

**REPORT OF THE SECOND SESSION OF THE
INTER-COMMISSION TASK TEAM ON REGIONAL
CLIMATE CENTRES**

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1. OPENING OF THE MEETING

- 1.1** The second meeting of the Inter-Commission Task Team on Regional Climate Centres (ICTT-RCC) was opened at 10h00 on 25 March 2002. Mr. Boodhoo served as acting chair until the arrival of the chair, Mr. Mildner. Mr. Boodhoo welcomed the group to Geneva and stated that the group had expanded due to the insight of EC to ensure there was regional and the Commission for Hydrology representation on the ICTT-RCC. The members of the Group introduced themselves and are listed in Annex 1.
- 1.2** The Assistant Secretary General (ASG), Prof. Hong Yan opened the meeting on behalf of the Secretary General of WMO, Professor G.O.P. Obasi. In his remarks, Prof. Yan stated that Congress XIII, EC-LII and EC-LIII had placed great importance in the work of this group. In particular, noting the infrastructure requirement for seasonal to interannual forecasts and the need for advice on how to begin the implementation process for Regional Climate Centres (RCCs). The ICTT-RCC was responsible for proposing potential functions for RCCs and the possible interfaces within the Regions. He stressed that the ICTT-RCC was not tasked with defining the network of RCCs, which was a regional responsibility, but was tasked with providing the groundwork for the establishment of these Centres. Finally, Prof. Yan stated that there were several outstanding issues involving the RCCs and that the agenda should lead to specific recommendations for EC-LIV to determine how to proceed with the implementation of the RCCs. He wished the meeting well and stated that he is looking forward to hearing the results of the groups' deliberations.

2. ORGANIZATION OF THE MEETING

2.1 Approval of the Agenda

The ICTT-RCC agreed to the working arrangements for the meeting. The meeting would be in session from 09h00 to 12h00 and 14h00 to 17h30. Every effort would be made to complete the meeting by 12h00 on 28 March 2002.

2.2 Other organizational matters

The Agenda was approved (see Annex 2) with the addition that a detailed paper on the CCI perspective and vision for the RCCs would be provided under agenda item 3.3.

3. REVIEW OF THE STATE OF WORK OF THE INTER-COMMISSION TASK TEAM ON REGIONAL CLIMATE CENTRES AND OTHER RELEVANT BODIES

3.1 Review of the report of the first meeting of the Inter-Commission Task Team on Regional Climate Centres

The chairman introduced the report of the first meeting of the ICTT-RCC held from 30 April to 3 May 2001. He explained the need to have regional representatives to ensure that all regional aspects and concerns about the RCCs would be addressed. He recalled that in view of the expressed need for Seasonal to Interannual forecasts, the ICTT-RCC was established by EC-LII to develop a systems approach to the operational provision of SI forecasts and related regional services to all Members under the relevant WMO Programmes through the formation of Regional Climate Centres (RCCs). After the presentation of the first report of the ICTT-RCC to EC-LIII the preliminary results and recommendations of the ICTT-RCC were adopted and the mandate of the Group was extended on the basis of a set of new terms of reference laid down in Res. 7, EC-LIII. This included

in particular that the Regional Associations and the Commission for Hydrology were invited to designate experts to the ICTT-RCC with a view to increasing its competence to deal with all aspects of regional implementation of SI forecasting and RCC services.

- 3.1.1 The ICTT-RCC undertook a review of the functions of RCCs as listed in the Annex to the report of its first meeting. It was noted that although the first meeting had compiled a fairly comprehensive list of RCC functions, there was still room for a few additions, e.g. with regard to including functions such as regional climate monitoring and climate data services including data from satellites and from ocean observing systems. It was pointed out that the hydrological activities that RCCs could perform were not highlighted in the functions either. The meeting agreed that these items, although not adequately covered at present, would merit the full attention of the relevant implementation groups on the regional level. **The ICTT-RCC recommended that Regional Associations make an effort to emphasize the need for close collaboration between the potential RCCs and the hydrological information user groups.**

3.2 Decisions of EC-LIII

The ICTT-RCC was informed of actions taken in pursuit of the decisions of EC-LIII which resulted in the designation by the presidents of Regional Associations of experts to represent the Regions in the ICTT-RCC. It also resulted in a circular letter to Members and institutes capable of providing global SI forecasts inviting them to indicate their potential commitment to participate in a system to meet relevant requirements under the WMO Programmes. Since few responses had been received so far, **the ICTT-RCC recommended to renew the effort to solicit the support of those centres identified by EC-LIII for the start-up phase of a global SI forecasting system.**

3.3 Results of CCI-XIII relevant to the Inter-Commission Task Team on Regional Climate Centres

- 3.3.1 The president of CCI informed the meeting of relevant discussions of CCI dealing with the provision of SI forecast and the establishment of RCC functions. While noting the important role Regional Climate Outlook Fora (RCOF) had played in recent years in defining the requirements for RCC functions in the Regions, it emphasized the need for close cross-programme collaboration in this field. It noted in particular the joint responsibilities for the formulation of data requirements (e.g. recently vis-à-vis the satellite operators), the development of suitable techniques and design criteria for data generation networks, and the importance of supporting the GCOS objectives specifically on the regional levels. Other examples are the establishment of a coherent verification scheme, capacity building including training of NMHS staff and the agreement of a research agenda in support of RCC operations.
- 3.3.2 CCI-XIII recognized that the designation process recommended by the ICTT-RCC for the RCCs which follows established rules laid down in the Manual on the GDPS were found acceptable by EC-LIII as modified by the ICTT-RCC. It stated in this context that the requirements for RCCs functions in the Regions are differing. Therefore Members in the Regional Associations might choose among several options for the creation of RCC functionalities where these are required, for example the establishment of a centralized RCC versus the establishment of an RCC with distributed functionalities.

