
Archiving the past,
VEGETATION
Imaging the future

# VEGETATION
# Archiving the past, Imaging the future

*cover:*
*Composite of all daily VEGETATION images acquired during the last 10 years.*
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How does the vegetation cycle evolve on a planetary scale? How does climate change affect the Earth's vegetation cover? What is the impact of forest fires? What is the capacity of wooded areas to trap atmospheric carbon?...To these questions, space can provide us with an answer.

Ten years ago, in 1998, when the first Vegetation instrument was placed into orbit aboard the SPOT 4 satellite, the scientific community had high expectations of the applications that this new tool would be able to offer. With its global vision and almost worldwide coverage every day of the year, it promised an exceptional harvest of data on the "green" planet and its health.

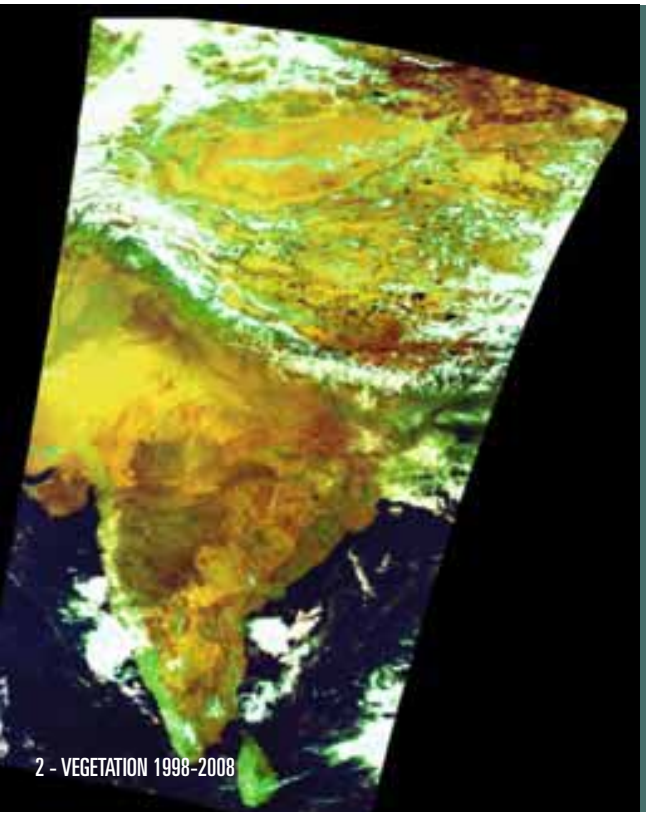
Over the years, Vegetation data users have certainly not been disappointed. The Vegetation mission gave rise to hundreds of applications and research programmes, sometimes in unexpected yet fascinating fields: famine prevention in the Sahel, gauging the perfect moment to begin harvesting grapes in Portugal or mapping the effects of war on the abandonment of crops...

Over the years, research efforts have been intensified, especially since the launch of the Vegetation 2 instrument in May 2002. Data distribution also took a leap forwards, particularly with the PUMA initiative launched in Africa by EUMETSAT, the European organisation for the exploitation of meteorological satellites, as well as with the similar DevCoCast programme, which also covers South America. Alongside the research activities, there has also been a marked increase in the number of operational products that have resulted from the data collected through this ambitious programme.

After ten years in orbit, time has come to take stock of the programme and to look to the future. Indeed, the outlines of the future of the Vegetation programme are already visible. The uninterrupted flow of data on the day to day status of terrestrial vegetation gathered from space over the last decade is a true treasure trove waiting to be exploited even more. Of course, in order for this to happen, the programme needs to continue over the coming years.

Within the context of the European programme *Global Monitoring for Environment and Security* (GMES), Vegetation and its future offspring have a major role to play: keeping an even more watchful eye on our "green" planet!

*The first VEGETATION 2 image released to the wider public, taken on 09 May 2002 covering India*



*"Ten years in orbit with barely a hitch. Vegetation has been a spectacular success" says Jean-Paul Malingreau, Head of Unit at the European Commission's JRC (Joint Research Centre). "A top quality instrument with a tried and trusted data distribution service: these are the keys to the programme's threefold triumph."*

*"Firstly, from a scientific point of view, the mass of publications based on the information obtained thanks to Vegetation is a reflection of its success. We now have a far better understanding of the planet's vegetative biosphere, with all its spatial and temporal variations."*

*"The second aspect of this success is of an operational nature. The Vegetation system makes it possible to monitor European Community policy in the field of agriculture and, by extension, also allows for the monitoring of crops at a planetary level ... and it is able to do this on a day-by-day basis. As a case in point JRC just recently has published a report on rice production in China, based on data from this instrument."*

*"Thirdly, Vegetation is of strategic importance for Europe. It enables us to independently monitor the global changes that affect our planet, in complete autonomy from the other space "super powers."*

*Clouds over the Sahara. Image taken by SPOT-VEGETATION 2 on February 3, 2004*

# SPOT at the origin

The VEGETATION programme is the fruit of a space collaboration between various European partners: Belgium, France, Italy, Sweden and the European Commission. In 1998, it was grafted onto the SPOT programme, founded in 1978 by Belgium, France and Sweden.

SPOT is a fine example of a successful European intergovernmental cooperation in the field of remote sensing. The SPOT satellites ("Satellites Pour l'Observation de la Terre") provide high resolution images of the Earth's surface in the visible light spectrum. The degree of visible surface detail provided by such high resolution sensors is of the order of 2.5 metres per pixel. The instrument has a 60 km by 60 km field of view.
The SPOT 1 satellite was released into orbit in 1986. Since then, the SPOT range has recorded a series of successes. Five satellites have been launched into orbit and the ground infrastructure includes data reception, data processing and distribution stations.

## *The "10:30 AM" satellites*

*The SPOT satellites are placed into a near polar, sunsynchronous orbit at an altitude of 830 km. This means that their orbital plane constantly maintains the same orientation in relation to both the earth and the sun. This explains why the SPOT satellites and their instruments, such as the VEGETATION instruments, observe the part of the globe they cover every day at the same time. For SPOT, this is the so-called 10:30 AM orbit. This means that every time the satellite crosses the equator (from the northern hemisphere to the southern hemisphere), it is always 10:30 AM, local solar time. As they ascend on the other side of the planet (south to north), these satellites cross the equator at 10:30 PM local time. This type of orbit guarantees observations in almost identical light conditions throughout the day.*

© CNES/ill./DUCROS David, 2002

# VEGETATION : one programme, two instruments and several teams

The VEGETATION programme is a joint programme involving Belgium, France, Sweden, Italy and the European Commission. It consists of two observation instruments in orbit, as well as ground infrastructures.

