Editorial: EGNOS implementation: a major step forward for satellite navigation for air transport in Europe

On 12 July 2010, ESSP SAS – the operating company for the European system for regional enhancement of GPS, EGNOS (European Geostationary Navigation Overlay Service) – was certified by the French civil aviation authorities in cooperation with the German, Belgian, Italian, Spanish, Portuguese, Swiss and British authorities, in application of the European single sky regulation (regulation 2096/2005). ESSP SAS, a “société par actions simplifiée” (limited liability company) with headquarters in Toulouse, was created by seven air navigation agencies: AENA (Spain), DFS (Germany), DGAC/DSNA (France), ENAV (Italy), NATS (UK), NAV Portugal and Skyguide (Switzerland). The certification of ESSP SAS as air navigation service provider marks an important stage in the operational use of satellite navigation systems in the service of air navigation. We might recall that the EGNOS system – designed to provide air transport with a navigation service meeting the very stiff criteria as regards accuracy and safety required by air navigation under terms stipulated by the International civil aviation organisation (ICAO) – was developed by the European Space Agency at the request of European civil aviation authorities.

With respect to the service provided when using only the civil signal of the American GPS, EGNOS offers the necessary enhancements in terms of accuracy and integrity over the whole of the European zone, the Mediterranean and North Africa. It is the European equivalent of the WAAS (Wide Area Augmentation System) system set up in the United States by the FAA (Federal Aviation Administration) to cover civil aviation needs. Japan is setting up a similar system, the MSAS (MTSAT Satellite-based Augmentation System), and India is bringing in the GAGAN system which will use signals both from GPS and the Russian satellite navigation system GLONASS. The FAA anticipates a 30% increase in air traffic management efficiency when these regional GPS enhancement systems have been fully implemented.

ESA transferred property of EGNOS to the European Union in April 2009 and it is now managed by the European Commission. The latter will continue to rely on ESA according to terms defined by a convention delegating system design and procurement of the different components. The ESSP certification is significant since it is the first of many implementation stages for satellite systems in the service of air transport. The next will be certification of the EGNOS so-called “Safety of Life” service, scheduled for 2011. Succeeding stages will correspond to the transition to operational service of Galileo, the European satellite navigation system. The first two experimental satellites of the Galileo programme have already been in orbit for two years and have both validated orbital function of the European-made atomic clocks and protected European rights as regards broadcasting frequencies of the Galileo signals deposited at the International Telecommunication Union (ITU). The first four (of thirty) operational satellites in the constellation will be placed in orbit in 2011 and 2012, and the remaining 26 will be launched in pairs from 2013 to 2015. The entire constellation should be in service by 2016 and certification of civil aviation services obtained in 2017.

Of all civil sectors relying on satellite navigation services, air transport probably has the stiffest requirements in terms of accuracy, reliability and integrity. By showing an interest in these new satellite services in the late 1990s and clearly setting out the highly specific requirements of civil aviation, the air navigation authorities of several European countries displayed great foresight. As this first stage – certification of the EGNOS operator – is completed, it is important that we pay them due homage.
THE ACCELEROMETERS OF THE SPACE MISSION GOCE

The GOCE mission of the European Space Agency* is a mission of space geodesy, which aims at establishing a very precise cartography of the Earth’s gravity field, making it possible to plot the terrestrial geoid with an accuracy of 1 cm in height and 1 mgal \((10^{-5} \text{ ms}^{-2})\) for gravity anomalies.

**Introduction**

The geoid represents the shape of the Earth, which is known to be close to a flattened ellipsoid. Because of anomalies in distribution of internal masses, the geoid – which represents the average surface of the oceans assumed at rest – presents undulations with regard to this ellipsoid. Defined only by the field of gravity, the geoid is used as the benchmark surface for all of the Earth’s topographic structures. The precision with which it is determined plays an important part in geodesy, geophysics and oceanography for improving knowledge of the Earth’s structure or oceanic circulation.

