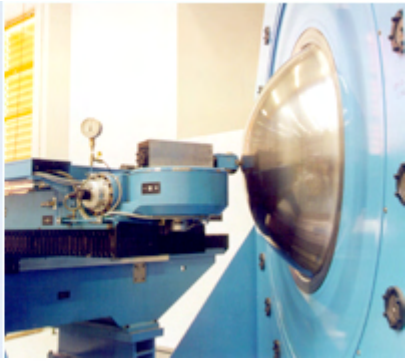
2009 Summer School Team Project

2009 – ARIANE success story for 30 years: outlook on European Space transportation in the coming decades

CVA Summer School students will work in teams to develop innovative ideas and propose engineering solutions to the following challenges:

- Launch system options beyond Ariane 5: evolution of the current system, or new developments in the framework of the European launcher family.
- Adaptation of Ariane 5 to human spaceflight.
- New materials, such as Carbon Fibre (CFRP), and new manufacturing technologies for Europe's future launchers.





MT AEROSPACE

First reunion of CVA alumni

Heilbronn-Lampoldshausen 16 to 19 August 2007

- Impressive programme put together by the City of Hardthausen-Lampoldshausen, Heilbronn University and DLR
- Alumni from past Summeer Schools and Intercultural Seminars presented their current activities
- ESA keynote lecture on human spaceflight
- Cultural and industrial visits
- Networking activities

COMMUNITY of ARIANE CITIES

Second reunion of CVA alumni

Madrid, 24 to 25 July 2008

- Visit of ESA's European Space Astronomy Centre- ESAC
- Visit of historical town of El Escorial
- Lectures by senior Spanish leaders in the space sector
- Presentations by students and alumni

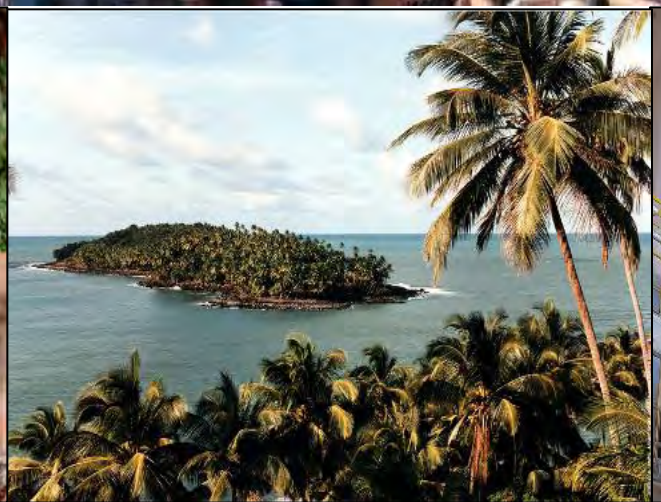
Third reunion of CVA alumni
Augsburg, 20 to 23 August 2009

- Lecture on “Ariane, a success story” by Dr. Klug, MT Aerospace
- Visit of EADS Astrium in Friedrichshafen
- Student and alumni presentations
- Keynote address by CVA honorary Member Juan-Manuel Lecue
- Visit to Munich and the Deutsches Museum

Picture will come

CVA alumni trips to Europe‘s Spaceport

- **Programme open to alumni of all CVA programmes, and featuring:**
  - **Detailed presentations and guided tour of the Guiana Space Centre**
  - **discussions with employees from companies working on site**
  - **canoeing tour in the Amazonian rainforest**
  - **boat trip to Devils Islands**
- **Personal contribution of about 50% of the actual cost**



COMMUNITY of ARIANE CITIES

CVA's next alumni trip to French Guiana

- **December 3d to 10th, 2009 (Dec 4th Paris-Cayenne; 5 days and 5 nights in French Guiana; Cayenne-Paris on Dec. 9th; arrival early morning of Dec. 10th)**
- **Participants must cover:**
  - **Trip to Paris and hotel on Dec. 3d.**
  - **CVA alumni who never visited French Guiana before: 750.- Euros**
  - **Repres. of CVA member cities or industry (limited seats): 750.- Euros**
  - **Friends and relatives: 1.500.- Euros**

CVA's 10th anniversary 1998-2008

- Micro-rocket workshops were held in most Ariane Cities on 9 October 2008
- Workshops were organized by certified associations with:
  - local CVA alumni
  - school teachers (REVA network)
  - Ariane industry
- Watching live Ariane launch broadcast at night
- Sharing launch videos on a blog: **http://arianecities.viladecans.org/**






Thank you!