The first of the two instruments is aboard the SPOT 4 satellite and was launched on 24 March 1998. The second is aboard SPOT 5, which was placed into orbit on 3 May 2002.

Unlike the other sensors aboard SPOT 4 and SPOT 5, which deliver high resolution images of the Earth's surface, the data from the VEGETATION instruments are provided in a spatial resolution of approximately one kilometre. Each pixel of the VEGETATION images therefore represents one square kilometre on the ground. It is possible to precisely locate this square to within 300 metres.

Whilst the SPOT instruments have a quite limited swath (60 km width), VEGETATION is able to visualise a "wider" frame: 2,200 kilometres at a glance.

During its daily orbits around the planet, this wide view allows it to observe almost the entire surface of the globe and its vegetation cover. Only a tiny piece of the Earth, at the equator, escapes this daily inspection. However, this "gap" is immediately filled the following day as the orbits overlap from one day to the next.

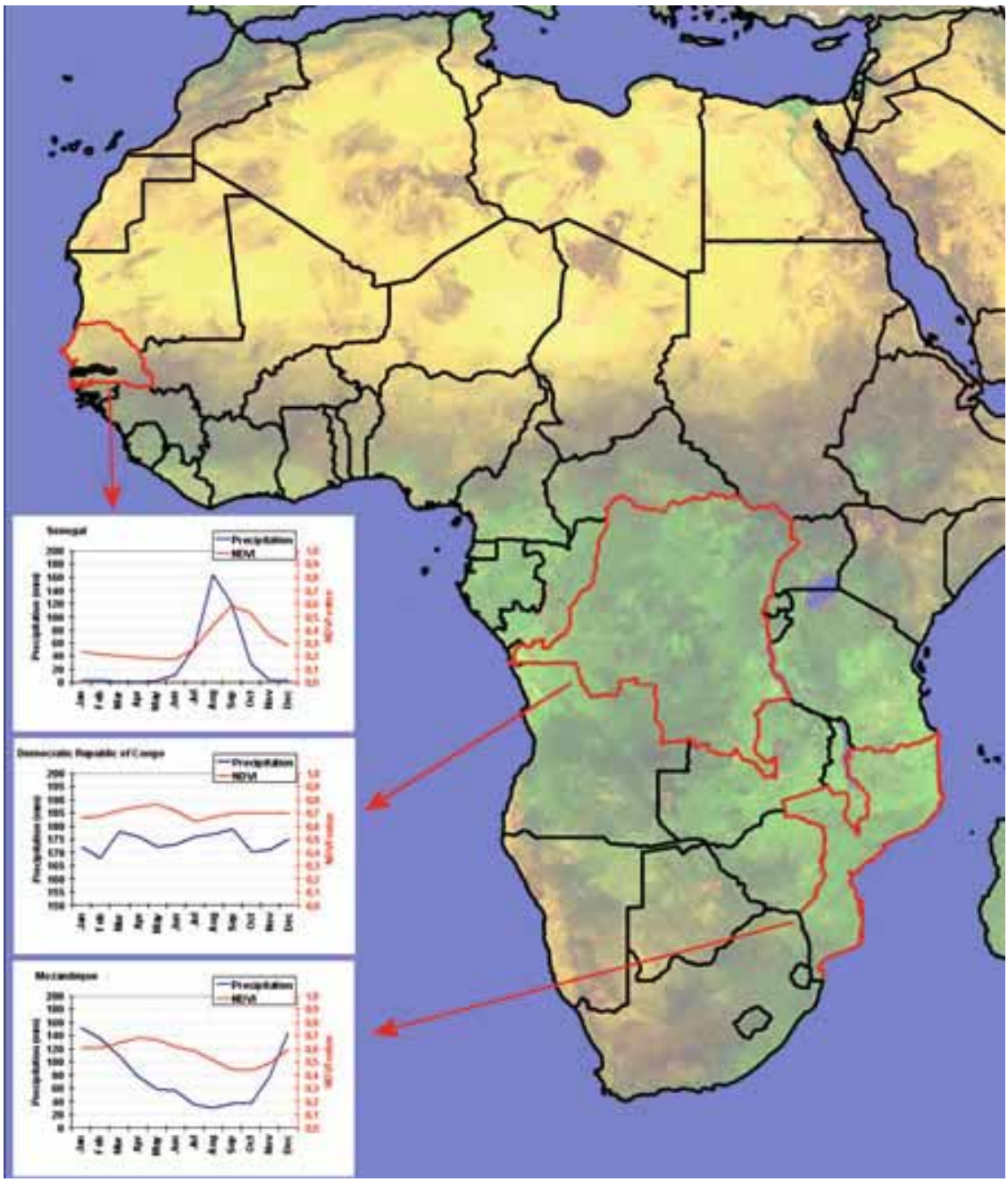
## A visual sensor called a radiometer

The VEGETATION instrument is a radiometer that has been specially designed to track the evolution of vegetation and its links to changes in climate. A radiometer is a device that collects and measures the electromagnetic energy emitted, for example, by the Earth's surface, ice or clouds. Each surface radiates in a precise wavelength, depending on its nature or health. It is this very information that makes it possible to (re)construct "images" of natural vegetation, agriculture, woodlands and forests etc.

The radiometer is sensitive to four types of radiation (in four spectral bandwidths): blue (in wavelengths from 430 to 470 nanometres), red (610 to 680 nm), near infra-red (780 to 890 nm) and mid-infrared (1.58 to 1.75 micrometers).
Red and near infrared spectra are particularly appropriate to describe the photosynthetic activity of vegetation, while mid-infrared detects surface humidity and the moisture content of vegetation. The blue channel is primarily used for atmospheric corrections.

# Good to know…
# NDVI: A KEY INDEX

A key notion that comes up time and time again in the professional jargon of satellite monitoring of vegetation is NDVI. This is an indicator of the vegetation cover of the surface, the quantity of biomass and the general state of the vegetation. The index is sensitive to the vitality of the vegetation and therefore to its photosynthetic activity. NDVI (*Normalized Difference Vegetation Index*) is based on two measurements: visible red light and near infrared. Healthy vegetation absorbs red light and reflects infra-red radiation. When subject to stress, these parameters fluctuate. The combination of these two measurements and their comparison at different time intervals gives an accurate assessment of the health of the surface vegetation under observation.



