

## **EUMETSAT's expanding contribution in support of Climate Monitoring**

**By**

**Dr. Donald Hinsman**

**Special Advisor to the Director General of EUMETSAT on Climate Issues**

Since EUMETSAT's establishment in 1986, its primary objective has been to establish, maintain and exploit European systems of operational meteorological satellites, taking into account as far as possible the recommendations of the World Meteorological Organization (WMO). A further and recent objective of EUMETSAT is to contribute to the operational monitoring of the climate and the detection of global climatic changes. In early 2009, the Director General of EUMETSAT commissioned a Study that would propose, by the end of 2009, high-level recommendations and guidance that will enable EUMETSAT to increase the visibility of the contribution of its data and products to climate monitoring. The Study should also articulate recommendations on the way to optimize coordination with ESA's Essential Climate Variable Programme and EUMETSAT's contribution to the Initiative on Climate being taken by the European Commission (EC) in response to the European Space Council Resolution of 26 September 2008.

A review of the present EUMETSAT Strategy, its various climate monitoring activities, the international context in which these activities are coordinated, the spectrum of research sponsored by EUMETSAT and its outreach approach have focused the Study into five high-level areas. A distinguished panel of experts is collaborating in the formulation of the Study Report.

In parallel with the Study, EUMETSAT has reached a significant milestone that will be the cornerstone for its future climate monitoring activities. EUMETSAT Members, at its June 2009 Council, agreed on the remit of EUMETSAT activities in support to Climate Monitoring to ensure their optimal complementarity with activities developed at European level and in Member States. This will then allow EUMETSAT, as an organization, to develop a way forward to implement supporting activities in a coordinated and complementary manner. In particular, EUMETSAT will provide and maintain satellite-based Climate Data Records over decades with the highest possible level of accuracy, homogeneity, reliability and stability. As a first priority, EUMETSAT, at its Central Facility and through its Satellite Application Facility (SAF) on Climate Monitoring (CM SAF), will generate Fundamental Climate (FCDR). As a second priority, EUMETSAT will generate Thematic Climate Data Records (TCDR), making best use of the expertise available in the EUMETSAT SAFs. In order to fulfill the above objectives, EUMETSAT will rely on GCOS guidance and extensively build on international cooperation schemes, such as the WMO GSICS and SCOPE-CM activities.

This paper will report on the progress to date in developing the high-level recommendations and guidance within the Study Report and interactions that are foreseen as EUMETSAT develops an Implementation Plan for activities in support of climate monitoring in a coordinated and complementary manner.

## I. Introduction

Since EUMETSAT's establishment in 1986, its primary objective has been to establish, maintain and exploit European systems of operational meteorological satellites, taking into account as far as possible the recommendations of the World Meteorological Organization (WMO). A further and recent objective of EUMETSAT is to contribute to the operational monitoring of the climate and the detection of global climatic changes. In early 2009, the Director General of EUMETSAT commissioned a Study that would propose, by the end of 2009, high-level recommendations and guidance that will enable EUMETSAT to increase its visibility for the contribution of its data and products to climate monitoring. The Study should articulate recommendations on the way to optimize coordination with ESA's Essential Climate Variable Programme and EUMETSAT's contribution to the Initiative on Climate being taken by the European Commission (EC) in response to the European Space Council Resolution of 26 September 2008. One important and immediate outcome from the Study was the realization that EUMETSAT has the potential to serve as a cornerstone in the nascent but emerging European Climate Infrastructure (ECI) concept being coalesced under the leadership of the European Commission. The Study also addressed the need for a number of themes on which dedicated leading research activities should be conducted, which could be supported by EUMETSAT in the future. In order to validate the outcomes of the Study and to facilitate its endorsement by a panel of experts, several workshops in EUMETSAT involving a limited number of key scientists in the domain have been planned. Other parallel activities and their important conferences have advanced the concept of the coordinated European approach towards effective climate monitoring. These parallel activities include an initiative by the European Commission resulting in a workshop at the JRC held in Ispra, Italy in March, 2009 and the Third World Climate Conference organized by the World Meteorological Organization and held in August-September 2009.