Launched on March 17, 2009, GOCE is the third of a series of three space missions dedicated to studying the gravity field which have deeply modified our approach to the Earth’s field of gravity. Up to that point, the gravity field was deduced from regional measures using embarked gravimeters or the observation of orbital disturbances in ‘test’ satellites such as Starlette or LAGEOS, orbiting at high altitudes. At the end of the Nineties, satellites became a platform for active measurements; they were equipped with onboard satellite navigation systems for precise, continuous orbit positioning and an accelerometer for measuring surface forces, atmospheric drag and solar radiation pressure, thus enabling precise measurements, free from non gravitational disturbances. This is all the more necessary when the satellite has to operate in low orbit, at 500 km or less. Launched in July 2000, the German mission CHAMP validated this gravimetric mission concept. In particular, it carried the electrostatic accelerometer STAR developed by ONERA which was active throughout the mission until its recent re-entry into the atmosphere, on September 16, 2010. NASA’s GRACE mission followed in March 2002. By using two satellites, following each other at a distance of 250 km, it provides more accurate measurements by monitoring the variation in distance between the satellites, of which the gravitational component can be identified thanks to the SuperSTAR accelerometer equipping each satellite. GRACE has thus been able to highlight temporal variations in the field of gravity linked to seasonal evolutions in the hydrographic basins or the melting ice mass in Greenland and the Antarctic.

The concept of measurement by difference is pushed a notch further with GOCE which measures the difference in gravity between two points 50 cm apart, using a 3-axis gradiometer. Gradiometry makes it possible to partially compensate the attenuation of the field of gravity exerted by altitude; the effect is also reduced as much as possible by the choice of a low orbit (259.5 km). In order to compensate the high atmospheric drag at this altitude, this choice requires an electric propulsion (so-called drag-free mode of functioning) system. The successful implementation of these two technologies were two remarkable operational ‘firsts’ of the GOCE mission.

The mission’s instrument is a 3-axis gradiometer, made up of six accelerometers designed, produced and delivered by ONERA. They are assembled in pairs on a carbon-carbon structure in order to form three orthogonal gradiometric arms (Fig.1) crossing each other at the centre of gravity of the satellite.

**Measurement principle**

The ONERA accelerometers are based on a measurement of the voltage necessary in order to maintain a proof mass in electrostatic levitation in the centre of a cage placed at the centre of gravity of the satellite. Under the effect of surface forces the satellite deviates from its gravitational orbit and the electrostatic forces automatically subjugate the proof mass to the trajectory of the satellite. By measuring the electric voltage applied it is possible to deduce the acceleration of non gravitational origin, and by reconstructing the gravitational

---

* For additional information on the GOCE mission and accelerometers, please visit: [http://earth.esa.int/goce/](http://earth.esa.int/goce/) and [http://www.onera.fr/dmph/index.php](http://www.onera.fr/dmph/index.php)
component of the orbit, to derive the field of gravity. This measurement configuration is applied in the missions CHAMP and GRACE. For a measurement of the gravity gradient according to a given direction, two accelerometers are placed symmetrically, relative to the centre of gravity of the satellite, in the direction of the gradient to be measured. Each accelerometer then also becomes sensitive to the movements of attitude of the satellite and 'sees' a different field of gravity. By operating in differential mode, the effect of the surface forces is eliminated and the angular acceleration around the gradiometric axis can be determined as well as the difference in the field of gravity between the two accelerometers. The difficulty is to extract this signal from the difference of two signals of much broader amplitude. This has two consequences for the satellite and the accelerometers, in terms of increased performance of:

• the system of drag compensation to bring the residual acceleration of the satellite to a level of a few nano-g,
• the accelerometers, whose resolution is increased by a factor of 50 as compared to the SuperSTAR accelerometers of the GRACE mission, with an objective of about $10^{-12}$ ms$^{-2}$, the equivalent effect of a snowflake on a super-tanker.

As a result, the accelerometers on board the satellite have a double function:

• as ‘drag free’ sensors, they provide a measurement of the acceleration to the drag compensation system,
• as scientific instruments they deliver with unprecedented accuracy the signals from which the components of the gravity gradient will be reconstructed.

**Description**

The proof mass is a platinum-rhodium parallelepiped of 4cm by 4cm by 1cm weighing 320g. The proof mass is free except for a gold wire 5 microns in diameter used to apply a continuous voltage so as to free it from potential fluctuations in orbit related to charged particles in the environment and to linearise the acceleration-voltage response of the accelerometer.