*Inserts showing the changes in NDVI over the course of a year. The map shows yearly average NDVI values in Africa.*

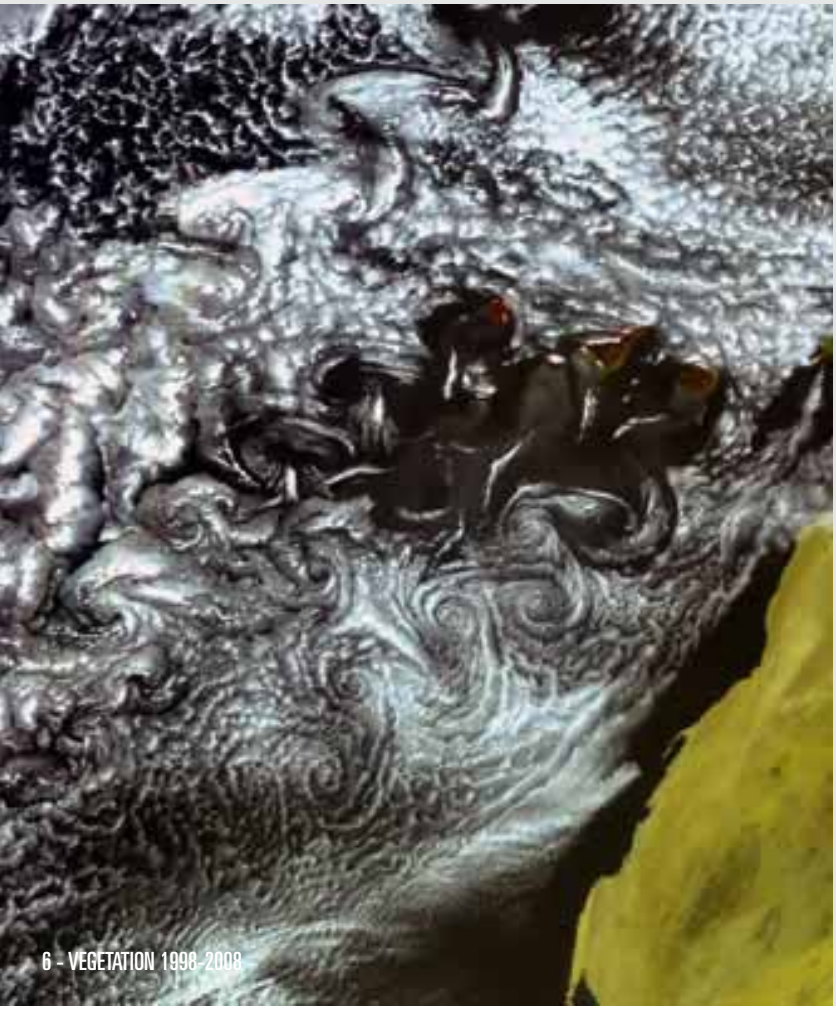
# VEGETATION
# Job description: Proxy!

Eric Gontier is the Ground Segment coordinator ("proxy" is the jargon term used). He is based at VITO, the Flemish technological research Centre in Mol, in the north of Belgium. VITO hosts the CTIV or "Centre de traitement des images VEGETATION" (Centre for VEGETATION Image Processing), one of the principle nodes of the VEGETATION ground infrastructure and the archive for its data. Since 1 January 2007, VITO has also held exclusive rights to the distribution of data from the orbital instruments.

**Space Connection: How do images get from the orbiting instruments to the CTIV?**

Eric Gontier: The satellite is on a near polar orbit. During its sweep over Scandinavia, it passes several times a day above the ground reception station at Kiruna, in the north of Sweden, whereto it transmits its data. Once their quality has been checked, the images are subsequently sent directly to VITO where we correct any defects (radiometric and geometric calibration) and process them into a range of data products. These data are then transmitted to users within two to four days, sometimes even quicker.

*Clouds circling the Canary Islands. Image taken by SPOT-VEGETATION 1 on July 6, 2002.*



**Space Connection: Who are the main users of Vegetation data?**

Eric Gontier: There are several types of users. Companies in the agricultural and food sectors make use of our products, for example, to monitor developments in the production of certain prime commodities, such as coffee, so that they can anticipate market fluctuations. We also have institutional clients, such as the FAO, the UN Food and Agriculture agency, and the United States' FAS (Foreign Agricultural Service). The Joint Research Centre of the European Union (JRC) is also interested in our products, as are a variety of governmental institutions. Also Russia has worked with our data as part of a study to measure the extent of forest fires in that country. In this particular case, the aim was to test an algorithm. Finally, VEGETATION data are used for pure research purposes by thousands of scientists throughout the world. According to our estimates, some 7,500 users have used our data thus far.

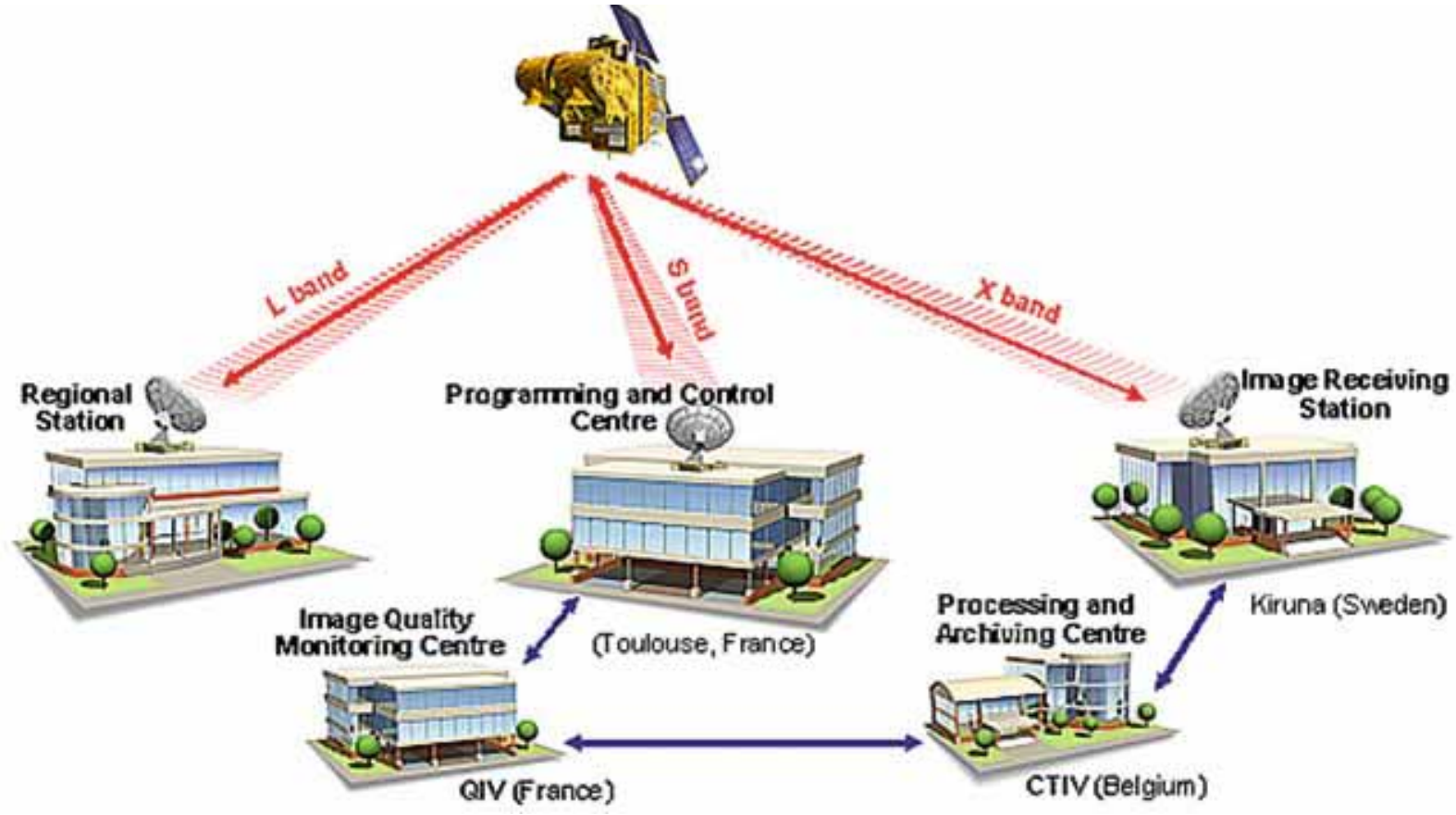
**Space Connection: What kind of products do you offer your users?**