## II. Ispra - Prospects on European capacity for monitoring and assimilating space-based climate change observations

At an informal European Competitiveness Council Meeting held in Kourou, French Guiana on 21-22 July 2008, European Member States highlighted the contributions made through satellite-based climate change monitoring and related research activities. They stressed the importance to make better use of existing European and national resources and infrastructures by strengthening cooperation and networking. It was agreed to conduct a European-wide study to assess in-depth the need for a new instrument in this field as well as possible solutions taking into account existing capacities and resources in Europe. In response and in a resolution adopted on 26<sup>th</sup> September 2008 by the 5<sup>th</sup> Space Council (a concomitant meeting of the EU Competitiveness Council and the ESA Ministerial Council), the European Commission was requested to conduct a European-wide study to assess the needs for full access to standardized data and for increased computing power, and the means to fulfill them taking into account existing capacities and networking in Europe.

The resolution further called for the scientific community, in conjunction with the EC, ESA and EUMETSAT, to define how the range of GMES services and European space observation archives can contribute most effectively to the provision of data including ECVs for scientific research. The European-wide study is being conducted by JRC-IES as part of its support to GMES.

JRC undertook a preliminary analysis and convened a workshop at which ESA, EUMETSAT and other key stakeholders attended. The workshop was held at Ispra, Italy, 30<sup>th</sup> – 31<sup>st</sup> March. The workshop: assessed current and planned EU capacity to deliver ECVs; analyzed the need for additional capacities to service these tasks; and indicated the extent to which the additional capacities could be accommodated within the existing infrastructures. The overall conclusions resulting from the Ispra Meeting showed that Europe currently possessed great capabilities for climate monitoring through various ground and space based observation systems. However, translating these capabilities to true climate monitoring lacked sustained funding that would enable the consistent generation of climate data sets such as Fundamental Climate Data Records

(FCDRs), essential for the derivation of Essential Climate Variables (ECVs). Effective provision of data sets, proper coordination of activities, including the generation of FCDRs and ECVs can only be made by securing a stable financial platform which guarantees sustained support for a) the space segment making measurements, b) for the processing, product generation and their QA/QC and c) for reanalysis and assessment strategies to turn these data into policy relevant information. Europe's scientific community, in conjunction with the EC, ESA, EUMETSAT, EUMETNET, ECMWF and Member States Institutions have the capability to deliver, but currently don't have the continuous means.

### III. The Third World Climate Conference (31 August through 4 September 2009)

The 3<sup>rd</sup> World Climate Conference was convened by the World Meteorological Organization and provided a venue for EUMETSAT to highlight its contributions and goals in support of its mandate for climate monitoring as stipulated in the EUMETSAT convention. EUMETSAT will continue its all-important and well-established mission to deliver operational satellite data, products and services in support of meteorology while at the same time address the two greatest challenges facing humankind in the 21st century. The first is global warming and the climate change associated with it. The second challenge EUMETSAT faces alone; namely how to strategically and tactically align its tremendous capabilities, ranging from space systems to end users, to address the urgent requirements needed to understand, mitigate and adapt to the potential devastation caused by global change. It is clear that EUMETSAT's mandate embraces both challenges. EUMETSAT's vision is to be the leading operational satellite agency for European Earth observation programmes that are consistent with its objectives as noted in the Introduction. Being 'operational' is key and mandates EUMETSAT to maintain continuing series of satellites with a guaranteed replacement policy. This distinguishes EUMETSAT from its other European space partner, the European Space Agency (ESA), whose primary objective in Earth observation is research and development. Whereas ESA develops new capabilities for monitoring global climate changes, EUMETSAT hones that new potential into continuing series of data. These data respond directly to the requirements of the WMO's co-sponsored Global Climate Observing System (GCOS). GCOS has articulated requirements for Essential Climate Variables (ECVs) to allow the production of long-term data records, called Fundamental Climate Data Records (FCDRs). Since its existence EUMETSAT has responded with dedication and vigour in producing operational FCDRs. The availability of accurate climate information collected over decades will benefit mankind at all levels and in a wide range of areas, including:

- Assistance to policymakers when considering the need for, and the effects of, actions to mitigate climate change, such as the Kyoto Protocol;
- Monitoring compliance with international obligations related to climate change;
- Assistance to regional and national planners to better assess the potential impacts of climate change and to thereby select the most appropriate options for their infrastructure planning;
- Supporting initiatives such as Global Monitoring for Environment and Security (GMES) in its provision of accurate information for policy-making;
- Assistance to the science community in its quest to better understand the mechanisms of climate change and its potential impacts;
- Support for a better understanding of climate physics, resulting in better climate projections;
- Management of human health risks associated with climate change, such as the spread of vector-borne diseases and heat stress;
- Identification of flood-prone areas and requirements for coastal protection;
- Management of agriculture, fisheries, food production, freshwater resources and land use;
- Risk identification for biodiversity;
- Providing the industrial and service sectors with the information they need to respond efficiently to the challenges of climate change; and

- Providing the material to educate people about climate change and the contribution attributed to human activities, thereby enabling individuals to better understand the impact of their decisions.

In supporting the development and production of ECVs and FCDRs, EUMETSAT has strived to place these new data sets into the hands of the ultimate user communities guided by a comprehensive end-to-end process that enables EUMETSAT to best achieve its vision and meet the challenges. The following is a brief description of three inter-related and mutually dependent components – space, ground and end-user segments – for EUMETSAT's integrated and coordinated approach to tackling climate monitoring challenges from an operational agency's perspective.

### *Space segment*

The Meteosat programme is the well-established European contribution to the ring of operational geostationary satellites. The first Meteosat satellite was launched by ESA in 1977. In 1995, EUMETSAT took over the operation of the Meteosat satellites. EUMETSAT still operates two Meteosat satellites of the first generation (Meteosat-6 and -7) over the Indian Ocean and two second generation satellites (Meteosat-8 and -9) over the prime meridian, clearly demonstrating Europe's ability to build long-lasting systems that strongly contribute to fundamental climate data records. Second generation satellites have much higher capabilities in terms of temporal repeat cycles (15 minutes compared to 30 minutes for the first generation) and twelve spectral bands, as compared to only three spectral bands for the first generation Meteosats. The larger number of spectral bands enables a better observation of important climate variables, especially those undergoing diurnal cycles. An additional advancement of vital importance to climate observations is the improved onboard calibration of the thermal infrared channels of the Meteosat Second Generation (MSG) satellites.

EUMETSAT has already made good progress in a programme for the third generation of operational geostationary satellites. The unique nature of geostationary measurements and their high temporal frequency provide the capability to observe sub-synoptic atmospheric and surface events – particularly precipitating cloud systems – and to characterize the diurnal cycles of the atmospheric surface system. Characterization of the annual, as well as diurnal cycles, is crucial for an understanding of the physical processes determining the status of the climate system and its potential changes. Since the launch of Metop-A in October 2006, EUMETSAT has been operating a polar orbiting satellite system, called the EUMETSAT Polar System (EPS), with a long-term operational and global perspective. Through its innovative payload, the Metop satellite can provide information on a large number of key climate variables over at least 14 years of operational service on a global scale. The hyper spectral sounding Infrared Atmospheric Sounding Interferometer (IASI) allows the retrieval of temperature and moisture profiles with high accuracy (1 Kelvin, 15 per cent, respectively) over one-kilometre layers. IASI also allows the observation of trace gases relevant to the greenhouse effect and for atmospheric chemistry. The Global Ozone Monitoring Experiment-2 (GOME-2) will continue to measure ozone profiles and related trace gases with high accuracy. The Global Navigation Satellite System Radio-occultation Atmospheric Sounder (GRAS) also provides information on temperature and humidity profiles, with the advantage that no adaption of calibration between subsequent satellites is required for the creation of long-term data sets. The observations are absolute, based on time. From the other instruments on Metop – the Advanced Very High Resolution Radiometer (AVHRR), Advanced TIROS Operational Vertical Sounder (ATOVS) and Advanced Scatterometer (ASCAT) – long-term climate records can be derived, especially with regard to AVHRR and ATOVS, which provide continuity of climate records from US National Oceanic and Atmospheric Administration (NOAA) satellites dating back to the 1970s. The continued contribution to ECVs with satellite data depends on observations from operational meteorological satellites in a polar orbit, because such satellites provide the required continuity in time and global coverage. The post-EPS satellite series planned after EPS/Metop will provide the necessary continuity for atmospheric ECVs, as well as for terrestrial and oceanic ECVs.

