

**Report to UNFCCC  
from the  
European Commission  
on Community actions regarding  
global climate observing systems**

**A. General approach to systematic observation**

Although there is currently no overall European Union approach to climate observation systems, various elements under the Community Research or Environment policies already contribute to the development of global observation systems.

The Environment and Sustainable Development Programme of the 5<sup>th</sup> Framework Programme for Research, Technological Development and Demonstration (1998-2002)<sup>1</sup> includes a research item on the “European component of the global observing systems” the aim of which is to identify and help to fill key gaps in capacity of existing observation systems (climate, terrestrial and oceans) to ensure that data sets are collected in a co-ordinated manner and with a long term perspective. It also includes a research item on Earth observation generic technologies. The aim of this activity is notably to extend the European capacity in earth observation technologies to monitor, understand and protect our environment through developing new methodologies to retrieve bio-geophysical parameters from space data and demonstrate new pre-operational services in the priority fields like international conventions or environmental indicators.

It is planned that these activities will be followed up under the 6<sup>th</sup> FP<sup>2</sup> towards Integrating and strengthening the European Research Area. One research area will concern Global climate change observing systems, the objective being to make systematic observations of climate parameters so as to strengthen climate change research, consolidate long-term observations for the modelling and forecasting of the marine, terrestrial and atmospheric environment, establish common European data bases and contribute to international programmes.

Furthermore the European Commission together with the European Space Agency have launched a joint initiative to prepare the establishment by 2008 of a European capacity for global monitoring of environment and security (GMES)<sup>3</sup>. GMES will develop around three strands of action:

- the supply of policy relevant information and services to users;

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<sup>1</sup> OJ N°

<sup>2</sup> OJ N°

<sup>3</sup> European Commission. A sustainable Europe for a better world: A European Union strategy for sustainable development. COM(2001)264 final.

- the permanent improvement of the efficiency of the production and delivery of information, and the animation of a permanent dialogue between data gatherers, information producers and information users;
- the development of coherent networks of monitoring infrastructures and the improvement of related knowledge and models.

Over the past 10-15 years significant progress has been achieved in relation to the consistency of data collection and observation systems on environment between the 15 Member States of the European Union. Many texts of the legislation of the European Union on environment require Member States to report on e.g. on water quality, on air quality, on air emissions, etc. Furthermore, the European Information and Observation Network on Environment (EIONET) and the European Environment Agency<sup>4</sup> are in charge of improving the conditions for the provision of harmonised environmental data at the European level. Much progress indeed is still necessary to ensure comparability of data and information between countries and over time<sup>5</sup> and to facilitate routine reporting to UNFCCC and international data centres.

## **B. Meteorological and atmospheric observation**

The main contribution of the European Union in this area relates to the GAW Regional Network as well as to questions of data analysis, data quality, databases and archiving programmes. (There are currently no direct contributions to the GCOS Surface Network (GSN) and the GCOS Upper Air Network (GUAN)).

- **Global Atmosphere Watch (GAW)**

The Joint Research Centre of the EU is the GAW World Data Centre on aerosols Regional Stations. It collects, processes, analyses and distributes the data obtained from the GAW stations. The operation of the Ozone Mapping Centre of WMO at Thessaloniki (GR) has been supported through research projects of the European Union. The Centre uses data from GAW stations.

- **Regional Background Stations**

Many of the GAW European stations are a subset of the EU air quality exchange of information network<sup>6</sup> In addition over 1100 monitoring stations, of which some 250 are in rural areas, report ozone levels and exceedances<sup>7</sup>.

- **EU contributions to data analysis, data quality, archiving programmes**

- The ERA-40 project objectives are: i) to create and maintain an archive of global meteorological and oceanographic in situ and satellite observations

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<sup>4</sup> OJ N°

<sup>5</sup> European Environment Agency. Environment in the European Union at the turn of the century. ISBN 92-9157-202-0

<sup>6</sup> Council Decision 97/101/EC of 27 January 1997 establishing a reciprocal exchange of information and data collected from networks and individual stations measuring ambient air pollution within the Member States

<sup>7</sup> Directive 92/72/EEC on air pollution by ozone.

from 1957-2001; ii) to perform validations; iii) to generate assessments on the quality of observing systems.

