

VRI SPACE UPDATE
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New Year 2010: good news of great projects and of high successes to make people happy and secure !

1. Europe in space: towards a more integrated programme of innovative applications and of advanced systems

- **Antonio Tajani, the ‘Mr. Space’ of the European Commission, in charge of EU Galileo and GMES programmes**

On February 1st, the Barroso II Commission is expected to become the new Executive College of the European Union, with the recently ratified Lisbon Treaty as its innovative framework and with Herman Van Rompuy as the President of the EU Council (for 30 months). On 27 November, Jose Manuel Barroso, President of the European Commission, when he introduced his College for the next four years (until 31 October 2014), made this statement: *“We have a European programme and now we have a European team. On the basis of the nomination by the Member States, I have sought fresh ideas and new momentum on the biggest challenges we face in Europe today. This College will implement the political guidelines that I presented to the European Parliament [for his re-election]. I am confident that this College will be decisive in steering Europe towards recovery and a sustainable social market economy that works for the people. I have put together a strong Commission to fill the enhanced role of Europe, including on the world stage, provided by the Lisbon Treaty. One of the key tasks of this College will be to give life to the new opportunities provided by the Lisbon Treaty. The Commissioners-designate will present themselves in the hearings before the European Parliament in January. After the vote of consent of the Parliament, it will be time to start to work and to produce results for our citizens.”*

The Barroso II Commission, with 27 members, including President Barroso and 7 Vice-Presidents (with Vice-President Baroness Catherine Ashton of UK, who will be the High Representative of the Union for Foreign Affairs and Security Policy), must gain approval from the European Parliament before it takes office until 31 October 2014. Commissioners-designate will appear in individual hearings before Parliamentary Committees from 11-19 January. The vote of consent on the new Commission as a whole is foreseen to take place on 26 January. On the basis of the vote of consent, the Commission shall be appointed by the European Council.

For his second mandate, President Barroso gives a new look to the College with a number of **new portfolios**: Climate Action; Home Affairs; Justice, Fundamental Rights & Citizenship. Many other portfolios have been reconfigured: Education, Culture, Multilingualism & Youth; Health & Consumer Policy; **Industry & Entrepreneurship; Research, Innovation & Science**; International Cooperation, Humanitarian Aid & Crisis Response; Digital Agenda. No specific Directorate for Europe's space programme, but two Commissioners, indicated in heavy characters, are greatly concerned by its management.

- **Antonio Tajani**, an Italian lawyer (and journalist) born in August 1953, would be one of the seven Vice-Presidents and the Commissioner for Industry & Entrepreneurship (DG ENTR). From 9 May 2008, he was in the Barroso I Commission as Vice-President and responsible for Transport (DG TREN, whose activities include the EU development of the Galileo navsat system). His new portfolio includes the management of the operational GMES (Global Monitoring for Environment & Security) system which consists of the Sentinel remote sensing satellites (developed by ESA) and of the in-situ observations (through the EEA/European Environment Agency). The Satellite Navigations (TREN G.3, G4 and G.5) will move from DG TREN to DG ENTR. Consequently, the GNSS (Global Navigation Satellite System) Supervisory Authority or GSA comes under the DG ENTR portfolio, along with the GMES programme. A. Tajani will control Galileo and GMES, the two major space programmes of the Union. He will be the main EU interlocutor of ESA Director General Jean-Jacques Dordain, of ESA EOP (Earth Observation) Director Volker Liebig for GMES, of ESA Director NAV (Navigation) René Oosterlinck for Galileo (because of his retirement, he will be replaced by Didier Faivre on January 1st, 2011).

- **Irish Maire Geoghegan-Quinn** would be the new Commissioner for Research, Innovation and Science (DG RTD), instead of Slovenian Janez Potochnik, who would get the Commission for Environment (DG ENV). Among her responsibilities, there are the 7th Framework Programme of Research & Technology Development activities. Some projects are related to space science & technology.

