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MEDIAS FRANCE

**MEDIAS Newsletter**

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## EDITORIAL

As my term in office came to an end, I have left the MEDIAS-France GIP in July 2003, after spending more than five years as its Director.

During this period, through hard work, the MEDIAS staff has been providing the services expected by the national institutions (CNES, CNRS, IRD, METEO-France, SPOT-Image and CLS) that extended the life of this Public Interest Group.

Among the professions that led to the creation of MEDIAS-France, the management of scientific data is currently the service most required from this structure. The computer team (dozen engineers) has succeeded in developing a high quality know-how to achieve large multidisciplinary databases. MEDIAS-France technical products are now well in-line with the scientists who supply data, the modelling experts and the requesting parties who expect the long-term continuity of these data. Besides the computer team, several MEDIAS-France theme experts act as interfaces with project scientists.

In this Newsletter, you will find a presentation of the ESCOMPTE experiment, which combines intensive measurements of the pollution in the area of Marseilles with digital modelling, in order to forecast intense pollution events. The database associated with this experiment is both the most complicated and the best completed achievement carried out by MEDIAS-France in the last three years.

The BIODIVALP and GEO-OSS projects presented in this issue are also connected with MEDIAS-France activities in the field of data management.

As wished by the Public Interest Group, a new service, the POSTEL thematic, unit has been launched in 2003. This national project aims at developing the supply of bio-geophysical products characterising land surfaces and derived from satellite observation. Since the beginning of 2004, a 6-engineer team has been carrying out the first national and European contracts won under the POSTEL label. The POSTEL thematic unit is presen-ted in this Newsletter by its co-ordinator.

To conclude this editorial, I am doubly delighted. First, to see that the MEDIAS Newsletter has regained its size of fifty pages (whereas the Newsletters 12 and 13 exceeded hundred pages). Second, to note that the content of the Newsletter refocuses on information regarding the services that MEDIAS-France provide to its users. ◆

**J.P. LACAUX**
**Director**
**from March 1998 to July 2003**

# The POSTEL "Continental surfaces" thematic unit

## Introduction

The French policy regarding Earth observation satellite data recommends to set up thematic units. Their aim is to federate scientific expertise and to pool the means to be implemented in order to generate enhanced products derived from satellite data. Within these units, study results are bound to be developed and adapted to be made operational for the users by creating prototypes of services. These thematic units will therefore become the precursor elements of the future services of the GMES (Global Monitoring for the Environment and Security) European programme by 2008-2010.

Regarding the "Continental surfaces" theme, POSTEL (Pôle d'Observation des Surfaces continentales par TELEdétection[1]) is the French enterprise to be integrated into the future GMES services that are being defined through projects financed by the European Space Agency and the European Commission.

The **geo**land integrated project funded by the 6th Framework Programme of the European Union indisputably represents the most structuring effort in this field. Infoterra GmbH (Germany) and MEDIAS-France are in charge of its coordination. This project aims at defining and testing the "observatories" that actually are prototypes of GMES services. It distinguishes two large scales, the European regional scale and the global scale. At the global scale, observatories are closely related to EU policies: land cover and forest change, food security and crop forecasting, carbon cycle. Most of these services will be based on data assimilation techniques in models of biosphere functioning. Such data will be derived from ground measurement networks and from generic biophysical products characterising continental surfaces originated in space-based observation.

As far as France is concerned, structuring its community through the POSTEL unit is a major stake that consists in preserving and valorising its know-how as well as its scientific and technical lead, not only regarding space-based infrastructures (among others, the follow-up of SPOT satellites) but also regarding the organisation of ground segments and services. Thanks to POSTEL and the situation of the French institutions within **geo**land, France should be in a position to claim an important part in the generic processing of space-based observation data associated with in situ data collection networks, as well as in one or several related services. POSTEL is consequently bound to cohabit with projects of the European Commission and ESA for several years, but should eventually be integrated into GMES services.

The consortium that is in charge of developing POSTEL at the French scale currently includes CNES, METEO-France, CNRS/INSU, IRD and INRA. As it is expected to quickly gain a European standing, other institutions are liable to join it.

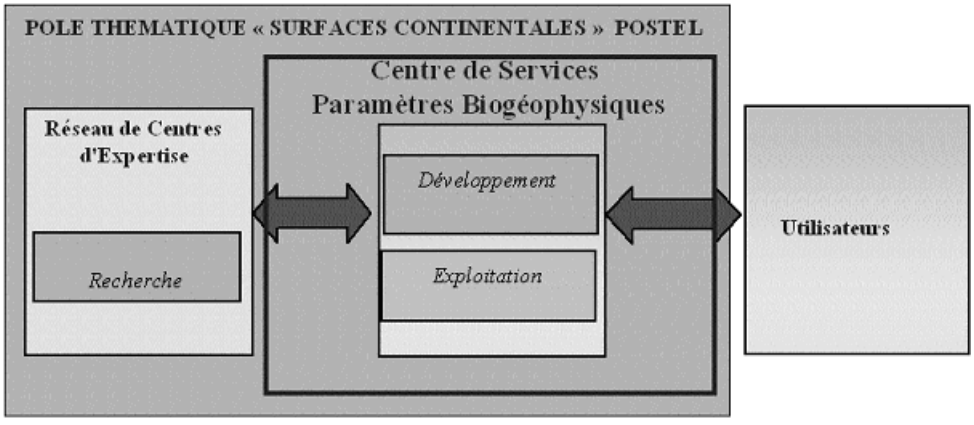
The relationships between POSTEL and the EUMETSAT Land SAF (Satellite Application Facility) in Portugal will conceivably expand as well. Land SAF currently generates products derived from meteorological satellites (MSG today, EPS soon) in near real time for the operational needs of meteorology and weather forecasts. POSTEL has to issue satellite-derived products qualified to meet the needs of the GMES services at the global scale (food security, carbon fluxes, land cover change). The products worked out by combining data obtained from different wide-swath sensors (100 m to 1000 m resolution) are delivered in delayed time and are archived to create long time series. The complementary nature of Land SAF and POSTEL may evolve according to the options of the European authorities regarding GMES services. The expansion of POSTEL to finer scales (typically 10 m) is another conceivable development.

## Structure of the unit

The thematic expertise unit revolves around three types of bodies:

- a Core Service for Bio-geophysical Parameters (CSP). Its mission consists in supplying a set of technical assistance and mutual services allowing the users' community to make the most of the data and products derived from space missions related to the "Continental surfaces" theme,
- upstream from the CSP, Scientific Expertise Centres. Expertise Centres are laboratories or research organisations that contribute to defining space missions and to designing and validating derived products. Such Expertise Centres manage all the scientific activities related to the thematic unit.
- downstream from the CSP, the users' community.

Strictly speaking, POSTEL's sphere of activity includes French Expertise Centres, the CSP and the interfaces between the CSP and users (see chart).

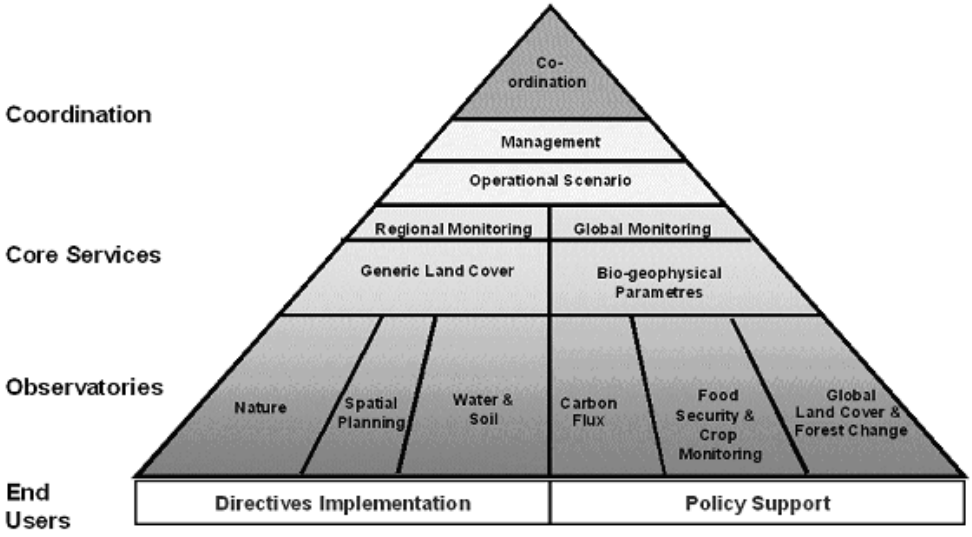



Organisation chart of the thematic unit

The CSP fulfils two functions:
- a developing function, i.e. setting up scientific processing chains and software for the analysis of satellite data, in accordance with the specifications defined and validated by the relevant scientific Expertise Centres,
- an operating function, i.e. generating, archiving and circulating products derived from space missions.

At the beginning of 2002, the MEDIAS-France GIP was commissioned to design and implement a prototype of CSP and its interfaces upstream and downstream.

The bodies acknowledged as Expertise Centres are laboratories or public organisations that are engaged in the development of products delivered by the CSP. They supply algorithm specifications and/or data allowing to validate the products, within the scope of opportunity projects named "precursor projects".




Situation of the CSP in relation to Space Agencies, Operational Services and End-Users

## Programme of activities

The activities that belong to the scope of POSTEL include:
- defining, designing and setting up a prototype of CSP and its interfaces upstream and downstream,
- taking part in French and European precursor projects that are as many stages in the creation of the operational CSP (see details hereafter),
- supplying users with products through these different projects.

A 6-person team made up of 3 theme experts and 3 computer scientists is currently working within the MEDIAS-France GIP in order to lead these various activities.

As already mentioned, POSTEL products are bio-physical products derived from observing satellites. Such products characterise continental surfaces: leaf area index, fraction of vegetation, albedo, land cover, downward radiative flux, surface moisture and temperature, burnt areas,...

The scales under consideration are regional to global scales, with time scales as long as possible.

Within this scope, priority is given to the use of low to medium spatial resolution satellites (typically from 100 to 1000 metres). However, extending this to finer scales (10 m) is a conceivable development.

Products will be more and more derived from multi-sensor data according to the scientific and technological progress in this field.

## Value chain

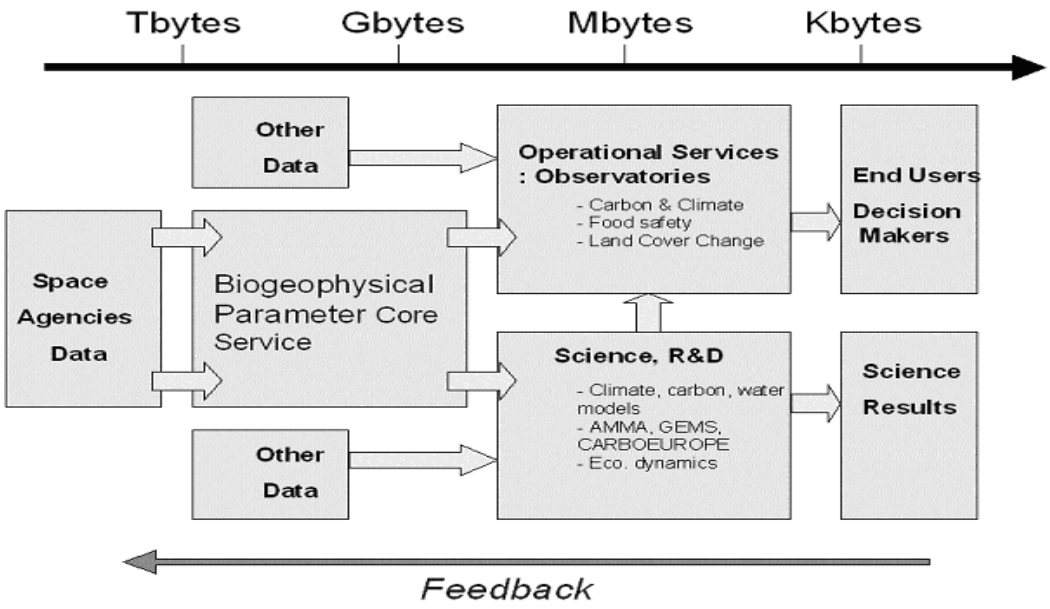
The information chain designed from space agencies to end-users is shown in the following figure. The input received by the CSP consist of level-1 data (geo-coded luminance) from space agencies (ESA, CNES, EUMETSAT, NASA,...). The CSP develops level-3 or -4 products aimed at operational services downstream (carbon & climate, food security, land cover change) and at the scientific community. The end-users (decision-making, application of European policies, assessment of international conventions) are downstream from these operational services.

The volume of data is strongly reduced from left to right, i.e. from space agencies (Tbytes) to end-users (Kbytes), while highly increasing the value added.

The setting-up of a structural link between space agencies and end-users allows to introduce a mechanism of feedback and formalisation of users' needs, that is to result eventually in the implementation of operational observing satellite series, therefore ensuring time continuity.

## Structures of leadership and co-ordination

POSTEL structures of leadership and co-ordination include a Management Committee, an Expert Committee and a Project Team.
The Management Committee consists of representatives of the French organisations involved in POSTEL. This Committee manages the POSTEL project by:
- establishing the orientations and objectives of the unit, defining strategic choices regarding scientific and industrial policies (partnership, co-operation, etc…),
- making sure that the needs of the users' community are taken into account and satisfied,
- taking any initiative intended to make the implementation of Expertise Centres and the links between Expertise Centres and the CSP easier, with the aim to make the most of the French research potentiality on this subject.




Two-level strategy: Core Services and Observatories

The Expert Committee includes representatives of Expertise Centres as well as delegates from the various users of POSTEL products and services. This Committee plays a part of expertise and support to the Management Committee regarding the orientations and priorities to be considered in order to meet users' needs.

Lastly, the Project Team gathers engineers and technicians attached to the CSP. It is in charge of managing the project as far as the CSP and its interfaces upstream and downstream are concerned.

## Precursor projects

The POSTEL work programme follows the orientations defined by the European GMES programme, including two stages:
- 2002 – 2007: demonstration of pre-operational capacities,
- 2008 -: operational implementation of the CSP.

As stated above, the approach consists in joining precursor projects that contribute to the same global target of demonstrating pre-operational capacities.

Several precursor projects are already under way. They are briefly described hereafter.

### GEOLAND

The GEOLAND project, already brought up in our introduction, gathers 56 partners from 15 European countries. Its objective is to prove the pre-operational capacities of two Core Services (the first one on land cover, the second one on bio-geophysical parameters) and of six services downstream (Observatories). The latter are divided into 3 European regional services and 3 global services.

GEOLAND activities also include proposing scenarios for the implementation of operational services to be distributed over Europe after 2008.

The first two Core Services will provide the services downstream with the basic information they need. Maps of land cover will be designed at the regional and national scale in the "Generic Land Cover" Core Service. These maps will be used as reference for the activities of the three regional services whose goal is to support the application of European guidelines at the regional scale.

Global services are the ones already quoted above (Natural carbon fluxes, Crop monitoring and food security, Land cover and forest global change). They aim at supporting the European policies and international conventions that require a continental to global scale environmental monitoring. These services will be supplied with satellite products from the second Core Service, "Bio-Geophysical Parameters", that corresponds to the CSP already presented.

Within GEOLAND, the part of MEDIAS-France is to support Infoterra GmbH, Project Co-ordinator, by acting as Deputy Co-ordinator for the whole project (with special responsibility for global service monitoring), and to lead the CSP.

The GEOLAND/CSP activity that started at the beginning of 2004, is jointly led by CNRM (France), NOVELTIS (France), IM Lisbon (Portugal), the University of Karlsruhe (Germany), VITO (Belgium), EARS (Holland), the University of Vienna (Austria), the University of Bonn (Germany) and MEDIAS-France. This activity consists in demonstrating that Europe owns the pre-operational capacities of providing the following continental or global products: leaf area index, vegetation cover, fraction of absorbed photosynthetically active radiation, albedo, downward radiation, temperature, surface moisture, burnt areas, rainfall. Various optical and micro-wave sensors are used to that effect: VEGETATION, MERIS, POLDER, MSG, AVHRR, ATSR, ERS / Scatt and AMSR.

### CYCLOPES

The aim of CYCLOPES is to develop and validate biophysical products (albedo, leaf area index, vegetation cover) derived from wide-swath sensors (AVHRR, VEGETATION, POLDER, MERIS, MSG). The algorithms to be used will merge the available simultaneous observations; they will be designed to supply continuous long-term series.

CYCLOPES products are the global fields of these variables and their associated uncertainties over the period 1997-2003, with a 1-8 km and 10-day

spatio-temporal resolution. A first version of these products will be available from April 2004. The use of these products will then be demonstrated within the framework of two important applications related to climate change:
- detecting and categorising land use changes,
- assessing carbon fluxes in order to improve the description and understanding of vegetation-atmosphere interactions.

CYCLOPES is a project led by INRA Avignon, which is co-funded by the DG Research of the European Commission (within the 5th RDFP), the Terre & Espace network, the Midi-Pyrenees Region and the CNES.

A first global-scale output is scheduled as early as March 2004. A production cycle is then planned every six months, each cycle improving the algorithms and spatio-temporal coverage of the variables obtained.

### POLDER

POLDER instruments are wide-swath visible & near-infrared radiometers developed by the CNES. These instruments were operated on the ADEOS-1 Japanese platform from November 1996 to June 1997, and on ADEOS-2 from April 2003 to October 2003. A third instrument is scheduled to fly on board the PARASOL micro-satellite to be launched at the beginning of 2005.

The level-3 "Surface lands" jobstring reproduces the characteristics of continental surfaces based on data derived from POLDER sensors. The algorithm employed uses the bi-directional reflectance distribution function measured by POLDER to generate biophysical products such as directional/hemispheric reflectance, leaf area index, and vegetation cover.

The tasks to be performed by POSTEL consist in setting up the operational configuration of the land surface level-3 algorithm chain, to deliver it to the POLDER Production Centre, to ensure computer and algorithmic servicing, and to check the products before distributing them to users. These various activities and related products are detailed in the paper by Roselyne Lacaze in the present Newsletter: "POLDER Land Surfaces biophysical parameters".

### AMMASAT

As the name indicates, AMMA is a project devoted to the Multi-disciplinary Analysis of the African Monsoon. Regarding continental surfaces, the aims are to describe surface evolution over the last 50 years while distinguishing between anthropogenic and climatic forcing, and to study the possible impact of this evolution on monsoon.

Through the AMMASAT group, the remote-sensing community is supporting AMMA, especially by supplying the project with the satellite products required.

POSTEL serves as a gateway to the AMMA project and its AMMASAT component, regarding continental surface products at the West African and whole African scales over the period 2004-2007 and beyond. Such products are intended to hydrologists, ecology experts, and atmosphere scientists.

## Outlook

The scope of POSTEL is bound to evolve quite appreciably in the years to come, before the operational implementation of services within the GMES framework after 2008.

For instance, POSTEL is contemplated to act as a service provider regarding the development of surface moisture products derived from the SMOS satellite, in close co-operation with the Expertise Centres in charge of specifying and validating the related algorithms. The SMOS (Soil Moisture and Ocean Salinity) satellite that will take on board a passive micro-wave radiometer is co-funded by ESA, CNES and Spain; it is scheduled to be launched in 2007.

The operational nature of POSTEL could be strengthened shortly by taking into account the operational production of the POLDER/PARASOL data related to continental surfaces as soon as 2005.

Moreover, other calls for tenders issued by the European Union and ESA are being prepared; they could expand the range of POSTEL activities in the forthcoming years. Products from POSTEL should respond to scientific needs from the MEDIAS network. ◆

[1] Unit for the observation of continental surfaces through remote sensing.

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# First POSTEL products: POLDER "Land surfaces" biophysical parameters

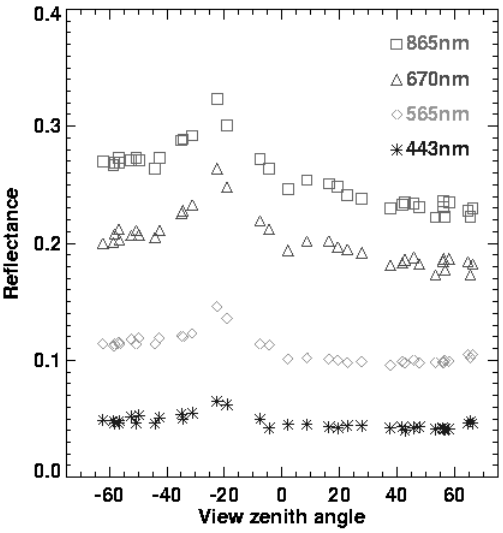
## Introduction

The POSTEL "Continental surfaces" thematic unit prefigures the setting-up of a European Service Centre devoted to bio-geophysical parameters (CSP). The goal is to provide varied users with satellite products that meet their specific needs. With this aim, POSTEL has achieved thematic and computing skills: this double competence allows both to develop operational jobstrings from algorithms specified by Expertise Centres, and to validate scientifically the products thus generated.

Within POSTEL, MEDIAS-France takes charge of the "Land Surfaces" jobstring of the POLDER project which reproduces the biophysical properties of continental ecosystems from surface bi-directional reflectances. The data processing architecture of this jobstring was first reorganised to meet industrial quality criteria, then the whole system was made operational before being delivered to the POLDER Production Centre of the CNES. Today, the activity consists in maintaining a computer and algorithmic follow-up, and in assessing the quality of biophysical parameters before distributing them to users. Such actions are performed in co-operation with scientific laboratories (LSCE, LOA) and companies (NOVELTIS) partners of the project that develop its algorithms. Lastly, MEDIAS-France acts as an interface with the users and meet their specific demands.

## Validated available products

The "Land surfaces" biophysical parameters derived from POLDER-1 data are the first components of the catalogue of POSTEL products. They include directional albedos, NDVI (Normalised Difference Vegetation Index), LAI (Leaf Area Index), FVC (Fraction of Vegetation Cover), FAPAR (Fraction of Absorbed Photosynthetically Active Radiation), with a 6-km/10-day spatio-temporal resolution. The Bi-directional Reflectance Distribution Function (BRDF) is another product specific to POLDER which is now available. You will find them on-line at the POSTEL site:
http://medias.obsmip.fr/postel/Projets/POLDER/produits/
Such products meet the needs of specific users. For instance, the BRDF database concerns those involved in measurement physics (e.g. the CSIRO and the University of Boston), that develop more and more effective radiative transfer models. Albedos, LAI, FVC and FAPAR are essential to model water, energy and carbon exchanges at the ground-vegetation-atmosphere interface. They are aimed at scientists and at institutes developing operational methods in hydrology, meteorology, climatology, carbon cycle, land use changes, food security and agricultural production.