Eric Gontier: We have three main types of data available. Firstly the "P" (Physical) range of products: raw data transmitted by the instrument and corrected next. They have the shape of partial images of the Earth's surface, sections of the ground as observed by the satellite.

Every day, on the basis of these data, we process products we call "S1" (daily synthesis). We are able to build up a daily image of almost the entire surface of the Earth.

Finally, we also produce ten day syntheses called "S10". When creating these complete images of the Earth's surface, we use the best pixels we received during this 10-day period. That way we are able to obtain a full global image of the state of terrestrial vegetation and we are also able to eliminate, in so far as is possible, any "holes" that might appear on certain days, in other words the "blank" pixels that indicate the presence of cloud cover.

Please note that our archives are available to our users. They represent an excellent tool in themselves: ten years of uninterrupted observations of the state and evolution of the planet's vegetation cover.




The VEGETATION ground segment consists of several entities:

- The VEGETATION programming centre (CPV) within the SPOT operations control centre (CMP), which commands, controls and programs the VEGETATION instrument. It uses the CNES network of 2 GHz stations to track the satellites;
- The centre for image quality (QIV), which ensures calibration and image quality monitoring;
- The image processing centre (CTIV), hosted at VITO in Mol, which processes, distributes and archives the data products;
- The ground station in Kiruna, Sweden, which is in charge of data reception in X-band;
- Local L-bandwidth ground stations.

**Space Connection: How is the Vegetation system managed?**

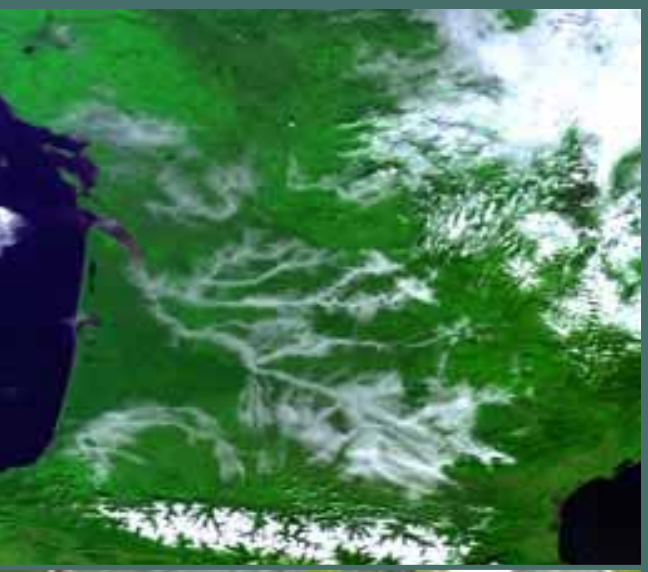
Eric Gontier: Every Tuesday, we hold a coordination meeting with all of the colleagues involved in this programme within the operations coordination group or OCG. We discuss the condition of the satellite, possible problems, the synchronisation of images and data production and prepare a provisional timetable of activities for the coming week.

**Space Connection: Both Vegetation instruments are still fully operational. Is this dual capacity of any real use?**

Eric Gontier: It is true that VEGETATION 1 is still in service, even though we work essentially with the second instrument, which is on board SPOT 5, in order to carry out the global monitoring of the world's vegetation. However, this does not mean that VEGETATION 1 no longer serves a purpose. Whenever necessary, it can complete the data collected by its brother and can even take over in the event of a technical failure (although there has only been a single, four day breakdown in ten years!). It may also be assigned to specific tasks. For example, since the beginning of the International Polar Year, VEGETATION 1 has been exclusively assigned to cover the Polar Regions and the movement of glaciers.

# Made by

*Fog in the valleys of the Dordogne and the Garonne rivers in Southern France. Image taken by SPOT-VEGETATION 2 on January 3, 2005.*