Other two Commissioners would be interested for their policies by the use of space applications:

- Danish Connie Hedegaard would be responsible for the new DG Climate Action to be set up before Summer 2010. Because her work concerns the EEA (European Environment Agency) involved with the GMES programme, she must coordinate EEA management and environmental monitoring activities with Janez Potochnik, the new Commissioner for Environment.

- Dutch Neelie Kroes would be Vice-President and in charge of the Commission Digital Agenda, controlling DG Information Society (INFOS) and the European Network and Information Security Agency (ENISA). Her action involves the development of broadband systems (Ku-band, Ka-band) and mobile services (S-band) with geosynchronous satellites.

- **Lisbon Treaty becoming the official reference tool to manage the European Union since December 1st: the European space policy and the European space programme are shared EU competences, as the European Space Agency as EU partner**

In its Article 189, the Lisbon Treaty of the EU gives an official status to the space activities and ESA role in the European Union. This article clearly states in these paragraphs the high-level importance of space research and applications in EU objectives and policies:

- 1. To promote scientific and technical progress, industrial competitiveness and the implementation of its policies, **the Union shall draw up a European space policy**. To this end, it may promote joint initiatives, support research and technological development and coordinate the efforts needed for **the exploration and exploitation of space**.*
- 2. To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of **a European space programme**, excluding any harmonisation of the laws and regulations of the Member States.*
- 3. The Union shall establish any appropriate relations with **the European Space Agency**.*

There is no regulatory indication about the industrial policy to be applied to the contracts for space systems in Europe: the mandatory ‘right return’ of ESA or the open competitive dialogue of the Commission will co-exist. The Parliament and the Council of the EU give the green light to the orientations of the European space programme by allocating the budgetary resources through the Commission. The strategic objectives of the European Space Policy are defined by the European Space Council, at Ministerial level, of EU and ESA member States. The next Council will take place at Brussels in November, during the Belgian Presidency of the European Union.

- **Eumetsat, as public operational actor, looking for a significant role in the GMES system, especially for climate change and oceanography**

The GMES (Global Monitoring for Environment & Security) programme gets a strong impetus as an essential tool for accurate observations of the climate change, in spite of the less promising of the COP15 (15th Climate Change Conference) organized in Copenhagen by the United Nations. ESA and Eumetsat made presentations of their experimental and operational systems to get worldwide data about the current modifications of atmospheric components, oceanic phenomena, ice coverage, water resources, ...

Eumetsat insisted on the operational aspects of Meteosat (4 in geosynchronous orbit, 2 in construction) and Metop (1 in sun-synchronous orbit, 2 in construction) satellites developed by ESA with the European industry (mainly Astrium Satellites and Thales Alenia Space), on the efficient network of its 8 SAFs (Satellite Application Facilities) with specific missions of data processing on forecasts, numerical weather prediction, ocean and sea ice, land surface analysis, climate monitoring, atmospheric chemistry, hydrology and water management, ... It also described its role in oceanography by exploiting – with US NOAA (National Oceanic & Atmospheric Administration) – the sea surface measurements made by the altimeters of the “made by France” Jason satellites. It announced a close cooperation with the KMA (Korean Meteorological Agency) for the geosynchronous COMS-1 satellite provided by Astrium, with ISRO for the exploitation of French-Indian oceanography mission SARAL (Satellite with Argos & AltiKa, planned for launch in 2010-2011).

What about the future of Eumetsat operations? The 24-member intergovernmental organization - it will welcome two new members in 2010 - pursues some great initiatives during the next years:

- through an agreement with ESA to operate the maritime observations of the Sentinel-3 spacecraft (1st launch in 2013)
- interest for the development of Sentinel-5 Precursor (in 2014 ?) which will carry the Dutch TROPOMI (Tropospheric Monitoring Instrument) payload.
- the urgent need to solve - in January 2010 - the funding of its optional Jason-3 satellite to be built for launch during 2013: some 63,6 million € (1/4 of the full budget) were still missing to finance it, while six interested member States - among them, Belgium - were unable to take any financial decision ...
- the preparation, with ESA as development manager, of the ambitious MTG (Meteosat Third Generation) system which will consist of 4 Imagers (1st launch in 2016) and of 2 Sounders (from 2018); the total budget is around 2.4 billion € Astrium Satellites (with SSTL) and Thales Alenia Space (with OHB-System) are competing for the six geosynchronous spacecraft to be

based upon the same 3-axis platform. No selection could be made in December 2009 and is expected, after new evaluation, in early February for a planned proposal to Eumetsat Council in March.