3.3.3 The meeting was further informed that the Presidents of the Technical Commissions had expressed the need for access to ocean data for modelling and monitoring of the climate as an essential function for RCCs to consider. The ICTT-RCC noted also that CBS has been tasked to develop Data Base Management standards in conjunction with a concept for an integrated approach to the future WMO information system serving all scientific and technical programmes. This would ensure that data and products were available and easily accessible to all regions and Members. These products included data, observation, data sets and climate outlooks and forecasts. Finally it was pointed out that at CCI-XIII several Members had volunteered to host RCCs within their countries. Thus, the ICTT-RCC should provide advice to EC on how to deal with this while implementing the RCC concept (see section 5 of this report).

3.3.4 The ICTT-RCC noted that CCI-XIII had changed its internal working structures and formed Open Programme Area Groups (OPAGs) following the structure CBS has successfully established a few years ago. It considered that this would have advantages for the further cross-programme cooperation between the two Commissions. In this connection the Group was informed that CAgM is in the process of restructuring in a similar way.

3.3.5 The meeting considered that a primary function of the RCCs was to ensure that Members within the Regions had an understanding and full access to climate forecasts, products and information. It was recognized that some WMO Members currently did not have the capability to provide a full suite of climate services, including downscaling of climate forecasts for their countries and the RCCs could serve to fill this gap. **The ICTT-RCC recommended that in establishing these functions the Regional Associations should apply the necessary flexibility to determine the most suitable arrangements to serve their Members.**

3.4 Results of the Commission for Basic Systems Expert Team on Infrastructure Requirements for Long-Range Forecasting

3.4.1 The Task Team was briefed on the results of the meeting of the CBS Expert Team on Infrastructure for Long-range Forecasting (CBS ET ILRF) held in Geneva in November 2001. The relevant extracts covered the review of observational and historical data requirements, requirements for research and model/method developments, requirements for products and user requirements, and guiding principles. They also relayed discussions on the procedures for exchange of and defining of LRF product; forecast skill and confidence level, verification and documentation; delivery technology, and conditions for exchange.

3.4.2 The extracts also covered the CBS ET ILRF's input to the ICTT-RCC concerning establishment of infrastructure for LRF. The Task Team noted that the CBS ET was informed of the intentions of the invitation letter to potential global-scale producing centres and the ET's support for the concept of a workshop of global-scale producing centres. The Task Team was also informed that many of the centres producing global products had been represented by experts in the meeting.

3.4.3 The Task Team noted that the CBS ET ILRF report was a very constructive contribution that had particular relevance to the LRF functionalities of RCCs. It

noted that the list of recommended LRF products (contained in the report's "Annex to paragraph 3.4.1") had been largely built from the inputs of several CCI-sponsored meetings and workshops. Also, the recommendations showed considerable agreement among the existing global-scale producing centres on the standards for forecast products that could be provided to RCCs.

3.5 Regional Requirements for Seasonal to Interannual Forecasts and RCC Services

- 3.5.1 The Task Team noted the need to maintain the distinction between requirements for seasonal to interannual forecasts, and requirements for RCCs' services. This would ensure that adequate attention would be paid to requirements in other topical areas such as climate data quality control and management, climate monitoring, and decision-support systems.
- 3.5.2 The Task Team received reports from its members on regional activities of relevance to the consideration of requirements.
 - 3.5.2.1 In RA V, a monthly telephone conference among a number of members in the South Pacific is hosted by New Zealand to review available global scale products, and to produce a consensus outlook known as the Island Climate Update. This activity was initiated in response to a top priority of the Needs Analysis conducted by the South Pacific Regional Environment Programme (SPREP) and ratified by Directors of Met Services in the Region. A complimentary input, provided by Australia is a consolidated review of available global scale products with interpretation known as the South Pacific Seasonal Outlook Reference Material. This product was initiated in response to a request from the 1999 SPREP meeting of Directors of Met Services in the region. The Task Team was informed that some of the developed countries within the Region are prepared to consider committing to provide some or all of the services required from RCC's, and are waiting to receive the statements of specific requirements along with an invitation to participate.
 - 3.5.2.2 RA I has conducted COFs since the inception of the concept. The Task Team was informed that RCCs within the Region should be formed around existing centres such as the Drought Monitoring Centres and ACMAD. RCCs will need data from participating countries to enable them to run regional climate models. The RCCs should also address issues on capacity building, suitable technology, uses of climate information, and research.
 - 3.5.2.3 The Task Team was informed of activities in RA VI, with regard to the findings of the RA VI Working Group on Climate-related Matters (RA VI WGCM). The RA VI WGCM had not reach consensus on a plan for RCCs within the Region. Two proposals are expected to be put forward to the thirteenth session of RA VI (Geneva, May 2002). One proposal is for a distributed centre, networking existing centres which would be identified to provide some of the full variety of climate service functions.
 - 3.5.2.4 The member from RA III informed the Task Team that the major climatic influences such as El Niño/Southern Oscillation (ENSO) are addressed within socio-economic-political frameworks. He described the Permanent Commission for the Southern Pacific (CPPS) and MERCOSUR frameworks, which functionalities are not totally similar and there is not interaction between them. It was noted the difficulty of identifying a single national centre that would serve as an RCC for the entire region. The Task