The cage is made up of 3 silica plates produced by ONERA by means of ultrasonic machining on which the electrodes are symmetrically engraved (Fig.2). The proof mass-electrodes unit constitutes a capacitive bridge which enables position detection at 100 kHz with a very high resolution of a few picometers and the control of the mass in the centre of the cage by applying the necessary voltage in the measurement band [5mHz-100mHz]. The distance between the proof mass and the electrodes is 300 microns for the Y and Z measurement axes and 30 microns for the X axis. The X axis is differentiated in order to enable lifting of the proof mass on the ground and so as to carry out functional tests of the accelerometers by increasing the force available thanks to a low gap capacitance. Consequently only the Y and Z axes (2x2 electrodes) are regarded as the highly sensitive measurement axes. The accelerometers are arranged within the gradiometer in such a way as to call upon only these sensitive axes (Fig.1).

The accelerometers are integrated in a clean room environment taking particular care to align the core on the interface plate on which the reference frame defined by the proof mass is located. In the absence of a blocking system the proof mass is left free during launch; qualification tests demonstrated the resistance and stability of the core for which a maximum displacement of 8 microns was specified for the whole lifespan. The sensors are equipped with an ion pump which maintains a high vacuum. A very comprehensive test programme is then carried out combining functional tests at ONERA on an anti-seismic pendulum and free fall tests from a height of 120m at the ZARM Institute tower in Bremen; the latter tests in reduced gravity replicate the environment in orbit as closely as possible.

**Conclusion**

The gradiometer was put into orbital operation on April 6, 2009. Having correctly carried out their functions both as ‘drag free’ sensors – providing ten times greater drag-compensation than envisaged – and as scientific instruments, these accelerometers have confirmed, after CHAMP and GRACE, the excellence of ONERA in this field. They are contributing to the exceptional success of the GOCE mission which has recently entered a new stage, after several technological successes, with the publication by the European Space Agency of the first gravity field data and first GOCE geoid model (Fig.3) at the Living Planet Symposium in June 2010 in Bergen (Norway). Significant improvements were already observed in high resolution areas of the geoid and the gravity field model will be constantly improved with the continuous arrival of new data.

**An engineering graduate from the Paris Ecole Supérieure de Physique et Chimie in 1974, Jean-Pierre Marque joined ONERA in 1983. As research engineer, he directed experimental and theoretical work into electrostatic discharges on satellites, lighting, electromagnetic compatibility and electric propulsion. In 2000 he was nominated Project Manager for accelerometers for the GOCE mission and in 2007, Head of the research unit “Instrumentation and aerospace equipment”, with the responsibility of developing ultrasensitive accelerometers for space missions.**
Air transportation is making a rapid recovery after the most serious crisis of its history. The relief is all the greater since this recovery will nurse whole sectors of the aeronautics industry back to good health. But how can we hope to see clearly when faced with a mass of often contradictory information?

Global air transportation is a profoundly cyclical economic sector, handicapped by high inertia which prevents it from reacting rapidly to unforeseen events or geopolitical developments; as a result it lurches from crisis to crisis. And the fact that airlines do not all obey the same rules makes it tricky to analyse its difficulties and gauge the efforts made during difficult moments.

The irresistible growth of “low-costs”, for instance, is insufficiently factored in by analysts, apparently caught unawares. In the U.S. the former account for almost a quarter of traffic. Their profile is more modest in Europe but nonetheless they carry no less than 150 million passengers per year. European charter airlines were likewise buried a little too quickly: their professional organisation, the International Air Carriers Association, is announcing 100 million passengers a year.

In other words – contrary to the situation that prevailed before air transport deregulation, set into motion some thirty years ago – determining and analysing the main trends governing air transport evolution constitutes a thorny task. The fact remains that the air pocket of 2008/2009 has left deep marks and plunged the entire profession into abyssal losses. Which will perhaps soon be forgotten since for two years they have destroyed the profit and loss accounts, if one can believe IATA’s calculations (which unfortunately do not take account of low costs and charters).

Now that the global state of affairs is better (perhaps one would be wise to say “less bad”), airlines are carried forward both by this recovery as well as a catch-up phenomenon. The barometer is set on fine weather and by mid 2010, the passenger traffic growth rate even reached a peak of 9%. Of course, this frenetic rhythm can only be temporary – indeed it has since dropped to a little over 6% – but it still testifies to a reassuring tendency.

IATA economists – undoubtedly some of the most highly skilled in the world in their specialty – have themselves been caught off balance. On 15 December 2009, the group announced that its 230 members would register losses of $5.6 billion in 2010, proof that problems were far from being over. Then forecasts suddenly became much more optimistic in early 2010: it was rapidly a question of profits of $2.5 billion then of over $9 billion. The exact figure that will be announced at the end of the financial year is neither here nor there; what matters is the sudden turnaround of the situation.