- **Astrium Services taking the leadership in Europe for earth observations from space by merging InfoTerra and SPOT Image**

In its Annual Awards for Excellence in Satellite Management, organized by Euroconsult in Paris, Astrium Services received the award for the Strategic M&A (Mergers & Acquisitions) Transaction of the Year 2009. The space services division of Astrium - particularly active in military satcom systems (Skynet 5 in UK, ComsatBw in Germany) - purchased a majority share in SPOT Image, which operates the SPOT-4 and SPOT-5 earth observation satellites. It holds 82 % of the equity. Through this acquisition, SPOT Image is closely aligned with the Infoterra company of Astrium, which operates the Terra-SAR X radar satellite, in order to provide a greater range of value added services to the market of remote sensing operations from space. Astrium plans to merge, for a more efficient synergy in a near future, the activities and competences of SPOT Image (optical images) and Infoterra (radar observations).

Astrium Services is reinforcing the assets operated by SPOT Image and Infoterra. In April-May 2010, after a delay of some six months, TanDEM-X will be launched by Dnepr rocket from Baikonur to join Terra-SAR for 3-D radar imaging data for 1-m resolution DEM (Digital Elevation Model) applications. The continuation of SPOT-4 and SPOT-5 images, particularly useful to update GIS (Geographic Information System) data, will be insured by agile SPOT-6 and SPOT-7 spacecraft to be launched in 2012-13 and 2014-15. Both satellites will be built by Astrium Satellites by using the Astrosat-250 bus, derived from THEOS (Thai Earth Observation System) of Thailand (in orbit since October 2008), from SEOSat of Spain (planned launch in 2012), from first 'Kazcosmos' Eosat of Kazakhstan. Astrium Services is candidate to operate the Sentinel-2 and Sentinel-3 missions of the GMES programme.

In parallel, Astrium Satellites and SSTL (Surrey Satellite Technology Ltd) are involved with joint ventures to develop small remote sensing satellites - based upon French Myriade or British SSTL 150 or SSTL 300 platform - in technologically emerging countries: Algeria (with two Alsat-2 – first to be launched in March 2010), Chile (with SSOT/Sistema Satelital para Observacion de la Tierra to be launched by late 2010), Nigeria (Nigeriasat-X and Nigeriasat-2), Vietnam (VNREDSat/Vietnam Natural Resources, Environment and Disaster monitoring Satellite), Kazakhstan (EO microsat).

- **Broadband systems by satellites with new operators and systems coming on the market of the European Union, with Newtec as key player for the interactive terminals**

The “last mile” for the Internet connections is quickly achievable by the use of geosynchronous satellites. It is clearly demonstrated by SES Astra with the Astra2Connect service (in Ku-band using compact and attractive Sat3Play terminals developed and produced by Newtec) and Eutelsat with the TooWay system (pushed ahead by Viasat, mainly in Ka-band). The current decade will be marked by an intensive use of satellite capacity to offer broadband interactive links into isolated areas and rural villages. Some parts of France, United Kingdom, Germany, Poland, Romania, Greece, Sweden, Norway... remain non-connected to Internet high-speed services. Outside SES Astra and SES Sirius - with up to 60.000 Astra2Connect terminals in service ! -, Eutelsat and Hispasat, the European Union (with the neighboring countries) is welcoming new four entrants in the form of specific systems and of advanced projects.

- **British Avanti Communications** is successfully marketing Ku-band and Ka-band capacity from existing geosynchronous satellites for broadband services. During this Summer, it will deploy its first Ku-/Ka-band satellite named Hylas-1 over the Atlantic Ocean to offer a Pan European coverage for high-rate connections; the launch will be made by the first Soyuz 2 from Europe’s spaceport in French Guyana (close to Sinnamary). Recently, Avanti Communications awarded a contract for Hylas-2 – to be positioned over the Indian Ocean, to cover Europe, the Middle East and large parts of Africa - to Orbital Sciences Corp and for its launch in 2012 with Arianespace.

