



## **SUBMISSION BY POLAND AND THE EUROPEAN COMMISSION ON BEHALF OF THE EUROPEAN UNION AND ITS MEMBER STATES**

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**Warsaw, 26<sup>th</sup> September 2011**

**Subject: Financial Mechanism of the Convention**

**Submission on support provided to developing country Parties and activities undertaken to strengthen existing and, where needed, establish national and regional systematic observation and monitoring networks**

### **1. Introduction and General Comments**

1. The SBI, at its 34<sup>th</sup> session, invited Parties to submit to the secretariat, by 19 September 2011, information on support provided to developing country Parties and activities undertaken to strengthen existing and, where needed, establish national and regional systematic observation and monitoring networks for compilation in a miscellaneous document for consideration by the SBI at its thirty-fifth session. (FCCC/SBI/2011/L.17, §8)
2. The EU notes that systematic observation can unfold its full potential only if there are capabilities to manage the observed data i.e. exchange at national and international level, including tools for archiving and analyzing the data.

### **2. Summary**

In the Annex to this submission examples on how EU member states and the European Commission provide support to strengthen systematic observation in developing countries are provided. This collection of examples is not an exhaustive and complete listing of all relevant activities. It is not therefore possible to provide an overall estimate of the financial support given to developing countries on systematic observations at this time. Nevertheless, some general conclusions can be drawn:

- The EU member states and the European Commission provide considerable support to developing countries in order to strengthen and maintain observation networks for climate including data management aspects;
- This support, in many cases, has elements that contribute to implementing actions included in the GCOS Implementation Plan<sup>1</sup>;
- The dimension of support depends on the situation and context of the individual donor countries and may be a part of a wider programme of support;
- Adequate longer-term support would help better address improvements of observing systems for climate, as identified in the GCOS Implementation Plan.
- A reporting mechanism within the evolving reporting system on financial support rendered under UNFCCC could improve the identification of financial resources allocated for this purpose at national, regional and international levels.

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<sup>1</sup> Update of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC. A summary of this updated plan is contained in document FCCC/SBSTA/2010/MISC.9. The full report is available at <<http://unfccc.int/items/3462.php>>.



## ANNEX

Some examples of recent and ongoing activities are listed below.

### 1. Examples from EU

Members of the EU, that are also members of the World Meteorological Organization (WMO) annually report, within the Voluntary Cooperation Programme (VCP) of WMO, on their activities in support of National Meteorological and Hydrological Services (NMHSs). Information on support provided in 2010 and previous years can be found on the Internet<sup>2</sup>.

#### 1.1 Contributions from the European Commission

The European Commission through its various programmes co-funds many projects related and/ or including elements to improve capabilities to observing the climate system in developing countries. In the following two examples of ongoing projects are given.

##### DevCoCast

Many developing countries are exposed to serious environmental risks and their need for adequate, environmental information is high. Unfortunately, reliable and continuous access to this information is often lacking. The GEONETCast concept overcomes existing data delivery limitations and provides this much needed operational and fast access. The "GEONETCast for and by Developing Countries" (DevCoCast) project brings together many disparate sources of environmental, added-value datasets (both in situ and satellite based) in Africa, South-America and Europe and disseminates these datasets in (near) real time and at low cost via GEONETCast, servicing a broad range of user communities. It thus improves the involvement of Developing Countries in the GEONETCast component of the global GEO System of Systems (GEOSS).

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<sup>2</sup> Information on 2010 activities:

<http://www.wmo.int/pages/prog/dra/vcp/documents/Doc.32011ReportedBilateralTCOActivitiesin2010.pdf>

Information for previous years' activities:

<http://www.wmo.int/pages/prog/dra/vcp/eventsandmeetings.php>



To accomplish this, DevCoCast builds upon existing production (e.g. SPOT-VGT), research projects and partnerships (e.g. GEOLAND, VGT4AFRICA, GOOS-Africa, YEOS) and it utilises and expands the existing EUMETCast dissemination infrastructure, one of the 3 cornerstones of GEONETCast. The main project objectives are to put the provided datasets to actual use, and building-maintaining capacity in Developing Countries through training workshops, networking and outreach. The relevant information, partly produced in the Developing Countries and disseminated through GEONETCast, is thus embedded in a systematic manner into reporting systems in support of research, planning and decision making processes. This will enable authorities in Developing Countries in fulfilling their increasing monitoring and reporting obligations and help them to better manage their natural resources through their sustainable development policies.

