World Meteorological Organization
Working together in weather, climate and water

Meeting on Sector Applications / Climate Observation Community dialogue
15 December 2011, WMO headquarter, Geneva

Final report

Key issues and outcomes

PART-I GFCS PRIORITY AREA REQUIREMENTS ON CLIMATE OBSERVATIONS AND MONITORING

1) **Understanding socio-economic hazards and climate hazards**: There is an issue of attributing the socio-economic impacts caused by climate hazards: In many cases the damages are due to the increased vulnerability more than to the severity of climate hazards. There is a need to establish mechanisms for connecting climate data and socio-economic data, including accessibility to the latter data. It is noted that socio-economic data exists but it is generally not known within climate communities. There is also a high priority for establishing mechanisms on warning populations against climate hazards. There is also a need to pay attention to small scale extreme events such as for example small scale drought conditions;

2) **Key issues and gaps related to Disaster Risk Reduction (DRR**): The difficulties in the identification of requirements, the number of levels of intervention, the multi-sectoral aspect, and the varying space scales makes Disaster Risk Reduction a complex domain. Therefore there is a need to understand current decision making, Risk Management, tools and data. These requirements are important for designing the systems for collecting the required data in the required format and developing and generating products for Disaster Risk Reduction. It was noted that one should make distinction between information, observations and products which are needed in DRR.

3) **Flood risk management:** A show-case from Pakistan provided the audience with useful information during the recent flooding in 2010 and 2011. It demonstrate the need for reliable and improved longer outlooks (monthly and beyond) and the need for expand the observing stations particularly over higher altitudes. There is also a need for higher resolution of observation networks to meet local service requirements, increased national capacity, sustained satellite data and robust climate data bases.

4) **Health sector**, there are difficulties in specifying the list of variables and data resolutions relevant to all situations. There is a need for tailored products (which are based on the raw data). A need to start very close dialogue to guide the establishment of mechanisms across climate and health sectors for better understanding each other mechanisms and the required data (including format, resolution, timeliness,

dissemination, metadata, etc..) that will be needed for the GFCS. This should include among the many other health issues the impact of Pollution and the need and requirements for Mega-cities

5) **Gaps in reporting climate observations on the GTS:** This is especially acute in many chronically food-insecure areas of the developing world. There is a need for:

- Increasing the frequency of reporting by stations through the WMO GTS network.
- Increasing the number of the existing NMHS stations reporting via GTS and to expand the NMHS networks as well as to add these new stations to the GTS.

6) **Other** d**ata products:** There will be inevitably gaps in station network coverage. Therefore there is a need for defining the requirements for gridded data products (see box below) at daily time steps, and ensuring the global coverage and the related data latency, as well as promoting its exchange and free of charge access. The mandate of NMHSs in these aspects needs to be clarified. Observations for including other climate system components are also required, such as from FAO and IOC. These observations should be made available on routine and near real time basis to support the generation of climate data and products based on the operational reanalysis systems.

User requirements for gridded data products

Existing gridded products are not ideal for operational climate services because they are produced either for NWP or research purposes. NWP processing results in non-homogeneous time-series, and research data sets are not available soon enough to meet climate monitoring requirements. Limited spatial coverage, coarse spatial resolution, short period of record, cost, and copyright restrictions, all constitute additional obstacles frequently encountered. The box below summarizes the critical user requirements for gridded data products

Gridded data products for operational climate monitoring required by climate services would ideally be characterized by:

- Daily time step (or better)
- Spatial resolution ≤ 5 km
- Global coverage
- Availability in near real time (next day)
- Long, homogeneous historical time-series
- Availability free of charge
- No IP encumbrances (public domain)

Gridded products needed for climate monitoring by climate services include:

- Precipitation
- Temperature
- Evapotranspiration
- Snow water equivalent (SWE)
- Soil moisture
- Vegetation indices

7) Capacity Development

- Regional and global collaboration are needed, as well as empowerment of local climate analysis through provision of appropriate tools and data sets, and provide advise to national centres on local climate services for sectors. Capacity development is required for the analysis and interpretation of relevant data and products. Interfaces with the sectors should be promoted

- There is a need to make a clear identification of what climate services as opposed to other sector services; this will be required for an optimal investment deployment

PART-II CLIMATE OBSERVATIONS AND MONITORING SYSTEM IMPROVEMENT FOR SUPPORTING GFCS

1) Observational needs and major gaps of the GFCS priority areas:

- Expand regional and global monitoring
- Make data assimilation for climate operational rather than relying on research funding – same for observing programmes-. This will respond to the user needs in climate data products (incl. gridded data) on more operational and near real time basis.
- Some countries appear not to release precipitation data (or at least not to the extent that they released data in the past) – and data are taking a long time to be released (not just precipitation)
- Need underpinning and ongoing research to support all GFCS data gathering
- Socio-economic data are needed for prediction of emissions

2) WMO Operational Climate Monitoring

Key Issue: Standardisation of tools, methodologies for the development of new climate monitoring products

WMO Operational Climate Monitoring includes provision of authoritative information on the state of the climate at global and regional scales. It is based on approved methodologies, data sets and algorithms for the generation of climate monitoring products on routine basis. The WMO Annual Statement on the status of the Global Climate is an authoritative voice on the state of the climate which provides annual summary for policy and decision making globally and nationally. WMO Congress-XVI issued a resolution on climate data requirement (in support of GFCS and Climate monitoring).

- Need for further developing and or standardizing methodologies, algorithms used for quality control and homogenisation of climate data and bringing new data types (Satellite, marine, Reanalysis, etc..) to improve operational climate monitoring.
- There is an urgent need for international and regional collaboration to address Data Recovery and digitisation of historical climate records as well as helping developing countries to acquire modern climate data base management systems

- Exchanging climate indices is currently promoted by the CCl/Clivar/JCOMM expert team on climate change detection and indices (ETCCDI). This approach is being sought by CCl to develop new climate products based on these indices that would be exchanged on operational basis to support CSIS operational activities

3) Space observation and monitoring challenges

EUMETSAT-CM SAF develops, generates and provides Climate Data Records (CDR) derived from operational meteorological satellites in support to climate monitoring. Satellite products supporting GFCS, include data supporting the mandatory functions of the WMO Regional Climate Centres and to data for the WMO climate Watch System which provides advisories in support of natural hazards preparedness, mitigation and response, by informing about evolving or foreseen climate anomalies at the regional and national levels, thus allowing them to make informed decisions.

- Committed satellite programmes show reduction in variables being measured over coming years,
- Existing experience in NWP using satellite data on sustained manner such as microwave sounding is a good example for the temperature records for the free troposphere and lower stratosphere that used for climate monitoring. However global satellite system for sustained climate observations required for climate monitoring is not yet fully guaranteed.

4) Architecture for climate monitoring from space

Key issue: Assessing capability at sensor level is not enough – need to trace through to end products to see if sensors provide needed quality.

WMO/CEOS/CGMS: Decision in January 2011 to create architecture for climate monitoring from space; a draft strategy document was developed in September 2011 in this regards. This architecture is high level and function based.

- Invitation to the participants (by Mark Dowel) to submit a proposal for a concrete case study to validate the logical architecture. There is a need to look at the requirements which are systematic across all sectors and those specific to each priority areas and specific to individual nations;
- New observation requirement coming from GFCS should follow a similar GCOS process for the requirement definition. GCOS essential climate variables and associated observational and product requirements were defined for the UNFCCC, but should be extended to meet GFCS needs;
- Implementation planning by GCOS and by the Expert Team for the Evolution of Global Observing Systems needs to be kept consistent for areas of overlap

5) Community observation networks

There is a need for pulling in other community observation networks (e.g., the Community Collaborative Rain Hail and Snow Network, CoCoRaHS, in the U.S.). This issue is a potential topic to be addressed within the Observation and Monitoring element of the GFCS. The existing show cases around the world show that briefing these

observational communities on a regular basis (e.g. the case of the community observation network for snow and hail in the USA) can improve the quality of the data coming from the observation they make and can be useful for generating good quality climate data. The idea of assigning a data centre to host the digitized data collected by these communities as part of a voluntary contribution to the GFCS by the host country should be fostered. The WIGOS and GFCS implementation plans need to be synchronized for addressing the improvement of these observations.

6) Data Rescue

Key Issue: There is a risk of losing important historical terrestrial and marine weather and climate records if no solution is found in accelerating and funding data rescue projects world wide, particularly in developing countries.

- There is a Need to encourage the International efforts in DARE and find solutions for international and regional collaboration to promote DARE and data digitisation. Such efforts are for example conducted under the WMO DARE and the implementation of Climate Data Management Systems (CDMS) programs mainly based on voluntary contribution from the Members. On another hand ongoing efforts by IEDRO and ACRE to develop this area in collaboration with nations and donors as well as with WMO and reanalysis projects. The digitisation of the records is being also promoted through crowd-sourcing through internet.