## Looking for clouds

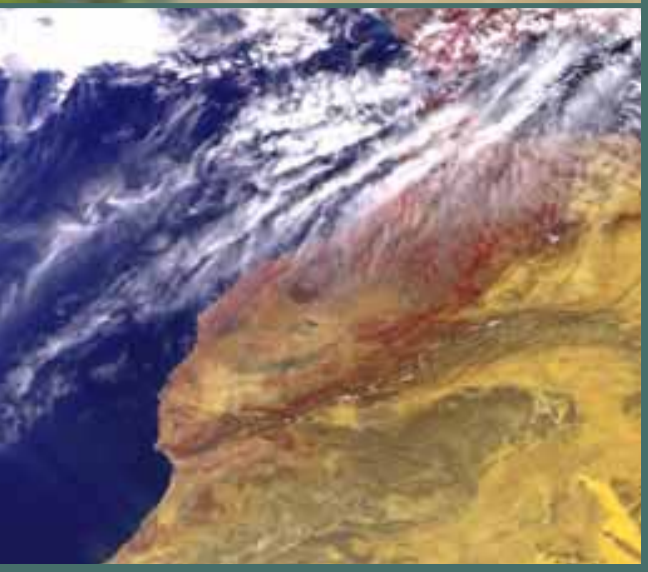
*The VEGETATION instrument is primarily interested in the world's vegetation cover. But its all seeing eye is regularly blocked by the layers of cloud that come between it and its Earthly target. Although the instrument was not initially designed for the detection or identification of clouds and even less for their classification, a team of Canadian and European researchers – from the Centre for Research in Geomatics at the Laval University, Quebec and the JRC of Ispra in Italy – have developed a data processing strategy to try and tease out this type of information from the P and S1 data...and it works in at least 97% to 98% of cases! The system is even able to make a distinction between bright thick clouds and thin or less bright clouds. Their funding gives an added value to using VEGETATION data.*

Neural network for cloud detection in SPOT-VEGETATION images, *International Journal of Remote Sensing, Vol 27, Issue 4, 2006, 719-736.*

## How much wine to bottle?

Vineyards in Portugal were at the heart of a research programme carried out by the Faculty of Sciences of the University of Porto. The researchers were trying to ascertain whether it is possible to predict annual wine production on the basis of VEGETATION images acquired at the beginning of the year. Five sites were chosen across the country (two in the Douro region, one each in Estremadura, Terras do Sado and Alentejo) and data were collected for the period 1998 to 2005. They concluded that it is possible to establish a correlation between the NDVI index derived from *VEGETATION* images and the year's wine production... but only in the Douro region. Elsewhere the results were less conclusive.

Analysis of the temporal signature of vineyards in Portugal using VEGETATION, A.R.S. Marçal, J.A. Gonçalves, H. Gonçalves & M. Cunha, Faculdade de Ciencias, Universidade do Porto, in *New developments and challenges in remote sensing*, Z.Bochenek ed, 2007, Millpress Rotterdam.



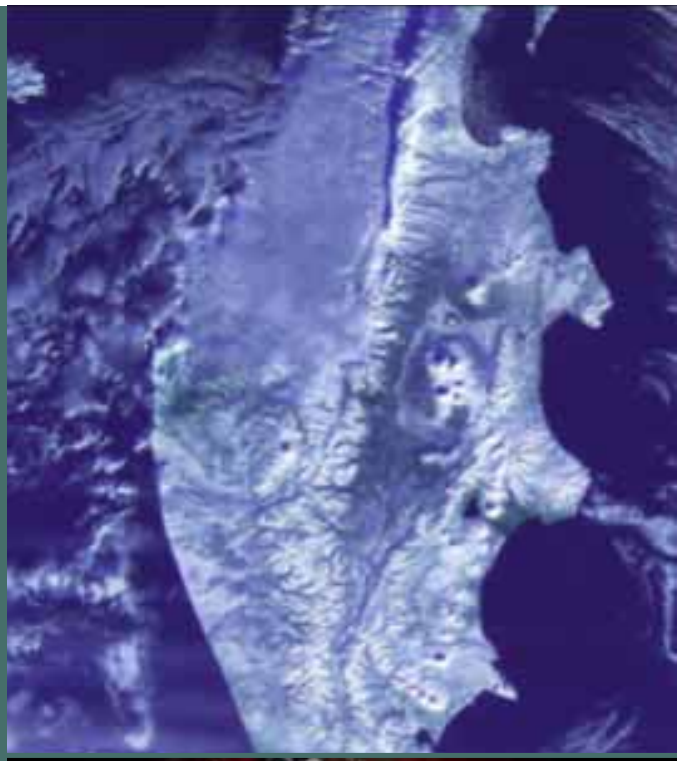
## The snows of the Atlas Mountains are not eternal

*The Atlas Mountains of Morocco are regularly covered in snow. In this semi-arid region, the importance of the additional water that this snow precipitation provides to populations in the lowlands in certain periods of the year, for example in spring or at the beginning of the summer, should not be underestimated. A Franco-Moroccan team (from the Centre for the Study of the Biosphere in Toulouse and the Caddi Ayyad University in Marrakech) has made use of VEGETATION data in order to gain a better understanding of the dynamics of this phenomenon. The team has pointed out that the use of satellite data from this instrument is very important in this context. As VEGETATION is able to provide information on a regular basis, this is a real advantage when you know that today's fresh snow may melt away in a day or two.*

A combined high and low spatial resolution approach for mapping snow covered areas in the Atlas mountains, *International Journal of Remote Sensing, vol 26, Issue 13, 2005, 2755-2777.*

*Snow on the Atlas Mountains in Morocco. Image taken by VEGETATION2 on November 3, 2003.*

# VEGETATION



*Vulcanoes on Kamchatka. Image taken by SPOT-VEGETATION 1 on November 27, 2002.*

## Making climate models more accurate

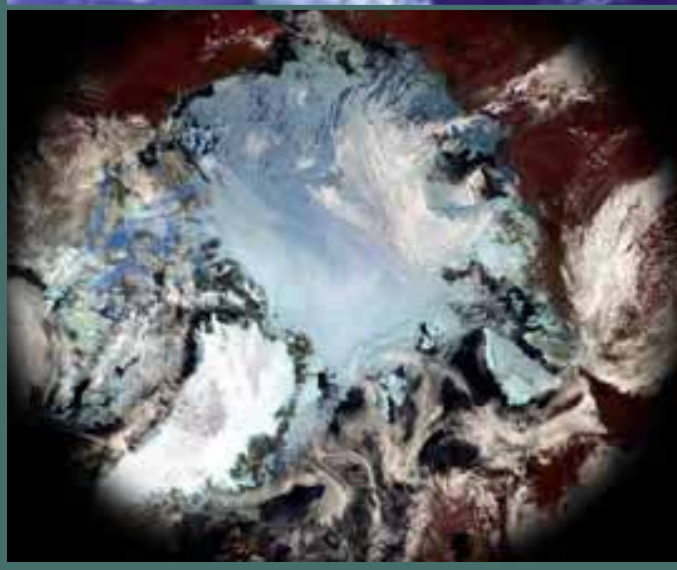
*There is no doubt that global warming has an impact on the world's vegetation. However, it is also true to say that the health of the planet's vegetation cover may also modify the accuracy of the models used by climatologists. Forests play a role in the carbon cycle by trapping $CO_2$ during photosynthesis. However, when fires break out in forested areas, huge quantities of carbon are released into the atmosphere. These twin phenomena are observable from orbit and are the subject of numerous research projects.*