The start date of this project was 01/05/2008, and duration 36 month. The total project costs are 2.14 million euro. The EU co-financing: 1.85 million euro.

Project website: <http://www.devcocast.eu>

### **CEOP-AEGIS**

The goal of the CEOP – AEGIS project is two-fold: a) to construct out of existing ground measurements and current/ future satellites an observing system to determine and monitor the water yield of the Tibetan Plateau; b) to monitor the evolution of snow, vegetation cover, surface wetness and surface fluxes and analyse the linkage with convective activity, (extreme) precipitation events and the Asian Monsoon. Three main elements are foreseen. A)

Observations of the terms of the water balance: precipitation, melt-water from snow and glaciers, changes in soil water content and evaporation for a period of three years will be generated by integrating ground and satellite measurements on weekly and monthly basis. Radiative transfer models and algorithms are being developed for different regions of the electro-magnetic spectrum. B) The water balance of the Plateau will be calculated with a distributed hydrological model. Interactions of land surface hydrology with convective activity and the Asian Monsoon will be investigated by using a meso-scale atmospheric model. C) Time-series of image data are being used to demonstrate a Drought and a Flood Early Warning Systems. The system relies on an existing and expanding network of observatories and on space-borne observing systems for which data continuity is guaranteed. A Database Management System will be put in place in Lhasa.

The start date of this project was 01/05/2008, and duration 48 months. The total project costs are 4.46 M€. The EU co-financing: 3.4 M€.

Project website: <http://www.ceop-aegis.org/>

Furthermore, there are two more earth observation projects with focus and/or participation of developing countries, which will start in autumn 2011:

- GEOCARBON (Operational Global Carbon Observing System)
  - Start date: 01/10/2011
  - Duration: 36 month
  - Project Funding (EU co-financing): 6.65 M€

The GEOCARBON project aims at designing a Global Carbon Observation and Analysis System, addressing the climate targets of the Group on Earth Observations (GEO) toward building a Global Earth Observation System of Systems (GEOSS) for carbon.

Specific objectives of the GEOCARBON project are:

- Provide an aggregated set of harmonized global carbon data information (integrating the land, ocean, atmosphere and human dimension)
  - Develop improved Carbon Cycle Data Assimilation Systems (CCDAS)
  - Define the specifications for an operational Global Carbon Observing System
  - Provide improved regional carbon budgets of Amazon and Central Africa
  - Provide comprehensive and synthetic information on the annual sources and sinks of CO<sub>2</sub> for the globe and for large ocean and land regions
  - Improve the assessment of global CH<sub>4</sub> sources and sinks and develop the CH<sub>4</sub> observing system component
  - Provide an economic assessment of the value of an enhanced Global Carbon Observing System
  - Strengthen the effectiveness of the European (and global) Carbon Community participation in the GEO system
- AGRICAB (A framework for enhancing EO capacity for Agriculture and Forest Management in Africa as a contribution to GEOSS)
    - Start date: 01/10/2011
    - Duration: 42 months
    - Project Funding: 3.5 M€

AGRICAB aims to strengthen Earth Observation (EO) capacities in Africa by building on the open data sharing through GEONETCast, connecting the available satellite and other data with predictive models in order to facilitate integration in agriculture and forestry planning and management processes. Dedicated national applications in various African countries are designed to address particular policy issues related to livestock, crop systems and forest management. Through these applications, “twinning partnerships” are developed between a European and an African partner, to maximize knowledge transfer and integration. Experiences learned will form a good basis for regional trainings to the member states of the Observatoire du Sahara et du Sahel (OSS) in Tunisia, the Regional Centre for Mapping Resources for Development (RCMRD) in Kenya and the AGRHYMET regional centre in Niger, covering almost the entire African continent. These activities will be linked with Africa-wide management and research initiatives and programmes on Forest and Agriculture and builds on experiences from the GEONETCast for and by Developing Countries (DevCoCast) and Global Monitoring for Food Security (GMFS) projects.