Supplied capacity and real traffic have reached a reasonable balance, the passenger load factor is once more at around 80% and the future looks rosy. Long-term studies carried out by IATA with the aim of anticipating traffic evolution in the coming decades have recently been published. They predict that in 40 years’ time, in other words around 2050, world traffic could exceed 15 billion passengers per year, as against 2.3 billion currently...

Such prospects for growth, if plausible, herald incredible challenges and, unquestionably, all kinds of serious difficulties.

Airspace management above all will have to be completely reworked, as will the organisation of airports. Truth to say, this long-term vision is a source of worry, a paradoxical situation to say the least. In other words, for those who were still in any doubt, air transportation will continue to keep us on our toes...
Y.M. Is it reasonable to hope that the project of an aviation theme park Aeroscopia, based at Blagnac, will at last come to fruition?

B.K. Absolutely: this is a shared goal of the Urban Community of Greater Toulouse and the Blagnac Municipality. By assigning prime contractorship of Aeroscopia to Blagnac Municipality, Greater Toulouse is putting its faith in City Hall to make sure the scheme is completed as quickly as possible. I might add that the project has been finalised on paper and that the question of funding is almost entirely settled. The recent success of Airbus’s Family Day, which attracted 145,000 visitors, confirms the demand of aeronautics fans in this area.

Blagnac is therefore fully committed to setting up this venture, less a museum than a theme park for scientific and technological discovery. It will be provide a strong, symbolic image of our agglomeration, an open structure which will work with the new exhibition centre situated nearby and provide a welcome boost to tourism, hotels and businesses.

Y.M. What will be the star elements?

B.K. Unquestionably the now mythical objects of our aeronautics heritage: Concorde above all, and Caravelle, the first Airbus A300 or the Super-Guppy, forerunner to the Beluga for transporting Airbus subassemblies. Visitors will be able to enter into and touch the aircraft, which is not the case currently during visits to the assembly lines, a source of frustration for the public. The magnificent collection of Ailes Anciennes will help enrich the display. The Aerothèque will also contribute, relating history that is still fresh and illustrating it by means of displays, models or other instruments from the early days. And of course, it will provide an attractive meeting place suited to Toulouse’s strong aeronautics identity: imagine a gala evening for a medical congress under the wings of Concorde!

Y.M. When will the park be officially open to the public?

B.K. The first stone is due to be laid in spring 2011. The aeronautics associations making up Terre d’Envol have been waiting for this moment for twenty years. So yes, we can say the countdown has begun. At last!

Y.M. 3 Questions to ...
Session of 14-15 October

The autumn session was held in the region of Provence-Côte d’Azur. A number of members were welcomed by the École de l’Air in a meeting in which different training issues were detailed:

- the new training course for air force officers, by GBA Gilles Modéré, head of the École de l’Air;
- new degrees on offer at the university, by Ms Dominique Viriot Barrial, Vice-president of Paul Cézanne University.

This working session was followed by a reception courtesy of the Aix-en-Provence municipality in the Town Hall.

The following day, the morning was devoted to Eurocopter: the market for helicopters and the company’s strategy and research programmes; these presentations were followed by a visit of the installations. In the afternoon, Jean-François Bigay gave a talk on issues surrounding the Marseilles-Provence airport, referring to the development of “low-cost” airlines.

Meeting with the Midi-Pyrénées Regional Council

Ms Belloubet, first Vice-president of the Midi-Pyrénées Regional Council, received a delegation from the Academy led by President Gérard Brachet. This meeting provided an opportunity to present the Academy’s activities, in particular “The Toulouse Encounters”, for which the Regional Council expressed a real interest. Coordination with the Regional Council will be enhanced in order to reinforce the coherence of actions undertaken.

Lectures

Aside from the lecture cycles scheduled in Toulouse, Paris and Brussels, the Academy has been called on regularly to make presentations at other events, for instance:

- the President gave a lecture on “World Space Activities: Present Trends and Future challenges” at IAS Toulouse. He also took part in the organisation of a CESA (Centre d’études stratégiques aérospatiales) training seminar on space for which he gave the opening speech. Fellow member Jacques Villain also gave a presentation at this event;
- Professor Blamont gave a lecture in Paris on the theme of “Future manned space exploration” in collaboration with 3AF;
- the Academy organised a meeting in Rabat on the theme “On the footsteps of the Aeropostale pioneers”, in partnership with Air Aventure and the Toulouse-Saint-Louis du Sénégal Rally.