*See numerous reports on this research in* International Journal of remote sensing *and* Remote sensing of Environment

## Arctic shrubs like it hot, lichens do not

*The Canada Centre for Remote Sensing in Ottawa has looked closely at the changes to vegetation cover in the far North in a context of global warming. This information is important for various climatic models, particularly when dealing with the production of biomass. This monitoring of the Arctic regions shows that Arctic scrub and bushes display a higher NDVI index when temperatures rise above their usual thresholds, whereas the opposite is the case for lichen, since its NDVI signature gradually becomes weaker under the same conditions. These observations are in keeping with data collected in the field.*

Short term response of arctic vegetation NDVI to temperature anomalies, *International Journal of Remote Sensing, Vol 28, issue 21, 2007, 4823-4840.*



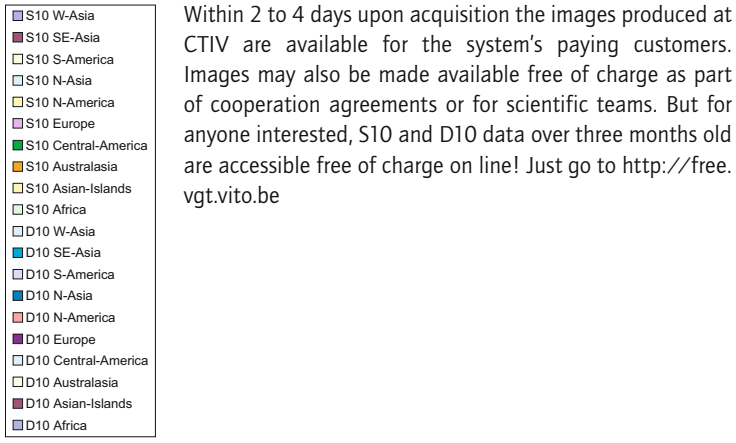
*The North Pole as seen by SPOT-VEGETATION 1 on June 19, 2007.*

## Mars: Europe monitors its agriculture

The monitoring of European agriculture from space has been a reality for the last two decades. In 1988, the European Commission's Joint Research Centre (JRC) launched the Mars programme (Monitoring of agriculture with remote sensing). Since 1998, this programme has become an operational instrument at the service of the Union's Common Agricultural Policy (CAP), notably thanks to the data acquired by the VEGETATION instrument. The "Mars Crop Yield Forecasting System" (MCYFS), for its part, forecasts crop yields by combining satellite data with weather forecasts. This summer, the MCYFS forecasts were quite encouraging. According to observations, the global European agricultural yield should be 5% up on last year, with a significant increase in corn production of + 20 %!

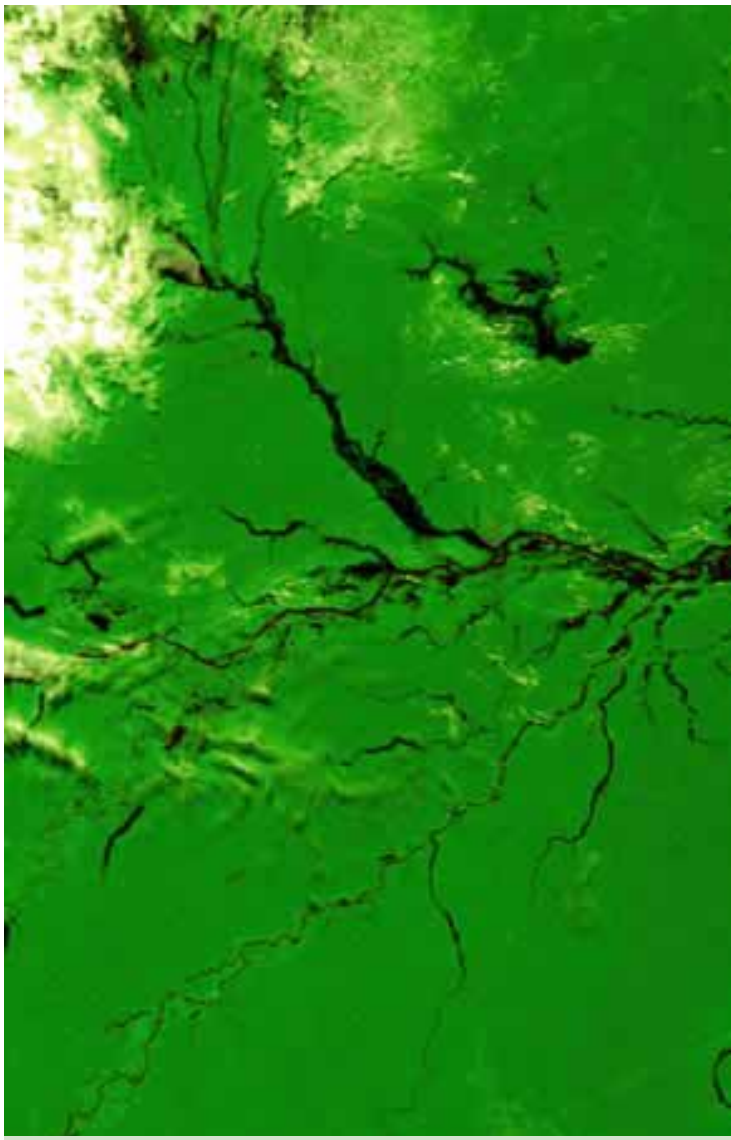
*Example of free image downloadable from http://free.vgt.vito.be*

# Free images!




*Quantity of data downloaded by region per annum*

Within 2 to 4 days upon acquisition the images produced at CTIV are available for the system's paying customers. Images may also be made available free of charge as part of cooperation agreements or for scientific teams. But for anyone interested, S10 and D10 data over three months old are accessible free of charge on line! Just go to http://free.vgt.vito.be



The information made available by the VEGETATION system is of great interest to countries of the South. Given the size of the continents and the inaccessibility of many of their biotopes, one can easily understand that data sourced from equipment in orbit represent some of the most attractive information available. But such information still has to reach its destination.

This is something that EUMETSAT, the European organisation for the exploitation of meteorological satellites, quickly understood. At the beginning of this millennium, it launched the PUMA programme which focused on the installation of dozens of ground reception stations for the capture of meteorological data from space for Africa's weather services.

Since the bandwidth of this network is very large, some room remained available on one of the channels for the distribution of complementary information. This opportunity was seized upon by the VEGETATION programme, which decided, henceforward, to distribute its ten day syntheses (VEGETATION-S10 data) to Africa.