Main FDRB cross section

## BRDF database

The BRDF describes how the surface reflects the sun radiation according to the directions of light and observation. The main BRDF features are a peak of reflectance for back-scattering when the solar and viewing angles coincide, and a minimum reflectance for forward-scattering. 22594 BRDFs collected by POLDER-1 from November 1996 to June 1997 have been gathered. They provide exclusive information on the anisotropy of the main continental biomes and their natural variability. They are consequently an exceptional product for many environmental studies, and a remarkable tool to test the performances of radiative transfer models.

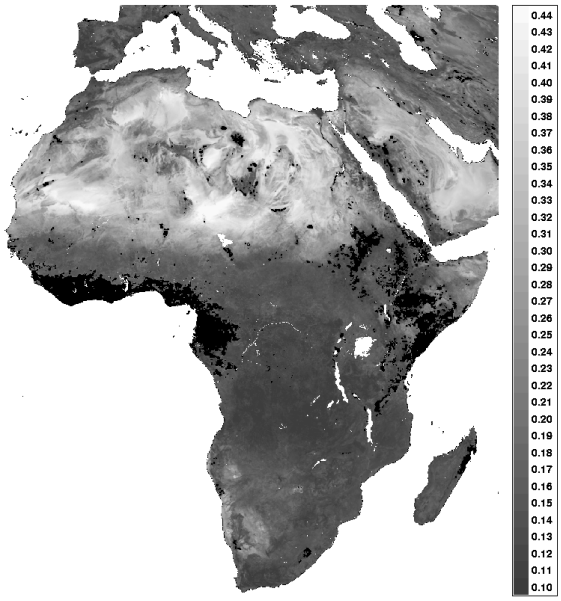
## Directional albedos and NDVI

Directional albedos show the reflective power of the surface integrated on the set of zenithal and azimuthal viewing directions. They are derived from the inversion of a BRDF linear semi-empirical model on the spectral bi-directional reflectances measured during the 30 days of synthesis period. The short-wave directional albedo represents the wide band (250nm, 2500nm). It is computed by a linear combination of spectral directional albedos at 443nm, 670nm, 765nm and 865nm. The NDVI derived from the spectral directional albedos at 670nm and 865nm is thus corrected from angular effects. Its temporal evolution is then linked only to changes in the state of surface.

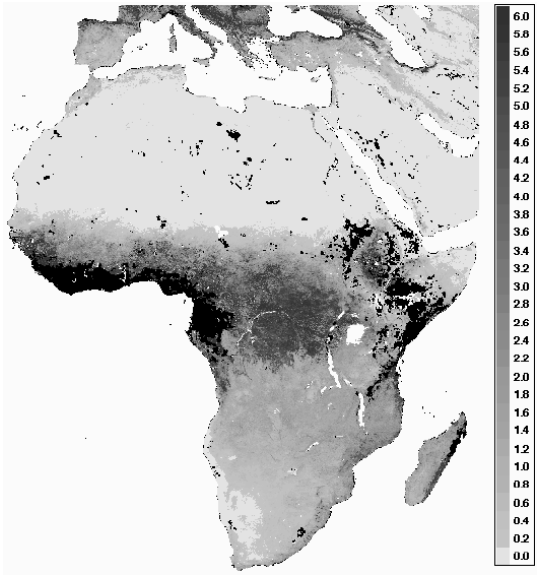
## LAI, FVC and FAPAR

The LAI represents the quantity of leaves that intercept the sun radiation while the FVC quantifies the share of surface covered with vegetation. These parameters derive from the inversion of a model of radiative transfer by neural network. The daily FAPAR is assessed by a linear relation with a vegetation index computed in the optimum angular configuration to minimise ground contribution.

Albedos, NDVI, LAI and FAPAR evidence the different continental biomes, their area, their transitions and their spatial heterogeneity. The temporal evolution of parameters at a 10-day resolution shows the natural seasonal variations, the consequences of extreme climatic events and the man-induced damage suffered by ecosystems.




Albedo short wave directional from POLDER data, June 1997




LAI from POLDER data, June 1997

## Validation plan

These products are validated, first of all to assess their accuracy for their users, and then to obtain a feedback in order to improve computing algorithms. The validation plan includes 4 stages. During the first phase, the reality of biophysical parameters is assessed by analysing their spatial variability at the continental scale and their temporal evolution over a yearly cycle. The second stage consists in comparing the new products with those of previous versions - if any - in order to estimate the impact of the improved algorithms. During the following third phase, the new products are inter-compared with equivalent concomitant products derived from other sensors (VEGETATION, AVHRR, MERIS, MODIS), with similar or different methods. Fourth and last stage, the satellite-derived biophysical parameters are compared with in-situ measurements. Some of them are collected during international or regional campaigns, that are available in the literature or in various databases. Others are spatialised reference data. Currently, they only concern LAI maps drawn up within the scope of the VALERI project (VAlidation of Land European Remote sensing Instrument) that are established from ground measurements and high-resolution satellite images. The documents that present validation results are associated with the products and are made available to users.

## Tools and services

POSTEL also aims at providing tools that make the use of its products easier. Developments are performed in co-operation with Expertise Centres and have to meet the requirements expressed by users. A practical application of this concept is for instance the availability on the POSTEL Web site of a tool designed to display the BRDFs developed by the LSCE. This tool allows to invert models and to compare results with measurements.

In the same perspective, the CNRM and MEDIAS-France are partners in the development of a tool designed to handle EUMETSAT SAF-Land products, and more widely, POSTEL products. After canvassing users' opinion, the resulting top-priority concerns the change of projection and the file format. The re-sampling of grids to be able to modify spatial resolution and the extraction of areas of interest for regional studies are also functions largely requested.

Assistance to users is materialised in concrete terms by the implementation of specific actions, such as the extraction of BRDFs in selected sites to be used as references in studies on radiative transfer. Also to help users, biophysical parameters (change of projection and of spatial resolution, extraction of areas) have been formatted to meet the specifications of the AMMASAT satellite database managed by the LMD and the IPSL within the framework of the AMMA international project (Multi-disciplinary Analysis of the African Monsoon).

## Outlook

In Spring 2004, the catalogue of POSTEL products will expand with the first surface parameters generated within the scope of the CYCLOPES project, co-financed by the 5th RDFP, the Terre et Espace network, the CNES and the Midi-Pyrenees Region. Albedos, LAI, FVC and FAPAR will be estimated through algorithms common to all sensors (AVHRR, VEGETATION, POLDER, MERIS, MSG). These algorithms are precursors of innovative methods that will be developed in order to merge data of various origins and of different instrument characteristics. When the project terminates at the end of 2005, the aim is to generate global maps of multi-sensor biophysical parameters with a spatio-temporal continuity guaranteed over the period 1997-2003.

Lastly, at the beginning of 2005, other parameters (surface temperature and humidity, incident radiative flux, burnt areas, rainfall etc…) will be produced by the GEOLAND consortium, backed by the 6th RDFP within the framework of the GMES activities of the European Community. When such elements are added to its catalogue of products, the POSTEL thematic unit will become a European Service Centre for bio-geophysical parameters. ◆

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# The ESCOMPTE programme: an overview

The "Expérience sur Site pour COntraindre les Modèles de Pollution atmosphérique et de Transport d'Emissions" (ESCOMPTE) is to produce a relevant set of data for testing and evaluating regional pollution models. It includes high resolution (in space and time) atmospheric emission inventories and field experiments, and covers an area of 120 km x 120 km, centred over the Marseilles-Berre area in the southeast of France during summer 2001. This region presents a high occurrence of photochemical pollution events which result from numerous industrial and urban sources of primary pollutants. From the dynamical characteristics of the area, sea-breeze circulation and channelling effects due to terrain features highly influence the location of the pollutant plumes. ESCOMPTE will provide a highly documented framework for dynamical and chemical studies.

Campaign strategies and experimental set up are described hereafter. During the planning phase, existing modelling results helped defining the experimental design. The campaign involved surface measurement networks, remote sensing, ship-borne, balloon-borne, and airplane measurements. Mean standard meteorological parameters and turbulent fluxes, ozone, ozone precursors, photochemically active trace gases, and aerosols were measured. Five Intensive Observation Periods (IOPs) were documented using a wide spectrum of instruments, involving aircraft (7) (one of them equipped with a Doppler lidar, the others for *in situ* meteorological and chemical measurements), constant volume balloons (33), ozone lidars (5), wind profilers (15 sodars and radars), Doppler scanning lidar (1), radiosonde systems (at 4 locations), instrumented ships (2). In addition to the air quality networks from environmental agencies, 15 supplementary ground stations equipped for chemistry and/or meteorology and/or surface flux measurements, were operational. All instruments were calibrated and compared during a Quality Control/Quality Assurance (QC/QA) week, at the very beginning of the campaign.

Fifteen days were intensively documented during 5 IOPs, referenced as 1, 2a, 2b, 3, and 4. High pollution levels were encountered during sea-breeze conditions observed during IOPs 2b and 3, whereas IOPs 2a and 4 corresponded to moderate wind and channelled plume regimes. In addition, hourly emissions inventories for all IOPs were established to complete data sets and to finalize the ESCOMPTE database (EDB) developed by MEDIAS-France.Two other projects were associated to ESCOMPTE: Urban Boundary Layer (UBL) and tropospheric water vapour content by GPS tomography (GPS/$H_2O$). They took advantage of the scientific environment provided by ESCOMPTE.

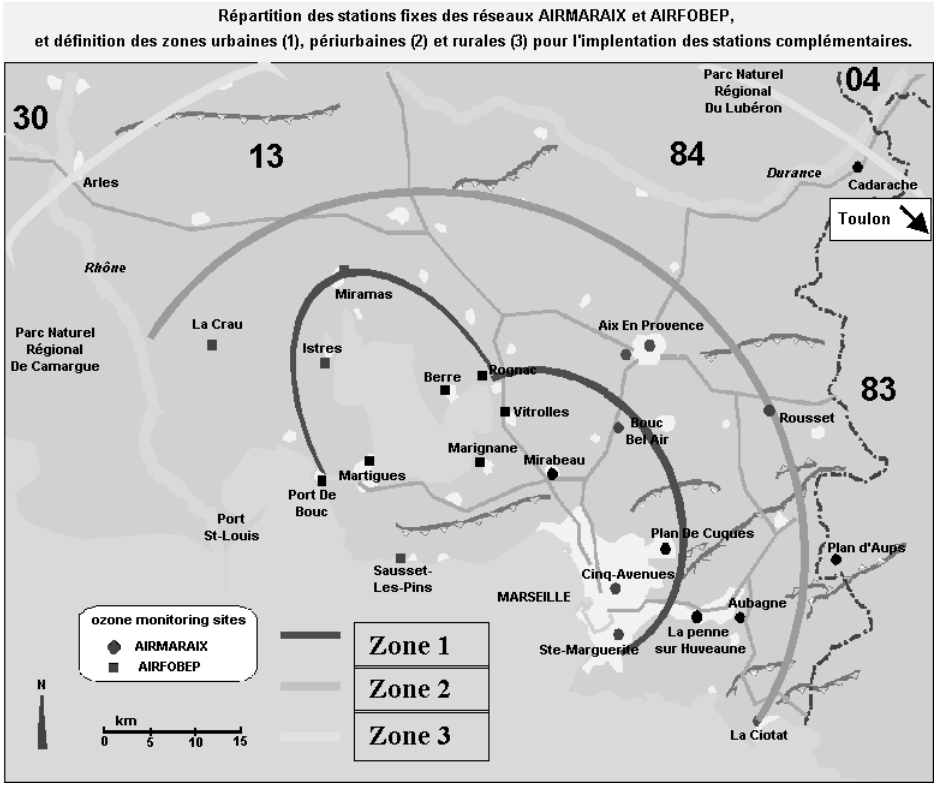
The data gathered during the ESCOMPTE field phase undoubtedly constitutes a reference with which mesoscale CTMs could be compared in the forthcoming years. Although the principal effort at this time is devoted to completion and improvement of the EDB by MEDIAS-France, several thematic studies have already been undertaken, among which the following can be mentioned:

- the data collected during the QC/QA operations, and more generally comparisons of same parameters measured by various instruments, should improve the measuring accuracy and reliability. This concerns ozone profiling (as measured by ground-based lidars, radiosondes, aircraft probes, and CVBs), wind profiling (as measured by Doppler sodars, radars and lidars (ground-based and airborne), and rawinsondes. Several studies will also be devoted to the retrieval of parameters to be deduced from the primary measurements; for example, the boundary-layer thickness from wind profilers (radars and lidars), turbulence characteristics from UHF radars, or mean vertical wind at various scales (from the local one, through a single wind profiler, to upper scales, from the profiler network over the domain),
- the high number of profilers (21 sodar/radar/lidars), the aircraft measurements and the rawinsondes should supply a thorough documentation of the various superposed layers in the lower troposphere. From the simultaneous analyses of wind, ozone, and aerosol, we expect to understand the origin and evolution of these various reservoirs or sinks of pollutants. These stacked layers are characteristic of this area, and probably result from the interaction of large-scale transport with local circulation like sea-lake-breezes and terrain elevation constraints.

The plumes are transported by the mean (horizontal and vertical) wind and diluted by turbulence from the two main emission areas (city of Marseilles and the Berre pond). Given the complex dynamical characteristics of the area, including sea and lake breezes across a tortuous shoreline, and highly varying terrain features (elevation, surface cover, …), a precise description of the flow has to be reached at various scales. This will include vertical exchanges (surface flux, transfer across the boundary-layer top, transport along slopes and within breeze fronts,…), horizontal dilution by turbulence, and channelling effects by hills and mountains. These studies will be correlated with the preceding issue through the description of the boundary-layer variability.

The budget of pollutants, like ozone, results from the transport and diffusion, as mentioned above, and from the chemical transformations, including natural and anthropogenic primary pollutants. These studies will therefore deal with chemistry and radiation measurement /modelling. Improved deposition velocities, deduced from the ozone surface flux, but also emission/deposition of nitrogen compounds are required to better monitor the time-variation of the concentrations. The profiles continuously measured by several instruments during several IOP days, combined with aircraft and balloon-borne measurements and modelling at various scales, should allow the establishment of a complete budget for some species of interest. This is probably one of the core actions of the program.

As mentioned earlier, the achievement of the emissions inventory is a crucial challenge without which high quality modelling could not be performed. This constituted one of the major efforts during the period which followed the ESCOMPTE campaign. MEDIAS-France has put together the ESCOMPTE




Stationary stations from AIRMARAIX and AIRFOBEP networks

database. MEDIAS-France is to serve the MEDIAS network for similar activities within large projects. ◆

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## ESCOMPTE data

The ESCOMPTE data bank worked out by MEDIAS-France includes two sets:
- a set of raw data collected during the campaign: hierarchically organised into files according to the type of data set (instrumented aircraft, balloon…), completed by documentation drawn up by the data set supplier; accessible as files at the following Web address:
**http://medias.obs-mip.fr/escompte/data/documentation/jeux/listeFTP.fr.php**
- a set of data organised into a relational database management system:
with nomenclature and value standardised according to GCMD standards regarding names of parameters, units, sensors,located (lat./lon.), dated (GMT) and including a metadata set (FGDC), accessible through a Web interface allowing to extract these data in relation to spatio-temporal and thematic criteria in a format compatible with usual spreadsheet programmes:
**http://medias.cnrs.fr/escompte**

The ESCOMPTE relational database management system comprises all the raw data (70 sets out of 78) excluding 2D data (transmission satellite and cadastre (7 sets)) and non-localised data (1 set).

Integrating the 50 million measurements supplied by the 450 platforms into the RDBMS required to develop a specific system in order to unify and process the distinct 122 data formats.

The whole set of programmes developed from freeware (Postgres, Tomcat, Java) can be implemented onto any PC/Linux platform, without additional license. Its durability only depends on the Postgres relational engine.

It was first used operationally to provide the control fields necessary for the modelling exercise:
**http://medias.obs-mip.fr/escompte/exercice/HTML/exe.html**

Up to now, the access to both RDBMS and programmes has been limited to the signatories of the ESCOMPTE data policy document accessible at the following Web address:
**http://medias.obs-mip.fr/escompte/data/documentation/Data_Policy_ESCOMPTE.pdf**

Unrestricted access will be authorised some time in 2004, but access to the SQL engine will remain limited.

The ESCOMPTE data bank is completed by the internet site:
**http://medias.obs-mip.fr**, which is the focus of the ESCOMPTE community and allows to manage ESCOMPTE working documents, publications and news.

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# IntraBioDiv project

Mission: Tracking surrogates for intraspecific biodiversity. Towards efficient selection strategies for the conservation of natural genetic resources using comparative mapping and modelling approaches. Supported by the European Commission (FP6).

## Rationale

Species richness is the most widely used measure for biodiversity assessment. However, it is intraspecific diversity (genetic polymorphism) that represents the evolutionary and adaptive potential of each species in changing environments.

The project will study possible correlations between intraspecific diversity and species richness or habitat variation. The objectives are:
- to find and explain possible relationships among inter- and intraspecific plant diversity and habitat variation,
- to elaborate a modelling approach to predict intraspecific plant diversity on a large scale, using more efficiently accessible surrogates,
- to establish tools to design a network of protected areas in order to effectively ensure the sustainable management of natural genetic resources.

The following questions will be asked, using the Alps and the Carpathians as model systems:
- is there congruence between intra- and interspecific biodiversity?
- do areas of high endemism, often coinciding with glacial refugia, harbour a great degree of intraspecific diversity?
- is habitat variation, characterised by environmental parameters, a good surrogate for intra- and interspecific diversity?

In order to accomplish these aims, the following maps will be drawn up:
- of intraspecific diversity, by using molecular markers in 30 model species,
- of species richness on the same area, mainly by using existing data on plant distributions,
- of habitat diversity, by compiling environmental data.

These maps will be compared in order to find possible correlations among these variables. Based on modelling and simulation techniques, a Web-based public platform will be developed to select efficiently nature reserve networks which comprise the highest proportion of both intra- and interspecific diversities.

This integrative approach should help to better understand and predict ecosystem patterns on a large scale. The platform established will provide an innovative and efficient technology for observing and managing biodiversity.

## Background

### Biodiversity also encompasses intraspecific genetic polymorphism

The amount of genetic variability within a species will determine its short-term (adaptive capacity) and long-term (evolutionary potential) ability to respond to environmental change. The persistence of populations was shown to be positively linked to genetic variability (Saccheri *et al.*, 1998; Frankham, 1998). Although Lande (1988) argued that demographic factors were more important than genetic ones in determining the short-term fate of a population, it is now accepted that they often act synergistically. Genetic variability may interact with demographic effects to produce the "extinction vortex" of small populations (Gilpin and Soulé, 1986).

Biodiversity can be considered as a synonym of "variety of life" (Gaston, 1996a): "Biological diversity refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequency. For biological diversity, these items are organised at many levels, ranging from complete ecosystems to the chemical structures that are the molecular basis of heredity. Therefore, the term encompasses different ecosystems, species, genes, and their relative abundance" (OTA, 1987).

Intraspecific genetic polymorphism is thus an integral part of biodiversity (Fiedler and Jain, 1992). It represents the evolutionary potential of each species, and is consequently of prime importance for the long-term preservation of biodiversity in changing environments. However, intraspecific diversity is often neglected because of the difficulty not only in rating its significance, but also in merely quantifying it (Hughes *et al.*, 1997; Till-Bottraud and Gaudeul, 2002).


### Surrogattes for quantifiying biodiversity

Species richness represents the most widely applied measure for biodiversity assessment (Gaston, 1996b), and for designing conservation strategies. Many attempts have been made to avoid the time-consuming and expensive direct estimation of species distributions.

According to the current knowledge on intraspecific biodiversity, the following questions remain open:
- is there congruence between intra- and interspecific biodiversity?
- do areas of high endemism, often coinciding with glacial refugia, harbour a greater degree of intraspecific diversity?
- does habitat variation, characterised by environmental parameters, serve as a good surrogate for intra- and/or interspecific diversity?

### Designing a network of nature reserves

Strategies for preserving biodiversity and designing reserves are still under active scientific debate. The concept of complementarity has become one of the essential criteria that should be taken into account in developing reserve systems (e.g. Pimm and Lawton, 1998; Margules and Pressey, 2000; Cabeza and Moilanen, 2001). The main aim of complementarity-based methods is to identify sets of protected areas that maximise the representation of regional biodiversity at the minimum costs.

It has been attempted to also take phylogenetic diversity into account in the selection of networks of conservation areas (Rodrigues and Gaston, 2002). But intraspecific polymorphism, which represents the evolutionary potential of the different species, has never been considered. Such a situation is not surprising, as the assessment of species distributions already represents a real challenge, and as data about intraspecific polymorphism are even much more expensive and time-consuming to obtain.

### Vascular plants of the Alps and the Carpathians as models

It is proposed in this project to use the flora of the Alps and the Carpathians as model systems to test a new approach to design a network of nature reserves taking into account both intraspecific biodiversity and species richness.

The following reasons justify to select these two mountain ranges for the large-scale study proposed:
- plant distributions over these two areas are relatively well-known (although there are still some gaps); but these data are currently not compatible across the different countries where these respective mountain ranges are located,
- the Alps and the Carpathians represent ecologically and geographically well defined areas, and mountain ecosystems exhibit high species richness (Körner, 2002),
- within continental Europe, the alpine ecosystem above the timberline is the least disturbed by human activities.

The factors determining plant distribution over the alpine areas are not well understood. The respective influence of current ecological factors versus historical factors on geographic distribution is still under debate for arctic-alpine plants (Birks, 1996; Wohlgemuth, 2002).

According to recent biogeographic and phylogeographic studies (e. g. Hewitt, 1996 and 2000; Taberlet *et al.*, 1998; Taberlet and Cheddadi, 2002), it is expected for both species richness and intraspecific diversity to be higher in areas that correspond to glacial refugia during Quaternary cold periods. It is true that in Europe species richness is greater in southern regions (potential refugia) than in regions of higher latitude (Gaston, 1996c; Gaston *et al.*, 1998). In the same way, for species with a large distribution, intraspecific diversity is usually greater in potential refugia (e.g. Demesure *et al.*, 1996; Taberlet *et al.*, 1998; Hewitt, 2000; Gugerli *et al.*, 2001). In the Alps, the two main refugia (i.e. non-glaciated areas) were located in the extreme South-West and in the extreme East (see figure below, Voges, 1995). According to the above reasoning, one might expect to find "hot spots" of intraspecific diversity and species richness in these areas.

However, post-glacial colonisation patterns can als have
an influence on species richness.

Contact zones between two lineages of the same species originating from different refugia might exhibit higher intraspecific diversity, and the same obviously holds for species diversity. As a consequence, the geographic distribution of both intraspecific diversity and species richness can be much more complex than expected. Furthermore, particular areas might have acted as small refugia in the Central Alps, on mountains that were above the ice sheet (nunatak hypothesis) (Stehlik *et al.*, 2001).

## Innovative aspects of IntraBioDiv

The most innovative aspect of this proposal is the production of an integrated database containing data on the intraspecific polymorphism of 30 species and on the geographic distribution of 1000 species, as well as extensive environmental data. This task will be carried out for two major ecological systems in Europe: the Alps and the Carpathians.

