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Year 11
Number 1
march 2006
Site: www.vrind.be

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Vlaamse Ruimtevaart Industriëlen
Flemish Space Companies

NEWSLETTER

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ALCATEL ALENIA SPACE - EUROSENSE BELFOTOP - FLAG - GIM - IMEC - NEWTEC CY - OIP SENSOR SYSTEMS - PUNCH TELEMATICS - SABCA LIMBURG - SPACE APPLICATIONS SERVICES - UMICORE ELECTRO OPTIC MATERIALS - VERHAERT SPACE - VITO

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Realisation with the support of:

Vlaams Innovatienetwerk
met steun van IWT

EDITORIAL

The new file of VRI has been approved by IWT. This means that VRI can continue to work with the support of the Flemish government for the next 4 years.

From the beginning our approach has been very ambitious, but realistic in the mean time. Our aim is to turn the Flemish Space Industry into a competitive expansive sector and our members have realised this.

Since our new start we don't focus only on ESA but as well on the EU, whose role is becoming more and more important.

The recognition of the impact of space research and industry on the Flemish economy is of great interest. There aren't many sectors in which technological innovation and economical success are so closely knit. ■

Dirk Breynaert,
president

CANBERRA DEVELOPS PIPS®-DETECTORS FOR SATELLITES

Field and Particles Pallet with CHEMS and LEMMS.
INCA sensor.

CANBERRA is located in Olen, Belgium, and is part of the AREVA Nuclear Measurements Business Unit, the world's leading manufacturer of instrumentation and systems for radiation detection and analysis (alpha, beta, gamma) on a turnkey basis.

In Belgium CANBERRA Semiconductor develops and manufactures silicon detectors for the detection of charged particles, X-rays and light.
CANBERRA has a long tradition as a supplier of detectors for space applications, especially the CANBERRA PIPS® (Passivated Implanted Planar Silicon) detectors, based on modern semiconductor technology, attract a great deal of interest from the space science community. Because of the very thin (20 tot 30 nm) dead layer (window), the PIPS® detectors were selected for the successful CASSINI mission to Saturn.
Two of the three instruments of the MIMI (Magnetosphere Imaging) instrument on board CASSINI are equipped with PIPS® detectors, developed by CANBERRA.
The CHEMS (Charge Energy Mass) spectrometer, built at the University of Maryland, USA, uses PIPS® detectors for the measurement of the charge state, the composition and the energy of ions with energies from 3 to 320 keV/e.
The LEMMS (Low Energy Magnetosperic Measurement) system has been developed by the Max Planck Institute in Lindau, Germany, and measures the intensity of low energy ions and electrons separately. The LEMMS, which contains 11 different PIPS® detectors, helps to study the magnetosphere and the radiation belts surrounding the earth.
More recently PIPS® detectors of CANBERRA were used in instruments on board of the satellites "Double STAR" and "MESSENGER" launched in 2004.
Also the satellite "IMPACT-STEREO", to be launched in 2006 will have PIPS® detectors on board. ■

SPACE APPLICATIONS SERVICES AND B.USOC OPERATE PROMISS-4 IN THE ISS

Ahead of Frank De Winne's flight in 2002 several Belgian made instruments were brought on board of the ISS. During his 10 days' visit in space the Belgian astronaut did various experiments. One of these experiments was "PromISS". Just now a new PromISS experiment has been finished by B.USOC and Space Applications Services.

PromISS is a holographic microscope, designed at the Microgravity Research Centre (MRC) at the University of Brussels (ULB). It is developed to observe crystallization of proteins. 6 reactors with a protein solution and a precipitant are placed on a disc, which turns around slowly inside the instrument. Each hour every reactor passes by the 'phase shift' interferometer. The disc stops at 6 different positions in the reactor. A video camera registers the interferograms.
These pictures are transferred to digital videocassettes and are brought back to earth together with the crystals. Using these images and crystals thorough research on the growth of crystals and on the depletion zones can be performed by scientists.

PromISS has been put in the Microgravity Science Glove box (MSG) and was controlled from earth.

The PromISS-microscope in the MSG glove box (left), and the PromISS-disc with the 6 reactors (right).

"PromISS-2", an improved version of PromISS, was brought to ISS in 2003 for the mission of the Spanish astronaut Pedro Duque. "PromISS-3" had to process a new series of reactors during Increment 8. All these times PromISS was operated from B.USOC in Uccle and ESA in Noordwijk.

For PromISS-4 ESA's ground station in Noordwijk was not available, so B.USOC was totally responsible for operating the instrument. They worked together directly with met MSG TSC at NASA, the control centre for the Microgravity Science Glove box.