*"With this project, which is called 'VGT4Africa', together with 'DevCoCast', we are able to provide local public*

# Southbound!

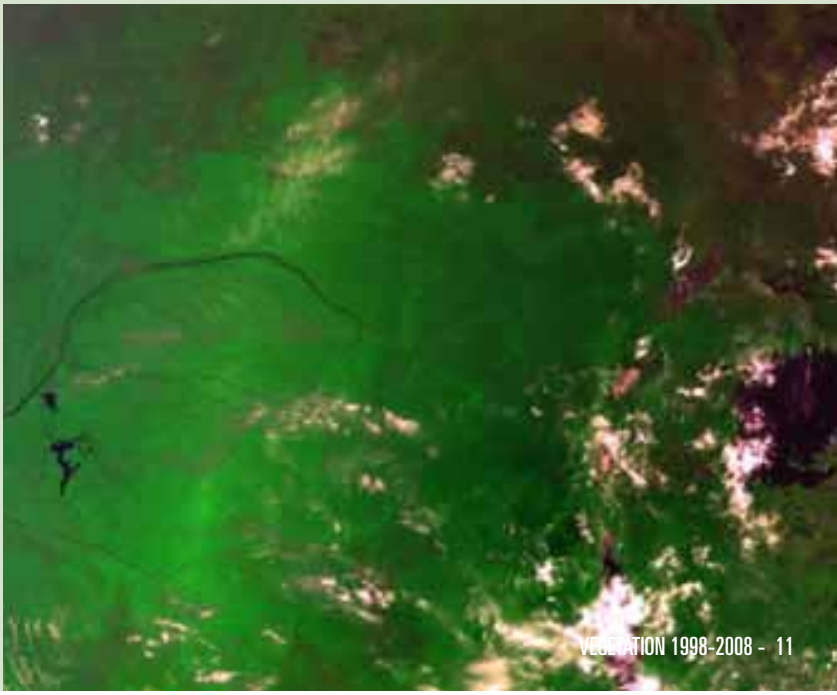
*services with information that can help them improve the way in which they manage their resources and anticipate health crises or unforeseeable natural catastrophes, such as floods or forest fires,"* explains Tim Jacobs of VITO. *"By combining the VEGETATION data with data gathered in the field local authorities can draw up reports on the state of their environment. This is the tool of choice for managing local vegetation resources. It makes it possible, for instance, to accurately monitor the state of forests, of crops and their health, or even water resources and the changes undergone by pasture. The latter of course is particularly useful when it comes to planning the movement of livestock from one area of pasture to another."*

It has also been possible to carry out other specific projects.
Following an FAO mission in Zimbabwe, it was discovered that significant differences existed between the data on cultivated areas held by different authorities across the country. It should be mentioned that the nation was just emerging from a significant phase of arable land reform. Thanks to the independent and up to date data collected by VEGETATION, it was possible to map the situation with a high degree of accuracy.

*www.vgt4africa.org*
*www.amesd.org*
*www.spot-vegetation.com*
*www.belspo.be*

*Deforestation in Pará State, Brasil. Image taken by SPOT-VEGETATION 1 on June 29, 2002.*

*The green heart of Africa. Image taken by SPOT-VEGETATION 2 on February 25, 2006.*



# Made by VEGETATION

## Assessing the magnitude of the Darfur tragedy

*The war in the Darfur region in Sudan has caused a massive population displacement. The United Nations estimate that between 2003 and 2008, more than 20,000 people have been killed and 2.5 million have been forced to leave their villages. In this difficult context, an instrument such as VEGETATION makes it possible to make an indirect assessment of the scale of this human catastrophe. The work carried out by Russel Schimmer (Yale University, USA) uses observation of changes in arable land use in this region as a means to evaluate human displacement. On the basis of satellite data (VEGETATION, Modis, TRMM), he has drawn up maps that clearly indicate where fields have been abandoned by their populations. The data are so accurate that the researcher has been able to create a map that tracks the conflicts that occurred in the region over the course of the last four years.*

("Tracking the genocide in Darfur: population displacement as recorded by remote sensing", *Genocide Studies Working Paper N°36, Russell Schimmer).*

## Keeping track of crop stress in Africa

*GMFS (Global Monitoring for Food Security) focuses on Africa. The project is an initiative of the European Space Organisation ESA. It aims at reducing famine risk. Information obtained from the VEGETATION-instruments is used to monitor crops at a large scale and to evaluate agricultural yield. GMFS is regionally active in West, East and South Africa and on a national level in Senegal, Zimbabwe, Ethiopia, Sudan and Malawi.*

*By closely monitoring the growth and the health of crops from space, it is possibly to pick up symptoms of crop stress that may negatively impact yield at an early stage and to alert programme partners and major international agencies such as WFP (the United Nations' World Food Programme). In a normal situation, VEGETATION data are used for analysis and local management: the evolution and yield of crops is mapped for local authorities. This fine example shows that it is possible to beter manage agricultural crops and protect large populations from famine.*

*www.gmfs.info*

## Predicting epidemics

*Malaria, meningitis, dengue, yellow fever... in semi-arid regions, these infectious diseases are spread by animals that are carriers of bacteria or viruses, with mosquitoes being the main culprits. By tracking changes to vegetation, it is possible to deduce the presence of surface water to which these insects are attracted and therefore to calculate the risk level for the occurrence of one of these diseases. In Gambia and Kenya, VEGETATION data have been used in this way to develop a malaria alert system, whilst in Cameroon the data have been used to estimate the prevalence of a parasitic worm. It is also possible to identify the risk for the development of animal diseases. The CIRAD, (*Centre de coopération internationale en recherche agronomique pour le développement, *a French agricultural development research centre) has used VEGETATION data to evaluate the risk of cross contamination between migratory birds and poultry farms in Mali.*

*www.cirad.fr*

## The hunt for pests

*Insects are capable of completely destroying crops. When a hoard of desert locusts descends on a field, their voracious appetite leaves nothing in their wake. One can hardly imagine the impact such a catastrophe can have on local human populations. The FAO has introduced a monitoring programme in order to try and minimize this type of risk. The EMPRESS programme* (Emergency prevention system for transboundary animal and plant pests and diseases) *focuses primarily on the evolution of desert locust populations. It also serves as an early warning system.*

*www.fao.org/EMPRES/debut.htm*

## Food security in Senegal

*In Senegal SPOT-Vegetation images are regularly used to evaluate agricultural production and forecast local or national shortages. For this purpose, the* "Centre de Suivi Ecologique" *(CSE: Centre for Ecological Monitoring) in Dakar makes use of the CTIV ten-day syntheses.* "We establish an index of vegetation health on the basis of the Vegetation images received from VITO", *explains Gora Beye of the CSE.* "This information is vital for our twice-weekly, interdisciplinary, national food security meetings"