## 1.2 Contributions from Austria

### Austrian Development Aid (ADA)

ADA has developed with the UNDP Regional Centre in Bangkok a project to address “Reducing Climate Change-induced Risks and Vulnerabilities from Glacial Lake Outburst Floods” The objective of this project is the reduction of climate change-induced Glacial Lake Outburst Flooding (GLOF) risk in the Punakha-Wangdi and Chamkhar Valleys in Bhutan. The project encompasses the national, district, and local levels using a three-pronged approach:

First, it aims to build capacity for disaster risk management at the national, regional, and local levels, with a focus on the skills and knowledge to integrate climate change risks. This will enhance adaptive capacity, enabling the key institutions and their partners to take actions that reduce the risks to communities of future climate change impacts.

The second component of the proposed project mitigates the GLOF risk from a specific lake and strengthens the technical expertise needed to reduce Bhutan's risks from future climate change-induced GLOFs.

The third component includes an early warning system for GLOF risks in Punakha Eangdi Valley and builds capacity for community based disaster preparedness and other climate risks that vulnerable people face.

The knowledge and skills gained through this project will be shared within Bhutan and regionally and the overall financial support provided from 2008 to 2012 amounts to 600.000€.

### Other support

As part of UN Spider and in cooperation with UNOOSA, Austria is supporting Technical Advisory Missions to developing countries (e.g. in 2009: 2 in the Caribbean and 2 in the Pacific) and participation as well as support of participants in two regional workshops on GIS and disaster management. Focus of the technical advisory missions as well as of the conference participation are on the access and use of space-based solutions for disaster management and emergency response in small island developing states. The financial flows in 2009 and 2010 amounted to almost 50.000 €.

## 1.3

## Contributions from Belgium

### UNESCO-WATCH

Development of an Operational Remote sensing Monitoring System of the UNESCO World Heritage Natural Sites in tropical forest environment

- Promoters: Pierre Defourny (UCLouvain), Mario Hernandez (UNESCO)
- Budget: 229 603 €
- Objective: Currently, only approximately 15% of the 689 World Heritage sites can be examined during one session of the World Heritage Committee regarding the state of conservation and status of endangered sites. The UNESCO and the World Heritage Center must thus develop a method to monitor at the long term 100% of the sites in such a way that the World Heritage Committee session could concentrate only on those sites which present particular issues, problems or threat. Similarly, the regular production of thematic maps (forest map, land cover change map, change rate estimate) can improve the information flow and communication amongst site managers and conservation authorities. The overall goal of this project is to assist UNESCO Member States with an overall assessment about the conservation of UNESCO World Heritage tropical forest sites using land cover change detection by Earth observation. The scientific objective is to establish non site specific methodology and processing chain to detect forest and other land cover changes on regular basis as a support to the Periodic reporting exercise.

### VEGECLIM

Integrating SPOT-VEGETATION 10-yr Time Series and Land-Surface Modelling to Forecast the Terrestrial Carbon Dynamics in a Changing Climate