Such a database has never been produced before, mainly because of the difficulties in estimating the intraspecific polymorphism of many species over large areas. Recent improvements in molecular techniques (including both the availability of new classes of genetic markers that can be operational in a short time period, and the automation of many steps in the analysis) now allow to assess intraspecific variation for many species. But such a research still requires the integration of many teams working together towards the same objective.

More particularly, we will test whether the distributions of intraspecific diversity, of species richness, and of environmental variation are congruent. If so, then it is justified to use only environmental data, which may be efficiently assessed over large areas, to estimate the best conservation strategy and to design networks of natural reserves that preserve most of the total biodiversity. Should these spatial distributions not be congruent, it will be essential in the future to also take into account intraspecific biodiversity together with species richness to optimise strategies for biological conservation.

Vascular plants of the Alps and the Carpathians will be used as model systems to assess general patterns that should also characterise any kind of ecosystems. Indeed, all ecosystems are characterised by:
- the fact that geographic distributions of organisms are changing over time (e.g. Taberlet and Cheddadi, 2002),
- the fact that Quaternary refugia exist,
- the fact that colonisation ability and genetic variability are different among species,
- the fact that regions of high endemism exist,
- perturbations due to natural or anthropogenic disturbances leading to the destruction or fragmentation of habitats.

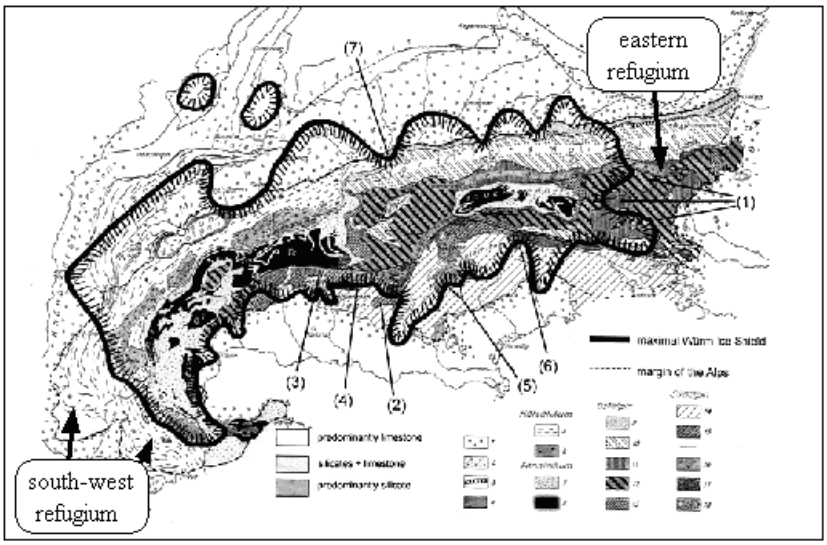
As a consequence, the results obtained during IntraBioDiv can be transferred to other ecosystems, including marine ones (see approaches trying to link habitat and biodiversity in marine ecosystems: Ward *et al.*, 1999; Thrush *et al.*, 2001).

## Scientific and technical objectives

The main strategic objective is to find reliable and cost-effective surrogates for the surveying and monitoring of intraspecific biodiversity. In order to achieve this goal, it is proposed to use the flora of the Alps and the Carpathians as model systems.

The particular objectives of this proposal are:
- to estimate the intraspecific genetic polymorphism of 30 species over the entire Alps (about 150 sampling localities per species),
- to estimate the intraspecific genetic polymorphism of 25 species over the entire Carpathians (about 30 sampling localities per species),
- to record the geographic distributions of as many alpine plant species as possible

across the Alps and the Carpathians (based on available data and on new prospecting where necessary),
- to establish a database that combines both the geographic distribution of intraspecific diversity and of species diversity (species richness) in the two study areas,
- to build up an integrated database for the Alps, consisting of environmental data (elevation, exposition, precipitation, bedrock) in order to estimate the influence of environmental factors (habitat diversity) on both intra- and interspecific diversity,
- to carry out a combined analysis of these three data sets (intraspecific genetic polymorphism, species richness, environmental data) in order to find surrogates for intraspecific biodiversity in the Alps,
- to validate these surrogates in the Carpathians,
- to establish a Web-based public platform as a tool to implement the design of networks of protected areas taking into account the three levels of biodiversity (ecosystem, species richness, and intraspecific genetic polymorphism).
Biodiversity is one of the four important component of the ESS-P international program (see the "Land Open Science Conference" in this newsletter). The GIP is to propose its services to the MEDIAS network involved in this activity. ◆




**Maximum extension of the ice sheet during the last glaciation (20,000 years ago); The figures indicate a subset of potential peripheral refugia (mainly in the southern Alps) (ice sheet limits from Voges, 1995). Both species richness and genetic polymorphism might be higher in former refugia.**

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# The GEO-OSS map server and data catalogue http://geooss.oss.org.tn/geooss




The decision-makers, technicians and researchers in charge of planning, managing or studying African territories are often hampered by the low accessibility of the available geographic data. In many cases, when topographic or thematic maps financed by African countries, the international aid or former coloniser states do exist, there is only a very small number of copies, whose location is known by few specialists. Although to a lesser extent, the same applies to the most recent materials: satellite images and databases, that are even sometimes paradoxically bought or produced in duplicate whereas they are usually very expensive.

The knowledge, access and circulation of geographic information are no doubt a priority for a better management of resources. The Sahara and Sahel Observatory (OSS) is well aware of the fact that the combat against desertification partly relies on the identification of the data necessary to analyse desertification processes and on an effective involvement and exchange of available data. As a consequence, since the beginning of the 1990's, this Observatory has been favouring the development of information circulation systems through its ISD (Information & Data System on Desertification) and ISD-EISI (Environmental Information Circulation & Monitoring System on the Internet) programmes.

Today, within the scope of the LIFE-Third country European programme that co-finances the implementation of the project entitled "Pilot Systems for Desertification Monitoring in Tunisia and Morocco", the OSS is developing GEO-OSS, a map server on the Web that integrates a metadata base. This system serves as an interactive geo-catalogue and enables all decision-makers, technicians and researchers to find the answer to several questions:

- which data are available for a given area?
- what are their extension on ground and their characteristics?
- what is their price? Who should be contacted to buy them?

GEO-OSS is jointly developed by SCOT and MEDIAS-France. This system is based on freeware solutions, that use in particular the MapServer developed by the University of Minnesota. It allows to consult the metadata base that describes the available data, to display a preview of the datasets and to download the sub-sets of data acquired by the OSS. Metadata are structured according to a profile derived from the FGDC standard. The described and (according to the circumstance) downloadable data consist of maps, satellite images, image-derived products, reports, tables and pictures. All these data concern the analysis and monitoring of natural resources in general and desertification in particular, as well as the monitoring and assessment of national and regional policies to combat desertification. MEDIAS-France has signed a working agreement with OSS. MEDIAS-France is pleased to have contributed to an important project coordinated by OSS. ◆

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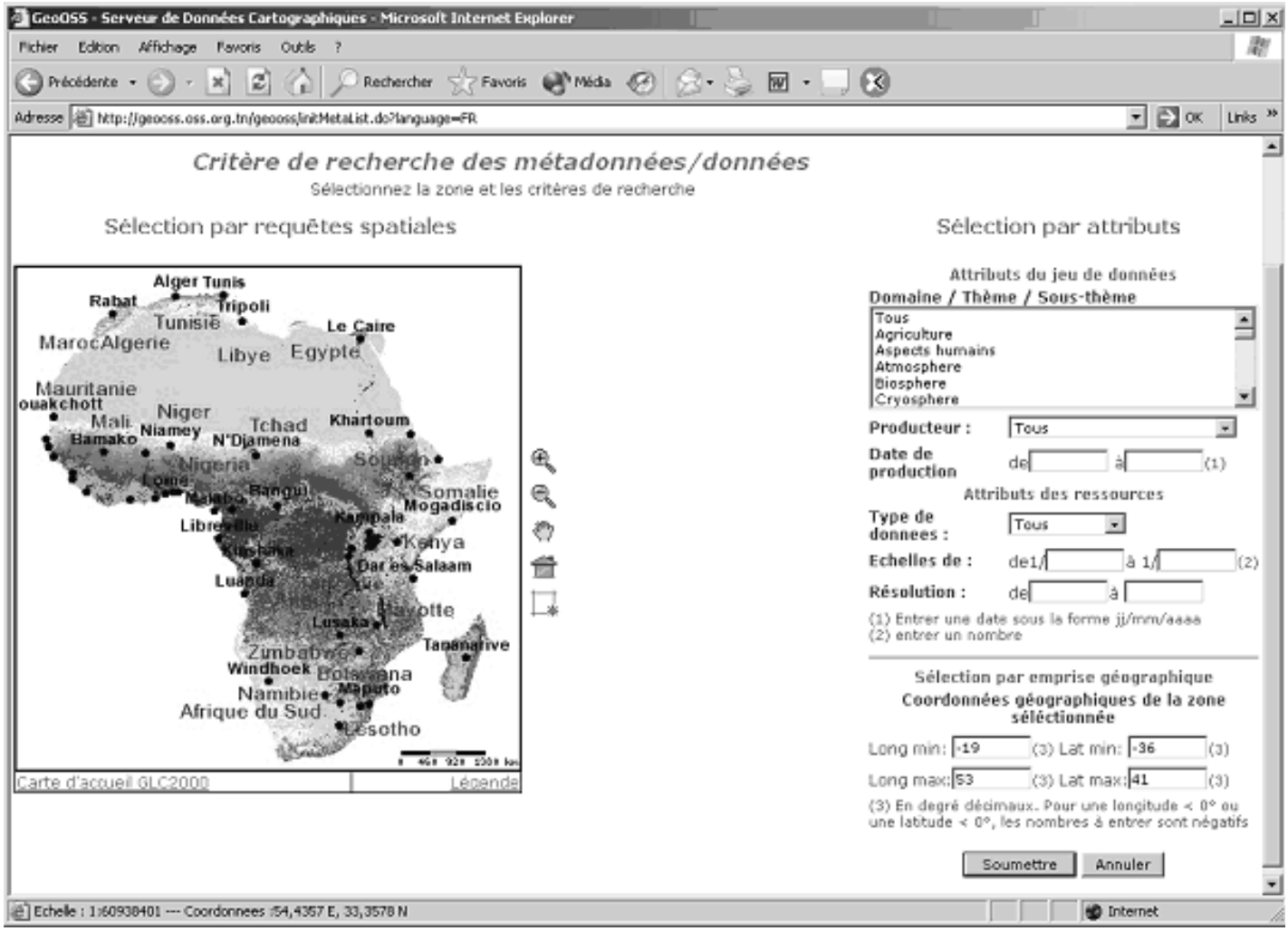


Search engine of GEO-OSS

# North Africa-West Asia (NAWA) - Sea-level pressure patterns and their linkages with the Eastern Mediterranean (EM) Climate

Monthly mean sea level pressure (SLP) dataset for a 40-year period (1958-1997) between 0°-80°E and 15°N-50°N has been analyzed. From point-correlation technique a significant winter SLP oscillation, between north Africa (NA) and west Asia (WA) or NAWA, is identified.

From the standardized NAWA index time-series (Figure 1), positive phases (P) dominated during the second half of the record. This is also the period when the winter Arctic Oscillation (AO) index displayed mostly positive values (Thompson and Wallace, 1998). Composited SLP anomalies patterns from the detrended NAWA index during P (negative, or N) phases displayed higher (lower) values over the Mediterranean basin, with maximum gradient over the middle-east (Figure 2, a and b). Moreover during P (N) phases increase (decrease) in the winter rainfall amounts and cooler (warmer) temperatures could be associated with enhanced north-easterlies (south-westerlies) over eastern Mediterranean basin. It is interesting to note that similar patterns have been found in proxy records of Red Sea coral (Rimbu et al., 2001), which are linked to AO signatures in that region.

The authors would like to thank MEDIAS-France, METEO-France, and the University of Haifa for their support. Special thanks to Dr Gérard Bégni, Director of MEDIAS-France who had the initial vision for this fruitful collaboration with the University of Haifa.

Such working relationship are to be developed within the MEDIAS network. More information in: Geophys. Res. Letter:, Vol., 30, No. 19, 1999, doi: 10.1029/2003GL017862, 2003. ◆

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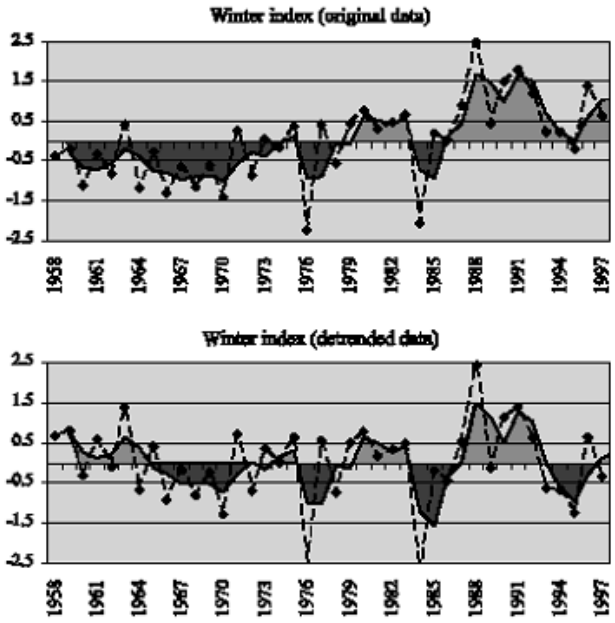



Figure 1 - Original winter NAWA time series (top)
Detrended winter NAWA time series (bottom)
The solid line is a five-winter running mean

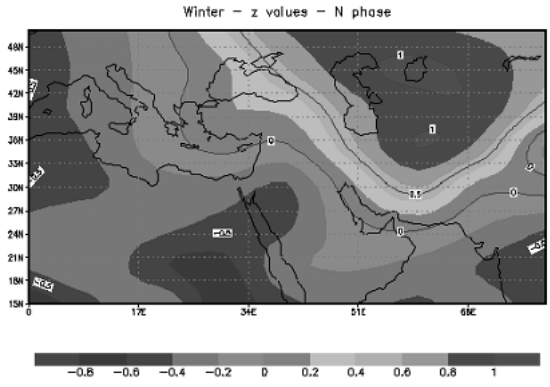



Figure 2a - Compositing of winter SLP anomalies for negative NAWA phases (N)
1964/65, 66/67, 68/69, 70/71, 72/73, 76/77, 78/79, 84/85
Warmer South-Eastern winds dominate the East of the Basin

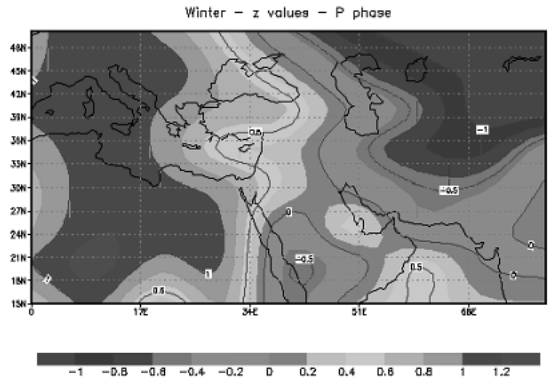



Figure 2b - Compositing of winter SLP anomalies for positive NAWA phases (P)
1980/81, 83/84, 87/88, 88/89, 90/91, 91/92, 92/93, 96/97).
Notherly cold winds dominate the East of the basin

# The Siberian Centre for Environment Research and Training (SCERT)

Started in 2002 from an initiative of the Institute for Optical Monitoring (IOM) Siberian Branch (SB) RAS. It is a multidisciplinary research centre which includes activities from several research Institutes of SB-RAS and Universities in Tomsk, Barnaul, Irkutsk, Krasnoyarsk, Novosibirsk and Moscow. Areas of interest cover regional climate change monitoring and modelling, as well as regional climate impact applications. The Centre is located at Tomsk, Akademgorodok. Following recommendation of the SB-RAS Presidium, SCERT became a SB-RAS international research Centre.

Currently SCERT is deeply involved in the organisation of an integrated regional study of the Northern Asia environment with special emphasis on geosphere–biosphere interactions and linkages with global climate change. Different mechanisms are used to this end, such as thematic Conferences, Workshops and Young scientists' schools as well as implementation of specific multidisciplinary projects.

More information can be found at the SCERT site: http://scert.ru/en.

In front of SCERT (Tomsk Akademgorodok)
To the left (front row), the SCERT Director: Pr. Gordov

## History

SCERT has been involved in several on-going national and international RTD projects and accompanying measures performed under the auspices of SB-RAS, RFBR, INTAS and other EC Programmes. It includes the RFBR project on the development of an integrated information-computational system (ICS) "Atmospheric Optics" including Web sites: "Atmospheric Models" (http://model.iao.ru), "Atmospheric Chemistry" (http://atmos.iao.ru), "Atmospheric Spectroscopy" (http://spectra.iao.ru) and "Atmospheric Aerosol" (http://aerosol.iao.ru), and providing users with access to relevant data and interactive modelling tools. The next project was devoted to the development of an Integrated System for Intelligent Regional Environmental Monitoring and Management (ISIREMM), which has been recently implemented by the consortium of 8 European and NIS organisations under the FP5 INCO PROGRAMME (http://www.ess.co.at/ISIREMM/ or http://isiremm.iao.ru/ISIREMM/ISIREMM.html). It addresses the problem of industrial pollution, and in particular, air pollution and its effects on human and natural environment. Also in process of finalisation is INTAS-supported project ATMOS. It is aimed at developing a bilingual Internet portal in the domain of Atmospheric Physics and Chemistry, and the related application domain of air quality assessment and management. It is performed jointly with the British Atmospheric Data Centre and other Russian and European partners.

Key staff members of SCERT organised the multidisciplinary international conferences ENVIROMIS-2000 (Tomsk, October 24-28, 2000), MODAS-2001 (Irkutsk, June 25-29, 2001), and ENVIROMIS-2002 (Tomsk, July 6-12, 2002). Additional information can be obtained at http://scert.ru.

## Main objectives

- To investigate contemporary climatic and environmental changes in Siberia as a part of the global Earth system. This is to understand major regional climatic tendencies and their social and economical impacts.
- To train researchers (especially young scientists) with the latest methods and approaches in Environmental Sciences.
- To promote participation of young Siberian scientists and senior researchers in European scientific co-operation, especially within the 6th Framework Programme.
- To disseminate recent results obtained in environmental studies thus making them available to the public and decision-makers.

## Main goals

- Multi-component monitoring of Siberian natural and anthropogenic complexes with special emphasis on biologic, chemical, physical and anthropogenic components of the regional geosphere-biosphere system.

- Modelling of major natural and climatic processes of the Siberian regional geosphere-biosphere system,
- Development of the informational-computational infrastructure for regional prognoses of natural and socio-economic processes caused by Global Change.

SCERT closely co-ordinates its activity with the Institute for Optical Monitoring SB-RAS, based upon scientific, methodological and technological results and techniques for monitoring and forecasting atmospheric and ecosystem changes of natural and anthropogenic factors.

Research activities of the Institute are carried out in the framework of Programmes of the Siberian Branch of RAS, as well as in the framework of Federal and Regional programmes as follows:
- new technologies, methods, and devices for atmospheric and ecosystem observations,
- monitoring and forecast of regional climate and ecological changes,
- sustainable development of ecological and economic systems.

The Institute also performs technology development work in the following fields:
- optical monitoring and measuring instrumentation and technologies,
- instruments and equipment for ecological and meteorological monitoring,
- instruments and equipment for the monitoring of roads and other technogenic objects,
- new processes for growing non-linear crystals and their application.

A comparatively powerful production and the technological potentialities of the Institute provide for a limited production of new instruments developed not only at the Institute, but also by other companies. Annual activities are determined by the national and foreign market demand.

The monitoring of the current environmental state of the region is performed jointly by SCERT and the Institute for Optical Monitoring of SB-RAS (IOM) at the Siberian Climate and Ecological Observatory (SCEO), which has the Basic Geophysical Stationary (Tomsk) and two antennae at Kireevsk village (Bank of the Ob river) and at Great Vasyugan Bog. It includes instrumental observation of meteorological and actinometric characteristics as well as atmospheric electricity and incoming surface UV measurements. Relevant databases and presentation of measurements results in Internet are under development now. The observational facilities are also used at Tomsk State University for students training.

## Projects

### "Siberian Geosphere – Biosphere Programme: integrated regional study of contemporary natural and climatic changes" (SGBP)

In this funded effort, 14 Institutes of SB-RAS as well as 5 Universities are in partnership to initiate a relevant study of the region. The IGBP programme, co-ordinating geosphere-biosphere research, highlighted several regions in the world which are most sensible to the natural-climatic changes. Northern Eurasia is one of them and Siberia plays a considerable role in the modulation (stabilisation and destabilisation) of the system. A simple signature of this remark is the possible change in the greenhouse gases balance resulting in a shift of the permafrost border. Wide-area environmental pollution also demands fundamental research of chemical elements' migration, and interaction of organic elements with water, gases and mineral components.

#### Main objectives

- To create a multicomponent monitoring system of the Siberian mesoscale natural-territorial ensemble. It includes all components of the regional geosphere-biosphere system. It is to create the informational basis for structuring, storing and providing free access to the flow of incoming measured and observed data.
- To prepare the guidelines for the multifactorial modelling of basic processes of regional complexes development, taking into account the interaction between the main components based upon climatic model systems, and to develop guidelines for the forecasting of geosphere-biosphere changes in Siberia, in the context of the sustainable development of the region.
- To investigate interactions of global and regional (in Western Siberia at first) climate characteristic changes, caused by natural and anthropogenic factors.
- To prepare a scientific technological background and a national scientific body for inclusion of the Programme into larger international projects supported by IGBP.

### "Environmental Observations, Modelling and Information Systems Special Support Action" (ENVIROMIS SSA) (funded, EC FP6)

#### Main objectives

- To contribute to strategic objectives of FP6, notably regarding the European Research Area i.e. to improve co-ordination, public awareness and preparation of future Community initiatives in environment protection and related safety aspects area via the organisation of a NIS-based ENVIROMIS Network.
- To promote and facilitate the dissemination, transfer, exploitation, assessment and/or broad take-up of past and present programme results obtained by the ENVIROMIS Network members and their European partners, including relevant FP6 NoE by means of modern IT and dedicated project Web site and specially developed information-computational system.
- To prepare future NIS community RTD activities within FP6 via dedicated educational and training programme realised by organising a coherent set of thematic Young Scientists Schools and International Conferences.