The Ocean Surface Topography Mission (OSTM/Jason-2) will provide essential observational data on mean sea level ECVs. It should be noted that Intergovernmental Panel on Climate Change reports on the acceleration of global mean sea level rise beyond 1993 are essentially based on satellite altimetry. Low-inclination orbiting satellite altimetry missions are unique instruments for addressing the spatial requirements on mean sea level observations. A particular goal of OSTM/Jason-2 is to extend the existing mean sea level ECV data set beyond Topex/Poseidon and Jason-1 to complete the first two decades of high-precision altimetry observations. EUMETSAT will also play a pivotal role in the space segment of the European GMES programme, in which it will operate the Sentinel-3 series of oceanographic satellites. Sentinel-4 and -5 instruments for monitoring atmospheric composition constituents from geostationary and polar-orbiting platforms are planned to be included on related follow-on EUMETSAT missions. The future is bright when considering EUMETSAT follow-on missions; it will further increase its capabilities with Meteosat Third Generation and Post-EPS by carefully assessing climate monitoring requirements within these two new programmes.

### *Ground segment*

EUMETSAT's application ground segment, which consists of the central facility in Darmstadt as well as the distributed network of Satellite Application Facilities (SAFs), is used for processing climate data records from its satellite data at various levels. Reprocessing of archived data is currently ongoing, targeting Meteosat First Generation calibration and the generation of surface radiation products and atmospheric motion vector (wind) products. EUMETSAT's network of SAFs consists of eight facilities, some of which are using data from meteorological satellites both in geostationary and polar orbit. EUMETSAT's Nowcasting and Very-Short Range Forecasting, Numerical Weather Prediction, Land Surface Analysis, Ocean and Sea Ice, Hydrology and Water Management, Ozone and Atmospheric Chemistry Monitoring and – of course – Climate Monitoring SAFs provide products and services on an operational basis that are extremely relevant to climate monitoring, in addition to the dedicated climate-related activities of the GRAS SAFs. On an international level, EUMETSAT currently supports two additional activities relevant to the production of information in support of climate monitoring: the WMO Global Space-Based Inter-Calibration System (GSICS) and the Sustained and Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM). SCOPE-CM, led by WMO and strongly supported by EUMETSAT, addresses GCOS requirements in a cost-effective and coordinated manner, capitalizing on existing expertise and infrastructures. Its overall objective is the continuous and sustained provision of high quality ECV satellite products on a global scale. GSICS was established by leading satellite operating agencies with the overall goal of creating an operational system that monitors and evaluates the calibration of the global meteorological satellite observing system in a coherent and systematic manner. EUMETSAT is one of the founding members of GSICS and very actively pursues the realization of such an operational system. Operational EUMETSAT inter-calibration activities have concentrated on the instruments on geostationary satellites: Meteosat Visible and Infrared Imager and MSG's Spinning Enhanced Visible and Infrared Imager. So far, this has been based on inter-calibration with the High Resolution Infrared Radiation Sounder instruments on NOAA satellites. A major recent step was the inter-calibration with the IASI instrument on Metop; IASI is considered an in-orbit reference for thermal infrared inter-calibration because of its excellent on-board calibration. It is also noteworthy that a longer-term (greater than one month) comparison with Meteosat First Generation (Meteosat-7) has been done, which is important for the recalibration of first generation Meteosat satellites; which is in turn important for reprocessing in support of reanalysis activities at numerical weather prediction centres. EUMETSAT has already reprocessed more than 30 years of Meteosat First Generation data. Additionally, since the beginning of Metop, EUMETSAT has been reprocessing ASCAT and GOME-2 data.