- **Swedish OverHorizon operator**, specialized in military communications, ordered from Orbital Sciences Corp (with intelligent payload from Thales Alenia Space) its first Ku-band satellite for mobile broadband links in Europe and the Middle East and Central Asia. OverHorizon-1 is planned for launch in 2012-2013 to use one geosynchronous position and Ku-band frequencies of Cyprus.

- **French CNES (Centre National d’Etudes Spatiales)** is working on the development of two specific communications satellites - 1 with Italy for dual-use services, 1 to cover the Hexagon - for interactive broadband connections. ATHENA-FIDUS (Access on Theaters and European Nations for Allied forces opportunities-French Italian Dual-Use Satellite) is a joint Ka-band satellite system of France and Italy - with Thales Alenia Space as prime contractor - for civilian and military connections using small terminals. Megasat is a innovative project to meet the challenging priority of the full digital coverage of France

with a powerful satellite in geosynchronous orbit; the public-private investment will use the available resources of the ‘Grand Emprunt’ decided by President Sarkozy in 2009.

- **The long and delicate way for EU member States to integrate into a single and unified network the military space systems for defence and security in Europe: the first and challenging steps are taking place...**

The EDA (European Defence Agency) is an EU institution, with limited resources, under the direction and authority of the Council. Baroness Catherine Ashton, as the High Representative of the Union for Foreign Affairs and Security Policy, acts as the Head of the Agency whose objectives are to develop joint investment programmes for military purposes and to establish Defence Procurement Opportunities.

Astrium Services has been awarded a contract by the EDA for a new preparatory study aimed at coordinating the future military communication needs of the European Union. During one year, an analysis of the Satcom requirements of the armed forces in the EU Member States will be the basis for an operational framework for the European Satellite Communication Procurement Cell (ESCPC). The aim of this Cell will be to coordinate and aggregate EU Member States’ orders for satellite communications services. Once the ESCPC is created, a centralized system will be in place for the procurement of satcom services on commercial space capacity, such as C, Ku and Ka bands. Astrium Services will be able to offer its unique one-stop-shop 24/7 approach, via its London Satellite Exchange (LSE) subsidiary with a full catalogue of services.

In the field of “spy satellite” systems, with telescopes and radars, in Europe, another coordinating process is required since many years. France took the MUSIS (Multinational Space-based Imaging System) initiative to stimulate joint operations with the next generation of very high resolution imaging satellites (to be developed by France, Italy, Germany and Spain). A group of six EU member States are showing a great interest to cooperate for the establishment of a coherent network for military observations: France, Germany, Italy, Spain, Belgium and Greece signed the MUSIS agreement, without precisely allocating financial resources. Poland contacts France to join this agreement. France decided to go ahead with its CSO (Composante Spatiale Optique) programme in order to guarantee the continuity of optical observations in a post-Helios 2 system. Belgium, which receives and processes Helios-2 data, is greatly interested to participate, but has not yet finalized its financial contribution (140 million €) for the industrial participation to MUSIS-CSO infrastructure. See

Annex 1 about the challenging efforts to establish a coherent network for the national space systems for military operations in Europe.

We must note that Europe is currently world leader in the development and exploitation of remote sensing satellites:

- with optical systems (SPOT, RapidEye, DMC, Meteosat and Metop from civilian side; Helios-2, Topsat from military side);
- with SAR instruments (TerraSar-X from civilian side, Cosmo-SkyMed constellation for dual use, SAR-Lupe constellation from military side).

During the 2010s, the number of earth observations satellites will grow up significantly: German TanDEM-X, French Pleiades, EU Sentinel family (3 satellites), Spanish Ingenio and Paz, PROBA-V, French SPOT 6 & 7, Turkish Goktürk, ... are in construction for launches before 2015.