*www.cse.sn*

## Methane and rice

*"Methane and the grain of rice": this could be the title of a modern-day fable. Methane is a less common gas than $CO_2$ in our atmosphere, but it generates a far more serious greenhouse gas effect. Not only is rice one of the world's major crops, it is also a considerable source of methane. At a global level, it is estimated that 8% to 10% of the world's total methane emissions comes from the cultivation of rice.*

*In India, a team of researchers from the Centre for Space Applications of ISRO (the Indian Space Agency) and from the Central Institute for Rice Research has used data from the Vegetation instruments in an attempt to model the methane flux from rice fields throughout the year. Vegetation's ten-day syntheses were of great value to this study. They showed that methane emissions are highest during the wettest periods of the year (August and September): 91% of emissions occur in the monsoon season.*

*Spatiotemporal modelling of methane flux from the rice fields of India using remote sensing and GIS, International Journal of Remote Sensing, vol 27, issue 20, 2006, 4701-4707.*

*www.gmfs.info*

# Proba-V and Sentinel 3,
## the post-VEGETATION era

The operational life of the VEGETATION instruments is not eternal. The SPOT 5 satellite is guaranteed to remain in service until the end of 2012. This means, of course, that one should already prepare for VEGETATION, the next generation. The continuity of the SPOT programme's high resolution observation instruments should be ensured by the Pleiades system, which is being jointly developed by France and Belgium.

The continuity of the VEGETATION instruments should be guaranteed by one of the satellites proposed by ESA (the European Space Agency), as part of the GMES initiative. This satellite, Sentinel 3, is still in design phase and will not be ready for launch before 2013.

*Fall in the Taklimaklan desert in China. Image taken by SPOT-VEGETATION 2 on September 28, 2004.*

The space "Sentinels" are new operational instruments that will be used to help develop Europe's environmental and security policies. At the beginning of 2008, ESA and the European Commission signed an agreement under which ESA was granted a budget of 624 million Euro as the Union's contribution towards the implementation of the space component of the GMES programme. Within this frame ESA will build the first three Sentinel satellites and will also establish the ground segment for the reception, processing and distribution of their data.

In order to fill the gap between the end of service of SPOT 5 and the launch of Sentinel 3, a small Belgian satellite from the Proba range (*Project for on board autonomy*) is due to be commissioned in order to cover the interim period. This Proba-V ("V" for VEGETATION), could be ready for launch by 2011-2012. It will have an operational life in orbit of 3 to 5 years. The satellite's platform will be constructed by Verhaert Space, a company from Kruibeke, whilst the construction of the satellite's payload will be entrusted to OIP in Oudenaarde. This interim satellite is currently in the early phases of development. Its spectral characteristics will be the same as VEGETATION's. Proba-V will also provide a similar spatial resolution: 1 km per pixel or less.

*www.esa.int/esaLP/SEMZHM0DU8E_LPgmes_0.html*
*www.esa.int/esaLP/SEMC64QL5DF_LPgmes_0.html*

# Ensuring data continuity

One of the strengths of the VEGETATION system is the wealth of its archives: ten uninterrupted years of monitoring the world's vegetation, its seasonal fluctuations, catastrophic events and the effects of climate change.

The continuity of data acquisition in the years to come is absolutely essential in the context of the global monitoring of our environment.
*"Just as is the centralisation of image processing from the VEGETATION instruments"*, says Dirk Van Speybroeck, head of the Remote Sensing Centre at VITO.

*"This centralisation of data, involving processing and near real-time distribution to users, but also archiving and the exploitation of these archives, are key elements in the success of this programme."*

*"The formula's effectiveness requires no further proof. The spirit of the VEGETATION programme fits perfectly within the European space strategy: to ensure autonomy of access and effective use of data from a European space instrument. In the area of remote sensing from space, we have been an example to the field for the last 10 years. Our future clearly ties in with the spirit of the Union's GMES programme."*

## Remote Sensing: a Belgian priority

Remote Sensing is a Belgian speciality. Via the Belgian Science Policy Office, the country has been one of the most active partners in the VEGETATION programme since its inception. At the federal level, the multiplication of research programmes (TELSAT, STEREO I, STEREO II etc.) is a reflection of this vitality.

And it goes much further than that! Belgium's ambitions within the GMES initiative are quite clear: to maintain and further develop the image processing Centre at VITO, the current distributor of VEGETATION images and products.

*www.belspo.be*

*The Chaitén volcano in Southern Chile erupted on May 2, 2008. The large ash plume is still visible on the VEGETATION image of May 5, 2008.*
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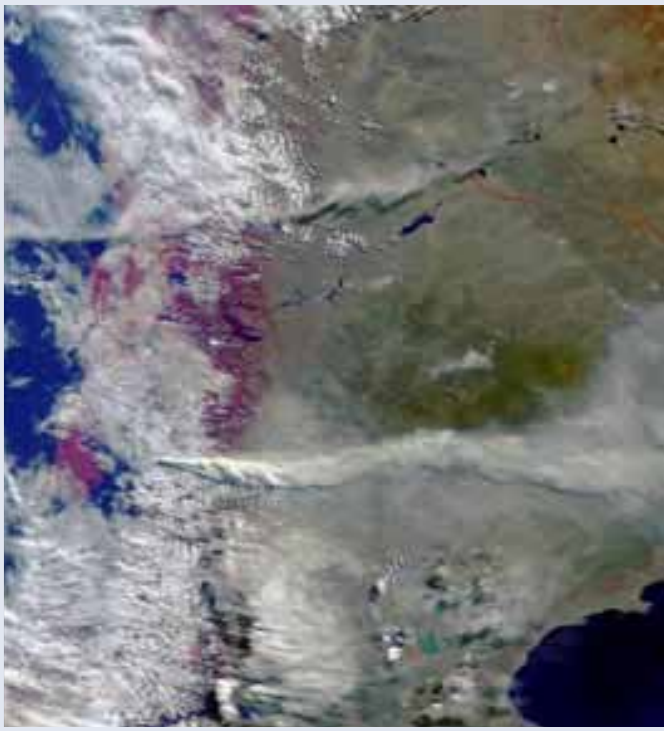

*Reflection of the sun near Somalia. Image taken by SPOT-VEGETATION 2 on March 30, 2005.*


*Composite of all daily VEGETATION images acquired during the last 10 years. © UCL-Geomatics (Belgium) 2008*