- A global oceanic climatic database for the 1750-1850 period will be prepared based on vessels log books (CLIWOC project).
- The objective of the QUILT project is i) to create and make available a homogeneous, quality controlled data set out of the existing NO<sub>2</sub>, BrO and OCIO data; ii) to work with these to validate models of seasonal variation and trends of O<sub>3</sub> and related species.
- A number of EU research projects supported the world-wide Network for the Detection of Stratospheric Change (NDSC). These projects were part of the Third European Stratospheric Experiment on Ozone (THESEO) Data archiving is taking place at NILU in Norway.
- Automated data processing techniques for the retrieval of integrated water vapour data from the Global Positioning System have been designed (MAGIC project) and regional GPS networks for water vapour retrievals have been demonstrated for near real-time operations (WAVEFRONT).

### **C. Oceanographic observations**

A number of EU funded projects contribute to different aspects of the improvement of oceanic observation, amongst which are:

- **facilitating and fostering co-operation between countries**
  - A Mediterranean network will be set up to help identify gaps in the present capacity for monitoring, modelling and forecasting in the Mediterranean. The project will also foster improvements and capacity building in the region. The MAMA project constitutes an important component of MedGOOS, the ocean observation system for the Mediterranean.
- **data quality, data standards and interfaces**
  - SEANET-DI is implementing a data interface in order to integrate different monitoring networks to allow the creation of one North Sea monitoring system.
  - SEA-SEARCH, MEDAR/MEDATLAS and other similar projects are working to establish common schemes, standards and protocols for archiving and accessing oceanographic data.
  - Both real-time and a seven year archive of TOPEX-POSEIDON and ERS altimetry data have been processed by the DUACS project to generate long time-series of satellite altimetry data adapted for use in climate models. The following files are available on CD-ROMs for general publication: corrected sea surface heights (CORSSH), along track sea level anomalies (SLA) and maps of SLA and associated errors (MSLA).
- **preparation and implementation of observation infrastructures**
  - The EDIOS project will deliver a European Directory core of ocean-observing sites and devices (location, characteristics, frequency and type

of observations, owner). Such meta-information is essential to progress towards a European ocean observing system. This project will provide an important foundation towards the implementation of EuroGOOS, the European contribution to the Global Ocean Observing System (GOOS)

- The focus of the ESODAE project is the exchange between institutes of data, models and data assimilation schemes. The overall goal of the project is to design an experiment to provide a practical demonstration of the overall capabilities of ocean analysis/ assimilation and forecasting models for the North West European shelf.
- The purpose of the ANIMATE project is to improve the eastern North Atlantic European observing infrastructure for CO<sub>2</sub> and carbon cycle measurements.
- The GAVDOS project will establish a sea level calibration facility, produce a regional geoid and sea surface topography model.
- The GYROSCOPE project will prepare a European component of a global in-situ observation system of ocean variability by testing a pilot array of 80 autonomous profiling floats (temperature, salinity, velocity).

#### **D. Terrestrial observations**

- **Contributions to FLUXNET**

- In the framework of EUROFLUX, fluxes of carbon dioxide, water vapour, and energy exchange have been measured at 13 forest sites encompassing the entire range in European climate, species distribution, and site conditions. The selected sites are representative of the regional features of the European basin.
- The CarboEurope Cluster brings together six projects designed to better understand, quantify and predict under current and future scenarios the carbon balance of Europe, from local ecosystem to regional and continental scale. Two of these projects, CARBOEUROFLUX and CARBODATA are of direct relevance to terrestrial observing systems.
- CARBOEUROFLUX. At 30 study sites representative of European ecosystems, carbon, energy and water exchanges will be investigated together with ecological processes controlling the ecosystem biospheric exchanges. The net flux of carbon entering or leaving the ecosystem will be measured, to provide the annual estimate of Net Ecosystem Exchange.
- CARBODATA. This project is designed to exploit and to make widely available the results of the mentioned EU funded research projects which have produced data on C fluxes and C stocks in European ecosystems.

- **Other EU relevant monitoring activities**

- Land Cover change. The Land Cover situation has been mapped for over 30 European countries under the programme of the European Environment Agency. (digital maps; scale 1/100.000; 42 land cover classes; reference years: end 80's early 90's). An update for the year 2000 is in progress.