SCERT also participates in:

**The interdisciplinary integration project (SB-RAS) «Complex Monitoring of Great Vasyugan Bog: modern state and development processes research»**, whose main objectives are:
- to create a databank on the characteristics of biological, physical, chemical and technogenic processes proceeding on the GVB territory,
- to investigate the GVB evolution scenario in interactive connection with the published scenarios of global climate change,
- to investigate functional patterns of the GV bog geosystem under the influence of natural and anthropogenic factors.

**The interdisciplinary integration project (SB-RAS) «Ecological Problems of Siberian Cities»**, whose main objectives are:
- to create a method of conducting multidisciplinary ecological examinations of acting and planned potentially dangerous

objects,
- to develop schemes of city territories zoning according to the environmental risks degree and biosphere and human fragility,
- to develop models and systems for the modelling of mesoclimate and pollution transport in a typical city with a background of dynamically changing large-scale processes.

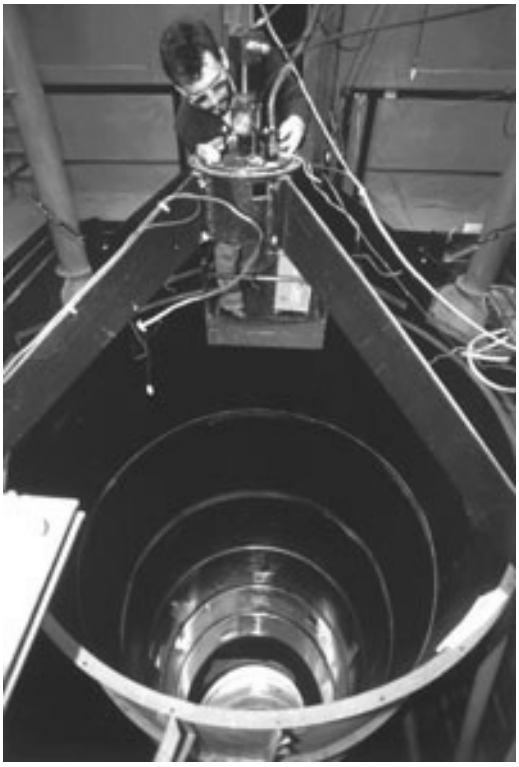
## Dissemination and training activity of SCERT

As a core element of SCERT activity as well as a part of its dissemination and educational strategy, the Centre initiated and organised the multidisciplinary international Conference and Young Scientist School CITES-2003 (Tomsk, September 1-10, 2003), which was supported by grant of the EC 5th Framework Programme and the Russian National Committee of the International Geosphere-Biosphere Programme. Nearly 80 young researchers from Russia, Ukraine, Belarus, Kazakhstan, Uzbekistan and Georgia gathered in Tomsk to receive new knowledge on recent achievements and major results obtained in this quickly developing area. All School participants received certificates and grades for practical work.

The international conference on computational information technologies for environmental science took place on September 8-11, 2003. Besides the School participants, more than 50 researchers from Russia, NIS and Europe took part in this conference. Experts working in this area reported on the most recent results obtained by them and their colleagues. Among the invited lecturers were known scientists from abroad: Dr Gerard Begni, Director of MEDIAS-France, Martin Heimann (Germany), EC project manager on the investigation of the carbon cycle in Siberia, Dr Domenico Anfossi (Italy), Senior Researcher of the Instituto di Scienze dell'Atmosera e del Clima, Prof. E. A. Zakarin (Kazakhstan), Head of laboratory of the Institute of Space Research.

At present, as a continuation of SCERT training activity and as a part of ENVIROMIS SSA project, an International conference on Environmental Observations, Modelling and Information Systems ENVIROMIS-2004 (Tomsk, Russia, July 17-25, 2004) is being organised. The Conference will be devoted to the state-of-the-art and usage of modern environmental observation techniques, computational and information technologies for assessment, modelling and mitigation of environment variations under natural and anthropogenic pressure including those caused by Global Change. Invited lectures will be presented by leading NIS and European specialists, which will allow young participants to get first-hand information on hot topics of Environmental Sciences. The Conference will facilitate interdisciplinary co-operation between young and prominent researchers thus giving a solid foundation of Earth System study on global and regional level as well.

One of the thematic focuses of the Conference will be devoted to detailed discussions of the climatic Hot Spots recently detected in Northern Eurasia. Being a region where climate variations are most pronounced and with potential influences on the Earth System operation as a whole, it has attracted recently the attention of a number of research and funding organisations, notably the Siberian Branch of RAS, NASA, IGBP and FP6 ESD Programme. A special 3-day workshop "Towards the integrated multidisciplinary study of the Northern Eurasia climatic Hot Spot" devoted to this theme is included in the conference agenda. The workshop will take place on July 23-25, 2004. It will bring together the scientific community at large involving scientists from the INTAS members and the NIS with representatives of national and international organisations in science, industries and other groups relevant for the aims of the workshop. Being addressed to as one of the research priorities of the FP6 ESD Programme, the planned strategic scientific workshop will engage the participants in in-depth and forward-looking discussions about the optimal ways to address scientific research topics and potential areas of co-operation, and aims to define future scientific priorities to this end as well as to identify research groups and projects



Siberian Lidar Station,
a unique experimental complex for
optical remote sensing
Institute of Atmosphere Optics

in a position to become integrated into the ERA, or even into specific FP6 actions within this and other research priorities. The workshop will be used to present and to discuss relevant national and international projects, notably INTAS and FP5/FP6 projects. Among those are FP5 projects SIBERIA 2 and TCOS-Siberia. A particular effort will be made to bring together contractors involved in projects funded by the EC Framework Programme, INTAS project participants and participants of relevant NIS projects, notably of SB-RAS funded integrated projects on environmental issues.

Finally a 10-day international event, CITES-2005, comprising scholars and experts on Computational Information Technologies for Environmental Sciences will be organised in Novosibirsk during March 2005.

## Co-operation

SCERT has strong co-operative links with a number of SB-RAS and RAS research Institutes as well as with environmentally oriented research organisations in NIS countries, including Belarus, Kazakhstan, Ukraine and Uzbekistan.

Since 2002, SCERT also has a co-operative agreement with MEDIAS-France and the Centre of Substances and Risk Assessment at the National Institute for Public Health and the Environment, the Netherlands.

Co-operation with MEDIAS-France is quite dynamic and fruitful. In particular, SCERT participated in the organisation of LUCC in Central Asia. ◆

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# The CRASTE-LF (African Regional Centre for Space Science and Technology – in French Language), affiliated to the United Nations: a tool to promote space technology for sustainable development in Africa

The CRASTE-LF was created in Rabat (Morocco) in October 1998, in order to implement the recommendations of the General Meeting of the United Nations. This institution is a Centre dedicated to high-level training, research and scientific activities in the field of space science and technology. Among other objectives, it endeavours to spread scientific information and to promote research and development applications regarding space science and technology. In addition to the CRASTE-LF that covers Africa as far as teaching in French language is concerned, the other centres are located in Nigeria (English language), India (Asia and Pacific area), Brazil and Mexico (Latin America) and in Jordan (Middle-East).

The CRASTE-LF is especially in charge of organising training classes, seminars, workshops, conferences and technical meetings of experts at the regional scale. Its goal is to enhance the technical skills of specialists, teachers, administrators and decision-makers and to keep them informed of the progress done in the field of space technology and its applications. Another of its missions consists in promoting co-operation between developed countries and member states, as well as among the member states themselves, in particular through the implementation of projects. Lastly, it provides services of technical advice to member states and to institutions that make such a request. It also collects, exchanges and distributes space-related information.

Twelve African countries are currently CRASTE members. They include Algeria, Cameroon, Cape Verde Islands, the Central African Republic, Congo, Gabon, Niger, Morocco, Mauritania, Senegal, Togo and Tunisia. The Ivory Coast has started procedures for admission, and other countries have expressed their wish to join the CRASTE (Mali, Burkina-Faso, Benin,…).

The class of 2001 – 2002 (Teledetection and SIG)

The scope of activities of the CRASTE includes:
**Remote Sensing and Geographic Information Systems (RSGIS), Satellite Telecommunications (ST), Satellite Meteorology and Global Climate (SMGC), as well as Space and Atmospheric Science (SAS).**

The Centre works with a restricted staff and chooses to resort to national, regional and international skills and expertise to supervise its missions of training, research and scientific activities. This is an essential orientation for its actions, that aim at creating and consolidating a regional centre for training, research and co-operation able to master and rationally use space technology and its applications for the sustainable development of the region. The CRASTE thus contributes to reducing the mass exodus of African executives by recognising their knowledge and skills and by enabling their mobility and involvement in regional development. With this aim, the CRASTE is progressively implementing a network of skills in the field of space science and technology; such a network is put at the disposal of partner institutions to assess, start or manage projects within their field of interest.

The supreme organ of the Centre is the Board of Directors. This Board consists of representatives of member states as

well as of delegates of international institutions and financing agencies with which the Centre is bound by an agreement. The Board of Directors is in charge of deciding the general policy of the Centre, of reviewing its programme of activities and of approving its budget and annual balance. The Centre also has a Scientific Board that gives opinion on the scientific programme to be submitted to the Board of Directors.

In spite of its restricted budget and thanks to the support of Moroccan, regional and international scientific institutions, the Centre has implemented five (05) postgraduate training sessions since April 2002 to this day. Overall, more than 60 African trainees coming from member states took part in the following courses: two training sessions for Remote Sensing and GIS, two training munications and one training session for Satellite Meteorology and Global Climate. A new postgraduate training session is scheduled for Remote Sensing and GIS, and more than 25 applications are recorded, thus showing the keen interest aroused by these tools in African countries.

The original feature of these training sessions lies in their unfolding in two stages. The first stage takes place in the Centre, and this course comprises more than 1000 hours, including the preparation of a pilot project. During the second stage, the trainee has to achieve a research project in his home country. At the end of this stage, a viva voce before an examining board is organised in the Centre.

By way of example, here are the subjects of the first theses submitted:
- extraction and texture analysis of urban fabric through texture and statistical approach from satellite imaging (RSGIS),


Opening workshop 2002:
meteorology from space and global climate

- application of wavelet transformation to multi-resolution texture classification of satellite images (RSGIS),
- contribution of remote sensing and GIS to the monitoring of land occupation dynamics in Tunisian arid environment. Case of the Haddej Bou Hedma observatory (RSGIS),
- image compression and transmission through VSAT (ST),
- contribution of Landsat 7 ETM+ images to map updating at the 1/200000 scale. Case of the M'Sila map sheet (High plateaux, Algeria) (RSGIS),
- assessment of the contribution of Ikonos images to topographic mapping - Application to large scales (RSGIS),
- feasibility study of a Moroccan nano-satellite dedicated to transmitting seismic signal (ST).

In its role as prime mover, and at the International Telecommunication Union's request, the Centre organised in July 2001 an international workshop on the theme "Regulation and Management of the Frequency Spectrum". It also took the initiative in organising in June 2003 an international workshop devoted to "Space Technology and Telemedicine" with the backing of the United Nations Office for Outer Space Affairs (Vienna) and the European Space Agency (ESA), the support of the Canadian Space Agency, the French Space Agency (CNES), ISESCO, Eutelsat, WHO,…

Besides, the Centre has been requested by the Secretariat of the GCOS (Global Climate Observing System - World Meteorological Organisation) to take part in the implementation of an action plan for West and Central Africa, by designing a project aimed at reinforcing the capacities related to the use of satellite observation data.

The activities led up to now by the CRASTE-LF gives this Centre its credibility as a partner in regional initiatives that involve the use of space-derived tools. On this account, the TIGER initiative of the World Summit on Sustainable Development Follow-up Programme of the CEOS, that intends to develop sustainable information services related to Earth observation for the management of water resources in Africa, recommended to rely particularly on Centres such as the CRASTE-LF in order to consolidate African capacities.

In addition, the Centre has been asked to support the implementation of the NAFREF project aimed at defining a Unified Co-ordinate Reference Frame for North Africa, especially as regards the realisation of the considerable training chapter it includes.

On this account as well, co-operation conventions were signed recently between the Centre and the Islamic Educational Scientific and Cultural Organisation (ISESCO) and with the African Centre for Meteorology Applied to Development (ACMAD), to say nothing of the agreements settled with specialised institutions of the member states.

*The World Summit on Sustainable Development clearly highlighted the use of space technologies to improve decision-making processes in various fields, in order to put an end to underdevelopment, especially in Africa. The setting-up of these technologies at a national scale in an autonomous and permanent way is subject to a considerable effort of reinforcement of capacities and awareness. The CRASTE-LF is dedicated to this task. To achieve this goal, the Centre relies on the commitment of its member states as well as on the support of international institutions and organisations of advanced countries that are interested in bringing their contribution to this process and in developing multilateral co-operation. This mission is quite in phase with main activities within the MEDIAS network.* ◆

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# MEDIAS-France today: reorganisation and continuity

Jean-Pierre Lacaux's term of office as Director of the MEDIAS-France GIP ended mid-July 2003. He has not wished to undertake a new mandate since he is to retire shortly; but he will maintain some activities within the scope of our GIP (particularly in the "Health and environment" field, a domain in which he has been a tireless originator). In fact, Jean-Pierre Lacaux chose to put an exemplary end to his career as a researcher in the area of atmospheric chemistry, especially by consolidating the measurement networks in Africa and by supervising the works of young scientists. This decision does him credit and will greatly contribute to reinforcing this field in the African continent.

The Board of Directors of the GIP held a meeting on June 27th, 2003, to designate Jean-Pierre Lacaux's successor as Director. They accepted the application of Gérard Bégni, Deputy Director, and asked him to suggest a new organisation (see chart at the end of this article), which requires a few comments.

First of all, this evolution clearly lies within a policy of continuity. Gérard Bégni declared to the Board of Directors that he wished to keep the main lines of the GIP policy and to consolidate the initiatives that are currently emerging. He will endeavour to strengthen the cohesion of the MEDIAS network and of its various geographic and thematic elements.

Gérard Bégni has called Michel Hoepffner to his side, with the position of Deputy Director. This appointment recreates the spirit of the previous two-person team. Jean-Pierre Lacaux had the career profile of a researcher, and Gérard Bégni the profile of an engineer. The dialogue between these two cultures proved to be fruitful regarding the design and management of the operations implemented by the GIP. Michel Hoepffner comes from the IRD where he is a research manager, and hydrology is his domain: the "cultural" two-person team is thus re-created. In addition, Michel has been part of the GIP since its foundation in 1994; he is therefore a living memory of the GIP, of both its successes and failures. Consequently, he is able to bring experience - such an essential component - in decision making.

Yves M. Tourre is an eminent scientist in the field of ocean-atmosphere interactions, as well as an enthusiast of the activity known as "capacity building" in the Anglo-Saxon world. This domain so difficult to translate into French corresponds to the mission of the GIP named "General information and specialised training". Yves spent some twenty years in the United States of America, thus offering the GIP a network of connections and a different way of thinking. The synthesis of these contributions together with the previous experience of the MEDIAS network is another factor of progress.

Danielle Barrère and Chantal Le Scouarnec are faithful to their post. With their competence and dedication, they have been so helpful to the members of the MEDIAS network that there is no need to introduce them any further. The expanding activities of the GIP should allow new members to make their acquaintance and to start cordial and effective professional relationships with them.

MEDIAS-France includes two structures aimed at production activities. The first one, "Computing and databases", is obviously the core activity of the GIP; it has set up more than forty data and metadata bases, for GIP members as well as for various national and international customers. A typical example is the federated palaeontological database on Africa. Many projects require the implementation of access systems to big sets of heterogeneous databases. Nearly half the staff of the GIP belong to this structure, that follows up the latest technological progress in this field and leads technological studies aimed at identifying the solutions most suited to its customers' needs. The "Computing and databases" structure is managed by Jean-Luc Boichard and is steered by a three-person team of different cultures: METEO-France (Jean-Luc Boichard), IRD (Fernando Niño) and CNES (Hassan Makhmara). It is composed by Alexis Bosson, Eric Fourlon, Hervé Legrand and Laurence Mastrorillo.

The Postel structure is managed by Marc Leroy; its objective is the operational implementation of this thematic unit dedicated to the production of quantified and spatialised geophysical information derived from satellite data, at the regional and global scale. The Postel project is presented at the beginning of the current issue of the MEDIAS Newsletter.

This structure is composed by Patrice Bicheron, Mireille Huc, Roselyne Lacaze and Bastien Miras. Fernando Niño is in charge of computer at half time.

Lastly, the "Co-ordination and consultancy" group has a more informal structure. This group gathers the seniors (most of whom perform other tasks within the GIP) as well as a small number of persons in charge of specific missions usually implemented in close synergy with the seniors. This group meets a strong demand for actions that involve studies and co-ordination, one of the essential tasks being of course to support the consistency and development of the dynamics of the MEDIAS network. They are assisted by Delphine Fontannaz and Anne-Thérèse Nguyen.

As mentioned above, this structure materialises the clearly unbroken concept of the missions assigned to the MEDIAS-France GIP. By strengthening the way MEDIAS-France completes its functions, it should enable to face future challenges and to lead with efficiency the necessary tasks, in close synergy with a consolidated MEDIAS network.

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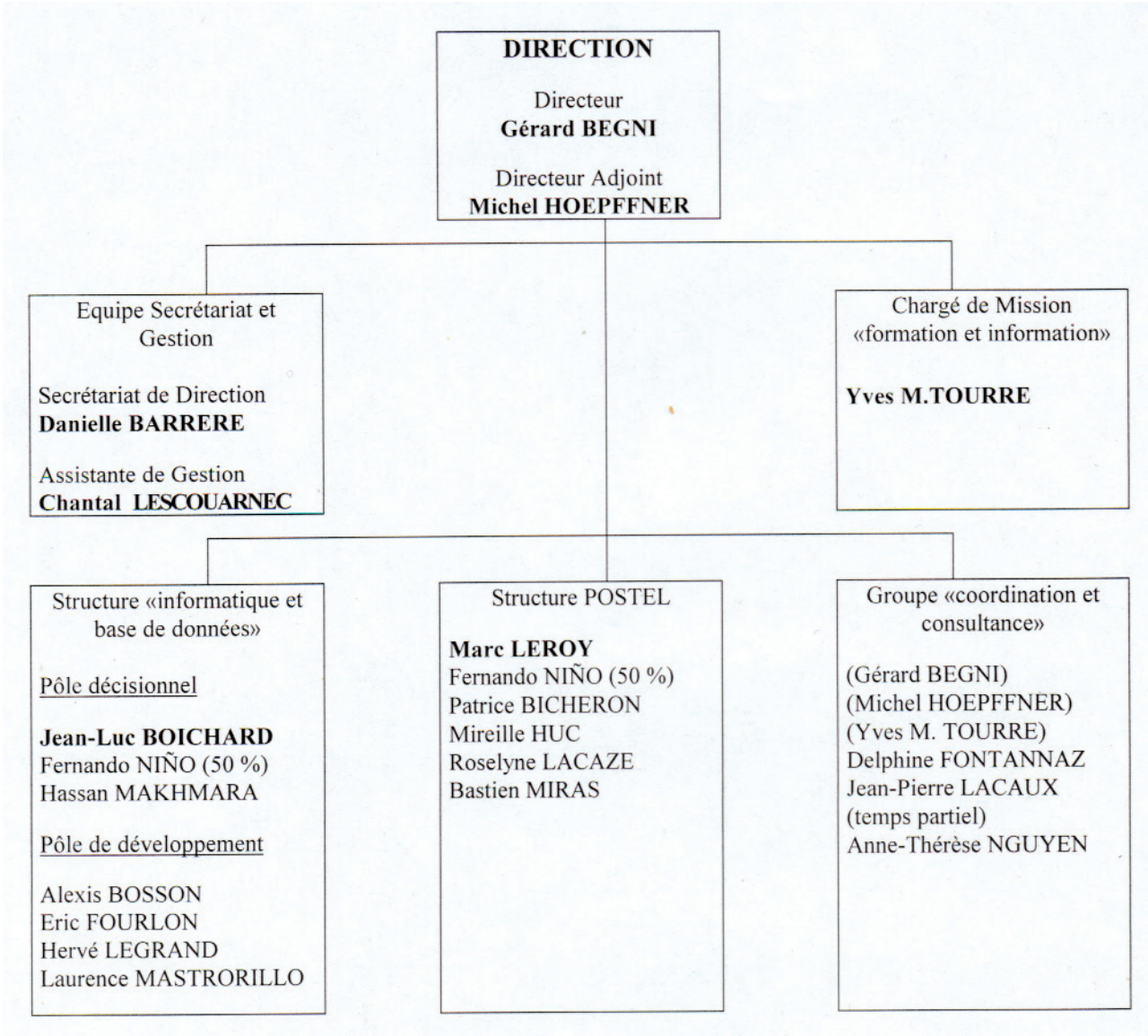



MEDIAS-France organizational chart

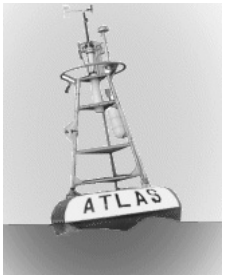
# PIRATA

PIRATA (Pilot Research Moored Array in the Tropical Atlantic) is a project originally designed by a group of scientists involved in CLIVAR; it has been implemented by the group through multi-national co-operation (France-Brazil-USA). The purpose of PIRATA is to study ocean-atmosphere interactions in the tropical Atlantic relevant to regional climate variability on seasonal, inter-annual and longer time scales.

Contributions are provided by France (IRD in collaboration with IFREMER, METEO-France and CNRS), Brazil (INPE and DHN) and USA (NOAA/PMEL, NASA and Universities).

PIRATA was built on the scientific success of TOGA and made use of the moo-ring technology deployed in the tropical Pacific where about 70 buoys make up the TOGA/TAO array http://www.pmel.noaa.gov/tao/.

PIRATA originally proposed to deploy and maintain (between 1997 and 2000) an array of 12 next-generation ATLAS buoys (see figure). The principal objective is to describe and understand the evolution of SST, upper ocean thermal




structure and air-sea fluxes of momentum, heat and fresh water in the tropical Atlantic. Ocean observations along with meteorological observations are transmitted to shore via satellite by the Argos Service and are available in near real-time on the Web at the following site: http://www.pmel.noaa.gov/pirata/display.html.