2. Significant achievements of Belgium in space during 2009

- **“Made in Belgium” PROBA-2 in good shape for scientific experiments and technological tests**

On November 2, as it was scheduled since many months, the Russian Rocket launcher put into orbit two ESA spacecrafts: Earth Explorer SMOS (Soil Moisture & Ocean Salinity) of 658 kg and compact PROBA-2 for scientific mission and technological experiments. The 135-kg microsatellite made by Verhaert Space in Kruibeke (near Antwerpen) carries two Belgian solar physics instruments, two Czech plasma physics experiments and up to 17 technological innovations - for orbital tests - from laboratories and industries of Belgium, France, Germany, Switzerland, Denmark, Italy, United Kingdom, the Netherlands and Canada. After two months in orbit and health checks under the control of ESA station in Redu (with Redu Space Services), PROBA-2 is in good shape and works normally. On 26 January (from 9 h 45 to 11 h), the Royal Observatory of Belgium and ESA will celebrate the first three months of PROBA-2 in space by a press conference on the first results of this challenging mission for a small satellite.

- **The safe return of Frank De Winne after more than 6 months in the ‘international microgravity oasis’ around the Earth**

On December 1st, the Soyuz TMA-15 capsule, with Russian Roman Romanenko, Canadian Robert Thirsk and Belgian Frank De Winne, achieved a perfect landing in the planned area of Kazakhstan. The 3-people crew, after nearly 188 days in weightlessness, had to suffer a 4-g force during reentry, before being back in the earth’s gravity. Congratulations for the great achievements of “our” ESA astronaut: onboard the ISS (International Space Station), he was the first to make viable and efficient a permanent 6-people staff working together in the same orbital infrastructure and he was during 46 days the first non-American and non-Russian commander of the station.

We must mention the exploit of Van Halewyck editor in Leuven to publish a 205-pages book about the long-duration spaceflight of Frank De Winne, less than two weeks after his return to Earth ! “*Het ruimtedagboek van Frank De Winne – Dagelijks leven in het ISS*” (The spaceflight journal of Frank De Winne – Daily life in the ISS) is the nice result of the editorial efforts, in a so-called PPP (Public-Private Partnership) initiative, of Herman Hendericks (VRT Radio), Tijs Mauroo (VRT TV) and Boudewijn Van Spilbeeck (VTM). The book contains beautiful color photographs and a lot of various reports explaining the activities of Frank De Winne in space during his second mission in orbit. This fine reference source will be published in French in February by Luc Pire Editions.

- **QB50 project taking form under the leadership of VKI: first successful workshop attended by the Cubesat community in Europe**

The international QB50 project workshop, organized by VKI (Von Karman Institute for Fluid Physics) in Sint-Genesius-Rode/Rhode Saint Genèse, got a great interest of both the scientific community concerned by the atmosphere and the Cubesat developers in Europe. Prof. Bob Twiggs, who is considered as the “father” of the Cubesat concept at Calpoly (California Polytechnic State University) in San Luis Obispo, encouraged such an initiative to stimulate interactive opportunities for educational purposes, between universities, institutes and industries. He also described the cheap ultra-miniaturized pico-satellite of some hundred grams (with sides of 2 cm), named 16 PocketQub: this educational tool, for short-duration experiments in low-orbit, could be developed and launched for less than 5000 €

QB50 is a constellation of up to 50 Double Cubesats for multi-point, in-situ, long-duration measurements (during three months) in the lower thermosphere - between 90 and 320 km - and for reentry research. Dr Jean Muylaert, who was, as responsible for the Aerothermodynamic Section of ESTEC, in charge of the EXPERT (European Experimental Reentry Testbed) mission - now scheduled for October 2010 -, gave a very useful summary of the QB50 network project and status. The 50 Double Cubesats of 2-3 kg, each designed and built by an university or laboratory around the world, will be deployed in 320-km circular orbit (79 degrees of inclination) by a Russian Shtil 2.1 missile, fired from a submarine near military Mourmansk complex. Dr Muylaert knows very well this rocket manufactured by Makeyev Rocket Design Bureau in Miass, because it is derived from the Volna missile which will be used for the EXPERT flight. The 223-kg payload to be launched by Shtil 2.1 for the QB50 mission will consist of 50 nano-satellites (100 kg), a solar sail package (23 kg) and the deployment system (100 kg).