- Fire distribution. The characteristics and location of forest fires of the Mediterranean countries of the European Union have been assembled into a database from which yearly analysis reports are produced<sup>8</sup>.
- The condition of forest ecosystems in Europe have been monitored at 840 stations in 30 countries<sup>9</sup> since 1994 (crown and foliar conditions, soil conditions, atmospheric deposition and soil solution chemistry, meteorological parameters).

## **E. Space based observation programmes**

- **Participation in space based observation programmes and programme using space data for climate information**

- The European Commission participates in the Integrated Global Observing Strategy (IGOS) through its partnership to the Committee on Earth Observation Satellites (CEOS). It has played a leading role in the activities initiated by the CEOS working groups in the fields of space data calibration/validation and space-based information systems and services
- Over the last three years the Joint Research Centre of the EU has established the World Fire Web (WFW<sup>10</sup>). This is a global network of 19 partners managing 22 space data receiving stations to collectively provide daily observations of global active fire distribution. These are used by the chemical transport modelling and land cover change modelling communities. This data is made publicly available via the Internet and the WFW a major contribution to the Global Observations of Forest Cover programme, a panel of the Global Terrestrial Observing System.

- **Contributions to missions, instruments, data management, applications**

- The European Commission contributed significantly to the development of the VEGETATION instrument onboard SPOT4, successfully launched in March 1998. Support was also given to ensure the improvement and the continuity of the VEGETATION mission through improving the products and services to the users and designing and developing technological improvements for the VEGETATION 2 payload to be flown onboard SPOT5 in 2002. VEGETATION provides accurate, daily, global measurements of basic characteristics of vegetation canopies on an operational basis.
- Twelve different feasibility studies (phase A studies) for new satellite missions have been supported to stimulate the development of new Earth observation space systems in the future. These studies had in common the identification of user requirements, the identification of the potential Earth observation technologies and the definition of the instruments, mission

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<sup>8</sup> Commission Regulation (EC) No 804/94 of 11 April 1994 laying down certain detailed rules for the application of Council Regulation (EEC) No 2158/92 as regards forest-fire information systems

<sup>9</sup> European Commission and UN/ECE. Intensive Monitoring of forest ecosystems in Europe. Technical report 2000. ISSN 1020-6078

<sup>10</sup> <http://www.gvm.sai.jrc.it/fire/wfw/wfw.htm>

characteristics and ground structure. These new mission studies mainly focussed on cloud and radiation (CLOUDS, REFIR), fire detection (FUEGO), surface temperature (MUST), Ozone (OASE), agriculture (SAAGE, SAFE) sea ice (OSIMS). Some of them have been proposed as ESA Earth Explorer or Earth Watch candidates; others have been adapted and proposed to complement NASDA or NASA missions or target a demonstration onboard the International Space Station (ISS).

- In October 1999 the Joint Research Centre of the EU began the Global Land Cover and Global Burnt Area 2000 projects. Daily global observations from the VEGETATION instrument throughout 2000 have been collected and distributed to a network of 34 partners. Through JRC co-ordination the partnership will establish a new consistent global land cover map at a scale of 1/1.000.000 for 2000 and a complementary map of burnt areas. The new maps will support biological process models for carbon studies. Target data for completion is March 2002.
- In February 2001 the Joint Research Centre of the EU completed a four year study of deforestation rates and patterns for the entire humid Tropics using a mixture of generalised global mapping and statistical sampling from high resolution satellite imagery. The resulting maps and statistics complement those of other exercises such as the FAO's Forest Resource Assessment
- In partnership with NASDA and NASA the Joint Research Centre of the EU has completed the Global Rain Forest Mapping Project. This major data management and processing exercise has resulted in creation of a set of CD ROM's (freely available to the science community) containing multi date mosaics of Radar imagery providing detail down to 100 metres for South America, Central Africa and S.E. Asia. A similar exercise is currently underway to build a circumpolar dataset, the Global Boreal Forest Mapping Project<sup>11</sup>.

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<sup>11</sup> <http://southport.jpl.nasa.gov/GRFM/>