New website

The Academy’s new website has been online since July with some exciting new facilities: as well as the calendar, the list of publications and information on our members, you can choose between two subscription facilities (free or for a small fee) in order to consult our new resources section which gives you access to our e-publications, lectures, proceedings, etc.

Take a look for yourself!  
www.air-space-academy.org

Distinctions

The Academy would like to congratulate its members for their recent distinctions and nominations:

- Médecin Général Inspecteur Valérie André was honoured by General Paloméros, chief of staff for the French air force, at a moving ceremony at Villacoublay; he presented her with the military helicopter pilot licence No. 001;
- Jean-Claude Hironde was awarded the ICAS innovation prize for 2010;
- Professor Giovanni Bignami was nominated President of COSPAR;
- on 30 September, Catherine Maunoury officially took on the function of director of the Musée de l’air et de l’espace at Le Bourget. The event was attended by the French Defence minister, the French air force Chief of staff and many other personalities, giving a particular lustre to this passing of authority. Catherine Maunoury took over from Gérard Feldzer, another Academy fellow, in this post.

A literary prize?

Section V of the Academy is considering creating a literary prize which, every year or two years, would distinguish a work combining aviation and literature. In a sense, the idea is not a new one in that Section V regularly puts forward candidates to the Prizes and medals commission, which in general are accepted and thus recognised.

This time, it is a question of creating a prize which would be both demanding and ambitious: the jury would be ready to distance itself from “run of the mill” aviation books. To start with, a simulation will be attempted and a theoretical list of works drawn up which could be taken into consideration. Your comments and suggestions would be most welcome.

Pierre Sparaco  
President of Section V

Members’ publications

André Turcat presents:

Une épopée française

Les créateurs de l’aviation nouvelle 1950-1960
André Turcat, Pierre Sparaco, Germain Chambost

It was former test pilot André Turcat who had the idea to devote a book to testimonies of the fifties, a daring and innovative era, bringing out the work of the test crews. With the help of Germain Chambost and Pierre Sparaco, he undertook to meet up with the main players of this exceptional decade, which paved the way for the renaissance of French aeronautics.

The result promises to be enthralling and instructive. The book, published by Pascal Galodé, will soon be in bookshops and will be able to be consulted at the Academy’s documentation centre.

André Turcat presents:

Une épopée française

Les créateurs de l’aviation nouvelle 1950-1960
André Turcat, Pierre Sparaco, Germain Chambost

It was former test pilot André Turcat who had the idea to devote a book to testimonies of the fifties, a daring and innovative era, bringing out the work of the test crews. With the help of Germain Chambost and Pierre Sparaco, he undertook to meet up with the main players of this exceptional decade, which paved the way for the renaissance of French aeronautics.

The result promises to be enthralling and instructive. The book, published by Pascal Galodé, will soon be in bookshops and will be able to be consulted at the Academy’s documentation centre.
The Ballistic Threat: what policy for Europe and Space Debris, 2008, 84pp, €15

Air Transport and the Energy Challenge, 2006, 200pp, €15

Airline Safety, 2007, 60pp, €15


Low-fare Airlines, 2005, 68pp, €15

The UAV Revolution, 2004, 40pp, €10

The Impact of Air Traffic on the Atmosphere, 2004, 88pp, €10

The Ballistic Threat: what policy for France and Europe?, 2004, 40pp, €10

Europe and Space Debris, 2003, 40pp, €10

Feedback from Experience in Civil Aviation, 2003, 28pp, €10

Pilot Training, 2003, 28pp, €10

Dossiers (bilingual French-English series)

32 Risktaking, conclusions and recommendations, 84pp, 2009, €15

31 For a European Approach to Security in Space, 2008, 64pp, €15

30 The Role of Europe in Space Exploration, 2008, 84pp, €15

29 Air Transport and the Energy Challenge, 2007, 60pp, €15

28 Airline Safety, 2007, 60pp, €15


26 Low-fare Airlines, 2005, 68pp, €15

25 The UAV Revolution, 2004, 88pp, €15

24 The Impact of Air Traffic on the Atmosphere, 2004, 88pp, €10

23 The Ballistic Threat: what policy for France and Europe?, 2004, 40pp, €10

22 Europe and Space Debris, 2003, 40pp, €10

21 Feedback from Experience in Civil Aviation, 2003, 28pp, €10

20 Pilot Training, 2003, 28pp, €10

General works

In French unless marked with an asterisk

• Annales 2001-2007, Tome 1, Travaux, 2009, €20

• Lexique franglais-français, 2009, 70 p A5, €10

• Les Français du ciel, historic dictionary published by cherche midi under the direction of L. Robineau, 2005, 784pp, €35