### *End-user involvement*

EUMETSAT's strength emanates from its primary focus on the end user. It maintains a close dialogue with its Member States' National Meteorological Services – its first and foremost customers. This close dialogue is designed to help EUMETSAT understand evolving requirements and to translate these into facilities capable of providing relevant services in support of national mandates throughout Europe, as well as sustaining other global communities. It is a formal and vigorous process based on permanent interactions among end users. As a result, data, products and services generated from EUMETSAT's satellites make a significant contribution to meteorological applications, as well as monitoring the global climate. As an example of support in other global communities, EUMETSAT organizes a biennial forum for African users. The forum is organized in collaboration with the National Meteorological Service of the host country, together with relevant governmental institutions and ministries, which also act as hosts. Representatives from the African National Meteorological Services, the African Regional Economic Communities, the African Union Commission, the European Commission, industry and other interested institutions attend the forum. The aim is to reinforce the well-established dialogue between EUMETSAT and the African user community to optimize the use of EUMETSAT satellite data throughout the continent. The forum also provides the opportunity to identify actions and initiatives that could be taken by EUMETSAT to meet the requirements of its African partners.

### *International partnerships: global solutions through networks*

The nature of climate change is such that no individual organization – or country – has the capability and resources to fully respond to its challenges independently. In particular, the need for global information on key indicators of climate change means that steps have to be taken to harmonize and integrate the various observation systems in order to be able to provide the required consistency of information. EUMETSAT has responded to this call through strong space agency collaboration within the Committee for Earth Observation Satellites (CEOS) and for even longer in the Coordination Group for Meteorological Satellites (CGMS) – in which it serves as the permanent secretariat. CGMS members include all the operational meteorological satellite operators. The CGMS link is especially beneficial for long-term continuity of data records due to its members' global contingency plans for both geostationary and polar-orbiting satellites. CEOS has played a vital role in preparing a space agency-wide response to the GCOS implementation plan, with recurring updates reported to the United Nations Framework Convention on Climate Change, as well as to the Group on Earth Observations initiative to establish a Global Earth Observing System of Systems. Within Europe, EUMETSAT participates as a member of the European Meteorological Infrastructure that includes member state operational meteorological organizations, the European Centre for Medium-Range Weather Forecasts and the European Meteorological Network and has the potential to serve as a cornerstone in the emerging European Climate Infrastructure as it is developed under the leadership of the European Commission.

### *3<sup>rd</sup> World Climate Conference Declaration*

The 3<sup>rd</sup> World Climate Conference brought together from 31 August to 4 September 2009, in Geneva, Switzerland, more than 2,000 climate scientists, sectoral experts and decision-makers and established a Global Framework for Climate Services “to strengthen production, availability, delivery and application of science-based climate prediction and services.” The Global Framework calls for a strengthening of five essential elements:

- The Global Climate Observing System and all its components, encouraging exchange and access to climate data;
- The World Climate Research Programme, underpinned by adequate computing resources and increased interaction with other global climate research initiatives;

- Climate services information systems taking advantage of existing national and international arrangements;
- Climate user interface mechanisms focussed on building linkages and integrating information between the providers and users of climate services; and
- Efficient and enduring capacity building through education, training and strengthened outreach and communication.

#### IV. EUMETSAT Study to expand its contribution to climate monitoring

As described in the Introduction, the EUMETSAT Study will propose high-level recommendations and guidance to enable it to increase its visibility for the contribution of its data and products to climate monitoring. The Study has a focus on the positioning of EUMETSAT in an international context, i.e. within WMO, GCOS, UNFCCC, WCRP and GEO. The Study included a review of plans for promoting climate monitoring activities on the basis of EUMETSAT data and products as well as the EUMETSAT Climate Communication Plan. On the basis of current climate requirements for MTG and Post-EPS, the Study investigated coherent global scenarios for EUMETSAT's contribution to operational climate monitoring and assessed their relevance and suitability in the process of creation of Fundamental Climate Data Records (FCDRs) and Essential Climate Variables (ECVs). The Study also considered the possibility for coordination among the European Meteorological Infrastructures (EMI), which covers resources made available by National Meteorological Services members of EUMETNET, the European Centre for Medium Range Weather-Forecasts (ECMWF) and EUMETSAT. The Study's review included five key areas as follows, each with associated focused topics that will elicit appropriate guidance:

##### 1. *EUMETSAT Strategic Planning and future missions and instruments*

Within this focused topic area, EUMETSAT's Strategy for 2030 will be considered with a view to provide recommendations and guidance for the new 2035 Strategy including clear goals and objectives in support of EUMETSAT activities for climate monitoring. The 2035 Strategy should describe EUMETSAT's role and benefits from strong involvement in the European Commission's Space Council as well as a pro-active role with NOAA on joint climate monitoring payloads. Another important area will be EUMETSAT's visibility in the space component of GMES. Finally, in order to achieve its long-term objectives, EUMETSAT should serve an influential role in important organizations including GEO and its GEOSS, CEOS, CGMS, and the WMO Space Programme.

##### 2. *Operational climate monitoring activities*

Strengthened and significant operational climate monitoring services will require increased and dedicated resources as well as activation of other SAFs (beyond the CM-SAF). It would also be appropriate for GCOS to establish a mechanism to recognize entities, such as EUMETSAT, that produce quality and dependable ECVs. Development of new GCOS ECVs that would be relevant to biological, ecological and socioeconomic variables relevant to climate should be investigated. Achievement of operational climate monitoring services will be enhanced through cooperation and coordination with ESA's ECV Programme, the European Commission Initiative on Climate as well as the emerging European Climate Infrastructure (ECI). With regard to existing activities, increased visibility for SCOPE-CM and GSICS should be a priority.

##### 3. *International activities*

From an international context, EUMETSAT should ensure that present and potential contributions for climate monitoring within a European context be recognized especially by top-level decision makers in the European Commission. EUMETSAT's support towards the goals and objectives of various international entities should be acknowledged including GEO and CEOS including CEOS activities

on the Virtual Constellation concept. EUMETSAT should strive for improved and clearer roles for the transition from research instruments to operational missions with ESA and other CGMS operators, especially NOAA. EUMETSAT should strengthening CGMS and its untapped role in climate monitoring as well as the WMO Space Programme.

#### *4. Research activities*

With regard to the exploitation of data, product and services, EUMETSAT should provide for increased resources for an expanded European-wide research programme. New themes for dedicated research activities should be aggressively pursued. Existing EUMETSAT's Research and Fellowship Programmes should be enhanced for support to GSICS, SCOPE-CM and all other SAFs.

#### *5. Communications and outreach*

In order to increase EUMETSAT's visibility, it should provide for an enhanced overall Communication Strategy to include web-based strategies across all EUMETSAT Programmes. EUMETSAT's outreach efforts should be directed to include an expanded EUMETSAT user base in order to more strongly involve the general public. New communication techniques, such as a EUMETSATzine should be developed. The new EUMETSAT Communication Strategy should contain a Climate Communication Strategy that is fully integrated within the overall Communication Strategy.

### V. NEW EUMETSAT REMIT

At the 67<sup>th</sup> EUMETSAT Council, held in June 2009, Member States agreed on the remit of EUMETSAT activities in support to Climate Monitoring that ensures their optimal complementarity with activities developed at European level as well as in Member States. This approach is in line with Article 2 of the EUMETSAT Convention, and based on an analysis of the different categories of climate related satellite products (Data Records) and processes. This allows EUMETSAT, as an organization, to develop a way forward to implement supporting activities in a coordinated and complementary manner.

For Climate Monitoring, based on the EUMETSAT's mission to deliver cost-efficient operational satellite data, products and services that satisfy the meteorological and the climate monitoring data requirements of its Member States, EUMETSAT will provide and maintain satellite-based Climate Data Records over decades with the highest possible level of accuracy, homogeneity, reliability and stability.