The tentative schedule presented by Dr J. Muylaert is particularly ambitious and audacious:

- November 2010 – Second International QB50 Workshop to select the standardized sensors for QB50 Double Cubesat payload, as well as Cubesat proposals (to be submitted to VKI for 11 October 2010) ;
- January 2011 - December 2012 – Cubesat development at universities with industrial support ;
- March 2013 – Delivery of Cubesat flight models to ESTEC ;
- July 2013 – QB50 Launch.

Four working groups are managed by VKI :

- QB50 Steering Group
- Orbital Dynamics
- Sensor Selection (4 meetings in 2010)
- Frequency Allocation (UHF/VHF or S-band)

The ground segment will have an interface with GENSO (Global Educational Network for Satellite Operations), through ESA station of Redu. QB50 data processing will use the systems and competences of the Belgian Institute for Space Aeronomy (IASB-BIRA).

It is possible to download the QB50 Workshop presentations on the web site <http://www.vki.ac.be/QB50/papers.php>

- **SEVESEO IS or Industrial Disaster from Space, with VITO as main partner of ESA, for applications in Antwerp and Luxembourg**

The European Space Agency, within its Data User Element program, has funded the SEVESEO IS (Information System) project, which is designed to assist emergency planners and rescue teams with the human and eco-toxicological consequences of incidents with dangerous products for a complete area. This system operates within a framework using remote sensing data to characterize the local environment and to assess environmental impacts using a client-server GIS architecture.

VITO (Vlaamse Instelling for Technologisch Onderzoek) in Mol contributes to this project by evaluating various risk scenarios for Antwerp (harbour zone) and for the province of Luxembourg (rural region). The result of this information system project will be particularly useful to provide incident database and model interface for the GMES operations and in the framework of the Integrated Applications Programme (IAP).

Annex 1

**Europe's military space systems : the next challenges
to combine them into a coherent network for efficient services**

(January 2010)

COUNTRY	Communications /number of satellites <i>prime contractor</i> (operational since) [planned date]	Earth Observations /number of satellites <i>prime contractor</i> (operational since) [planned date]	"Intelligence" (*) /number of satellites <i>prime contractor</i> (operational since) [planned date]
BELGIUM	<ul style="list-style-type: none"> - Bemilsatcom ground segment <i>L3 Communications</i> (with commercial satellites <i>Intelsat & Eutelsat</i> since 1999, contract with Hisdesat for X-band capacity of Xtar-EUR & Spainsat). - ATHENA-FIDUS broadband system/Thales Alenia Space with France and Italy [2013]? 	<ul style="list-style-type: none"> - Partner of Helios-2 (launches in 2004 and 2009, with receiving station and processing center in Evere, close to Brussels /<i>Astrium/Spacebel</i>), of Pleiades HR [2 satellites to be launched in 2010 and 2011] - Cooperation with France for MUSIS-CSO with very high resolution EO satellites (to be confirmed) - Royal Military Academy developing expertise to use satellite data for mine detection mapping. 	<ul style="list-style-type: none"> - Participation of Royal Military Academy and OIP Sensor Systems to the study made by OHB-System for ESA concerning the design of an European AIS (Automatic Identification System) constellation.
FRANCE	<ul style="list-style-type: none"> - X-band Syracuse-1/-2 payload of Telecom-1 /3 and of Telecom-2 /4 <i>Astrium</i> (since 1984) - Syracuse-3A & -3B /2 <i>Thales Alenia Space</i> (2005 and 2006) partner of the contract NATO Satcom-2000 system - ATHENA-FIDUS (Access on Theatres for European Allied forces Nations/French-Italian Dual-Use) project of Ka-band broadband satellite /<i>Thales Alenia Space</i> with Italy and Belgium? [2013] 	<ul style="list-style-type: none"> - *Helios-1A & 1B <i>Astrium</i> (since 1995) - *Helios-2A & 2B <i>Astrium</i> (since 2004) with Germany for E-SGA - *Pleiades HR-1 and -2 <i>Astrium</i> + <i>Thales Alenia Space</i> [in 2010] for the ORFEO (Optical and Radar Federated Earth Observation) system, with Cosmo-SkyMed of Italy. - Increasing role of <i>Astrium Services</i> for the integrated use of earth observations made by optical SPOT and radar TerraSAR-TanDEM-X satellites. - */** MUSIS-CSO (Multinational Space-based Imaging System for Surveillance, reconnaissance & observation /Composante Spatiale Optique) initiative of France (with Germany, Italy, Spain, Greece & Belgium – first contracts to <i>Astrium & Thales Alenia Space</i> - with very-high resolution sensor. To be combined with agile SAR satellites of Germany and Italy [2016] 	<ul style="list-style-type: none"> - Essaim-COMINT /constellation of 4 microsattellites made by <i>Astrium</i> (since December 2004) - SPIRALE (Système Préparatoire Infra-Rouge pour l'Alerte/Preparatory system for IR Early Warning) with 2 microsattellites of 120 kg in GTO, developed by <i>Astrium</i> (launched in February 2009) - ELISA (Electronic Intelligence Satellite) with 4 microsattellites of 130 kg developed by <i>Astrium & Thales Alenia Space</i> [for launch in 2010] - CERES (Capacité de Renseignement Electromagnétique Spatial) with 1 geosynchronous satellite (with Sweden and Greece) [in 2015 ?]