• *A positioning system “GALILEO”: strategic, scientific and technical stakes, English version 2004, 200pp, €19

• Ciels des Hommes, anthology proposed by L. Robineau, cherche midi, 1999, 222pp, €15

Conference proceedings

English and French according to speaker

• Airports and their Challenges, 2008, CDRom, €20

• Risktaking: a human necessity that must be managed, 2008, CDRom, €20

• Scientific and Fundamental Aspects of the Galileo Programme, 2008, CDRom, €20

• Legal Aeronautic Expert reports, 2007, CDRom (out of stock)

• Air Transport and the Energy Challenge, 2007, CDRom, €20

• Aircraft and ATM Automation, 2006, CDRom, €19

• Europe and Space Debris, 2002 CDRom, €25

Forums (in French)

24 Helicopters and Medical Emergencies, 2010, 76p, A4, €10

23 Vision: a view of the spirit, 100 pages A4 colour, €15

Homage to Pierre Gallois

Pierre Gallois passed away on 23 August, at the age of 99. He was not only a high ranking military officer, but also an industrialist, a writer, a teacher and a lobbyist, in the noble sense of the term. He was elected a Fellow of the Academy in 1985. A man of influence - brilliant, uncompromising, multitalented - his life work includes a dozen books (the most recent published in 2001) and hundreds of articles. He achieved much more than an exemplary career in the French air force, campaigning long and hard to ensure that France was equipped with a nuclear arsenal, thereby recovering and reinforcing its status as a major nation. Later on, after retiring from the air force, he joined Dassault Aviation as commercial director, whilst at the same time exploring an astonishing talent as a painter, specialised in large-scale trompe l’oeil.

Born in 1911, Pierre Gallois obtained his pilot’s licence at the age of twenty before joining the French air force in 1936, then the Royal Air Force during the war, flying a Halifax bomber. He was subsequently appointed deputy chief of staff of SHAPE (Supreme Headquarters Allied Powers Europe), with responsibility for strategic studies. This function was to place him at the forefront of a vast exchange of ideas, in which he was called on to define a plan to modernise the French air force; it also served to confirm his belief of the absolute need for France to possess the atomic bomb, both as a deterrent and as a symbol of a high ranking nation.

General Gallois then went on to define in great detail the theory of deterrence known as “weak-to-strong” and to defend what he called the levelling power of the atom thus helping shape General de Gaulle’s final decision to embark on this path. The challenge was enormous, which goes some way to explaining why the meticulous demonstration was supported by numerous writings, including some deliberately provocative ones. Often the titles are highly eloquent: “L’Adieu aux armées” (Goodbye to the armies), “La France sort-elle de l’histoire? Super puissances et déclin national ” (Is France dropping out of history? Super powers and national decline).

Respected, valued, highly sought after, Pierre Gallois was wooed by the Rand Corporation - the famous American Air Force “think tank” - as well as by Air France in the time of Max Hyman. In his own way, an honest man and a great one.

Pierre Sparaco
Plenary Session of the Air and Space Academy

26 November 2010, 2 pm, Salles des Illustres, City Hall, Toulouse

Elected members

FELLOWS
Michel Brafman: Director of La Réunion Spatiale, Technical Director of La Réunion Aérienne
Jean Broquet: former Director of Technology Strategy and Planning at EADS Astrium
Jacques Desmazures: former Technical Director of Programmes at Dassault Aviation
Gérard Fouilloux: former European affairs Director of the Snecma group
Alain Garcia: former Executive Vice-president Engineering at Airbus
Jean-Claude Hirode: former Deputy Technical Director General at Dassault Aviation
Wolfgang Koschel: former Director of the Space Propulsion Institute of DLR
Érick Lansard: Director at Thales research & technologies France
Gérard Weygand: Honorary President of the association Les Peintres de l’air

FOREIGN ASSOCIATE MEMBER
Mahmut Barla: Deputy President and Dean of the engineering faculty of Piri Reis University