Team **emphasized that the RCC concept does not limit a Region to the identification of only one Centre for the entire Region; that, instead, the Regional Associations have the opportunity and the responsibility to identify the centre configuration(s) needed to provide adequate regional support for the Region's NMHSs.**

- 3.5.2.5 The Task Team was informed that in RA II there are already existing mechanisms for producing SI forecast using multi-ensemble models. Joint meetings for “East Asia Summer since 1997” and “Winter Monsoon Prediction since 2000” had been organized by China, Korea and Japan. Discussions on RCCs are at an advanced stage resulting to countries such as China and Japan indicating willingness to host RCCs. The region has realized the need to have RCCs with functions which meet various user requirements.
- 3.5.2.6 The member for RA IV informed the Task Team that RA IV can be divided into two parts in terms of capacity and capability in producing SI forecast products. Canada and USA are highly advanced while Central America and the Caribbean Countries are less developed. Some countries in Central America and the Caribbean use products from Centres producing global products in Canada, USA and the UK to develop their rainfall seasonal forecast. A precipitation outlook for the Caribbean is prepared by the Caribbean Institute for Meteorology and Hydrology (CIMH) by combining dynamic model output from several climate models and subjective input. Regional Meteorological Services and Research Groups contribute to the preparation of precipitation outlooks. This activity is discussed by the Directors of Meteorological Services and redefined by the Council of ministers of the Caribbean Meteorological Organization at their annual meeting. In Costa Rica and Cuba considerable progress has been made in seasonal forecasting. Virtual forecast centres are being tested in some countries of Central America.
- 3.5.3 Requirements of WMO Technical Commissions for seasonal to interannual forecasts and RCCs' services.
- 3.5.3.1 The meeting noted the importance of RCCs products in the activities of the Commission for Agrometeorology. Seasonal to interannual forecast information is important in strategic planning of agricultural activities. It provides early warning information for preparedness on climatic hazards which may cause great damage to agricultural activities. The meeting also noted some of the important products proposed by the CBS Expert team on Long-range Forecasts which are important for agrometeorological applications. However, the meeting emphasized the need to have users of this information, at different levels and sectors, well trained so as to ensure that the information and plans related to application of the information are better implemented. Examples of the agricultural sector needs on RCCs are given in Annex 3.
- 3.5.3.2 The need for close collaboration between climatological, meteorological and hydrological/water resources management communities was noted. Such collaboration would be greatly enhanced through Regional Climate Centres (RCCs). Many problems related to the development of hydrological observing systems for regional needs may be overcome through establishment of the RCCs. The meeting noted the key hydrological variables necessary for improved climate and weather prediction, detection

and quantification of climate change, assessment of the impacts of climate change in the tropics and temperate regions and understanding the global water cycle.

- 3.5.3.3 The ICTT-RCC stressed that the proper functioning of RCCs can only be ensured if adequate and appropriate data are available. The structures of CCI and CBS allow for the identification of data requirements. The ICTT-RCC requested the above Technical Commissions to extend the functions of their Expert Teams to consider the requirements of RCC operations, other than those already identified.

3.6 Procedures and criteria for the designation of Regional Climate Centres to serve Members

- 3.6.1 The Task Team reviewed the procedures for the designation of Regional Specialized Meteorological Centres (RSMCs) as given in the manual on the Global Data Processing System, Annex IV to the WMO Technical Regulations. It confirmed that these procedures with a few adaptations as contained in section 9 of the first report of the ICTT-RCC meeting concerning the role of the Technical Commissions and Regional Associations in stating the requirements for RCC services and the joint responsibility of CBS and CCI for the demonstration of capabilities can be readily applied to the designation of RCCs. The ICTT-RCC stressed in this context the need for close collaboration of all WMO Technical Commissions in the interest of shortening the designation process.

- 3.6.2 The ICTT-RCC considered the designation process in some detail and found that the collaboration between the relevant implementation groups in the Regions was critical in preparing the decisions on the establishment of RCC functions. This therefore calls for greater initiative of the RAs in stating the requirements and the identification of capabilities and necessary infrastructures to serve Members in the Regions. **The ICTT-RCC recommended that Regional Associations should take note of input from the Regional Working Groups such as the WWW Working Groups, the Working Groups on Climate and Climate Related Matters and other regional groupings outside the WMO on functionality of RCCs.**

4. MECHANISMS FOR CO-OPERATION BETWEEN GLOBAL SEASONAL TO INTERANNUAL FORECASTING CENTRES, RCCs AND NMHSs

4.1 Infrastructure for cooperation

The Task Team was informed that the decisions of Congress and EC have emphasized that existing programmes and infrastructures shall be used to implement a system of operational production and provision of seasonal to interannual (SI) forecasts which essentially rely on the basic components of the World Weather Watch. In analogy with the Regional/Specialized Meteorological Centres (RSMCs), it is further agreed to create Regional Climate Centres (RCCs) where required to serve Members in accordance with stated regional requirements by providing a number of functions relating to the operational SI forecast service as well as services defined under the CLIPS programme of the WCP. EC has agreed that the designation procedure for RCCs would follow the established rules for the designation of RSMCs laid down in the Manual on the GDPS as adapted by the ICTT-RCC.