<p>GERMANY</p>	<p>- ComsatBw/2 Astrium + Milsat Services (first launch in 2009) [2nd in 2010]</p>	<p>- **SAR-Lupe /5 OHB-System (fully operational since 2008) - Cooperation with France to operate jointly in E-SGA (Europeanisation of Satellite-Based Reconnaissance) the Helios-2, SAR-Lupe et Pleiades systems. - Partner of the MUSIS initiative for the international development and exploitation, in Europe, of military satellites for earth observations (see France). Studies on Sarah demonstrator for very high resolution radar observations. - *Hi-ROS project proposed by German industry [possible launch in 2015 ?]</p>	<p>Study made by OHB-System for ESA concerning the design of an European AIS (Automatic Identification System) constellation. Concept studies of OHB-System and of Astrium for a constellation of early warning satellites.</p>
<p>GREECE</p>		<p>Partner of the French Helios-2 system with receiving station and processing center. - Partner of the MUSIS initiative for the international development and exploitation, in Europe, of military satellites for earth observations (see France).</p>	<p>Cooperation with France for the CERES project [geosynchronous satellite to be launched in 2015 ?]</p>
<p>ITALY</p>	<p>- SICRAL-1A /1 Thales Alenia Space (since 2001) - Hardened SICRAL-1B /1 Thales Alenia Space (2009) - partner of the contract NATO Satcom-2000 system - SICRAL-2 / Thales Alenia Space [2011] - Athena-FIDUS/Thales Alenia Space ? [2012]</p>	<p>- Partner of France for Helios-1 (since 1995) and Helios-2 (since 2004) systems - **Cosmo-SkyMed /4 Thales Alenia Space (3 in orbit and operational) [4th in 2010] - Cooperation with France for the ORFEO system with Cosmo-SkyMed and Pleiades [in 2008-2009] - Partner of the MUSIS initiative for the international development and exploitation, in Europe, of military satellites for earth observations (see France).</p>	
<p>LUXEMBOURG</p>	<p>Commercial offer of classified broadband links, for governmental services, through leased capacity on SES Astra and SES World Skies satellites.</p>		<p>- Project of AIS (Automatic Identification System) Constellation with microsatellites to monitor maritime traffic (signals) and sea environment (images)/study for ESA of OHB-System with Luxspace and SES Astra Techcom [2012-2013 ?] - Tests of AIS payload on the 4th stage of Indian PSLV rocket (Rubin/Pathfinder-1) and on the International Space Station (LuxAIS).</p>