It is envisaged that components of the array could be maintained on a long-term basis in support of GOOS (Global Ocean Observing System), GCOS (Global Climate Observing System) and CLIVAR activities in the Tropical Atlantic. ◆

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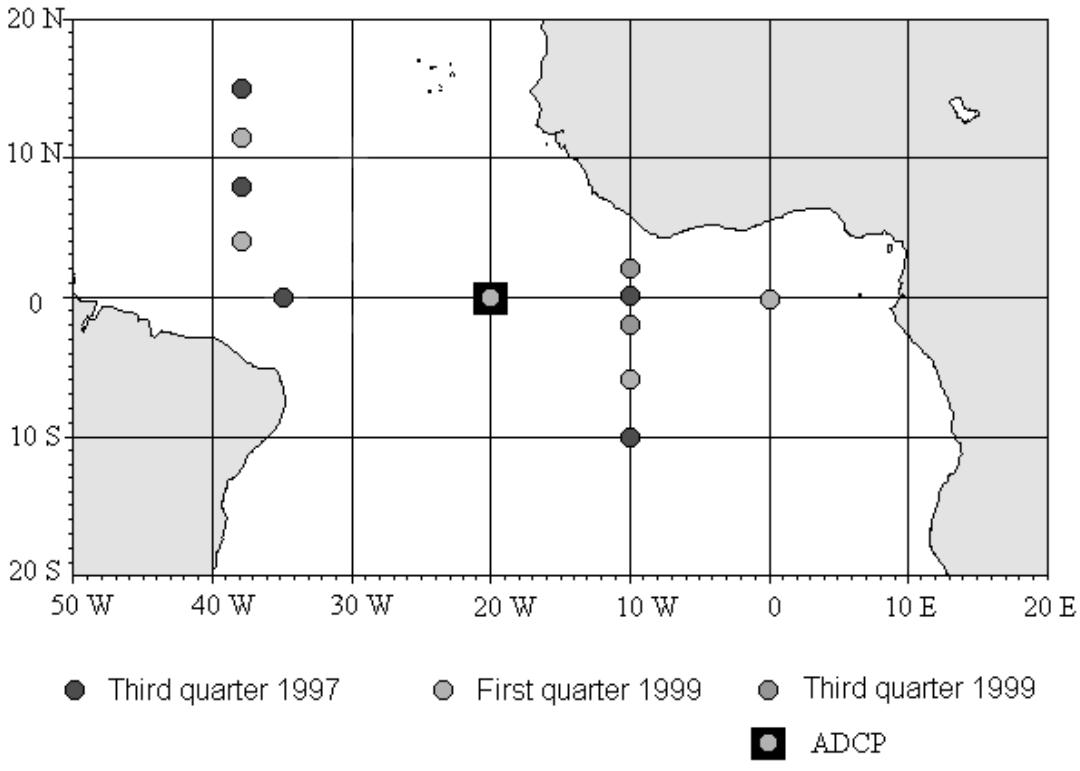



The PIRATA network in the Tropical Atlantic

# METEOSAT SECONDE GENERATION : MSG

## Foreword


For almost a quarter of a century, the METEOSAT system has observed been observing the Earth from a geostationary orbit at a latitude of 0°, transmitting low resolution visible and infrared images every half-hour. This is of a tremendous importance for the whole African continent, which gains a unique long-term observation dataset. Many members of the MEDIAS network took some major advantages from the METEOSAT products and/or the derived results and models.

On August 28, 2002, MSG-1 was launched, enabling considerable progress in observation facilities, result improvement and the development of innovative applications in Africa. Meanwhile, the PUMA and AMESD programmes were developed, that would allow the African continent to take full advantage of this innovative system. For sure, the MEDIAS network in Africa will be eager to know more about it and contribute to the development of application programmes.

## The MSG system

The METEOSAT system has been providing continuous and reliable meteorological observations from space to a large user community. In addition to providing images of the Earth and its atmosphere every half-hour in three spectral channels (Visible, Infrared and Water Vapour), METEOSAT also supports the retransmission of data from remote collection platforms, as well as the distribution of meteorological information and products.

With the advance of science and the development of numerical weather prediction, the need for more frequent and comprehensive data from space has arisen. The METEOSAT Transition Programme (MTP) is the current EUMETSAT programme responsible for the METEOSAT system of geostationary meteorological satellites. MTP has led to develop the METEOSAT Second Generation (MSG) system. MSG will serve the needs for nowcasting (real-time monitoring) applications and Numerical Weather Prediction, in addition to important data for climate monitoring and research. It has been established to ensure the operational continuity after the end of the successful METEOSAT Operational Programme.

The MSG satellites allow Europe to maintain its leading role in gathering global weather data for at least the next 15 to 20 years. Benefiting from the METEOSAT pedigree of over 20 years, MSG satellites represent a significant leap in technological capability and provide meteorologists with much improved imagery and data. Like their METEOSAT predecessors, the first of which was launched by ESA in 1977, MSG satellites operate from a geostationary orbit. MSG doubles the rate of the multi-spectral imagery of the Earth's surface and cloud systems (every 15 minutes instead of every half-hour for METEOSAT), and operates in a much larger number of spectral channels (twelve compared with three for METEOSAT). Its geometrical resolution is also greatly improved (1 km for the high-resolution visible channel and 3 km for the others). Eight of the channels are in the thermal infrared, providing among other information, permanent data about the temperatures of clouds, land and sea surfaces. Using channels that absorb ozone, water vapour and carbon dioxide, MSG will also allow meteorologists to analyse the characteristics of atmospheric air masses, thus making it possible to reconstruct a three-dimensional view of the atmosphere, while keeping the current METEOSAT capabilities.

The new MSG satellites are spin-stabilised and include many design improvements. When operating in geostationary orbit, the satellite spins counter-clockwise at 100 rpm around its longitudinal axis, aligned with the Earth rotational axis. MSG satellites are placed in orbit at a longitude of 0°, like those of the first METEOSAT generation, but could be moved up to 50° eastward or westward if needed.

The MSG body is a cylindrical-shaped solar drum, whose diameter and height are respectively 3.2 m and 2.4 m. The satellite itself is built in a modular way around four main sub-assemblies:

- the Spinning Enhanced Visible and Infrared Imager (SEVIRI) instrument in the central compartment,
- the Global Earth Radiation Budget instrument (GERB),
- the Mission Communication Payload (MCP), including antennas and transponders, in the upper compartment,
- the platform support sub-systems, in the lower compartment.

The space segment comprises four satellites manufactured by a European industrial consortium led by Alcatel Space Industries, France, under the responsibility of the European Space Agency (ESA). ESA has been responsible for the development of the first satellite according to a requirement baseline co-ordinated with EUMETSAT, and acts, on behalf of EUMETSAT, as procurement agent for MSG-2 , -3 and -4 satellites. Based on these MSG satellites, the MSG Programme is expected to provide an operational service to users over at least 15 years.

The first Geostationary Earth Radiation Budget (GERB) instrument was supplied on a national funding basis supported by The Natural Environment Research Council (NERC) of the United Kingdom, Services Fédéraux des Affaires Scientifiques, Techniques and Culturelles (SSTC) of Belgium and Agenzia Spaziale Italiana (ASI) of Italy. The recurrent models for MSG-2 to MSG-4 are financed by EUMETSAT. The GERB instrument and its following models are designed, developed and manufactured by an international consortium led by the Rutherford Appleton Laboratory (RAL) and consisting of the Imperial College of Science Technology and Medicine (ICSTM), London; Leicester University, UK; AEA Technology, UK; Galileo Avionica, Italy and AMOS, Belgium.

The MSG payload is designed in accordance with the MSG mission objectives in order to accomplish the following functions:

- permanent visible and infrared imaging of the Earth disc with a baseline repeat cycle of 15 minutes,
- high-resolution visible HRV imaging of half the Earth disc,
- transmission of raw data and other information from the satellite to the Primary Ground Station (PGS),

- transmission of meteorological data, via the satellite, to user stations,
- transmission of Data Collection Platforms (DCP) information, via the satellite, to the PGS,
- accommodation of a scientific payload,
- relay of distress signals through the satellite.

For its initial boost into geostationary orbit as well as for station keeping, the satellite uses a bi-propellant system. This includes small thrusters, which are also used for attitude control. The MSG solar array built from eight curved panels is wrapped around the satellite body.

The MSG spacecraft have been designed to be launched by Europe's Ariane-4 or Ariane-5 launchers from Kourou, in French Guyana. Each satellite has a planned operating lifetime of seven years.

The MSG-1 satellite was successfully launched on August 28, 2002 at 22:45 UTC (August 29, 00:45 CET). The on-board instruments are perfectly working. Due to a failure of a SSPA amplifier, EUMETSAT had to develop an Alternative Dissemination Method (ADM) to distribute MSG data. This system (EUMETCast) has been implemented in 2003 and is currently fully operational to disseminate data in DVB mode over Europe, Near East and Africa, through a commercial telecommunication satellite.

Following its commissioning, the MSG-1 satellite was declared operational on January 31, 2004 and was renamed METEOSAT-8.

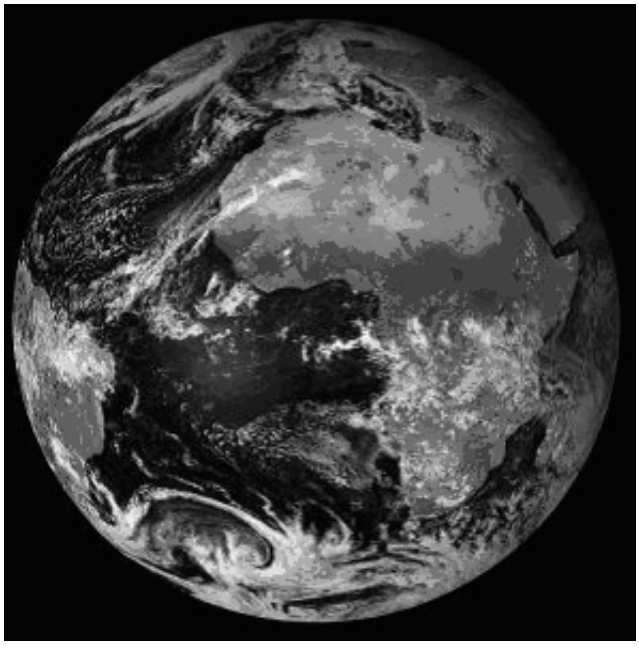
The MSG system will be established in its complete 2-satellite configuration (one operational and the other one as a hot back-up) after the successful commissioning of MSG-2, whose launch is planned in January 2005. After disposal of all the first generation satellites, the MSG system will be the only EUMETSAT geostationary system.

MSG-3 is planned to be launched approximately 7 years after MSG-1.

## PUMA outlook activities

In December 2002, the Preparation for Use of MSG in Africa (PUMA) project was put on hold following discussions held in EUMETSAT regarding the MSG data dissemination mode. The impact on the PUMA receiving stations of the switch to the Alternative Dissemination Method (ADM) of EUMETSAT (EUMETCast) for distributing MSG data was assessed by industry and the necessary modifications were implemented on the receiving stations. The main advantage for the African users is that, by using EUMETCast, the PUMA receiving stations will not only enable them to receive MSG data but also all the data distributed by EUMETSAT, which includes METEOSAT-5, -6, -7 and -8 data (MSG-1 was renamed METEOSAT-8 on January 31, 2004), but also all EUMETSAT products (MDD, SAF products), as well as third-parties data (discussions have been initiated with METEO-France to distribute RETIM Afrique data). In November 2003, the Factory Acceptance Test of the PUMA receiving stations was successfully passed and the first test-stations will be implemented in Africa from January 2004. It is planned that the full deployment in the African NMSs will take place between November 2004 and June 2005, following intensive testing in 6 test-sites.

Meanwhile, the Outlook Activities component has been given the green light with the publication of a Call for Ideas, published on the project Web site. This has resulted in the selection of 6 pilot projects which are currently under implementation. In addition, an information workshop for western Africa, hosted by the AGRHYMET centre, was held in Niamey (Niger). It should also be noted that the Belgian Technical Co-operation Office has decided to contribute to the PUMA project, and is financing a project aimed at helping the Democratic Republic of Congo (DRC) to prepare its site and personnel for the installation of the MSG receiving equipment. A feasibility study for an initiative planned as a follow-on to PUMA started after a meeting at the EUMETSAT headquarters in January 2003.



by courtesy of EUMETSAT

(Left) Black and white version of the composite image taken on February 12, 2003 (13:45 UTC) by MSG-1 (right)

Concerning the training activities, the first training sessions are planned for April 2004. Overall, the project will organise 17 training sessions, thus enabling to train more than 350 African specialists to the use and maintenance of the PUMA receiving stations.

The principal stakeholders of the African Monitoring of the Environment for Sustainable Development (AMESD) initiative met to plan the way forward and discuss the potential co-operation between African and European researchers in the field of environment management based on satellite observations. The PUMA Task Team, in charge of following the development of the AMESD initiative, recommended that links between AMESD and the European GMES initiative be established.

## AMESD

The need for timely access to accurate and reliable satellite-based information was stressed as one of the top priorities of the World Summit on Sustainable Development (WSSD) held in Johannesburg (South Africa) in August 2002. Together with other European partners, the European Commission has launched the Global Monitoring for Environment and Security (GMES) initiative, which includes co-operation with developing countries, in particular in Africa.

At a meeting in Dakar (Senegal, September 2002), the five African Economic Groups involved in the PUMA Project (CEMAC, ECOWAS, IGAD, IOC and SADC) endorsed the AMESD Concept Paper and signed the Dakar Declaration. This Declaration requested the European Commission to initiate a Feasibility Study for the AMESD project to ensure continuity with the PUMA project. The African Monitoring of the Environment for Sustainable Development is the African reply to the European offer to open GMES to developing countries.

More recently, the G8 Summit of Evian (France, June 2003) recognised that, in order to meet the objectives of the World Summit on Sustainable Development (WSSD) Plan of Implementation, developing countries and countries with economies in transition needed to build and strengthen their capacity to assimilate and generate knowledge. In particular, they were encouraged to increase knowledge of their environment, using modern technologies such as satellite imaging technologies, to support their Sustainable Development.

AMESD is seen as the follow-on initiative to the PUMA project with the aim of developing new applications using satellite technologies and other ancillary data in Africa. The objective of the AMESD programme is to help the African countries to improve the management of their natural resources by providing them with appropriate information on their environment using state-of-the-art technologies, including Earth Observation and Information and Communication Technologies. AMESD will also assist them in better defining their needs and identifying the potential beneficiaries.

The European Commission has agreed to fund the AMESD Feasibility Study. To this purpose, an invitation to tender was released in November 2003 and a company was selected to perform the feasibility study, anticipated to start this year. ◆

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# AQUA : the science of water and much more
# Excerpts from http://aqua.nasa.gov

## Background

It used to be that scientists pursued specific questions with carefully designed experiments and observations in an effort to uncover a specific answer. But in many fields this paradigm is changing. More often than ever before, experts are designing their explorations of the natural world in ways that utilise system-oriented approaches. In fact, this strategy goes beyond the bounds of observing platform alone. As only the latest launch in a series of Earth observing vehicles, Aqua's instrumentation and data collection efforts are all part of a larger effort to study the Earth in systemic terms.

NASA's latest Earth Observing Satellite, Aqua, was launched, May 4, 2002. The satellite weighted 6,468 lbs. (2,934 kg) at launch, fully fuelled. It was lifted into space on a two-stage Delta II 7920-10L rocket, equipped with 9 external solid rocket motors. Satellite designers built Aqua to function on orbit for a minimum of six years.

With the launch of the Aqua spacecraft, NASA's Earth Science Enterprise gains a powerful suite of tools. Flying at an altitude of 438 miles (705 km), the vehicle carries six advanced instruments designed to study various Earth processes. As part of the mission design, these instruments are specifically tailored to work together as well as separately - in essence embodying the philosophy that if the Earth's processes function in systemic, interrelated ways, the best way to study the planet is with sensors that can correlate their findings.

## The mission

The Aqua mission is a part of the NASA-centred international Earth Observing System (EOS). Aqua was formerly named EOS PM, signifying its afternoon equatorial crossing time.

AQUA is named for the large amount of information to be collecting about the Earth's water cycle, including evaporation from the oceans, atmospheric water vapour, clouds, precipitation, soil moisture, sea ice, land ice, and snow cover on the land and ice.

Aqua is dedicated to advancing our understanding of the Earth's water cycle and our environment. Launching the Aqua spacecraft marks a major milestone in support of NASA's mission to help us better understand and protect our planet and mitigate impacts from its changing climate.

Additional variables also being measured by Aqua include radiative energy fluxes, aerosols, land vegetation cover, phytoplankton and dissolved organic matter in the oceans, and air, land, and water temperatures.

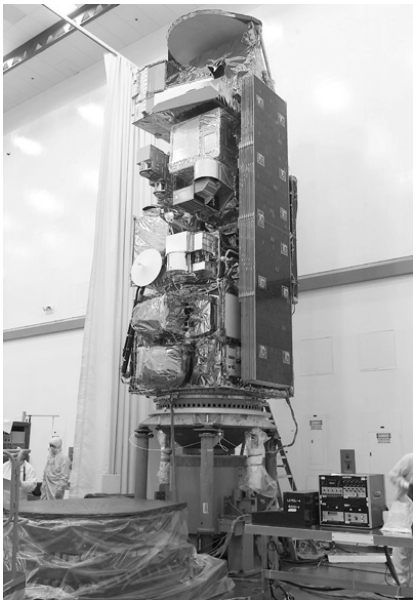
## The science: water vapour and climate change

There is no more important greenhouse gas than water vapour. As one of the fundamental parts of the Earth's atmosphere, water vapour affects global warming in both positive and negative terms, and offers scientists a trail to follow towards a better understanding about how the planet functions as a whole.

As water vapour moves through the hydrological cycle, it directly affects precipitation and surface water. These different components of the water cycle play an important role in regulating climate.

Water vapour directly interacts with other atmospheric contaminants, gasses, winds, clouds, and more. Much of what is so important about water vapour in the atmosphere is still only understood in the coarsest of terms. That is why water vapour is one of the principal aspects of the Earth's climate targeted for study by the Aqua satellite. By applying integrated analytic tools to the study of climate and climate change, experts hope to learn more specifically how water vapour and other greenhouse gasses move and function throughout the atmosphere.

Aqua is focused on the multi-disciplinary study of Earth's interrelated processes (atmosphere, oceans, and land surface) and their relationship to changes in the Earth system. The global change research efforts emphasized with the



AQUA satellite

Aqua instrument data sets include the improvement of numerical weather prediction. Aqua is also making critical contributions to the monitoring of terrestrial and marine ecosystem dynamics.

In Newsletter 13, TERRA system was presented. NASA should be highly thanked by putting through TERRA and AQUA efficient new tools to be used by the MEDIAS network. ◆

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# Land Open Science Conference Morelia (Mexico), 2-5 December 2003

Earth System Science Partnership

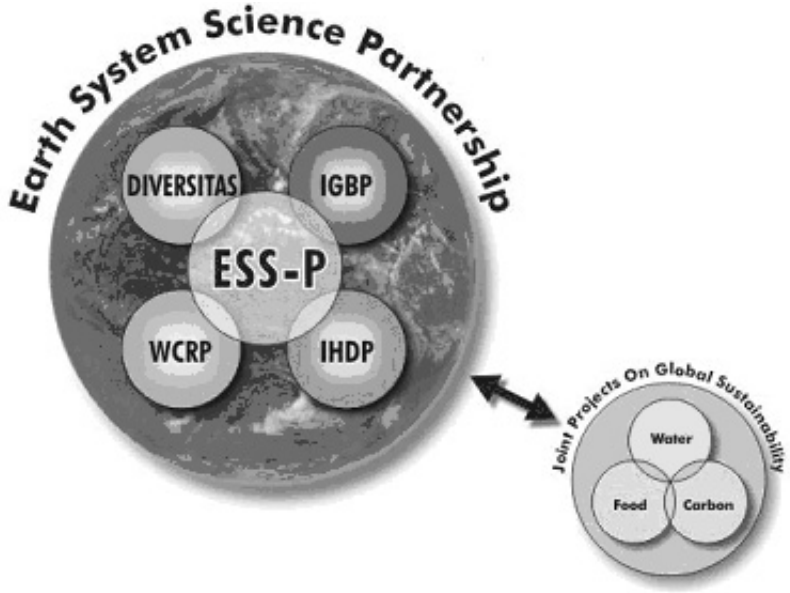
The conference that took place in Morelia (Mexico) from December 2 to 5, 2003, could prove essential to the MEDIAS network, regarding its overall orientation as well as the next works of many of its members. The Director of MEDIAS-France was invited to chair a Working Group about networks on desertification. MEDIAS is indeed a useful structure for the major scientific programmes either under way or being worked-out, which augurs well for the future involvement of its network in the Land project.

This conference comes within the general scope of IGBP evolution towards IGBP-II and of the creation of the Earth System Science Partnership. The ESSP, which results from the Amsterdam Conference 2001, gathers the four national core programmes on climate change (thematic and regional projects). The conference took place in the Ecosystem Research Centre, National Autonomous University, Mexico, just after a symposium of the GCTE (Global Change and Terrestrial Ecosystems) programme, which is destined to be integrated into this new project.

This conference entitled "The Integrated Research on Coupled Human-Environmental Systems" aimed at refining the draft Science Plan, on which a team of a dozen scientists have been working for two years, under the leadership of Drs. Dennis Ojima and Emilio Moran. This plan is to be submitted to the Steering Committees of the IGBP and IHDP programmes. A Steering Committee will then be appointed and will implement the project, which is meant to ensure the continuation of GTCE and LUCC (Land Use and Cover Change), the latter terminating at the end of 2005.

The Land project is intended to bring together the scientific communities dealing with global change (land use and cover change, terrestrial ecosystems and aquatic ecosystems on land). It focuses on coupled human/environment systems, involving all the interactions and evolutions of human, biological and environmental systems. This research requires, among others, to solve the intricate problem of interactions between, on the one hand, environmental changes and their impacts on ecosystems, and on the other hand, practices and decisions regarding land management, an issue that is still a challenge to global change science.

The scientific plan is structured around three themes, each including questions:




## Theme 1
## Causes and Nature of Land System Change

Question 1.1 - How do the human dimensions of global change affect regional and local human societies and their land use practices?
Question 1.2 - How do changes in land management decisions and practices impact ecosystems?
Question 1.3 - How do the biophysical dimensions of global change affect ecosystems?
Question 1.4 - What are the combined impacts of human and biophysical change on ecosystems?

## Theme 2
## Consequences of Land System Change

Question 2.1 - How do changes in ecosystem structure and functioning affect the delivery of ecosystem services?
Question 2.2 - What are the consequences for human well-being of changes in ecosystem services?
Question 2.3 - What is the role of changes in ecosystem services in land use decision making?
Question 2.4 - What are the feed-backs from changes in ecosystem function and services to the Earth system?

## Theme 3
## Integrative Analysis and Modelling of Land Sustainability

Question 3.1 - What are the dynamics of land systems that lead to emergent properties or to thresholds that change the structure and function of the systems?
Question 3.2 - How does the vulnerability of land systems to hazards and disturbances vary with changes in human and environmental interactions?

Question 3.3 - Which institutions and policies enhance adaptation towards land sustainability, and why?
Question 3.4 - How can data and models at different scales and complexities of analysis improve understanding and enhance decision making and governance?