Concerning the experiments Verhaert Space (earlier responsible for the electronics and software of PromISS) has developed a new type of reactors. It is now possible to activate an experiment by means of a miniature valve, which separates the precipitant and the protein solution before activation.

The operation activities by Space Applications Services and B.USOC in the control room of B.USOC

Space Applications Services has been asked by B.USOC to coordinate the operations of PromISS-4 and to provide the operators. A team of 8 operators was brought together, 3 of B.USOC and 5 of Space Applications Services, and they took care of the "B.USOC Ops" operating functions and "B.USOC GC" technical support during 2 weeks 16 hours a day. B.USOC also looked after the "Science Support" together with the "User Home Base" at ULB. The scientific team was represented by Ingrid Zegers en Mike Sleutel of the VUB.

The reactors were launched on December 21rst from Baikonur with Progress 20P. Verhaert Space and VUB were on site to perform a final check of the hardware. The experiment started on January 19th 2006 after the installation of PromISS-4 by the American astronaut Bill McArthur. The instrument functioned perfectly. Each day during one hour videotapes were made, so that the ground team got the opportunity to evaluate the progress of the experiment. That way telecommanded adjustments were possible, if necessary. In the mean time Bill McArthur changed regularly the videocassettes with the images of the growing crystals and he reported or questioned about the experiment.

The crystals were brought to earth on April 8th with Sojuz 11S. Then the real work did start for the scientists. Space Applications Services and B.USOC can look back on a fascinating experience and can continue to work on the development of B.USOC to a full control centre for the operating of PCDF and SOLAR instruments on board of Columbus.

The PromISS-4 project as well as the B.USOC was financed by the Belgian Federal Policy as part of the ESA PRODEX program (Programme for the Development of scientific Experiments).

umicore
Electro-Optic Materials

UMICORE IN SPACE

Umicore is a relative newcomer in space, but in the decade its products are being used in space power generation they have made it all the way to Mars.

Starting point of Umicore's space experience was the sudden upsurge in satellite communication in the mid-nineties. The growing demand for bandwidth necessitated more on-board power. Meeting these requirements using existing silicon based solar panels proved to be problematic due to their relatively low power/mass ratio; a switch to compound semiconductor solar cells was the evident solution. The technology for these III-V solar panels was developed as part of US government projects since the mid-eighties. During this development work germanium wafers were accepted as substrates of choice for the deposition of the III-V epitaxial structure. The commercial market imposed its cost targets on this technology, and to meet these targets 100 mm diameter dislocation free germanium wafers were considered a necessity. Umicore, at that time under its previous name Union Minière, was the only supplier of germanium wafers corresponding to these high standards. Its unique crystal growth technology was developed over a period of 40 years, for applications such as the early stages of microelectronics (in the fifties and sixties), infrared imaging and gamma ray detection. These technical skills combined with a rapid response to the market needs established Umicore as the leading supplier to the space power industry.

Figure 1: 100 mm diameter germanium wafer.

Over the years Umicore was able to maintain this leadership position by supporting its customers in the development of subsequent generations of multi-junction solar cells, in which germanium plays an active role providing the bottom (long wavelength) cell. Capacity was built up to follow the market requirements at Umicore's Olen, Belgium, plant and currently is at the level of 400,000 100 mm diameter wafers. Picture 1 shows a 100 mm diameter germanium wafer as supplied by Umicore and the corresponding solar cells. In the mean time Umicore developed its manufacturing competencies further and can now provide wafers with diameter up to 300 mm.

Although significantly more expensive than silicon solar cells, the excellent conversion efficiency of state-of-the-art triple junction III-V solar cells may very well open the door to a broader terrestrial use. Recent work on concentrator cells shows efficiencies of up to 40%, and a new US project has the ambition to reach 50% within 5 years. A spin-off into mainstream PV markets is very plausible in that case. First power plants using germanium

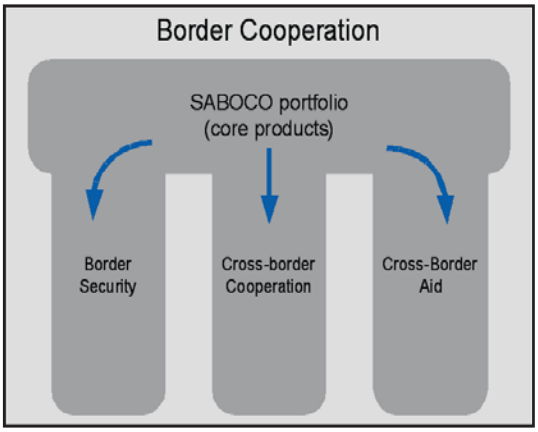
Figure 2: Hburg Palm Valley, © Solar Systems Ltd.

based III-V concentrator cells are already in operation in Australia (picture 2, courtesy Solar Systems Ltd). Umicore supports these efforts on the material side, and is well positioned to take significant market share should this new market materialize.