CORRESPONDENTS
Patrick Anspach: Aeronautics correspondent of the daily Belgian newspaper L’Écho
André Auer: Director of the Office fédéral de l’air (Switzerland), Chief executive Joint Aviation Authorities

Filippo Bagnato: Executive President of ATR
Xavier Boui: Technical Director General at Onera
Gérard Breda: Technical Director at EADS-Astrium space transportation
Jean-Georges Brévo: former Senior vice-president Defence affairs at EADS International
Michel de Gliniasty: Scientific Director General at Onera
John Green: President of the Executive Committee of Greener by design
Alain Hauchecorne: Deputy Director of Latmos
Philippe Jarry: former Senior Vice President Product at Airbus
Jürgen Klaffen: former Senior Vice President Head of the Center of competence flight physics at Airbus, Toulouse
Jean-Claude Martin: former Director of programmes France, MBDA
Jean-Philippe Mousnier: sociologist, expert in economic intelligence and sustainable development
Frédérique Rémy: Director of research at CNRS
Jean-Claude Ripoll: former Director of Engineering institute ENSAE
Louis-Alain Roche: contrôle général des armées en mission extraordinaire
Trevor Truman: former Technical and Engineering Director British Aerospace group

For further information: www.air-space-academy.org

The public plenary session of the Academy will take place in the prestigious Salle des Illustres in the Toulouse Town Hall.

On this occasion, the Academy will welcome in its new members and Board of governors, as well as presenting its prizes and medals for 2010.

A lecture at the end of the afternoon will be followed by a reception, courtesy of the Toulouse Municipality.

Programme

2:00 pm Opening, Presentation of new Board of Governors
Presentation by President Gérard Brachet of newly elected members

3:15 pm Lecture by Didier Evrard, Executive Vice President Airbus, Head of the A350 programme, on The Development of the A350

4:15 pm Break

4:30 pm Presentation of medals

5:15 pm Presentation of the Law, economy and sociology in air and space transportation prize

5:30 pm Presentation of the Great Prize

5:45 pm Policy Report of President Gérard Brachet

6:00 pm Closing speech by the Mayor Toulouse (to be confirmed)

Cocktail courtesy of Toulouse Municipality

The Lettre de l’Académie de l’Air et de l’Espace is a two-monthly publication – ISSN 1288-5223

The conclusions and opinions expressed in this document are those of the authors, within a context of freedom of expression cultivated by our Academy. They do not necessarily reflect the opinions of the Academy or its partners.

EDITORIAL OFFICES/ADMINISTRATION:
Air and Space Academy:
BP 75825 – 31505 Toulouse Cedex 5
Tel.: 33 (0) 5 34 25 03 80 – Fax: 33 (0) 5 61 26 37 56
Email: publications@iane.fr – Internet: www.air-space-academy.org
DIRECTEUR DE LA PUBLICATION/EDITOR: Gérard Brachet
EDITORIAL TEAM: Jean-Claude Chaussounet, Yves Marc, Pierre Sparaco, Martine Ségur, Lindsey Jones
PRE-PRESS: Lindsey Jones
TRANSLATION: Lindsey Jones, David Williams
Printed by: ENAC Service Edition
7 avenue Edouard Belin – 31055 Toulouse Cedex 4

Previous issues:
No.69 Future engines, September 2010
No.68 The Moon is dead, Long live Mars, June, 2010
No.67 Aeronautical and Space Training in Europe, April, 2010
No.66 General Aviation, January 2010
No.65 45 Years of commercial satellite operations, November 2009

The full list of previous issues and other publications can be found on our website: www.air-space-academy.org

The Challenges of Air Transport: some answers for the future

16-17 November 2010 at Cité Mondiale, Bordeaux

Organised jointly by “CENTEN’AIR, les 100 ans de l’aviation à Bordeaux-Mérignac”, AAAF and the Air and Space Academy, this conference will celebrate 100 years aviation at Bordeaux-Mérignac, underlining the strategic, economic and cultural importance of air transport in daily life, it will look into the future of air transport in the next decades, inform the public and encourage young people to consider aeronautics professions.

centenair2010.fr

Other events in 2010:
30 Nov. Melting icecaps as seen from space, lecture by Frédérique Rémy, 6-7.30pm, Médiathèque José Cabanis, Toulouse

Events 2011:
17 March “Clean”, safe aircraft, Palais de la Découverte, Paris
3-4 May Toulouse Encounters 2010