The following diagram shows how the elements of the Earth System are linked within this ambitious project

This new integrating project should prove to be very important for MEDIAS-France. ◆

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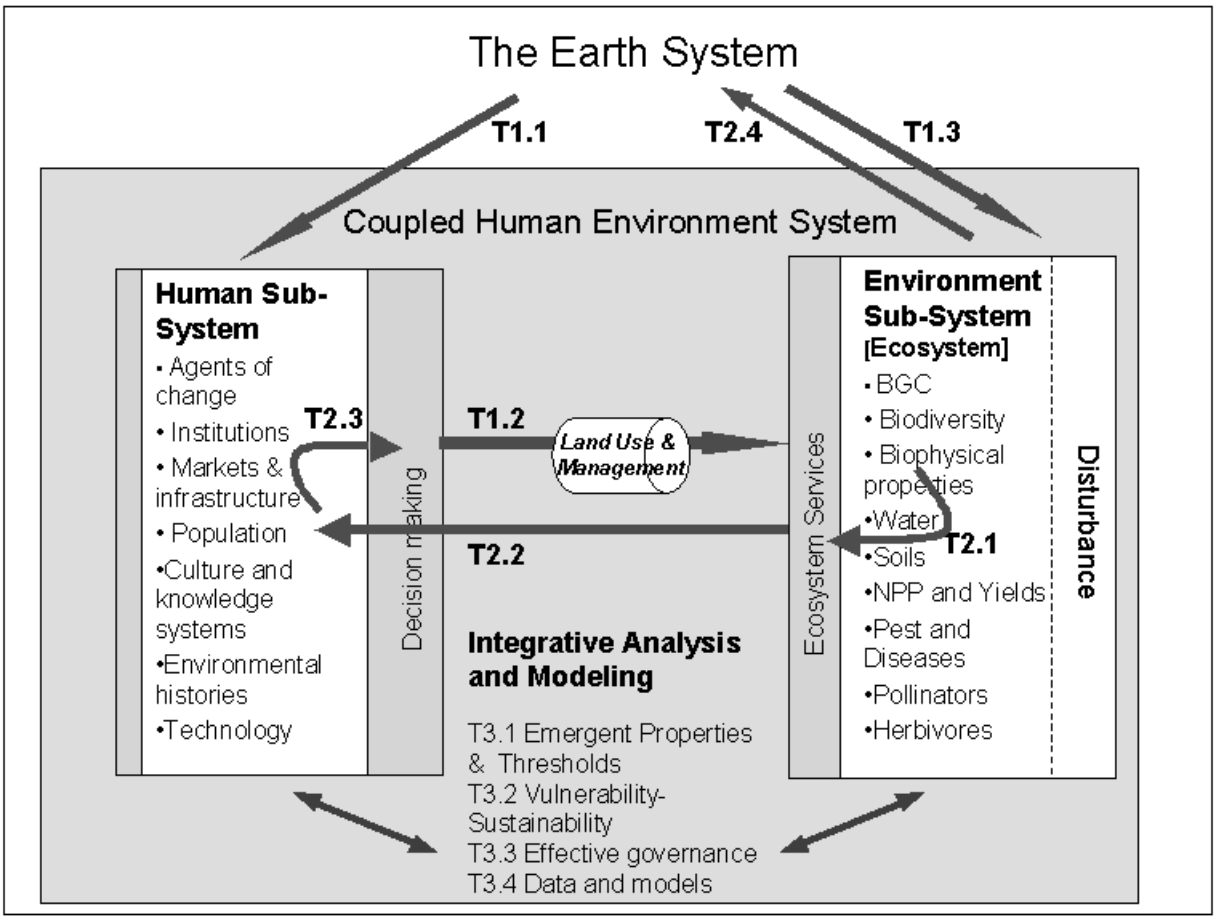

# Report on the ISPRS Commission VI Workshop "Development and Technology Transfer in Geomatics for Environmental and Resource Management" Dar es Salaam, Tanzania, 25 – 28 March, 2002

## The workhop

The workshop "Development and Technology Transfer in Geomatics for Environmental and Resource Management" held in Dar es Salaam, Tanzania, 25-28 March 2002, was co-organised by the ISPRS WG VI/1 "Education and Training" http://www.commission6.isprs.org/wg1/, WG VI/3 "International Co-operation and Technology Transfer" http://www.commission6.isprs.org/wg3 and the University College of Lands and Architectural Studies (UCLAS), University of Dar es Salaam, Tanzania. This is a continuation of a co-operation of these two WGs with activities last year in Latin America, this year in Africa and next year in Asia. The proceedings can be obtained from: GITC bv, P.O. Box 112, 8530 AC Lemmer, The Netherlands, tel. +31-514-561854, fax +31-514-563898, e-mail: mailbox@gitc.nl, http://www.gitc.nl.

The workshop was attended by 69 participants from 17 countries and three continents with 55 participants from African countries, 13 participants from Europe and one from Asia. Sponsors included the African Association of Remote Sensing of the Environment (AARSE), ISPRS Council, ITC, ESA and the UN Office for Outer Space Affairs (OOSA). Sponsoring organisations included UCLAS, a SADC Project on Capacity Building in Environmental Information Systems, ETH Zurich and the National Research Foundation of South Africa.

The workshop focussed on the use of geomatics technologies as tools to generate geo-spatial information for environmental and resources management. The main topics included:

- education and training, technology transfer and international co-operation
- EIS, crises and natural disasters, land degradation and desertification,
- mapping and spatial data infrastructure,
- ecosystems protection and resource management,
- GIS, Remote Sensing and Internet applications.

Official opening of the Workshop
Left to right: T. Woldai, UCLAS Director; X ; E. Baltsavias,
G. Cheyo, Minister of Lands and Human Settlements Development; M. Molenaar, ITC Rector;
G. Begni, ISPRS 2nd Vice President

The workshop was officially opened by the Honourable Minister of Lands and Human Settlements Development, Mr. Gideon Cheyo, (M.P.). The Minister stressed the importance of geomatics technologies for providing basic infrastructure information for a variety of applications such as mapping, cadastre, land use planning and resource management in Tanzania and the region. He emphasised the fact that about 90% or more of all maps in Tanzania are out of date and have un-necessarily long updating cycles, e.g. 10 years for 1:50,000 and 5 years for 1:2,500 scale maps. The Minister concluded by pointing out that scientists and professionals working in the fields of geomatics should develop mapping methods and operational procedures, aiming at reducing the currently prohibitive mapping costs of US$ 160/km$^2$ and US$ 40/km$^2$ for the 1:5,000 and 1:10,000 scales respectively, but still delivering acceptable quality.

Gérard Begni, the Second ISPRS Vice-President, explained the international role of ISPRS and pointed out that environment and resource management raised major concerns at global, regional, national and local levels and that physical and social-economic factors were highly embedded in their management. He therefore emphasised that a multi-disciplinary and interdisciplinary approach in the environmental and resource monitoring and management was mandatory and concluded that geomatics could give invaluable information to scientists, as well as to policy makers who have to ensure the sustainable management of the environment and natural resources.

Other short introductory remarks were made by Dr. G. Mtalo (Local Host), Prof. Idris Kikula (UCLAS Principal), Dr E. Baltsavias (Organising Committee) and Dr. T. Woldai (AARSE).

36 papers by 59 authors from 16 countries were arranged in five technical sessions. More details can be found in the full papers, which are available in the proceedings and on the Web.

## Key presentation

### Keynote Address

***"Capacity Building for Geo-Informatics in Africa: An ITC Perspective", Prof. Martien Molenaar, Rector of ITC***

Prof. Molenaar indicated that remote sensing and GIS techniques have matured and are fully accepted as tools for spatial management. A geo-information community has developed, consisting increasingly of highly educated professionals who can be categorised into three major groups:
- experts in the field of spatial information handling,
- users of geo-information,
- professionals and policy makers, who are aware of the importance of geo-information for the civil society. A similar trend of processes is evident in Africa but the technological and institutional conditions in many regions of Africa are far from optimal for the creation of an information infrastructure. Therefore, great investments should be complemented by institutional and organisational developments to ensure the adequacy and effectiveness of investments.

Regarding education and training, Prof. Molenaar underscored the importance of geo-information data infrastructures (GDIs) for good governance, which entails implications for national (public) organisations responsible for establishing and operating the GDIs. Therefore, the education of individuals should be accompanied by institutional capacity building. Most institutional capacity building in Africa in the past was project-based and the support stopped upon completion of such projects. In the new ITC approach, partners are expected to commit themselves to continue the collaboration, using their own core funding sources, and scholarships/fellowships should be funded from external sources, involving the development of regional networks.

### Invited Speaker

Prof. Tsehaie Woldai focussed on the status of EIS and the key factors that have influenced EIS development in sub-Saharan Africa. Such key factors included: Cultural profile; Lack of development of space technology in Africa; Poor tradition in surveying and mapping; Few institutions providing geodetic education; Limited support for geode-tic networking; Limited education and training in Earth observation systems in Africa; Role of donors and NGOs in EIS development in Africa with va-rying interests and emphasis at diffe-rent times.

## Tutorials

*"New Developments in Information Extraction from Remote Sensing Data", Prof. Peter Zeil and Stefan Lang , Centre for Geographical Information Processing (ZGIS), University of Salzburg, Austria.*

The lecturers stressed that the classification of single pixels in a multi-dimensional feature space is still very common. But extracting meaningful objects requires the use of context-information from the images based e.g. on texture or fractal dimension, an object-oriented image analysis approach and subsequent application-specific analyses taking into account the object attributes. A comparison between pixel- and object-based approaches was given, mentioning the limitations of the former and explaining the key procedures for object-based ones, including shape and texture parameters.

***"Applications of Imaging Radar", Prof. M. R. Inggs, Radar Remote Sensing Group, Department of Electrical Engineering, University of Cape Town***

The tutorial was presented in two sections. Prof. Inggs discussed the following topics: applications of imaging radar, introduction to the theory of imaging radar, examples of geological applications and existing airborne and spaceborne data sources and pricing. The second section dwelt on map generation using SAR, as well as on a wide range of imaging radar applications, especially on environmental and resource monitoring, and African experiences. Regarding costs, it was mentioned that airborne data are expensive due to mobilisation costs, reaching more than US$ 50/km$^2$ and rising to US$ 150/km$^2$ for a processed DEM. Satellite data are comparatively inexpensive, if bought from existing databases, e.g. about US$ 0.1/km$^2$ for ERS data. However, the processing, (interferometry and DEM generation) is highly technical and tedious and requires skill and experience.

## Discussions and recommendations

The topics of the two panel discussions, respectively co-ordinated by Prof. H. Ruther and Dr G. Begni, were: *Education and Training,* and *International Co-operation and Technology Transfer*.

### Discussions

Here are some of the key issues raised and agreed upon:
- it is necessary to create networks (South-South and North-South) to facilitate the sharing of human and training material resources,
- it is important to train and retrain personnel at various levels: technician, professional, management and career officer,
- it is necessary to launch vigorous awareness campaigns in the area of geo-information to increase involvement.

Training in geo-information should be application-oriented as well as linked to core profession courses supported by geo-information.

Policy makers at various levels (governmental, NGOs, intergovernmental, international) should facilitate job creation so as to create opportunities for those trained in geo-information.

There is need for a regional/international co-operation.

There are too limited institutional and financial resources in Africa for the creation of critical technical masses. These critical masses should be created while building teams of core professionals.

Multi-media education has been hampered in Africa by a poor communication network, thus hindering information exchange and international co-operation. The role played by EIS-Africa in bringing together players and stakeholders in geo-information was recognised and other institutions (particularly technical ones) were asked to play leading roles in the use of geo-information.

Funding fellowships for further trai-

ning should be made available to persons in governmental institutions, and to professionals in private institutions.

African countries must identify their priority needs in the area of geo-information.

The use of geomatics data has not yet very much come of age in Africa probably due to:

- the lack of awareness at the policy level of the large amount of geo-information data and their comparatively low cost,
- personnel inadequately trained in the use of geomatics technologies and data, thus stressing the serious need for high-level training at graduate or postgraduate level. In the past, the focus has been put on short training courses that have created awareness *but not* in-depth understanding of these technologies,
- the developments in geomatics technologies have been too rapid to cope with Particularly in Africa where in-depth understanding of geomatics technologies has not been updated.

## Specific Recommendations

Most data (particularly geo-spatial data such as topographic and thematic maps) in Africa are out-of-date. Geo-spatial data generators and geo-spatial application institutions such as Government Departments, Regional Centres, the United Nations Environment Programme (UNEP), etc. should come together to discuss areas of collaboration to help update information in Africa.

There is an urgent need to build and enhance capacity, particularly human resources, as a means to improve the use of geo-information in Africa. Fellowships/scholarships should be provided for graduate and postgraduate training. Organisations, especially regional and international ones, may assist either directly or through donors to provide funds for training in order to enhance the understanding and use of geo-information data at the global scale, and particularly in Africa where basic resources are quite limited.

The extensive use of remote sensing data, especially in emergency situations, is hampered by the fact, among other factors, that there is only one active receiving station in Africa (SAC, S. Africa) with a limited coverage of the continent. There is need to:

- standardise and harmonise available geo-information to facilitate and ease data exchange and transfer,
- generate metadata for all existing data in order to evaluate their quality, quantity and availability, and enhance their use.

Currently in Africa, there is a limited data-exchange network, which should be improved urgently - by the Africans themselves.

There is a lack of information exchange and co-operation within African countries, between countries and even more regions, with obvious negative effects.

Scientific events like this workshop, organised by ISPRS or other organisations, need to be better co-ordinated and gain more continuity. Additional measures should be taken (see above) in order to achieve a long-lasting impact and improve the current situation in Africa. ◆

[1] Radar with synthetic aperture

[2] Applied numerical model

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# «AMMA2E/1» - First AMMA summer school African Monsoon Multidisciplinary Analyses 1- 12 September 2003 Centre for Atmospheric Research Observatoire Midi-Pyrénées, 65300 Lannemezan (France)

The West African monsoon cannot be studied out of a wider context. The pattern of monsoon rainfall, whose socio-economic importance has been largely demonstrated, is conditioned by the ocean-continent contrast and by the characteristics of the continental surface. There are more and more actual evidences that the West African monsoon interacts with the climate of the tropical Atlantic and mid-latitudes. The environment is modified as well by the input of aerosols and chemical compounds from natural or anthropogenic fires of savannah and African forests, as well as from the big African cities.

Because of such constraints, and in view of considerable links with Europe, a multidisciplinary project known as "AMMA" is on the way. Information on this project may be obtained at the following Web address:
http://medias.obs-mip.fr/amma/.

Generally speaking, AMMA aims:
- to develop our knowledge of the African monsoon, its physical, chemical, hydrological aspects and its dependence on atmosphere-ocean-continent interactions,
- to obtain the best possible science that will allow to deal with the issues of water resources, food security and public health in West African countries.

Within the framework of capacity building, a particularly relevant action towards African scientists concerns training, education and related applications. It is also essential to train French scientists to the multidisciplinary aspects concerning the various fields of investigation (ocean, atmosphere, continent) and scientific themes (dynamics, chemistry, hydrology, socio-economic impacts,…).

The first AMMA Summer School, or "AMMASS/1" that has just taken place comes within this scope. It involved 31 trainees (4 women and 27 men, coming from 10 different countries and representing 10 disciplines) and 27 expert lecturers. Sponsors were: MEDIAS-France, CNRS, IRD, CNES, METEO-France, UPS, OMP/LA and MAE.

First of all, this School allowed to rationalise and encourage national and international scientific exchanges.

The "First Summer School" missions were the following:
- to contribute to know and exchange North-South information by integrating multi-disciplinary activities into the AMMA framework; to understand better the relations between the various aspects of the African monsoon and to favour co-operation among North-South scientists,
- to strengthen the links between French research centres and African institutions.

Educational methods included a syllabus that comprised specific sessions on physics, atmospheric dynamics and chemistry, surface and underground hydrology, vegetation dynamics, digital modelling applied to various aspects, ground and remotely sensed observations. These sessions lay within the AMMA perspective, i.e. with a multidisciplinary interactive approach. As such, they were aimed at effective applications, which required extra effort from experts/lecturers. Most specialists were already at home with AMMA. Practical work sessions were organised and enabled the audience to become acquainted with various tools that they will be able to use in their home country. Evening sessions were devoted to specific presentations by the trainees, in order to give mutual information and to prepare integrated research projects.

The 24 subjects of these presentations were as follows:

**Monday, 8 September**
Moderator: *C. Bouka Biona*
- Ergocidity of the precipitation field on the Senegalese coast
*A. Nzeukou*
- Evaporative rains: structures and water budget
*E.P. Zahiri*
- Spatio-temporal variability of pluviometry in West Africa: the case of Ivory Coast and Ghana
*A.D. Ochou*
- Spatio-temporal variability of the characteristics of rain drop distribution in tropical and temperate areas
*A.D. Ochou*
- Scale invariance in the spatial structure of precipitation fields in the Sahel
*A. Ali*
- Decadal variability of rains and rainy days in the Sahel
*A. Amani*

**Tuesday, 9 September**
Moderator: *A. Amani*
- Simulation of a rainfall change in West Africa induced by an increase in greenhouse gases
*T. d'Orgeval*
- Study of the seasonal variability of the partial pressure of ocean $CO_2$ and assessment of $CO_2$ air-ocean fluxes in the Gulf of Guinea
*G. Kouadio*
- Working-out of climate change scenarios in Mali
*F. Traoré*
- Influence of aerosols on energetic exchanges at the air-ocean interface in three PIRATA sites of the tropical Atlantic ocean
*A. Konaré*

Experts and trainees at the Pic du Midi fieldtrip

- An idealised study of the West African monsoon
*P. Peyrille*
- Assessment of surface emissivity in the micro-waves with a view of the inversion of humidity pressure in the lower layers of the atmosphere
*F. Karbou*

**Wednesday, 10 September**

Moderator: *A.D. Ochou*
- Impact of climate variability on agriculture: study through the MAR project
*A. Diawara*
- Rainfall variation and food security: example of the millet crop in Senegal
*M. Diop*
- Multi-agent tool for modelling and simulation to analyse desertification in the supplying area of fuel-wood for Niamey-city (Niger)
*A. Mahamane*
- Dynamics and multi-scale spatial representations of deforestation in Ivory Coast - Example of the forest reserve of the Haut-Sassandra
*J. Oszwald*
- Importance of surface states in the processes of runoff and particle transport in the Sahelian environment of Burkina-Faso
*H. Karambiri*
- Impacts of rainfall variability on ecosystems in Brazzaville-Congo
*G. Samba*

**Thursday, 11 September**

Moderator: *H. Onibon*
- Chemistry of rain water and wet deposits in equatorial forest environment: IDAF project
*L. Sigha Nkamdjou - V. Yoboué*
- Project: Study of the physico-chemical evolution of air masses during their transport from the Atlantic ocean to the AMMA area
*C. Bouka Biona*
- The "Below-ground biodiversity project" and its links with the AMMA programme *A. Konaré*
- CORUS project: Variability of the monsoon flux in West Africa and interactions with surface conditions
*A.D. Ochou*
- The FRIEMO-AOC project
*A. Amani*
- ICCE-BF project: impact of climate change on the environment in Burkina-Faso
*H. Karambiri*

All trainees rated highly the organisation of the school as well as the invaluable support kindly provided by the staff of the CRA (Atmospheric Research Centre) to organise this event.

The markedly multidisciplinary feature of the school was discussed. The general opinion was that the objective had been reached but several presentations were sometimes too detailed for non-specialists to keep up with them properly.

A CD-ROM including the digitised tutorials of all courses has been published and distributed to all participants.

Regarding the next summer school, it was suggested that students' presentations should take place during the first week, for the trainees to get acquainted more quickly and to come to know each other's field of work at the beginning of the school. This way, scientific exchanges between them would be easier. Concerning future AMMA workshops, priority will be given to a workshop bearing on data processing in the general sense (ground-based and satellite data, model outputs and analyses), on the use of databases and tools (including statistic tools). Tutorial classes, practical work and applications will prevail. The panel of lecturers of future workshops will include African researchers. ◆

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# 10th International Conference GIS Ostrava 2003: "GI-GIT theory and practice - Bringing them together"

## Foreword

MEDIAS-France has been very active at starting the so-called European GMES[1] initiative, developed by the EC and ESA in co-operation with EUMETSAT and some space agencies of participating states. The 10th International Conference GIS Ostrava 2003 offered an excellent platform to better advertise about GMES in the countries in accession phase. Ostrava is an old mining town, located in Eastern Czech Republic, close to Slovakia and Poland, a region facing deep economic and societal changes as well as severe environmental problems. MEDIAS-France presented the GMES activities and potential interest for the region under the umbrella of the so-called EUFOREO concerted action, developed in the framework of the EC FP5 programme under the leadership of the EARSC[2] association. The deputy Director of MEDIAS-France was invited as a national representative of France in the EARSeL[3] Council, while the main organiser, Pr. Tomas Benes, was the Czech representative in that Council. This shows how the MEDIAS network operates, bridging together various initiatives on environmental issues of common interest.

## Overall framework

The 10th International Conference GIS OSTRAVA 2003: 'GI-GIT Theory and Practice - Bringing them together' was organised by the VSB - Technical University of Ostrava and Czech Association for Geo-information, and sponsored by DIGIS Ltd.

The programme of the Conference was as follows :
Invited speakers :
Konecny, G.: Mapping from Space.

Begni, G.; Cannizzaro, G.: The European GMES programme and the related EUFOREO thematic network. Studying some candidate services.
Buchroitner, M.: Establishing an environmental GIS for remote mountain regions: the Altai example.
- global, European and national GII,
- metadata and GIT data gathering,
- interoperability and standards,
- geodata management and geodata warehouses,
- geo-information on the Web,
- GIT in utilities and transport networks,
- remote Sensing,
- mobile GIT,
- GIT in geology and mining.

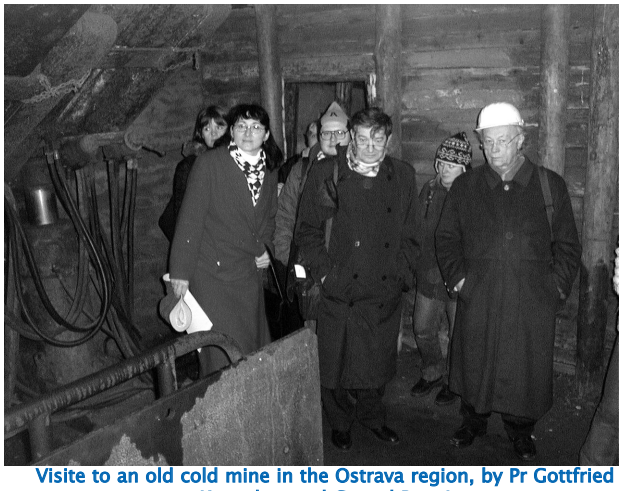
In addition, some technical visits were organised, among others to the University of Ostrava and to the Municipal Authority services.