Umicore's foray into space may therefore also pay off here on earth. ■

SABOCO SATELLITES IN BORDER COOPERATION

SABOCO contributes to the security and socio-economical development in border regions by delivering a portfolio of adequate geo data products. The project is part of the EOMD (Earth Observation Market Development) program of the European Space Organisation (ESA), exclusively carried out by Eurosense. A practical test (2005 - 2006) has been done at the border of Bulgaria and Macedonia.



In the context of extension of the EU and the resulting expansion of the external borders, the EU gave priority to cross border cooperation (ex. ENPI: European Neighbourhood and Partnership Instrument). Following relevant objectives are established:

- To promote enduring social and economical development in border regions
- To cooperate in handling common challenges in the field of environment, health and preventions/combat of organised crime
- To assure efficient and safe borders

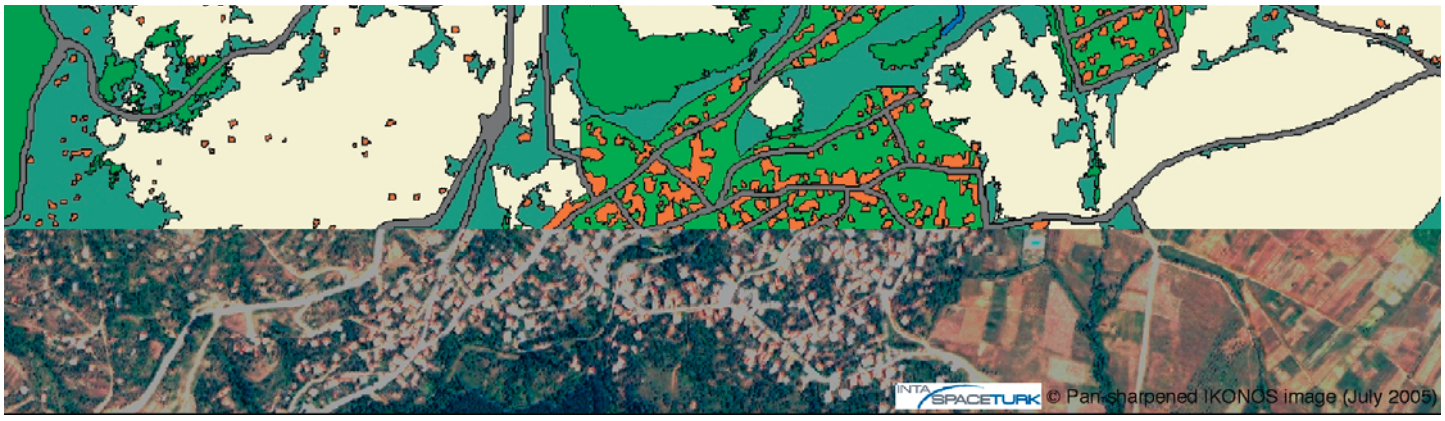
Of primary importance are as well the cross border security, cooperation and assistance outside the EU.

Good geo information is fundamental for the execution of successful border activities. Every cross border GIS (Geographic Information System) is based on this. Nevertheless data of good quality often are missing. SABOCO wants to contribute in this field.

By offering a solution for above mentioned problems in the present context of the EU (and outside of it), SABOCO intends to stimulate the interest and the acceptance and use of satellite data for a large market and various users, who are involved with cross border cooperation and security.

Despite the various consumer fields the wanted information on geo data (like satellite images, digital height models, topographic maps) are very much alike. The Eurosense SABOCO approach is to provide harmonised cross border geo data, aimed at various users. The portfolio has been presented to and is used by a whole range of users on regional, national, European and international level (ex. Bulgarian border police, Bulgarian ministry of environment & water (West-Aegean Region Basin Directorate), World Conservation Union (IUCN)). Based on their positive reactions, Eurosense is going to explore this market further in the near future.

Eurosense (www.eurosense.com) is a prominent Flemish company in the field of remote sensing. Next to a profound experience in aerial photogrammetry, cartography, hydrography, GIS and other products and services in a wide field of applications, Eurosense created great trustworthiness in the process of satellite images. Furthermore Eurosense is based in about 10 European countries, from which a few of them make part of the present and future external border of Europe. ■



IKONOS satellite images.