- Promoters: Pierre Defourny (UCLouvain), Kathy Steppe (UGent), Philippe Peylin (LSCE)
- Budget : 637.689 €
- Objective: Vegetation is a major carbon sink and is as such a key component of the international response to climate change, caused by the build-up of greenhouse gases in the atmosphere. However, anthropogenic disturbances like deforestation or fires are the primary mechanism that changes ecosystems from carbon sinks to sources, and are hardly included in the current carbon modelling approaches. Moreover, in tropical regions, the seasonal/interannual variability of carbon fluxes is still uncertain. In the context of climate change and mitigation policies like REDD, it is particularly important to be able to quantify and forecast the vegetation dynamics and carbon fluxes. In this purpose, the overall objectives of this research is to dynamically assimilate the land surface characterisation obtained from long SPOT-VEGETATION time series (e.g. plant functional type (PFT), phenology, Leaf Area Index (LAI), land cover change) into the ORCHIDEE global vegetation model, which simulate vegetation dynamics and carbon balance, in order to improve the forecast of the terrestrial Carbon cycle in tropical regions under different anthropogenic forcings. Such approach will allow us to



determine whether the African terrestrial carbon balance will remain a net sink or could become a carbon source by the end of the century, according to different climate-change and deforestation scenarios. The challenge of this research is to bridge the gap between the land cover and the land surface model communities.

## **SPOT-VEGETATION AND PROBA-V**

Since 1998, Belgium has been hosting at VITO in Mol the Processing Archiving and Distribution Facility of SPOT VEGETATION (CTIV), the only European instrument to provide daily information on the vegetative cover of the entire terrestrial surface. Monitoring the status of the Earth's vegetation cover in a timely and accurate way is of utmost importance as it is linked to the production of food, biofuels and other terrestrial natural resources, to storage of CO<sub>2</sub>, to biodiversity and nature conservation and because changes in land cover are an indicator of climate change.

The SPOT VEGETATION instrument is likely to cease operation in 2013, yielding an archive of 15-years of data on the status of the terrestrial surface.

In order to avoid a gap in data continuity, Belgium, in the frame of its participation in ESA is now building a gap-filling mission for monitoring of global vegetation under the name of PROBA-V (for Vegetation), which will be launched in 2012 Q4.

### **1.4 Contributions from the Denmark**

The Danish Meteorological Institute (DMI) has established a twinning project with the Zambia Meteorological Department (ZMD) with the goal of enhancing ZMD's capability in the fields of climate variability and change in Zambia. This is achieved by enhancing ZMD's capacity in climate monitoring and climate modelling as well as in the dissemination of weather and climate products. By this, ZMD will be better prepared for providing weather- and climate-related information and services to the public as well as to various kinds of stakeholders, both governmental and non-governmental ones. Capacity building is an essential part of these activities. Hence, training and education of ZMD's staff both from the central office and from the regional offices are included in all these activities. The project runs from November 2009 to December 2012, and has a budget of 70 k€.



From 1997 to 2004 DMI participated in a development project together with the meteorological institute of Ghana (Meteorological Services Department - MSD). The purpose of the project included re-establishing a network of meteorological stations in the country, thereby ensuring collection of data. At the same time, it was to improve communication and use of the collected data. The project was completed in 2004. At the end of the project, MSD had an efficient network of around 300 observation stations registering the usual meteorological parameters.

### **1.5 Contributions from the Finland**

In 2010, the total sum of all Finnish Meteorological Institute (FMI) projects funded by the Ministry for Foreign Affairs of Finland (MFA) was €1,501,804 (i.e. US\$1,973,701). In addition, two EU Twinning projects in Croatia and the FYR Macedonia in the field of air quality were implemented during 2010 with total value of €276 237. MFA is also funding a JPO position at the WMO Resource Mobilisation Office for two years from June 2010.

#### **Plans for 2011**

Total MFA funding for 2011 to FMI managed projects in the field of meteorology is estimated at €1,185,000. The total funding allocations from MFA for 2009-2012 is €3,430,000. In addition to these projects, the government of Finland is supporting several other climate change and adaptation funds, NGOs and mechanisms.

#### **Expert Services**

##### *Pacific Island Countries*

A two-year project with SPREP on the Pacific Island Countries Aviation Weather Service Quality Management System (QMS) implementation will end in April 2011. The 2010 status of QMS implementation is as follows: Fiji and PNG have completed QMS implementation, have most documents done and have plans for certification; Cook Islands, Niue, Samoa, Solomon Islands, Tonga and Vanuatu have started implementation and have some documentation ready; Kiribati and Tuvalu have not started on the QMS work (only performing observations).