4.2 Cooperation at Global Level

4.2.1 A number of meteorological centres are offering global SI forecast products based on coupled NWP models, or prescribed sea surface temperature conditions from ocean models or other techniques to force atmospheric models, and have in the past made them available to NMHSs and end users. WMO intends to make these products operationally accessible by Members and to provide for a certain degree of harmonization and standardization under WMO Programmes. In addition, WMO has the following aims:

- ◆ Ensure regular operational production and services;
- ◆ Systematically enhance the SI models and quality of products;
- ◆ Steadily improve the level of service and skills in interpreting SI products.

EC-LIII has identified National Meteorological Centres (NMCs) and institutions outside the WWW system that have demonstrated capabilities in SI production and service provision on an operational scale. At present, these centres work independently from each other and shall therefore be invited to take part in a global system. This would mean on a global level:

- ◆ Agreement on an organized production scheme;
- ◆ Regular exchange and evaluation of the SI products;
- ◆ A shared development and research programme;
- ◆ Training of users in interpreting SI products for specific applications;
- ◆ Development of methods of handling marked difference in model output.

4.2.2 The Task Team considered that cooperation on the global level may evolve during the start-up phase which will include only a limited number of producing centres. However there must be a commitment to:

- ◆ Fixed production cycles and time of issuance;
- ◆ Provision of products in agreed standard formats of presentation;
- ◆ Regular exchange and near real-time interpretation of SI products;
- ◆ Participation in a training programme for NMHSs;
- ◆ Participation in a R&D programme to develop relevant production methods and verification;

Other centres and institutes not ready to commit to the full scope of global activities may be invited to contribute to this cooperation as they see fit.

4.3 Cooperation at regional level

4.3.1 The meeting noted that the regional scale of co-operation is largely driven by regional needs and Members' ability to meet requirements as defined in the first session of the ICTT-RCC, including the need for consensus forecasts. With regard to SI forecasts, consideration has to be given to:

- ◆ The calibration of global-level products to a specific Region or sub-region;
- ◆ The selection of the best product/approach for the Region or sub-region, and
- ◆ The interpretation of SI forecasts for Regional applications;
- ◆ Methods of forecasting and product interpretation;

- ◆ Quality and limitations of SI forecasts;
- ◆ Regional use of SI forecasts;
- ◆ Feed-back from NMHSs and end users;
- ◆ Possibilities for the harmonization of SI forecasts providing divergent signal etc.

4.3.2 The meeting further underlined that any product whether at the global or regional level must be accompanied by a measure of skill for as long an historical period as possible (ideally 30 years) to guarantee quality of products. Regional production centres would also be required to give an appraisal of confidence in specific forecasts issued to Members. There is also a need to educate the public and other users of SI products (energy, agriculture, fisheries, etc.) so that they understand that long-range forecasts do not have the same level of accuracy as short range forecasts.

4.3.3 Depending on the needs of Members in the Region, the necessary mechanisms for interaction between the RCCs and the NMHSs need to be defined. This will also include the definition of areas of responsibility and the provision of boundary products from neighboring RCCs as well as procedures to deal with the harmonization of RCC products.

4.3.4 The ICTT-RCC stressed the importance of capacity building to allow all Members to attain the maximum benefit from the RCC services and products on the national level. **The ICTT-RCC therefore recommended that RCCs have an important role in arranging for regular workshops and training programmes to improve the capacity of Members to downscale, interpret and use the SI forecast products and assist in the education of end users.**

4.4 Collaboration with other international Programmes and Institutions

4.4.1 The ICTT-RCC noted that the operational provision of SI forecasts and RCC services may be of great interest to other international programmes and activities of various UN Agencies. The collaboration with the GCOS groups aiming at the joint implementation of observing systems, the potential role of the joint WCRP/CCI/ CLIVAR and the involvement of CAS through its research groups in further developing appropriate methodology for the production and interpretation of long-range forecasts and climate outlook products was mentioned in this connection.

4.5 Instruments for collaboration

4.5.1 The ICTT-RCC considered that the organization of Regional Climate Outlook Forums had proven to be very useful in the past. **It recommended therefore that liaison should be maintained with the relevant steering groups and potential sponsors to enable to hold similar events in the future, perhaps with a focus on the most urgent issues, in the interest of reducing costs.**

4.5.2 **With regard to starting the system for the provision of global SI forecasts, the ICTT-RCC strongly recommended that a workshop be arranged in the second half of 2002 involving the Centres committed and capable to provide global SI forecasts on an operational basis under the WMO Programmes. The ICTT-RCC agreed that it would be useful for a representative of the NMHS user community to attend the proposed**

workshop and requested the Chairman of OPAG on DPDFS in consultation with CCI to consider this proposal.

5. INFRASTRUCTURE NEEDS FOR OPERATIONAL PROVISION OF SEASONAL TO INTERANNUAL FORECASTS AND REGIONAL CLIMATE SERVICES

5.1 The ICTT-RCC concluded its considerations of the main conceptual characteristics of RCCs. A list of such characteristics is set out below:

- ◆ Establishment is the prerogative of a group of Members within a Regional Association;
- ◆ An RCC can be a single centre, or a distributed function; regions may require more than a single centre;
- ◆ Functionality is to be decided by members, but possibilities include the generation of SI products, data management, climate system observing and monitoring, training, research, capacity building, etc.;
- ◆ GDPS regulations provide framework for designation, to be a joint CBS/CCI responsibility;
- ◆ Existing structures should be used as far as possible;
- ◆ Functions may extend beyond those of NMHSs and involve other organizations.