The attendance could be divided into three circles, as usually in that kind of regional conference:
- local students, researchers and service providers, who appear quite active in the field of Geographic Information,
- regional audience. In addition to Czech attendants, participants from Germany, Austria, Poland, Slovakia attended.
- the international audience (beyond the region) included participants from France, Turkey, Algeria and Japan.

The Conference can be mainly presented as a regional one, bringing together highly skilled specialists in geo-information for environment and civil engineering.

A very small number of scientists and engineers had heard about GMES in that region, whereas most of these countries are going to join the European Union. They will be full members in 2008, when GMES is planned to be fully operational. Therefore, GMES will be their own program for Environment and Security. As a consequence, it is quite important to involve them as soon as the first phase of the GMES action plan ("Strand 1"). In addition, no other regional opportunity was identified in the region before the EUFOREO concerted action deadline (March 2003) and the end of the GMES strand 1 (end of 2003).

In addition, the Conference was in fact conveyed by UHUL, a Forest Institute. Forest is a quite important issue in GMES, as well as the leading theme of two identified EUFOREO services. Other topics of the Conference have obvious links with GMES and with some themes of the 6th FP. Consequently, it appeared quite important to advertise widely about GMES and the 6th FP. We will then focus on GMES, which should be a key tool for the regional management of environmental and security issues.



Visite to an old cold mine in the Ostrava region, by Pr Gottfried Koneckny and Gerard Begni
The collapse of old foundations have to be solved by GMES

## Presentations (related to GMES) by invited speakers

The first invited presentation: 'Mapping from Space' by the world-wide known specialist Pr. G. Konecny emphasised the interest (and costs) of remote sensing technologies. This is a key technological issue that cuts across all the GMES themes. Actually, the very beginning of the GMES concept was the so-called Baveno Manifesto, issued by space agencies. This raised sometimes some criticisms about a "technological push" of GMES. Now, it can reasonably be considered that these times are over and that the right concepts have found their right place within GMES.

The third invited presentation: 'Establishing an environmental GIS for remote mountain regions: the Altai example' by M. Buchroitner - another world-wide known specialist - addressed technological issues connected with the setting up of GIS in complex remote areas. Modern technologies offer a wide range of tools to feed GIS with quite different layers of geocoded information, thus allowing GIS to be key tools for a lot of applications that request to handle multi-layered geocoded information, from scientific research to decision making for land use management. The use of geographic information through GIS for environmental and/or management purposes is quite developed in the region. It is taught in Universities, several service providers have attractive offers, and administrative services widely use GIS to assist policy makers at all scales.

The second presentation began to deal with the GMES programme and its specific importance for Central Europe. It then focused on four "candidate services" developed within the framework of the EUFOREO concerted action, that appeared of specific regional importance:
- monitoring of indicators for biodiversity and nature protection,
- flood-related services,
- forest fire-related services,
- other forest-related services (global carbon mass, ARD issues).

The presented GMES candidate services did not raise specific comments from the audience and the specialists consulted in side meetings. As anticipated, forest fires rose less interest than other services, which are now developed in the region mainly through 'traditional methods'. The candidate services are well in line with the regional needs. GMES is expected to offer valuable services to the region and will hopefully find enthusiastic actors, either from the suppliers or the users side.

## Conclusions of interest for EUFOREO and GMES

***About the presented GMES candidate services and the use of remote sensing technology***

Remote sensing is poorly used simply because it is poorly known. The high prices of data and processing are perceived as a hindering factor. Some service providers make use of remote sensing for general or dedicated purposes (such as Corine Land Cover maps). Other service providers chiefly use traditional information (mainly aerial photograph) to feed the GIS services they offer.

The applications addressed are mainly local or regional (in the administrative meaning). High resolution satellites (SPOT-5, IKONOS) are therefore the unique source likely to compete with traditional sources. The accuracy of some products has to be increased, and an interwoven use of several types of data should be developed and encouraged. For instance, the HRS altimetric resolution is convenient for flood modelling studies at the watershed scale, but is not suited to accurately identify endangered areas in highly populated zones. On the other hand, collecting and using data suitable for that specific issue in the overall modelling process is useless and would be extremely expensive. Pricing policies can be a serious hindering factor. Consequently, developing adequate methodologies could prove beneficial in an end-to-end economic approach. Research in that field is encouraged.

The debates consolidated the vision of the candidate services developed by EUFOREO. There are considerable needs in that region, where the use of EO techniques is less developed than in other European areas. This is a matter of breaking working habits in well-developed operational services and of offering attractive pricing policies. On the whole, the situation can be considered as positive and promising provided that a competitive offer could be developed. It is a question of attracting public and private service providers.

***About other potential services of interest***

Needs for some specific services were identified. They are in line with GMES priorities and are shortly described hereunder.

As said above, the whole region is an old mining zone. Important coal mining activities existed in that part of the Czech Republic and in Southern Poland (also in Germany) until the beginning of the 90's. This causes soil subsidence in several places, endangering existing buildings and making decisions about new building zones hazardous. Photogrammetric and laser-based technologies are used to monitor endangered buildings. It has been shown on an experimental basis that SAR interferometry could be used to identify and map slight terrain subsidence. This could be used as a complement to local in situ monitoring methods. This problem is quite in line with the 'S' (for Security) of GMES.

Atmospheric pollution mainly (but not only) due to industrial activity is also a concern. Just as in Western Europe, measurements are made and propagation models for several trace constituents are being developed. Again, this corresponds to one of the priority themes of GMES (atmosphere).

***Developing GMES in Central Europe***

As stated above, considering that the countries of that region belong to the 6th Research FP, that most of them will join the European Union in 2004, and that they will be fully involved in 2008 - when GMES is operational -, they should actively participate in the preparation of GMES.

It must be acknowledged that the situation was perceived as rather disappointing in that respect. It appears quite difficult to many small- or medium-sized laboratories and service providers that wished to be or were actually involved in the previous 5th FP to find their way in the 6th FP and in the preparation of GMES. The concept of the European Research Area, the implementation of such new instruments as the Integrated Projects or the Networks of Excellence are undoubtedly an ambitious way to push forward a strongly structured and competitive European research. Such limiting factors to a fully efficient ERA have to be gradually overcome. ◆

[1] Global Monitoring of Environment for Security

[2] European Association of Remote Sensing Companies

[3] European Association of Remote Sensing Labs

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# International symposiums organised by the Akademgorodok of Tomsk

We will not repeat here the content of the article devoted to SCERT. Nevertheless, we will highlight the fact that Siberia hosts several "Akademgorodok" i.e. academic villages (Novosibirsk, Tomsk) that gather several research institutes and are areas of much scientific worth. Such centres stand comparison with the most prestigious scientific institutions in the world. However, they are subject to three handicaps that they try to overcome with courage and perseverance. Distance and geographic isolation are a first disadvantage. Second, before 1990, these centres were politically isolated from the outside of the communist bloc because of the cold war context. The subject of our paper, the Akademgorodok of Tomsk, was barred to foreigners. Third, after 1990, the collapse of the USSR entailed a terrible recession regarding research funding. But junior and senior researchers faced this situation with intelligence, courage, faith and perseverance which I personally witnessed, and I really want to pay tribute to them. The Akademgorodok has taken the initiative to organise every year an ambitious international scientific symposium devoted to environmental and climatic issues. Within the scope of the eastward development of the MEDIAS network, which is strongly supported by SCERT, MEDIAS-France decided to grant a much modest contribution to this initiative. SCERT honoured MEDIAS-France with placing its Director at the head of the Scientific Committee members list in the programme of these symposiums.

The ENVIROMIS-2 conference took place in 2002. It was devoted to the state-of-the-art and use of modern environmental observation techniques, modelling tools and information technologies for pollution assessment of air, water, soil and vegetation cover in integrated information systems aimed at the environmental management of industrial areas at a city and regional scale. This conference intended to fill the gap between basic science achievements and their practical applications in this domain, as well as to create a solid foundation to mitigate pollution in selected areas. It included the following sessions:

- the three lectures of the opening ceremony (by Profs. Lykosov, Gordov and Volostnov),
- observations, local and remote sensors for air, water, soil and vegetation assessment,
- remote sensing (at large: not only space- or aircraft-based),
- GIS and multi-dimensional databases,
- urban and regional scale modelling,
- hydrologic systems,
- assessment of soil and vegetation cover,
- joint session with the participants to the conference "Environment Control and Management",
- urban and regional atmosphere: environmental state and climatic change assessment,
- integrated Information Systems for environmental assessment/management, DSS (Decision Support Systems): environmental management and legal aspects,
- special session - Monitoring of INTAS environmental projects.

In 2003, the CITES-2003 initiative organised a two-part programme, namely a Young Scientist School and the international Conference itself, which was entitled: "*Computational Informational Technologies for Environmental Sciences*".

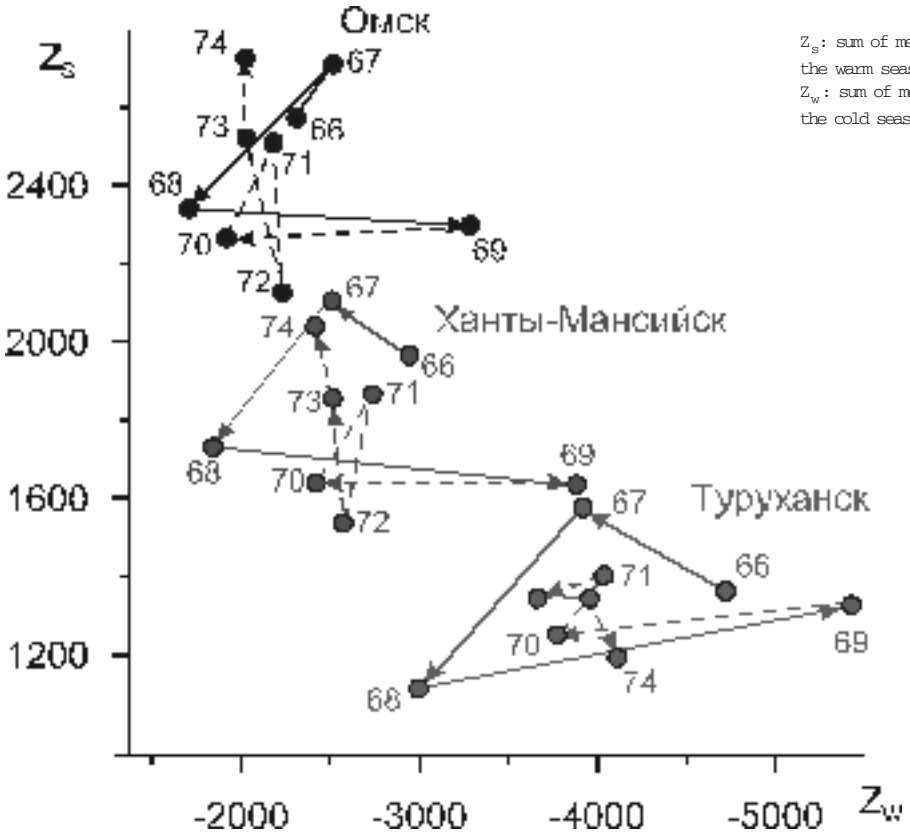
This conference came into line with the events of the previous years, having learnt from them and allowing to take stock of the advances in knowledge and technology. Although its programme might seem more condensed than the previous one, this conference was as full of information and teachings. It included four major sessions:

- the first one was devoted to atmospheric observation databases, and included four presentations. We had the privilege of opening the session - and consequently the symposium - with a presentation entitled: "The MEDIAS distributed databases for environment information in Central Asia environmental issues", by Begni G., Makhmara H., Niulina S., Zakarin E., Gordov E.,
- the second part focused on the very important issue of climate system physics, which is always a matter of discussions, and of improvement of models and observing methods. Twelve presentations were performed; the figure hereunder was taken from them,
- the third session was devoted to basic and applied information-computational models. Its ten presentations proved that the questions of a user-friendly access to data through structured bases, of metadata bases and of information portals - which keep MEDIAS-France so busy - also concern our regional colleagues. The ATMOS information portal developed by SCERT was demonstrated within this scope.
- the fourth session was entitled: "Urban and regional atmosphere: from modelling to monitoring and risk estimation". It involved sixteen presentations, which shows how much this theme is a sensitive environmental issue in this area.

These presentations were completed by two poster sessions, that included respectively the themes of sessions 1 and 2, and of sessions 3 and 4. The audience took as keen an interest in the presentations as in the poster sessions, which generated animated discussions. The moderator found it quite hard sometimes to keep the participants to the timetable!

The annual series of international symposiums organised by SCERT will be materialised by two events in 2004: a usual colloquium supported by the INCO European programme on the one hand, and a strategic scientific seminar within the scope of the INTAS programme on the other hand. It is really desirable that the success met by the previous events should keep on increasing, and in particular its international audience. This would be a significant asset to consolidate the regional activities of the MEDIAS network.

Example of climate analysis presented during the second session of CITES-2003. A similarity between synchronous annual temperature regimes in different climatic zones of Siberia can be observed for the climatic anomaly of the years 1965-1975. This peculiarity of temperature regime dynamics indicates to single for Siberia reorganisation of processes of energy transformation and energy and mass transport in atmosphere. ◆




$Z_s$: sum of mean daily temperature during the warm season (2-m high)
$Z_w$: sum of mean daily temperature during the cold season (2-m high)

The figure shows the trajectories of temperature for different Siberian cities (Omsk, Khanty-Mansiisk and Turukhansk). Black dots represent indicated nearby years. Solid lines are for direct motions while dotted lines are for retroactive ones.

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A Visit to a Research Institute atTomsk Akhademgorodok
ENVIROMIS-2
From the left to the right: Pr Yu. Polictchouk ; G. Begni ; Dr E. Genina ; Dr I. Krutikov

# «Global change, sustainable development and environmental management in Central Asia» international workshop January 20 – 22, 2004, Tachkent (Uzbekistan)

## Foreword

Several years ago, it was decided to extend the MEDIAS network to Central Asia, in agreement with a group of regional stakeholders. The initial concept actually derived from the informal meeting of Prof. Edige Zakarin and Dr Gérard Bégni, taking the opportunity of the UNISPACE III United Nations Conference on Space held in Vienna in 1999. This was already reported by the MEDIAS Newsletter, among others in the presentation of the Ulaan-Baatar symposium (Newsletter n° 13). The idea is to put this new regional network under the aegis of the LUCC programme, and then of the "Global Land Science" new emergent programme of the ESSP (see article on the Land Open Science Conference of Morelia in this issue). This initiative is being strongly encouraged by the current LUCC-IPO and Dr Dennis Ojima. START, APN and INTAS did not fail to support the enterprise as soon as they knew of it, and so did other actors such as the French Embassy.

As a matter of course, the serious problems raised by environmental management and regional sustainable development lie eventually in the hands of policy makers. Their action must be based on a sound physical and socio-economic scientific expertise, which requires both a disciplinary and interdisciplinary approach within an integrated environmental scope, the so-called IEA "*Integrated Environmental Assessment*".

Very soon, a key element to strengthen the network and its action plan was identified, i.e. a founding or at least "consolidating" workshop. This seminar was to allow to take stock as much as possible of the key disciplinary knowledge as well as of interdisciplinary approaches with a view to an integrated environmental concept. It also aimed at defining the steps to be taken in order to progress towards the objective defined. This entailed to identify on the one hand, the state of the art, and on the other hand, the tasks remaining to be done in order to achieve an homogeneous disciplinary as well as interdisciplinary knowledge status. It was planned to gather scientists in the various relevant subjects, major international programmes, and sponsors likely to approve and grant a financial support to this enterprise. Policy makers, who are essential for the success of this initiative, were to be involved at a later stage, as the scientific concerns and proposed solutions should be expressed in their own "political language", which implied a subsequent common task.

Dr Svetlana Nikulina, in charge of implementing the joint UNDP-Uzbekistan government programmes, took the heavy responsibility of organising this workshop. The seminar was held in Tashkent (Uzbekistan) from January 20 to 22, 2004.

The general opinion is that, despite the many conferences held in this area or related to this region, this workshop was the first one that dealt with these issues with such objectivity, global approach, interdisciplinary scope and projection towards a regional working plan. Moreover, this seminar avoided focusing on the disaster of the Aral Sea, which would have been understandable in human terms. Instead, it was more balanced at the regional scale and also considered its farther connections.

The workshop included six parts. The opening ceremony was chaired by Dr Dennis Ojima and allowed several actors to present their activities - we will not deal with it in this short paper. We will briefly present the recommendations and conclusions of the four disciplinary sessions and of the final synthesis, entrusted to MEDIAS-France.

Of course, it is impossible in such a brief article to give an exhaustive account of the deep and accurate discussions. Within a few weeks after redacting this paper, the final report of the workshop will be made available on the Web site of MEDIAS-France.

## The four disciplinary sessions

### Session 1: Climate change Moderator: Dr Svetlana Nikulina

This session highlighted the fact that every country in that region had signed the United Nations Convention on Climate Change and implemented the related action plans, but that each country was designing scenarios within different approaches.

Among the gaps to be filled and the works to be undertaken, the following ones were mentioned: separating global change effects from those connected with direct human activities; reducing uncertainties; devoting more efforts to impact studies and training, especially regarding young scientists; unifying scenarios (in accordance with IPCC) and methodologies (particularly regional downscaling); undertaking a consistent programme at the regional scale and rationalising available databases and their access through a portal.

### Session 2: Land use, regional ecosystems and biodiversity Moderator: Dr Dennis Ojima

This session evidenced the richness of regional ecosystems. Although they are quite well known, their understanding still requires to be updated and enhanced, in particular by means of a monitoring network.

The second session underlined the need to develop an interdisciplinary context to study this theme in the various regional landscapes. A relevant scientific network should be set up, communication with local stakeholders and decision-makers should be improved within a strategy of sustainable development, and transparent information exchanges should be made easier.

## Session 3: Air pollution and atmospheric composition change Moderator: Prof. Evgueni Gordov

This session emphasised the importance of atmospheric effects, in particular since the atmosphere conveys aerosols, sand and salt as a result from climate change physics and human activities, and since it entails impacts on both (especially on human health).

There are not enough measurement and monitoring networks. They need to be developed and standardised (and should make use of remote sensing). Specific points were identified in order to enhance thematic knowledge and the necessary interdisciplinary co-operation. This basically involves understanding the underlying processes of the events observed through various chains of phenomena, within a framework in line with the ESSP initiative. This group also drew attention on the necessity to share data in a standardised way through an information portal, and on the need for training.

## Session 4: Quality and quantity of water resources Moderator: Prof. Victor Dukhovny

This session dealt with the challenge related to decision making as regards the distribution of water resources and the assessment of their current and future availability faced with a growing demand.

It is essential to care for hydro-meteorological monitoring, the maintenance of the associated network of measurement stations, and the availability and accessibility of information at suitable scales through common databases. This requires to set up a consistent cross-border approach, in particular considering the threat of climate change, as well as to implement common regional modelling and scenarios and early warning systems. Designing watershed-scale management methodologies, developing new irrigation methods and communicating with all the stakeholders is also essential.

## Final synthesis and general conclusion

The final synthesis allowed every disciplinary group to present its recommendations and conclusions, and then to exchange with the others in order to develop overarching main themes and to draw interdisciplinary conclusions and recommendations with a view to an integrated environmental approach.

Several core themes arise from the preceding text. Basically, what is needed is to inventory, preserve and enhance all the assets of the past, and to associate a regional approach with the legitimate national approaches. This concerns many subjects. It is necessary to maintain and develop interdisciplinary measurement networks that should be rational and consistent with each other at the regional scale. There should be a will to make data available as much as possible, in particular through common formats and access protocols (access portal). Disciplinary and interdisciplinary regional models and relevant downscaling and upscaling processes must be developed, as well as scenarios in line with the IPCC approach. Lastly, interdisciplinarity and training of young researchers should be encouraged, in order to set up a community of the "sustainable development science".

Scientists have established a definite disciplinary and interdisciplinary work programme; they have to take the initiative for these joint developments. International structures such as APN, INTAS, START, WMO, ESSP and its programmes should take over. In parallel, the relationship with all the socio-economic actors should be enhanced as well: on the one hand, field stakeholders and NGOs, and on the other hand, economic and political decision makers. This dialogue will be fruitful only if the scientists and associated organisations are able to demonstrate to these policy makers, in their language and way of thinking, the positive benefits that such improvements can bring to the economy and the sustainable development of this region. This is by no means the least of the tasks that the scientists gave themselves in concluding this workshop! ◆

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## UNEP feels the pulse of stratospheric ozone

Since 1989, UNEP has published a report every four years on the environmental impacts of the depletion in the stratospheric ozone layer.

The "ozone hole" evidenced above the Atlantic in 1985 entailed the signature of the Vienna Convention (1985), and then of the Montreal Protocol (1987) aimed at stopping the emission of chlorofluorocarbons (CFC), substances that destroy stratospheric ozone through complex catalytic mechanisms. The ozone hole (integrated amount of gas inferior to 220 Dobson units[1]) reached the record area of 29 million km² in 2000, to decrease to 25 million km² in 2001 and 16 million km² in 2002. In the Antarctic, minima are about 90 Dobson units, i.e. less than 40% of the typical values of the 70'. A main function of the stratospheric ozone layer is to filter the ultraviolet radiation (UV-B) that, among others, has a destructive effect on living cells, thus inducing serious burns and skin cancers. UNEP reports use to underline the impacts of the ultraviolet radiation (UV-B) at the Earth surface.

Interactions between depletion of the ozone layer and global climate change are complex. Two phenomena are particularly important. First, the emissions of greenhouse gases might contribute to the destruction of the ozone layer or at least decrease its potential for rebuilding. Surface warming occasions a cooling of stratospheric temperatures, that slows down ozone depletion at mid-latitudes but accelerates it at high latitudes, the catalytic phenomena being triggered off on contact with polar clouds below a critical threshold of temperature. Second, variations in the ozone layer may affect the features of tropospheric circulation and therefore of climate, while climate warming may have an impact on other variables (cloud and snow cover, aerosols) that also influence ultraviolet radiation. The 2002 UNEP report also deals with these interactions, acknowledging that they are complex and poorly understood, and that they may cause both positive and negative impacts.

Contrasting with the situation in the stratosphere, the concentration of noxious tropospheric ozone has increased by 35% within 100 years in the Northern hemisphere, according to the 3rd IPCC report. ◆

## FAO studies the impact of AIDS on malnutrition in Africa

AIDS is not only a scourge that has been leading to an outburst of mortality in Africa (eight million peasants killed within 15 years[2]). This disease also involves consequences on food insecurity and the breakdown of the social fabric.