##### *Peru*

A 2.5-year project ending 2011 has been running to support the capacity building of the Peruvian NMHS (SENAMHI). The capacity building activities focus on automatic weather observations, climate change research, and NWP in Peru and support sustainable development of these functions at SENAMHI.



### *SADC Countries (Southern Africa)*

A project office located at the South African Weather Service (SAWS) in Pretoria was setup in January 2010 and carried out project activities to the 14 SADC member countries. The activities of the project included workshops in aviation weather QMS implementation, TDCF implementation, climate change, remote sensing and strategic planning and in-country assessments of critical development needs for all countries. The project was successfully completed in 2010. The project produced a regional development project plan in close cooperation with the Meteorological Association of Southern Africa (MASA) and submitted it for approval to the MFA in November. The MFA has approved a financing of 8 M€ for the project over four years starting in 2012 with major components in lightning detection and AWS networks and capacity building.

### *Viet Nam*

A two-year, project with the NHMS of Viet Nam was signed in April and launched in May 2010. The project will focus on supporting the use of weather radar products through product development and capacity building, AWS network planning, maintenance and calibration and strategic planning.

### *Caribbean*

The MFA is financing four projects in the Caribbean region:

- SHOCS: multi-hazard early warning system and QMS capacity building two-year project with the Caribbean SIDS and ACS & WMO, launched in June 2010. It includes a feasibility study on MHEWS and workshops on DRR and QMS implementation for aviation weather services.
- Jamaica: weather production system upgrade and capacity building at the Jamaica NMHS. One-year project was launched in June 2010.
- Trinidad & Tobago: weather production system upgrade and capacity building at the Trinidad & Tobago NMHS. One-year project was launched in June 2010.
- Barbados: CIMH regional instrument calibration centre modernisation and capacity building, signed in November 2010. The two-year project will focus on improving the sustainability of the CIMH RIC by developing SOPs, training new staff and purchasing some equipment.

### *Nepal*

The FMI has started a 2.5-year project with the Department of Hydrology and Meteorology of Nepal (DHM) in February 2010. This MFA funded project will focus on building the capacity of DHM in weather observations and remote sensing as well as adaptation to climate change.

### *India*

MFA funds a research-oriented project between Finland and India on the research of air pollution and air quality in India. The project is managed by the FMI and involves the research teams on aerosols and air pollution. The project has been granted continuation until 2012. A supplementary EU project also led by the FMI addresses some of the same issues in India.

## 1.6 Contributions from Germany

Germany, like many other WMO members, annually reports on its contributions to the WMO Voluntary Cooperation Programme (VCP). In these reports activities from various ministries, institutes and agencies are included which are considered to be in support of National Meteorological and Hydrological Services (NMHSs) in developing countries.

In 2010, Germany's total contribution to the VCP was about US\$ 5.3 million, consisting of about US\$ 4.3 million for bilateral arrangements and about US\$ 1 million for training and fellowships (Country Statement Germany, April 2011, Informal Planning Meeting on the WMO Voluntary Co-operation Programme and related Technical Co-operation Programmes). Out of this US\$ 290,000 can be considered directly support to observing systems for climate in developing countries. Another US\$ 3.9 million was provided for projects that support observing systems for climate and included data management and, in some cases, related information and/ or warning systems activities. In addition almost US\$ 800,000 had been spent for projects/ activities which indirectly support observing systems for climate in developing countries.

Activities include installation of 3 automated hydrometeorological monitoring stations in Kyrgyzstan (US\$ 270,000), implementation of a simple flood warning system in Mozambique (US\$ 180,000), support to the Mekong River Commission to set up an early warning system for floods including related information and data management (US\$ 1.4 million), support to the *Commission Internationale du Bassin Congo-Oubangui-sanga* to set up an information system including data exchange for hydrometeorological data (US\$ 2.3 Million), and support to the GCOS Surface Network station Arragats in Armenia (US\$ 28,500).