5.2 The meeting noted that infrastructure already exists that can be used for different purposes related to RCCs functionality. This includes infrastructure on data management, observation network, telecommunication and computers. The meeting recommended that use of existing infrastructure should be given high priority.

5.3 The ICTT-RCC considered arrangements for the further development of operational and technical guidance, research and training in support of RCC operations. The technical commissions will play a major role in developing the capabilities of RCCs through the activities of the relevant OPAGs. Roles and responsibilities of the different WMO constituent bodies are attached in Annex 4 for references. The activities will be carried out by Expert Teams and Implementation/Coordination teams as required. As the implementation of RCCs further progress, it is expected that the activities carried out under different OPAGs will evolve, some tasks may be dropped and others added. The ETs have been involving experts from other Commissions, and from organizations outside of WMO as appropriate, which facilitates collaboration and cross-program cooperation.

5.4 In particular, the ICTT-RCC recognized that the roles and responsibilities of CCI and CBS are best carried out by the OPAG on Climate Applications, Information and Prediction Services and the OPAG on Data Processing and Forecasting Systems respectively. The meeting was also informed that CAgM is in the process of establishing an OPAG structure and that activities related to climate prediction outlooks for agriculture and forestry will be dealt with through an OPAG. The ICTT-RCC also noted that other OPAGs such as the OPAG on Climate Data and Data Management (CCI) and the OPAG on the Global Observing System (CBS) are also relevant to the establishment of RCCs as they deal with some data aspects.

5.5 The ICTT-RCC recommended that, given the broad conceptual framework described in 5.1, that the RAs now be invited to consider detailed requirements for RCCs in their Regions, and to assess the capabilities of Members to meet them. The ICTT-RCC considered that progress on the

establishment of RCCs need not await the output from the OPAGs, although arrangements may be revised in the light of such output.

- 5.6** The ICTT-RCC noted that many RAs had already established Rapporteurs on the implementation of Climate Information and Prediction Services (CLIPS), and Rapporteurs or Working Groups on Climate (related) Matters. Also many Members had nominated CLIPS Focal Points. The ICTT-RCC proposes that inputs from such Groups, Rapporteurs and Focal Points be considered by the RAs in determining the necessary functionalities of RCCs.
- 5.7** The ICTT-RCC noted that both CBS and CCI, so far, had established programmatic Implementation Coordination Teams (ICTs), including Regional ICTs, to enable RAs to present implementation requirements and problems. These Teams could thus provide a continuous link with the Regions on the development and operation of RCCs.
- 5.8** The ICTT-RCC noted that once a group of Members had agreed to the functionality of an RCC, and agreed on the means of providing such functionality, it would be the responsibility of a nominated NMHS to seek designation from CBS and CCI, as agreed at the first ICTT-RCC session.
- 5.9** The meeting further noted that some regional economic groupings provide valuable infrastructure to regional entities similar to those proposed for RCCs. Use of such support should be explored and facilitated and existing arrangements should be made known to the RAs. It further agreed to make available to RAs examples of centres, including their operational characteristics and responsibilities, which already had functionalities similar to those proposed for the RCCs.
- 5.10** The ICTT-RCC requested the Secretariat to arrange for the presentation of input on RCCs and their development to each RA Session, and further requested the EC to advise RAs of its conclusions and to seek their active involvement and overall responsibility for the establishment of RCCs.

6. FUTURE CROSS - PROGRAMME CO-OPERATION

The ICTT-RCC considered that with the report from this meeting to be given to EC-LIV by the president of CCI its task in providing a conceptual frame for the establishment of a global SI forecasting system and the establishment of RCC services in the Regions is completed.

The ICTT-RCC recommended to transfer appropriate follow-up actions to the relevant OPAGs of CBS, CCI and CAgM on the understanding that their terms of reference will be expanded to include the responsibilities listed in the Annex 4 to this paragraph. It further recommended that through the presidents of the RAs and with the support of the Technical Commissions concerned, the RA programme implementation groups be invited to take initiatives leading to the establishment of RCC functionalities and provisions for the operational availability of SI forecasts and derived products.

7. REPORT AND RECOMMENDATION TO EC-LIV

The ICTT-RCC considered the important issues for submission to the fifty fourth sessions of the Executive Council (EC-LIV). The Chairman of ICTT-RCC emphasized the need to ensure that the process to set up RCCs moves forward. He expressed his intention to see the process move to an implementation stage where there may be no need for

continuation of the ICTT-RCC. He stressed the need to provide the EC with appropriate recommendations to enable it to take the process further to the implementation of the RCCs concept. The ICTT-RCC report and recommendations given in Annex 5 will be submitted to EC-LIV by the president of CCI.

8. CONSIDERATION OF THE FINAL REPORT OF THE SECOND SESSION OF THE INTER-COMMISSION TASK TEAM ON REGIONAL CLIMATE CENTRES

The ICTT-RCC considered the final report of its second session. It accepted the report and agreed that it provided an accurate account on the issues discussed during the meeting.

9. CLOSURE OF THE MEETING

Being no others issues for discussion the Chairman thanked all the members for the good work they had done since the Task Team was established. He expressed concern that the process had been rather slow, but hoped that the recommendations developed so far for submission to EC-LIV would make the process move faster. He further thanked the Secretariat for the support it had provided to the ICTT-RCC during its period of operation. The meeting was closed at 13h30.