The General Delegation is at your disposal

- Magali Foulet cva@ariane-cities.com
- Philippe Noël issat@issat.com
- Juan de Dalmau juan.de.dalmau@esa.int

In Catalan, English, French, German, Italian, Portuguese or Spanish

To convey the enthusiasm about space activities and the cooperation among European citizens

COMMUNAUTÉ DES VILLES ARIANE
COMMUNITY OF ARIANE CITIES

www.ariane-cities.com
www.villes-ariane.org

Organisation

- Association à but non lucratif, fondée en 1998, enregistrée en France, avec siège à Evry (bâtiment Arianespace)
- Le Conseil des maires:
  - décide des programmes et du budget, et accepte les nouveaux membres
  - se réunit deux fois par an
  - présidence tournante, assurée par un maire
- Le Bureau:
  - Met en oeuvre les décisions du Conseil, et prépare les propositions de nouveaux programmes
- La Délégation générale, assure la gestion
- Le Comité d'orientation et de planification (COP):
  - Réunit des membres et non-membres
  - Analyse les résultats et réfléchit sur les orientations futures
  - Emet des recommandations

COMMUNITY of ARIANE CITIES

20 Conseils des Maires dans 12 villes

- Janv. 1999: Les Mureaux
- Mai 1999: Toulouse
- Oct. 1999: Colleferro
- Avril 2000: Bordeaux
- Juillet 2000: Guyane
- Déc. 2000: Augsburg
- Déc. 2001: ESA, Paris
- Déc. 2002: CNES, Paris
- Avril 2003: Bruxelles
- Oct. 2003: Brême
- Mars 2004: Barcelone
- Oct 2004: Guyane
- Avril 2005: Bruxelles
- Oct. 2005: Liège
- Avril 2006: Barcelone
- Nov. 2006: Barcelone
- Mars 2007: Toulouse
- Oct. 2007:Toulouse
- Avril 2008: Liège
- Octobre 2008: Liège
- Mars 2009: Lampoldshausen

A European partnership

- If you are a City or a local administration
- If you are a Space industry in a CVA city
- If you are an educational planner or a teacher
- If you are a student of science or technology
- If you are still at school
- If you are a citizen who cares about economy and education…

...please use the CVA !

If you are a City or a local administration…

…please use the CVA:

- To inform your citizens about the economic and social impact of Space investments
- To show to your local community that you care about high-value jobs and the benefits of Space to the quality of life
- To have a stronger leverage in front of your national authorities
- To provide to your educators and students inspiring programmes in science and technology
- To strengthen your network of Europe-wide partners
- To enhance the international recognition of your city or region

Last updated: 2 August 2009

If you are a Space industry in a CVA city…

…please use the CVA:

- To strengthen your links to your local administration
- To open the doors of your company to the citizens
- To showcase your capabilities and positive impact on the local economy
- To train your promising young graduates
- To have access to engineers trained in space transportation and in intercultural teamwork

COMMUNITY of ARIANE CITIES

If you are an educational planner or a teacher..

…please use the CVA:

- To use Space as an inspiring theme to attract young people into science and technology
- To exchange best practices with other educational professionals across Europe
- To send your students (and teachers) to CVA's growing educational programmes

If you are a student of science or technology...

…please use the CVA:

- To learn about European cooperation in Space
- To practice teamwork in a competitive (and cooperative) environment, with fellow students from other European countries
- To learn about (and work at) the Guiana Space Centre, Europe's Spaceport
- To build and maintain a strong network of professional contacts in the space community

If you are still at school…

…please use the CVA:

- To learn about the importance of investing in Space to improve the quality of life on Earth
- To practice teamwork, and trial-and-error, in an exciting model rocket project
- To experience European intercultural collaboration during one week (or more)
- To learn that Space is far away, but also in your own city
- To help you decide on a career in science or technology

COMMUNITY of ARIANE CITIES

If you are citizen who cares about economy and education…

…please use the CVA:

- To learn that Space is far away, but also in your own city
- To discover how much Space activity is done in your city
- To see bright young people from your city making a career in the European Space programmes
- To see the name of your city lifting-off from French Guiana
- To get a greater sense of what it means to be part of Europe