On-going activities include:

- A project to establish a database to manage climate adaptation information in Indonesia is presently being detailed (US\$ 3 million for 11/2010 to 11/2013).
- A project component on adaptation to climate change in the water sector in Uganda provides support by installing hydrometeorological observation stations and facilitating exchange between hydrometeorological services in East Africa.
- A project in Peru supported national and regional authorities to analyse meteorological data from weather stations and thereby helped to identify more suitable local adaptation and risk management strategies.
- In the Pacific region a project supports setting up climate data bases in three countries.

## 1.7

## **Contributions from The Netherlands**

A joint project of the National Meteorological Services of Indonesia (BMKG) and The Netherlands (KNMI) aims to digitize and make available for research, historical climate data from the Indonesian region. The project, called DiDah, runs from 2009 to 2011 with a budget of 300k€. It will not only produce newly digitized historical climate data but BMKG will also archive and process the data and produce climate information e.g. on trends, patterns and extreme weather events. BMKG will adopt state of the art database techniques and climatological methods and tools that were developed at KNMI to establish a web-based climate (change) information system for the Indonesian region. To realize this, BMKG specialists work at KNMI for several months during 2010 and 2011. At an international climatological workshop held in Jakarta in December 2009 several international data rescue and climatology experts presented lectures and training and held discussions with trainees from BMKG and stakeholders from the region. The project will end with a stakeholder workshop where potential users of BMKG climate information and climate services will discuss their needs and requirements with BMKG.

Between 2007 and 2011 the Netherlands donated 900k€ to the trust fund of the GCOS Cooperation Mechanism (GCM) in support of the global climate observation networks in developing countries in Africa. Projects that were supported through the GCM were (i.a.): installation of hydrogen generators for balloon soundings (Seychelles, Niger), radiosondes (Mauritius), training workshop (Namibia), and renovation of the surface networks (Angola, Madagascar, and Zambia).

### **1.8 Contributions from Poland**

In the last few years Poland did not directly support activities or projects aimed at strengthening and maintaining the existing and/or the establishing national systematic observation and monitoring networks in the Least Developed Countries. However, bearing in mind that such activities include data management aspects as well, Poland (the Polish National Meteorological and Hydrological Service respectively) organized jointly with WMO two Workshops for WMO Information and Public Affairs Focal Points (2008 and 2011). The venues and dates of the workshops were respectively: Warsaw, 13-14 May 2008 and Krakow, 9-11 March 2011. Poland has offered a number of fellowships for representatives of LDCs and covered their travel, accommodation expenses and Daily Subsistence Allowance rates. The objective of the workshops were to strengthen national services being in charge of systematic observation and monitoring networks through enhanced cooperation in the field of data management and public information. It allowed the participants to exchange ideas, compare data management procedures, national policies and to establish a good communication strategy.

### **1.9 Contributions from the Spain**

Spain has established, within WMO, several Trust Funds to finance its cooperation activities. One Fund for the [Ibero American Cooperation Program](#), agreed with 20 NMHs of Latin American and Portugal. The contribution to this fund was of US\$ 1.707.552 in 2007, US\$ 1.740.803 in 2008, and US\$ 345.466 in 2010. The activities supported by this fund in 2009 and 2010, includes:

- CLIBER (“Clima Iberoamericano”) project for studies of current situation and development of NMHSs infrastructures, in Colombia, Uruguay, Paraguay, Nicaragua,
- 2 Pilot implementation of the hydrometeorological database administration system MCH in Costa Rican *and one in Uruguay*
- Funding of the Fortaleza ( Brazil, March 2-5, 2009) meeting between the members of the Virtual Center for the Prevention of Severe Phenomena in the South East of South America; impulse to a new Virtual Center for Central America, Caribbean and Northern South America. And a workshop regarding the installation of a communication system within the AR III based on internet VPN technology.
- Funding the attendance of the Latin American NMHSs representatives to 3rd World Conference on Climate.
- Funding of PROHIMET network Conference on coastal floods, held in El Salvador, November 30 to December 4, 2009.
- Training activities in South and Central America: Satellite Meteorology 6 and 7th edition, Use of NWP products 4th edition, Seasonal Forecasting 2nd edition, Climate Change scenarios 3rd edition, other specialized Workshops (in Uruguay, Costa Rica, Ecuador, Cuba Colombia, Chile and Venezuela).
- Funding of the PROHIMET Network Conference about “Regional Hydrometeorological Observation Systems: exchange of information”, held in July 19-23, 2010 in San José (Costa Rica).
- Support to horizontal cooperation between NMHSs (expert training, stays, etc.) on implementation of WIS in South America, instrument calibration and generation of climate change scenarios
- Roving course on use and installation of automatic hydrometeorological stations. Costa Rica, July 19-30, 2010

A second Trust Fund for the [West African Cooperation Program](#), agreed with 16 West Africans NMHSs. The contribution to this fund was US\$ 2.249.100 in 2009, and US\$ 345.466 in 2010. The activities supported by this fund in 2009 and 2010, includes:

- Implementation of the agrometeorology project (METAGRI), consisting on Roving Seminars for farmers with in situ installation of rain gauges in Burkina Faso, Mali, Mauritania, Niger , Senegal, Benin, Cape Vert, Guinée-Bissau, Guinée-Conakry, The Gambia and Togo.
- Marine meteorology project in the West African Coast. Countries involved in pilot phase: Cape Vert, Gambia, Mauritania, Senegal, including installation and maintenance of 6 marine weather radars and communication equipment
- Urgent equipment needs projects for Least Developed Countries: Côte d’Ivoire, Guinea Bissau, Sierra Leone, Togo, Liberia and Guinea, €257,508.00 allocated

The Spanish AEMET Izaña Atmospheric Research Center continued the cooperation with the Argentinean Meteorological Service within the Ushuaia-Izaña GAW stations twinning collaboration. The ozonesonde equipment at Ushuaia provided by AEMET was used to monitor the evolution of the ozone layer in this sub-Antarctic site throughout the year, and to monitor the ozone hole during the austral spring. AEMET provided in 16 ozonesondes to support the ozone monitoring and 14 ozonesondes in 2010 with total estimated cost of US\$ **36.800**. These



observations are of prime importance due the shortage of this kind of data in the high latitudes of the Southern Hemisphere.

Experts from Izaña (Spain) calibrated the Tamanrasset-Assekrem the AERONET sun photometer improving the aerosol optical depth program of the Global Atmospheric Watch (GAW) station, from 9 to 16 February 2009, and installed an AERONET-PHOTONS-RIMA station in Cairo (Egypt financed by the Spanish International Cooperation Agency for Development (AECID) through WMO (SDS-Africa Project).

In 2009 Spain contributed with US\$ 262.909 through a forth specific WMO Trust Fund for financing the African Centre of Meteorological Application for Development (ACMAD), in particular capacity building, research and general operations.

Finally, Spain, in the context of [RIOCC](#) program, promotes the development of an Implementation Strategy for the Global Climate Observing System (GCOS) in Latin America and is also a financial contributor to GCOS Cooperation Mechanism (GCM) yearly since 2005. GCOS projects finance by Spain includes the renovation of 4 GCOS Surface Network stations (GSN) in Uruguay, and the renovation of the Upper Air System in Galapagos.

### **1.10 Contribution from Sweden**

The following activity is one (major) example of recent Swedish efforts on this area. It has been carried out by the Swedish Meteorological and Hydrological Institute, SMHI, and the Swedish efforts have mainly been financed by the Swedish Development Cooperation Agency, Sida.