LIST OF PARTICIPANTS

Mr Yadowsun Boodhoo

Meteorological Services
St. Paul Road
VACOAS
Mauritius
Tel: (+230) 686 1031
Fax: (+230) 686 1033
Email: yboodhoo@bow.intnet.mu

Mr Frank Farnum

Chief Hydrologist
Caribbean Institute for Meteorology and
Hydrology
P.O. Box 130
BRIDGETOWN
Barbados
Tel: (+1 246) 425 1362/1365
Fax: (+1 246) 424 4733
Email: frankfarnum@hotmail.com
f_farnum@cimh.edu.bb

Mr Urip Haryoko

Meteorological and Geophysical Agency
Jl. Angkasa I No. 2
JAKARTA
Indonesia
Tel: (+62 21) 424 6321
Fax: (+62 21) 424 6703, 316 0382
Email: urip_haryoko@hotmail.com

Mr Stephen Lellyett

Regional Manager Climate and
Consultancy, NSW
Bureau of Meteorology Regional Office,
NSW Level 16, Centennial Plaza 300
Elizabeth St, P.O. Box 413
N.S.W. 2010 DARLINGHURST
Australia
Tel: (+61 2) 9296 1525
Fax: (+61 2) 9296 1567
Email: S.Lellyett@bom.gov.au

Mr John Nicholls

18, Health Close
Berkshire
WOKINGHAM RG412PG
UK
Tel: (+44 118) 978 1020
Email: JiMi@nich66.fsnet.co.uk

Mr Jorge Carrasco

Head of the Department of Climatology
Dirección Meteorológica de Chile
Casilla 117
SANTIAGO
Chile
Tel: (+56 2) 676 3453
Fax: (+56 2) 601 9590
Email: jcarrasco@meteochile.cl

Prof Georgi Gruza

Climate Monitoring and Prediction
Department
Institute for Global Climate and Ecology
20-b Glebovskaya St.
MOSCOW 107 258
Russian Federation
Tel: (+7 095) 169-11-07
Fax: (+7 095) 160-08 31
Email: climate@cabel.net

Dr Benjamin Kirtman

Associate research Scientist
Center for Ocean-Land-Atmosphere
Studies
4041 Powder hill Road, Suite 302
CALVERTON 20705
USA
Tel: (+301) 595 7000
Fax: (+301) 595 9793
Email: kirtman@cola.iges.org

Mr Stefan Mildner

Director, Technical Infrastructure
c/o Deutscher Wetterdienst
P.O. Box 100465
63004 OFFENBACH
Germany
Tel: (+49 69) 8062 2846
Fax: (+49 69) 8062 5217
Email: stefan.mildner@dwd.de

Prof Laban Ogallo

Project Coordinator, DMC
P.O. Box 30259
NAIROBI
Kenya
Tel: (+254 2) 567 864, 578 340
Fax: (+254 2) 578343
Email: logallo@lion.meteo.go.ke

Dr James Salinger
Senior Climate Scientist
National Institute of Water Atmosphere
Research (NIWA)
P.O. Box 109-695
Newmarket
AUCKLAND
New Zealand
Tel: (+64 9) 375 2053
Fax: (+64 9) 375 2051
Email: j.salinger@niwa.cri.nz / [@niwa.com](mailto:niwa.com)

Dr Li Weijing
Deputy Director General
National Climate Centre of China
China Meteorological Administration
46, Zhongguancun Nandajie
100081 BEIJING
China
Tel: (+86 10) 6840 8144
Fax: (+86 10) 6217 6804
Email: liwj@cma.gov.cn

WMO Secretariat
7bis, avenue de la Paix
Case Postale No. 2300
1211 Genève 2
Suisse

Mr Paul Llanso
Chief, World Climate Applications Division
World Climate Programme
Tel: (+41 22) 730 8268
Fax: (+41 22) 730 8042
Email: llanso_p@gateway.wmo.ch

Mr Morrison Mlaki
Chief, Data Processing Systems Division
World Weather Watch B Department
Tel: (+41 22) 730 8231
Fax: (+41 22) 730 8181
Email: mlaki_m@gateway.wmo.ch

Mrs Angele Simard
Director Informatics
2121, Trans Canada Highway
DORVAL H9P 1J3
Canada
Tel: (+514) 421 4745
Fax: (+514) 421 4703
Email: angele.simard@ec.gc.ca

Mr Kenneth Davidson
Director, World Climate Programme
World Climate Programme
Tel: (+41 22) 730 8377
Fax: (+41 22) 730 8042
Email: davidson_k@gateway.wmo.ch

Mr. Joël Martellet
Scientific Officer
Global Data Processing System
World Weather Watch B Department
Tel: (+41 22) 730 8313
Fax: (+41 22) 730 80 21
Email: martellet_j@gateway.wmo.ch

Dr Buruhani Nyenzi
Chief, CLIPS Project Office
World Climate Programme
Tel: (+41 22) 730 8273
Fax: (+41 22) 730 8042
Email: nyenzi_b@gateway.wmo.ch