The 32nd FAO conference (Rome, December 2003) set forth significant conclusions: starvation is gaining ground; 842 million human beings are affected[3]. Even though the production of meat and dairy produce is quickly increasing, global crops of cereals (1.874 billion tons) remain inferior to the needs: for the fourth consecutive year, it will be necessary to draw from stocks. Jacques Diouf, FAO Director General, reminds that 65 to 80% of food emergencies are due to natural disasters (droughts, floods). But the AIDS pandemic severely increases the disorganisation of the economic cycle in Africa; the situation of food insecurity suffered by this continent is in all likelihood partly due to this affliction. The problem is bound to get worse considering the 6 to 8 years' time-lag between the detection of seropositivity and the death of the ill person. Half the population is loosing up to the two-thirds of their resources. The disease is said to affect 26% of farm workers in Namibia, 23% in Botswana, 20% in Mozambique and 17% in Kenya. It contributes to increasing the vulnerability of households by ruining their capacity of production in countries enduring food insecurity. The ill person progressively becomes completely unable to work and even to communicate. This leads to break down the traditional familial and social fabric, for children to leave the school system, and to stop the passing down of knowledge and skills from generation to generation, which is the basis of a sustainable development in this type of population[4]. ◆

## The countries South of the mediterranean basin worried by the relationships with the EU

As shown by day-to-day exchanges within the MEDIAS network, the countries of the Mediterranean South are worried. According to them, the forthcoming unprecedented enlargement of the European Union is granted a political attention as well as resources that relegate trans-Mediterranean co-operation to a position of secondary importance. To put it plainly, the Barcelona Process (1995) is sluggish and needs to be given a boost.

The persons in charge of the policies and programmes of the European Union have been doing their best to reassure these countries of the Mediterranean South. Community programmes exist and are fully prevalent. The member countries also actively co-operate with them.

The heads of State and of government are anxious to highlight this trans-Mediterranean policy. For instance, in October 2003, during his official visit to Morocco where HM King Mohammed VI had just announced unparalleled political, legal and social measures, the President of the French Republic addressed the Moroccan young people in Tangiers, who needed to be "enlightened and reassured", asserting his wish that "the Euro-Mediterranean dimension be at the core of the European construction". He insisted: "Our Euro-Mediterranean area can offer this great federative and involving project that will allow to meet your rightful expectations… The integration of new members does not exclude building our relationships with our Southern partners; quite the reverse… In the economic and social fields, the enlargement of the Union will not put us off from the vital issue of the development of the Mediterranean Southern shore".

This process reached a peak during the meeting of ten heads of State or of government held in Tunis on December 5

and 6, 2003, on President Ben Ali's initiative. Five Southern countries (Tunisia, Algeria, Morocco, Mauritania, Libya) and five Northern countries (France, Italy, Spain, Portugal, Malta) were represented, as well as the top representatives of the European Union (Messrs Romano Prodi, Javier Solana and Chris Patten).

In parallel, in a document preparatory to the 6th Conference of the European Foreign Ministers, held in Naples on December 2 and 3, 2003, Germany, Cyprus, Spain, France, the United Kingdom, Greece, Malta, Poland and Portugal appealed to restart the Euro-Mediterranean partnership. ◆

## 9th Conference of Parties of the UNFCCC: slight progress, but …

The 9th Conference of Parties of the UNFCCC took place in Milan from December 1 to 12, 2003. On that subject, the GECR review ran as a headline: "Same song, ninth verse". We set out hereunder the disappointing - although expected - attitudes of the USA and of the Federation of Russia. Nevertheless, several measures were taken, which are likely to have an impact on some institutions of the MEDIAS network.


Two funds were thus created to help developing the nations that undergo the effects of climate change, i.e. the Special Climate Change Fund and the Least Developed Countries Fund. Twenty developed nations will provide 410 million US$ per year to developing countries through these funds and/other mechanisms. The European Union will contribute up to 369 million US$. ◆

## … the USA will not sign the forthcoming Multilateral Environmental Protocols…

In 2002, the US emissions of "$CO_2$ equivalent" increased by 0.5% compared with 2001, and by 10.9% in relation to 1990. The substitute policies proposed by the american administration were set out in the "News" of our last Newsletter. During the UNFCCC COP-9, Paula Dobriansky, Under-Secretary of State for Global Affairs, called the Kyoto Protocol "an unrealistic and ever-tightening regulatory straightjacket curtailing energy consumption". ◆

## … and adopt a strategic plan for their Climate Change Science Program…

The Senate bill S139, the Climate Stewardship Act, which would have reduced US GHG emissions more quickly and established a trading platform for national emissions, was defeated by 43 votes against 55 on October 30, 2003. Six republican senators crossed their party lines.

Actually, the US have adopted a plan of their own. In February 2002, President George W. Bush announced the formation of the Climate Change Science Program (CCSP), in order to co-ordinate and direct US research efforts, including the US Global Change Research Programme (USGCRP) and the Climate Change Research Initiative (CCRI), launched by the President in June 2001. The CCSP aims to balance the near-term focus of the CCRI with the breadth of the USGCRP. Some 250 scientists participated in redacting both the Discussion Draft Strategic Plan (November 2002) and the final document, now available since July 2003. A prominent Web link for receiving and displaying comments has been made available (www.climatescience.gov). This plan is based upon the following key scientific issues:

- atmospheric composition,
- climate variability and change,
- water cycle,
- land-use/ land-cover change,
- ecosystems,
- human contributions and responses to environmental change,
- modelling strategy,
- development of decision support resources,
- observing and monitoring the climate system,
- data management and information.

These activities are brought together by integrating climate and global change research, while a communication plan allows to advertise the results. International research and co-operation are also encouraged since "the United States are … a leader in climate change science". US scientists have been part of the MEDIAS network. Such resolution should reinforce exchanges. ◆

## … Russia too remains most reluctant, but Japan approves the Kyoto protocol…

During the UNFCCC COP-7 held in Marrakech, when at last an agreement on the Kyoto Protocol was reached in spite of the US and Australian hostility, significant concessions were made to Japan and Russia. But the latter, signatory on March 11, 1999, is still most reluctant to ratify it.

When President Vladimir Putin opened the World Climate Change Conference held in Moscow from September 29 to October 3, 2003, he mentioned that the problem of climate had not only a scientific but also a practical sense. Russia is a Northern country, so possibly climate change could even be beneficial for it from some point of view. But Russia should also consider the consequences which could lead to disasters such as floods or droughts in some regions. All the negative and perhaps even positive impacts of global climate change should be taken into account on the long run. On the second day of the Conference, Prof. Andrei Illarionov, economic advisor to President Putin, addressed 10 important questions to the Conference. They generated answers from participants involved in the IPCC work, that were presented by Prof. emeritus Bert Bolin, IPCC Chairman. Nevertheless, Mr Illarionov's conclusion was that Russia is not ready yet to ratify the Kyoto Protocol, arguing this statement with scientific uncertainties and some possible economic irrationality.

Therefore, the announcement that the Federation of Russia would not ratify the Kyoto Protocol made by Mr Illarionov during the UNFCCC COP-9 on December 3, came as no surprise. The negative attitude from the USA (that represent 36.1% of $CO_2$ emissions in the world) and from the Federation of Russia (17.1% of same) is liable to bring its coming into force to a standstill, although the Protocol has been ratified by 120 Parties, including Japan that had signed it on April 28, 1998, and has ratified it on June 4, 2002. ◆

## … and draws closer to ASEAN

On December 10, 2003, Japan also signed another international co-operation agreement at the regional level with ASEAN, the "Tokyo Declaration for the dynamic and enduring ASEAN-Japan Partnership in the new millennium".

The Association of Southeast Asian Nations (ASEAN) was created in Bangkok on August 8, 1967. Today, it brings together: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The ASEAN region counts about 500 million people, a total area of 4.5 million square kilometres, a combined gross domestic product of 37 billion US$, and a total trade of 720 billion US$. Its two main commercial partners are the USA and Japan.

The aims and purposes of the ASEAN are to accelerate economic growth, social progress and cultural development in the region and to promote regional peace, stability and development by enhancing social resilience. In 1997, the ASEAN "Vision 2020" called for a Dynamic Development Partnership aimed at reinforcing a closer economic integration within the region and at forging a stable, prosperous and highly competitive ASEAN Economic Region, where goods, services, investments and capital would circulate freely, economic development would be equitable, and poverty and socio-economic disparities would decrease.

In order to implement that agreement, the jointly defined common strategies for action are:

- reinforcing comprehensive economic partnership and monetary and financial co-operation,
- consolidating the foundations for economic development and prosperity,
- strengthening political and security co-operation and partnership,

- facilitating and promoting the exchange of people and the development of human resources,
- enhancing co-operation in culture and public relations,
- deepening East Asia co-operation for an East Asian Community,
- co-operating in addressing global issues. ◆

## European research policy: Britain, France and Germany tell EU: Innovate or stagnate!

Britain, France and Germany issued a joint call on October 7, 2003, for Europe to invest fast in technology if it ever wants to attain its goal of overtaking the United States as the world's most competitive economy by 2010. The three Finance Ministers wrote that the EU must shake up its sclerotic labour and welfare markets to jumpstart a faltering progress towards the 2010 goal, agreed upon at the Lisbon summit three years ago.

In the second semester of 2003, the Italian EU presidency had outlined plans to spend billions of euros on improving and creating transport links throughout the EU in view of enlargement.The heavyweight trio's initiative was presented at the EU Finance Ministers' meeting to be submitted to a summit of Heads of government in Brussels on October 16-17. The Finance Ministers of Denmark, Finland and Sweden demanded that the Lisbon strategy take pride of place.

At the beginning of October 2003, the European Commission published its recommendations to implement the European Initiative for Growth, prompting Commission President Romano Prodi to call for a "clear agreement" on the proposals from EU Heads of state and government. Mr Prodi also pressed for a commitment from the Council and European Parliament to reach decisions on key issues covered by the initiative in early 2004, which represents an integrated approach of policies, delivery mechanisms and institutional arrangements designed to achieve implementation within a tight time period.

The new Irish EU presidency affirmed at the beginning of 2004 that research and innovation were a key priority for Europe. Its objective is to give the proper impetus to raise the R&T investment to 3% of the EU GDP in 2010, to promote fundamental research excellence and to set up an efficient European space policy based upon the "White book" presented hereunder. ◆

## European space policy: the European Union adopts a "White book"

With a view to achieve an ambitious space policy, the European Union has published a "Green book" adopted by the Commission on January 31, 2003. This book has been subject to a wide consultation closed by a Conference held in Paris on June 23-24, 2003, that allowed to start the redaction of a White book. Mr Philippe Busquin, European Research Commissioner, declared: "The European Union is expected to play a growing role in space".

Besides, the European Parliament has adopted by a large majority a report by Mr Guido Bodrato on the European Space Policy, that deplores the difference in public budgets between Europe and the USA in the civilian and military domains. In the USA, official expenses in the space sector account for more than 60% of the world activity in this field, versus 14% in Europe. The report also highlights the fact that Europe worryingly depends on US technologies.

Lastly, the crucial importance attached by the European Union to its space policy is well evidenced by the fact that the Convention in charge of drawing up a draft treaty establishing a European Constitution included space policy (Article III.155).

The White book published by the European Commission on November 11, 2003, and presented to the Competitiveness Council Ministers on November 26, 2003, is organised around three key ideas.

1 – Space applications contribute to the main political objectives of the European Union, which are the following three aims: making Europe the most dynamic society based on knowledge, guaranteeing sustainable development, reinforcing the role of Europe throughout the world and the security of European citizens. The European Union, together with ESA and the national agencies, will pave the way for the systems that Europe still lacks. This is particularly the intention of the two major initiatives, GALILEO and GMES (the latter was the subject of a communication from the European Commission to the European Parliament and Council on February 3, 2004).

2 – Their development relies on the necessary joint strengthening of European independence regarding access to space, scientific excellence through an upturn of its institutional funding[5], technological innovation, and industrial competitiveness within a recovered market dynamics.
3 – The European institutional effort in these fields calls for a new cohesion within an enlarged space policy. The part played by ESA should be reinforced in its excellence domain, as shown by the provisional framework agreement that ESA signed with the EU on November 25, 2003, for a first four-year period. But the European effort should as well be emphasised in the sectors beyond ESA trade. The European Union can bring its own added value, thus completing the part that ESA, EUMETSAT and the national agencies must keep on playing.

The White book should give the European Union the means to realise the ambitions of its space policy. The members of the MEDIAS network already know its applications in the fields of environment and sustainable development. This initiative comes within the strategy for a sustainable development adopted by the European Council in Göteborg in June 2001, and with the European stands claimed during the WSSD held in Johannesburg in 2002. ◆

## Kazakhstan proposes an ambitious project to save the Northern section of the Aral sea

The basin of the Aral Sea is without contest one of the major man-made ecological hotspots all around the world. The MEDIAS network is more and more active in these regions in order to bring its own modest contribution to solve the outstandingly dramatic challenges that the region has to face.

The Aral, once the world's fourth biggest inland sea, declined from a volume of about 1,000 $km^3$ 40 years ago to 110 today. The water level fell within that time from 53 metres to 28. The annual inflow in 1960 was 63-65 $km^3$, but now it is about 1.5. Yet 10 $km^3$ are needed just to keep the sea as it was, let alone to reverse its plight. The mineral content of the water is now up to seven times higher than 40 years ago, with pesticides and fertilisers combining with salt to produce "a sort of salty paste". The shoreline receded by up to 250 km, lea-ving toxic dry deposits. Dusts blown away by the wind cause serious threats to human health. Anaemia, cancers, liver and kidney diseases and children's illnesses are all increasing.

The devastation of the Aral Sea dates from the Soviet era, when huge tracts of central Asia were turned into chemically intensive cotton farming. Poorly efficient irrigation systems still consume huge amounts of water which would once have reached the sea. The Syr Darya, which flows into the Northern section through Kazakhstan, provides almost all the inflow to the entire Aral. The more Southern Amu Darya contributes little more than a trickle.

Kazakhstan and its neighbour Uzbekistan share Aral waters. With Turkmenistan, Kyrgyzstan and Tajikistan, they have formed the International Fund for Saving the Aral Sea (IFAS). Afghanistan has proposed to join IFAS, since 10% of the Amu Darya's flow comes from that country.

In order to try to revitalise part of the shrinking Aral Sea, Kazakhstan has mounted an ambitious plan that involves the building in about four years' time of a massive dam - a concrete structure 12.7 kilometres long - to separate forever the two distinct parts into which the sea has now split. The dam should raise the water level in the Northern section to between 38 and 42 metres, a level not seen for more than a decade. Among others, it would help reviving the Kazakh fishing industry while reducing the ecological catastrophe in Kazakhstan.

The project means the virtual abandonment of any hope of restoring the far bigger Southern section of the sea, which will get scarcely any water. But its catastrophic situation appears irreversible to most of the experts: consequently, the idea of the project is to save what can actually be saved now. ◆

## Changes of responsibilities in organisations related to the MEDIAS network

Institutions remain but personnel change. The MEDIAS network regularly witnesses the departure of women and men who worked closely with it, while fresh enthusiasm is brought by new arrivals. Since the publication of our last Newsletter, several organisations related to our network saw their management change hands.

- Thus the ACMAD, bound with MEDIAS-France by a convention, has a new Director, Mr Abdoulaye Kignaman-Soro succeeding Mr A. Boulaya.
- Mr Chedli Fezzani, Executive Secretary of the OSS, an institution also bound with MEDIAS-France by a convention, is to leave in March 2004. The name of his successor is unknown to this day.
- EUMETSAT witnesses two successions. In June 2003, Mr Peter Ewins replaced Dr Henri Malcorps as Chairman of the EUMETSAT Council. Prof. Tillmann Mohr, Director General, will be substituted by Dr Lars P. Prahm on August 1, 2004.
- Lastly, ESA Director General, Mr Antonio Rodota, was replaced by Mr Jean-Jacques Dordain on July 1, 2003.

MEDIAS-France wishes the newcomers success in their functions. They will provide fresh stimulus for the members of the MEDIAS network, which hopes that the relations it has been developing with the institutions presided over or managed by these leaders will keep on consolidating and extending to new domains. ◆

## Books – French translation of a key book on sustainable development...

Joseph Siglitz' famous book, "Globalization and its discontents", has been translated into French soon after its publication, under the title "La grande désillusion". The author is a former Adviser to the US President Bill Clinton, as well as Chief Economist and Vice-President of the World Bank. He wrote this book to denounce, with evidence to prove it, the troubles that according to him affect the World Bank and the International Monetary Fund (IMF). The IMF, whose decisions are made in camera, is in fact the instrument of Wall Street's powerful bank interests via the US Treasury, and largely eludes US favourite democratic processes. The author vigorously exposes the "Bolsheviks of neo-liberalism" led by a simplistic and dogmatic ideological

vision and catch-all prescriptions, and proposes a neo-Keynesian concept in keeping with the original mission of the IMF. In particular, he analyses causticallly the Asiatic crisis and the failures (with Mafia-like overtones) of the "shock-therapy" transition of the former communist countries to free market economies when there is no suitable institutional framework. He shows how the countries that resisted best are precisely those that deviated from IMF recommendations: Malaysia, South Korea, Poland. He concludes in his postscript (January 2003): "Our system of world governance without world government can work only if based on multilateralism. He also critics the ways IMF makes decisions, sometimes contrary to the US democratic process. Questions in this book are of primary importance for sustainable development. They are part of great interest for the MEDIAS network. ◆

## … two books in French by scientific environmentalists…

Among a great deal of works published on various environmental aspects, we focus on two books of different purposes:

Prof. Monique MAINGUET: "Les pays secs : environnement et développement", Ellipses Publishing, Carrefours Collection[6].

We take the liberty of making up the word "arido-pessimism", to tell precisely what Prof. M. Mainguet's book, as the result of a long experience and a deep maturity, prompts us to refuse. 20% of the world population live in dry regions that highly depend on the environment and naturally chaotic climates. These people are aware of the contradictory requirements of an adapted sustainable development and of environmental conservation. They know their specific handicaps and resources. Nomadic breeders and sedentary farmers have been developing complementary economies for thousands years. They are confronted with what the author calls in her introduction "environmental terrorism". Prof. Mainguet then develops her theses in three volumes:
- contradictory requirements of development: this part raises essential questions regarding the various constraints faced by the populations involved, and presents the specific assets, handicaps and risks of the environments where they live,
- competing land occupations for these civilisations of survival: the author shows that, although water resources are currently the focus of our concerns, the exhaustion of soil resources and of the biosphere are more worrying,
- oases: these classic examples are severely threatened by "modern" development and may witness an alternative development, according to the author.

Cautiously rejecting pessimistic and globalising approaches, Prof. Mainguet highlights the assets to be preserved for a new development: deep rooting of men to land, respect for the various situations and for the structuring values of the past, strong family ties and consistent social network, increasingly diversified activities and incomes. The author quotes Gliese's masterly sentence: "People are part of the solution, not part of the problem", and herself opens beautifully her second book with the words: "The African or Asian peasant is a researcher in his field". Here is a lesson of optimism carefully thought out, that is bound to motivate the reflection and action of the members of the MEDIAS network within one of its priority topics.

Prof. Annie VALLET: "Economie de l'Environnement[7]", Seuil Publishing, Points Collection, Economie (E53) Series.

The environment is one of the mainstays of sustainable development. It conditions the survival of the richest as the poorest nations, which implies resolute strategic and political choices. Economics must therefore take it into account, just like other key factors, within a rational and consistent approach. The book written by Prof. Vallet has the virtue of showing how such an integration can be achieved within the scope of usual economic concepts. It is based on the theory of external effects and public property and leads to a cost-benefit analysis of the regulations included in the Kyoto Protocol. This clear book is within the reach of everyone. It certainly is worth reading by the French-speaking members of the MEDIAS network who wish to better understand how to integrate rationally the environment into their decision processes. ◆

## …and two books in English derived from the RICAMARE project (see Newsletters n° 12 &13)

The four workshops of the RICAMARE project have generated four documents: the synthesis on biodiversity is available through the MEDIAS-France Web site (http://medias.obs.mip/ricamare/), and MEDIAS Newsletters n° 13 and 13bis were devoted to the conclusions of the workshop on land cover. The other two workshops form the subject of two books available on sale.

Prof. Hans Jürgen BOLLE, Editor: "Mediterranean Climate - Variability and Trends", Springer Publishing, "Regional Climate Studies" Series, 372 pp.

This book stems from the "Assessment, assimilation and validation of data for global change-related research in the Mediterranean area" RICAMARE workshop organised in Casablanca in February 2001, invited by the Moroccan Meteorology and supported by the ENRICH and INCO European programmes, START and CNES. The "Development of priority climate indices for Africa: a CCI/CLIVAR workshop of the World Meteorological Organisation and the World Climate Research Programme" workshop was held in parallel and was arranged by WMO and the "CCI/CLIVAR Working Group on Climate Change Detection". This book including an introduction and six chapters (overview; challenges for data analysis; large scale aspects; regional aspects; variability; co-operative research) takes up the essentials of the communications presented during the RICAMARE workshop, as well as some contributions from the second one.

Profs. Carlo GIUPPONI & Mordechai SHECHTER, Editors: "Climate Change in the Mediterranean: Socio-economic Perspectives of Impacts, Vulnerability and Adaptation", by Northampton, MA: Edward Elgar Publishing, 352 pp.

This book is derived from two workshops: the "Impacts of climate change on the Mediterranean area: regional scenarios and vulnerability assessments"

workshop, organised in Venice in December 1999 by the FEEM and the Venetian Institute for Arts and Sciences, and the "Socio-economic assessments of climate change in the Mediterranean: Impacts, adaptation and mitigation co-benefits" workshop organised in Milan in February 2001, invited by the FEEM[8] and backed up by the ENRICH and INCO European programmes, START and the FEEM. This book comprising an introduction and four chapters (impacts; vulnerability and adaptation; water resources; land uses; coastal areas) includes the essentials of the presentations of both workshops.

Books that deal with these aspects of the Mediterranean region are quite rare, hence the significant contribution brought by the MEDIAS network to the scientific understanding of this area. As written by Pr. Carlo Carraro in the preface of the second book: "The co-operation between the RICAMARE network and the FEEM has been very fruitful". And to pick up the idea expressed by Prof. Lacaux in the introduction of the current Newsletter, it is an original service provided to its requesting parties. The French physicist and the Italian socio-economist invite us to carry on our efforts to serve the scientific community in charge of global change, environment and sustainable development. ◆

[1] 1 Dobson unit = $2.69 \times 10^{20}$ molecules/m².

[2] A quarter of the farming population in Africa is likely to die from this scourge according to the FAO, while a better nutrition would allow them to resist.

[3] I.e. 26 millions more than in the mid-90', whereas the first World Food Summit of 1996 had set as a target to have this figure decreased by half in 2015.

[4] See hereafter the report on the book written by Pr. Mainguet.

[5] Aeronautics and space are granted a budget of 1.075 billion euros for the period 2002-2006, within the 6th Research Framework Programme of the European Union. The White Book outlines three scenarios of budget trends at the European scale.

[6] Dry countries – environment and development.

[7] Economics of the Environment.

[8] See a presentation of the Pr. Eni Enrico Mattei Foundation in Newsletter n° 13.

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