<p>NORTH ATLANTIC TREATY ORGANIZATION</p>	<p>- NATO-4A & -4B <i>EADS Astrium</i> (since 1991) NATO Satcom-2000 system: - SHF & UHF services with British-French-Italian consortium (Skynet + Syracuse 3 + SICRAL) - EHF services with American military comsats ?</p>	<p>Possible use of classified spy satellites operated by US Department of Defense</p>	<p>Possible but restricted use of classified intelligence satellites operated by US Department of Defense</p>
<p>NORWAY</p>	<p>- Projet, announced in late 2009 but not confirmed, of military communication satellite with Spain ?</p>		<p>- NSat-1? /1 FFI & Kongsberg + Luxspace ? microsatellite or piggyback payload designed to monitor sea traffic by detecting AIS (Automatic Identification System) radar signals - Participation of Norwegian Defense Research Institute and of Kongsberg Seatex to the <i>study made by OHB-System + Luxspace for ESA</i> concerning the design of an European AIS constellation.</p>
<p>POLAND</p>		<p>Possible partner of the MUSIS initiative for the international development and exploitation, in Europe, of military satellites for earth observations (see France).</p>	
<p>SPAIN</p>	<p>- X-band payload of Hispasat-1A/1B /2 <i>EADS Astrium</i> (since 1992) - "Made in USA" SpainSat/Hisdesat /1 <i>Space Systems Loral</i> (in 2005) and XTAR-EUR /1 <i>Space Systems Loral</i> (in 2006) - Cooperation with Norwegian Defense for a milsatcom system.</p>	<p>- Partner of France for Helios 1 (since 1995), Helios 2 [in 2004], Pleiades [in 2008] - Spanish National Earth Observation Programme with some European partners (especially France), . of * Ingenio/Sesat optical satellite for dual-use imagery/1 ESA/CDTI + EADS CASA [2012] . of ** Paz/SeSAR for military radar observations/1 TerraSAR-type satellite with INTA/Hisdesat + Astrium [2012] - Partner of the MUSIS initiative for the international development and exploitation, in Europe, of military satellites for earth observations (see France).</p>	
<p>SWEDEN</p>	<p>Private development of the OverHorizon system for mobile broadband services in Ku-band, with position and frequencies of Cyprus [1 to be launched in 2013]</p>	<p>* Partnership with France for the data of the dual-use Pleiades HR satellites [to be launched in 2010 and 2011]</p>	<p>Cooperation with France for the CERES project [geosynchronous satellite to be launched in 2015 ?]</p>
<p>TURKEY</p>	<p>X-band payload on Türksat-2A/1 <i>Thales Alenia Space</i> (since 2002).</p>	<p>- *Project of dual-use earth observation RAsat microsatellite /1 Tübitak + SaTReCI [in 2010] - *Göktürk EO satellites for reconnaissance & surveillance /1 mini-satellite TAI/Turkish Aerospace Industries + Telespazio & 1 micro-satellite Tubitak Uzay + TAI + SaTReCI [in 2012-2013]</p>	

<p>UNITED KINGDOM</p>	<p>- "Made in USA" Skynet-1A & -1B/-2A- & -2B <i>Ford Aerospace</i> (since 1969) - Skynet-4 /6 <i>Astrium</i> (since 1990) - Skynet-5 /3 <i>Astrium</i> developed and operated by <i>Paradigm Services/Secure Communications</i>, an <i>Astrium Services</i> company (in 2005, with the Skynet-4 system, 3 Skynet 5 launched in 2006-2008), partnership of the contract NATO Satcom-2000 system</p>	<p>-*TOPsat /1 microsatellite developed by <i>Qinetiq</i> with <i>SSTL</i> and operated by <i>Infoterra Ltd</i> in a Public-Private Partnership (since 2005) -**Project AstroSAR/1 minisatellite proposed by <i>Astrium</i> & <i>Infoterra</i> [2013, but no governmental approval]</p>	<p>- Possible but restricted use of classified space systems operated by the US Department of Defense ? - Interest with <i>QinetiQ</i> for SSA (Space Surveillance Awareness) operations?</p>
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In heavy characters: "made in Europe" satellites (developed by European prime contractors)

Earth observation satellites: * optical sensors ** SAR/radar systems