AGENDA

1. OPENING OF THE MEETING
2. ORGANIZATION OF THE MEETING
 - 2.1 Approval of the Agenda
 - 2.2 Other organizational matters
3. REVIEW OF THE STATE OF WORK OF THE ICTT-RCCs AND OTHER RELEVANT BODIES
 - 3.1 Review of the report of the first meeting of the ICTT-RCCs
 - 3.2 Decisions of EC-LIII on matters related to ICTT-RCCs
 - 3.3 Results of CCI-XIII relevant to the ICTT-RCCs
 - 3.4 Results of the CBS Expert Team on Seasonal to Interannual and Long-range Forecasting
 - 3.5 Regional requirements for Seasonal to Interannual forecasts and RCCs services
 - 3.6 Procedures and criteria for the designation of RCCs to serve Members
4. MECHANISMS FOR CO-OPERATION BETWEEN GLOBAL SEASONAL TO INTERANNUAL FORECASTING CENTRES, RCCs AND NMHSs
5. INFRASTRUCTURE NEEDS FOR OPERATIONAL PROVISION OF SEASONAL TO INTERANNUAL FORECASTS AND REGIONAL CLIMATE SERVICES.
6. FUTURE CROSS-PROGRAMME CO-OPERATION
7. REPORT AND RECOMMENDATION TO EC-LIV
8. CONSIDERATION OF THE FINAL REPORT OF THE SECOND SESSION OF THE ICTT-RCCs
9. OTHER ISSUES
10. CLOSURE OF THE MEETING

Agricultural Application of Seasonal to Interannual Climate Forecasts

The main applications of SI forecasts for the agricultural sector are in support of strategic decisions from the farm to government policy making.

1. Farm level

- Irrigation planning for the growing season
- Fallow practice for crops pastures and livestock grazing
- Land preparation planning
- Planting and crop scheduling
- Crop yield estimates
- Weed management
- Pest management

2. Harvesting and Processing

- Improved planning for wet weather disruption
- Forecasting of start and finishing of cropping/harvesting
- Crop size forecasting
- Crop yield forecasting
- Civil works scheduling

3. Regional Planning

- Land and water resource management
- Environmental management

4. Marketing

- Crop size forecasting
- Early season supplies
- Supply patterns
- Shipping and transport to markets
- Global supply

5. Government

- Water allocation
- Natural hazards and extreme events

ROLES AND RESPONSIBILITIES WMO Constituent Bodies

CCI

- ◆ provide guidance on post-processing for sector-specific application of SI products in collaboration with CAgM and CHy;
- ◆ provide leadership in the development and implementation of verification of post-processed products to end-users;
- ◆ co-ordinate training for sector-specific users on the interpretation of SI products and the skill of these products, respectively confidence levels;
- ◆ Co-ordinate climate monitoring activities;
- ◆ Monitor the skill of post-processed products;
- ◆ assess the impact of SI forecasts in sector-specific applications and provide advice for the development of future products;
- ◆ collaborate with CBS and CAS on matters of common interest.

CBS

- ◆ provide the infrastructure needed for the operational production and exchange of SI forecasts and related services;
- ◆ define and implement standards and formats for SI production and exchange;
- ◆ develop and implement verification schemes for SI forecasts in collaboration with CAS;
- ◆ make verifications available regularly to RCCs and NMHSs;
- ◆ monitor scientific progress with a view to improving SI forecast services;
- ◆ provide up-to-date information on methodology used by the RSMCs with specialization on long-range forecasting;
- ◆ collaborate with CCI and CAS on matters of common interest.

CAgM

- ◆ provide guidance on post-processing for applications of SI products to agriculture and forestry;
- ◆ provide leadership in the development and implementation of verification of post-processed products to end-users in agriculture and forestry;
- ◆ co-ordinate training for sector-specific users on the interpretation of SI products and the skill of these products, respectively confidence levels.
- ◆ Monitor the skill of post-processed products;
- ◆ assess the impact of SI forecasts in applications to agriculture and forestry and provide advice for the development of future products;
- ◆ collaborate with CBS and CCI on matters of common interest.

CHy

- ◆ provide guidance on post-processing for applications of SI products to hydrology;
- ◆ provide leadership in the development and implementation of verification of post-processing products to end-users in hydrology.

CAS

- ◆ conduct research into long-range forecasts;
- ◆ provide guidance on the calibration of products for specific locations in collaboration with CBS and CCI;
- ◆ conduct research into the development of value-added products;
- ◆ improve the performance of models and methods used for SI production and identify relevant research needs;
- ◆ collaborate with CBS and CCI on matters of common interest.

Regional Associations

- ◆ identify the Region specific requirements for the establishment of Regional Climate Centres and the capabilities of Members in the Region to meet them (e.g. functions and infrastructure required, and how this can be best achieved i.e. one, virtual, distributed or other centres) ;
- ◆ co-ordinate the implementation of relevant services and co-operations on the regional level (includes coordination with other regional bodies where appropriate).
- ◆ Establish and/ or support links with technical commissions to collaborate on requirements and implementation.

Regional Climate Centres (Emerging from Constituent Bodies activities)

- ◆ **generation of tailored products to meet NMHS needs including seasonal outlooks;**
- ◆ **interpretation and evaluation** of SI products from global prediction centres;
- ◆ **co-ordinate its functions with NMHSs** and users in the Region;
- ◆ **provide Regional Climate Monitoring products;**
- ◆ **assist Members in the Region** in systematic training and capacity building;
- ◆ **conduct and co-ordinate Regional Research** and Development in post-processing, product interpretation, calibration and sector specific application of SI forecasts;
- ◆ **provide regular feed-back** on the skill of products and model performance on the basis of systematic verification;
- ◆ **conduct studies** to identify which method/model approach works best in their Region;
- ◆ **mount an education programme** for regional users;
- ◆ **advise** on the generation of consensus forecasts for the Region.