## **Capacity Building for Meteorological Services in Botswana**

This effort involves the Department of Meteorological Services (DMS) of Botswana and SMHI. So far, the project has run two phases (Sep. 2006 –Feb. 2008; May 2008 – Dec. 2011). The specific objective has been to upgrade capacity at DMS as the National Service in Botswana for meteorological monitoring, forecasting and warnings, as well as services for community sectors dependant on the weather for their safety, planning, operations and commercial business”. Future cooperation beyond 2011 is discussed, evaluation of proposal and decision about financing pending. The project cost has been 17 MSEK (about 1.8 M€), which is divided between Sweden and Botswana.

Especially the following areas of work are relevant in terms of strengthening observations and monitoring networks

- WP1, Meteorological Observing Stations and Data acquisition (Maintenance routines, scheduling systems, safety, training)
- WP3; Data Archiving, Storage and Retrieval (Databases, digitizing met data, new analysis tools, systems upgrade, training)

Among the results are: (i) better tools and routines for Terminal Aerodrome Forecast are introduced during 2010, and (ii) better information system on lightning is for the first time introduced in Botswana including the development of a new warning system for hazardous weather.

### **1.11 Contributions from the United Kingdom**

The Met Office operates a budget for international development work in coordination with the WMO VCP - [http://www.wmo.int/pages/prog/dra/vcp\\_en.php](http://www.wmo.int/pages/prog/dra/vcp_en.php) and the Global Climate Observing System <http://www.wmo.int/pages/prog/gcos/> funded from the UK Public Weather Service. This requires open access to observations and services for safety of life and property of UK citizens in developing countries; in turn, the National Meteorological and Hydrological Services (NMHS) of developing countries need support to be sustainable organisations delivering effective services. Areas of work include:

#### **Direct support**

Funding is provided for GCOS Upper Air observing from small islands; St Helena, Gough Island, Seychelles, Funafuti (Tuvalu), Tarawa (Kiribati) and Rarotonga (Cook Islands) plus AWSs on Pitcairn Island. St Helena is fully funded by the Met Office and operated by the Government of St Helena. The others are partially funded, generally for consumables.

## **Support for related projects**

Delivery of climate services within the Global Framework for Climate Services requires that the NMHSs (as National Climate Centres) have skilled staff and operate Climate Data Management Systems (CDMS). Increasing the local understanding and use of climate data will lead to improvements in the quality and quantity of GCOS observation data. The Met Office, with ACMAD, has supported the development of the Climsoft CDMS which originated in the NMHSs of Zimbabwe, Kenya and Guinea, and is now used operationally in at least 26 developing countries worldwide. Climsoft can be used for real-time gathering and QC of observations as well as management of historical climate data and metadata.

Met Office VCP provided funding for visits by a technical specialist from Kenya Meteorological Department to Uganda and Rwanda to automate ingestion of observation data to the Climsoft climate data management system and real-time reporting in TDCF. With Computer Aid International and ACMAD, a project in Zambia has been funded to automate ingestion to Climsoft at the observing stations through provision of second-user PCs.

The Met Office is undertaking business projects to install AWSs in Madagascar and Sierra Leone and integrate these with climate data management systems and real-time reporting in TDCF of observations, in association with Kenya Meteorological Department.

Reading University, UK, has developed a new MSc course in applied meteorology, climatology and management, to address the need for more climatologists which will be a consequence of the Global Framework for Climate Services. 8 Fellows are being sponsored jointly by the Met Office, WMO and Reading University. The Statistics In Applied Climatology courses <http://www.reading.ac.uk/ssc/courses/siac/> have trained many people over a long period with Met Office support. A taught course in the Caribbean is being planned, plus another run of the e-learning version.

More generally, the UK's Department for International Development (DfID) is working in partnership with the Met Office Hadley Centre to provide improved knowledge and evidence on current and probable future climate conditions, for use by decision makers in Africa. This project includes making better use of surface and satellite observations. DfID is also developing climate programmes which are likely to include elements which improve climate science and observations in developing countries.