As a first priority, EUMETSAT, at its Central Facility and through its Satellite Application Facilities, will generate Fundamental Climate Data Records (FCDR).

As a second priority, EUMETSAT will generate Thematic Climate Data Records (TCDR), making best use of the expertise available in the EUMETSAT SAFs.

In order to fulfill the above objectives, EUMETSAT will rely on GCOS guidance and extensively build on international cooperation schemes, such as the WMO GSICS and SCOPE-CM activities.

### VI. IMPLEMENTATION PLAN DEVELOPMENT

An Implementation Plan proposing a set of activities supporting the execution of the now approved remit for climate monitoring in a coordinated and complementary manner is in development. During the development of the Implementation Plan, the EUMETSAT Secretariat will interact with Member States and international experts to ensure that the proposed activities are also fully complementary with other initiatives in Europe and at the global level. Secretariat activities in the development of the Implementation Plan will be guided by a Working Group for Implementation Plan Oversight

involving Member States. The 67<sup>th</sup> EUMETSAT Council agreed that the Implementation Plan should be prepared and presented to Council in Spring 2010. The following process and timetable are now envisioned to enable presentation of the Implementation Plan in June 2010.

### *Implementation Plan Development Progress*

A draft Table of Contents for the Implementation Plan was produced in July 2009. Comments were requested in August and the Table of Contents was finalized in early September. On the basis of the Table of Contents, a draft Implementation Plan will be elaborated by end of September, reviewed internally by the EUMETSAT Secretariat in early October and further developed during the course of October 2009. The draft Implementation Plan will then be reviewed by the Working Group for Implementation Plan Oversight. A first meeting of the Working Group is planned tentatively for the end of December 2009, tentatively 17 December 2009. At the first Working Group meeting, Terms of Reference will be agreed and the draft Implementation Plan discussed. The Chairperson for the Working Group will be shared amongst the Chair and Vice-Chairpersons of EUMETSAT's Science and Technology Group. Following recommendations made at the December meeting of the Working Group for Implementation Plan Oversight, the Implementation Plan will be further evolved with the expectation for a review at a second Working Group for Implementation Plan Oversight meeting in March 2010. The Implementation Plan will then be presented to the normal round of spring 2010 EUMETSAT Delegate Bodies meetings, i.e. its Policy and Advisory Committee (PAC), the Science and Technology/Advisory Finance Groups and finally the EUMETSAT Council in June 2010. Progress reports will be regularly presented to EUMETSAT Delegates on an annual basis together with an updated Implementation Plan. Once the Implementation Plan is approved, the Working Group for Implementation Plan Oversight will only be maintained as required, i.e. if major changes in the Implementation Plan are needed.

### *Preliminary content of the IP*

The Implementation Plan format will be based on previous EUMETSAT experiences, i.e. in the context of GSICS and SCOPE-CM Implementation Plans. The Implementation Plan will be in two phases with Phase 1 covering the 2010-2011 timeframe and Phase 2 the 2012 – 2017 timeframe. The initial Implementation Plan presented to the Working Group for Implementation Plan Oversight in December 2009 will cover both phases (7 years). The Implementation Plan will cover at a minimum:

- The international context for EUMETSAT activities;
- EUMETSAT planned activities and corresponding outputs including FCDR generation, Communication Plan, and access through EO portal;
- Interactions with EMI, ECMWF, ESA, ESA, WMO GSICS, WMO SCOPE-CM;
- Coordination with the process for preparation of SAF CDOP-2;
- Responsibilities in carrying out these activities including Central Facility, SAFs and SCOPE-CM;
- Efforts envisaged and associated costs;
- Organizational structure to implement IP

The EUMETSAT Study organized by the Special Advisor to the EUMETSAT Director General on Climate Issues will provide the international context for the Implementation Plan. As such, the Special Advisor serves as a reviewer during the entire process. In addition, the panel of experts established to review and endorse the EUMETSAT Study on high-level recommendations and guidance will also assist the Special Advisor review proposals made on the international dimension of the Implementation Plan.