NMHSs

- ◆ **provide the user-interface** for the delivery of products and services to end-users within their national responsibility;
- ◆ **contribute to** the evaluation of products skills and quality within their area of responsibility;
- ◆ **provide feed-back** to RCCs and global producing centres, as appropriate.

It is understood that institutes and centres outside the WMO membership will participate in relevant bodies of the Technical Commissions and committed to support the required functions under the WMO programmes.

Recommendations to EC

The ICTT-RCC noted that sufficient requirements have been laid down as probable functions of RCCs and the time is ripe to proceed to the next stage of the process in the realisation of the network of regional climate centres. This is the stage when all the regional associations should consider the issue so as to start the process of designating these centres. In this respect the ICTT-RCC recommended that:

- 1) In establishing the functions in the provision of full suite of climate services, the Regions should apply the necessary flexibility to determine the most suitable arrangements to serve their Members;
- 2) The RCC concept does not limit a Region to the identification of only one Centre for the entire Region and instead, the Regional Associations have the opportunity and the responsibility to identify the centre configuration(s) needed to provide adequate regional support for the Region's NMHSs;
- 3) That RCCs have an important role in arranging for regular workshops and training programmes to improve the capacity of Members to interpret and use the SI forecast products and assist in the education of end users;
- 4) That since the organization of Regional Climate Outlook Forums had proven to be very useful in the past, liaison should be maintained with the relevant steering group and potential sponsors to enable to hold similar events in the future, perhaps with a focus on the most urgent issues, in the interest of reducing costs;
- 5) The Regional Climate Centre nomenclature be retained, and that the identification of special focuses be designated by appending the focus to the RCC, e.g., "RCC-Specialization in Long-range Prediction."
- 6) The Regional Working Groups such as the WWW Working Groups, the CLIPS Working Group and the Working Group on Climate Matters which are expected to take the lead and other regional groupings outside the WMO may usefully be involved;
- 7) Regional Associations strive to emphasize the need for intense collaboration between the potential RCCs and the hydrological and other user groups;
- 8) With regard to starting the system for the provision of global SI forecasts, the ICTT-RCC strongly recommended to arrange for a workshop in the second half of 2002 involving the Centres committed and capable to provide SI forecasts on an operational scale under the WMO Programmes;
- 9) Finally, the ICTT-RCC considered that with the report from this meeting to Council its task in providing a conceptual frame for the establishment of a global SI forecasting system and the establishment of RCC services in the Regions is completed. However should the need arise for further consideration of the matter, there exists adequate structures within CCI and CBS (OPAGs) to which appropriate follow-up actions could be transferred. This will be done with the understanding that the terms of reference of the OPAGs will be expanded to include the responsibilities listed in Annex 4. It further recommended that through the presidents of the RAs and with the support of the Technical Commissions concerned the RA programme implementation groups be invited to take initiatives leading to the establishment of RCC functionalities and provisions for the operational availability of SI forecasts and derived products.

ACRONYM LIST

ACMAD	African Centre for Meteorological Applications for Development (Niamey, Niger)
AGRHYMET	Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (Niamey, Niger)
ASG	Assistant Secretary General
AWG	Advisory Working Group
CAgM	Commission for Agricultural Meteorology
CAS	Commission for Atmospheric Sciences
CBS	Commission for Basic Systems
CCI	Commission for Climatology
Cg	Congress
CHy	Commission for Hydrology
CIMH	Caribbean Institute for Meteorology and Hydrology
CLIPS	Climate Information and Prediction Services (project of WCASP)
CLIVAR	Climate Variability and Predictability (sub-Programme of WCRP)
CPPS	Permanent Commission for the Southern Pacific
DMC	Drought Monitoring Centre (Nairobi, Kenya and Harare, Zimbabwe)
DPFS	Data Processing and Forecasting Systems
DPS	Data Processing System
EC	Executive Council
ECMWF	European Centre for Medium-Range Weather Forecasts (Reading, UK)
ENSO	El Niño/Southern Oscillation
ET	Expert Team
GCM	Global Circulation Model
GCOS	Global Climate Observing System
GDPS	Global Data Processing System
ICTT-RCC	Inter-commission Task Team on Regional Climate Centres
ICT	Implementation Coordination Team
ILRF	Infrastructure for Long-range Forecasting
IRI	International Research Center for Climate Prediction (New York, USA)
NIWA	National Institute of Water Atmosphere Research
NWP	Numerical Weather Prediction
NMHS	National Meteorological and Hydrological Service
NMC	National Meteorological Centre
OPAG	Open Programme Area Group
RA	Regional Association
RCC	Regional Climate Centre
RCOF	Regional Climate Outlook Forum
RSMC	Regional Specialised Meteorological Centre
SI	Seasonal to Interannual
SPREP	South Pacific Regional Environment Programmes
WCASP	World Climate Applications and Services Programme (sub-Programme of WCP)
WCDMP	World Climate Data and Monitoring Programme (sub-Programme of WCP)
WCP	World Climate Programme
WCRP	World Climate Research Programme
WGCM	Working Group on Climate Matters
WMC	World Meteorological Centre
WMO	World Meteorological Organization
WWW	World Weather Watch