

**SEMINAR ON CLIMATE DATA RESCUE, MANAGEMENT,  
APPLICATIONS AND PREDICTION FOR SPANISH-SPEAKING  
COUNTRIES IN REGIONAL ASSOCIATIONS III AND IV**

**(Guayaquil, Ecuador, 31 March – 4 April 2003)**

**FINAL REPORT**

**WORLD METEOROLOGICAL ORGANIZATION  
April 2003**



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# **Final Report of the Seminar on Climate Data Rescue, Management, Applications and Prediction for Spanish speaking countries in Region Association III and IV**

## **1. INTRODUCTION**

At the kind invitation of the International Research Centre on El Niño (CIIFEN), the World Meteorological Organization (WMO) organized the Seminar on the Climate Data Rescue and Management, Monitoring, Application and Prediction of Climate Data held from 31 March to 4 April 2003. This seminar was the first of its kind and was held in the CIIFEN office located in the Fundación El Universo building in the city of Guayaquil.

The meeting was attended by 31 experts, including lecturers and moderators from Brazil, Costa Rica, Colombia, Chile, Ecuador, France and WMO-Switzerland, as well as representatives of the National Meteorological Services (NMSs) of Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Honduras, Nicaragua, Paraguay, Peru, the Dominican Republic, Uruguay and Venezuela (see Annex 1).

## **2. OPENING OF THE SEMINAR**

2.1 The opening of the seminar took place at the Bolivar Salon at the Hampton Inn Boulevard Hotel and Casino on 31 March 2003 at 9.00 a.m.

2.2 The seminar was opened by Captain (Navy) Byron Sanmiguel Marín, Director of the Oceanographic Institute of the Navy (INOCAR) and Chairperson of National Technical Committee of ERFEN. Mr Sanmiguel emphasized that we were living in a period of intense climate variability and that people were increasingly vulnerable. Therefore, it was essential to unite efforts, which, with the dynamic input of international organizations such as WMO, could give impetus to sustainable development through harmonious relationships between people and their environment. Furthermore, he urged seminar participants to make the most of the discussions that would take place during the seminar, and also cordially welcomed them to the city of Guayaquil.

2.3 Dr José Luis Santos, Director of CIIFEN, said that it was a great honour to be the host of the first event held in CIIFEN offices since the Centre's inauguration in January 2003. He highlighted that it was not only important to make scientific progress in predicting the El Niño phenomenon, but it was also necessary to focus on meteorological activities aimed at providing the various forecast users with the tools required to prevent large-scale economic losses. He also pointed out that this first technical activity conducted by CIIFEN would strengthen the Centre without diminishing the importance of the activities carried out by all National Meteorological and Hydrological Services (NMHSs) of the region. This was because of the importance of establishing good relations to improve and achieve a better exchange of information; a requirement that would be reflected in the activities conducted in the region.

2.4 Mr Paul Llansó, Chief of the WMO World Climate Data and Monitoring Programme (WCDMP) Division, indicated that the seminar was a great opportunity for all climate experts from Meteorological Services of the region. He highlighted that the meeting would enable CIIFEN to provide assistance to ensure adequate information and early warnings that could be given in a timely manner to prevent or mitigate future economic losses. The meeting would also help countries of the region to achieve their

national development objectives. Furthermore, he stated that since the seminar focused on countries of the Pacific Ocean basin, it was an opportunity to initiate activities and improved collaboration to increase climate analysis and prediction in regions affected by the El Niño phenomenon.

### **3. ORGANIZATION OF THE SEMINAR**

3.1 Seminar participants approved the agenda (see Annex 2)

### **4. DATA RESCUE**

This focused mainly on the rescue of data from NMS archives and historical data stored in other places, such as libraries, national archives, churches, etc.

4.1 Mr Llansó gave an introduction to the structure of the WMO Commission for Climatology (CCI) and the Open Programme Area Groups (OPAG), which formed the Commission. Furthermore, he described the projects being developed by the WCDMP, such as CDMS/CLICOM, DARE – ARCHISS and the Climate Monitoring System. He also outlined the aims and objectives that it was hoped Regional Associations III and IV would achieve by 2010.

4.2 Mr Alain Gioda, on mission for UNESCO under the International Hydrological Programme, made a presentation on the Archival Climatic History Survey (ARCHISS) Project and focused on the important role it played in historical climate data and the activities carried out in collaboration with Latin American and Caribbean countries. He also referred to the rescue of hand-written data contained in NMS archives.

4.3 Mr Rodolfo Sánchez gave a summary of the principles of Data Rescue (DARE) and cited the activities of the Meteorological Institute of Costa Rica as an example. Moreover, he referred to the use of ORACLE software and its benefits, and the storage of the different types of meteorological variables and their frequencies. Lastly, he gave a comprehensive presentation of the products generated by that Meteorological Service and the way in which users could access the information.

4.4 Mr Sánchez used various examples to demonstrate the good results achieved by using digital cameras for data rescue, and informed participants of the virtues and technical features of the cameras used and of procedures for the capture and storage of digital images.

4.5 All of the seminar participants agreed on the various problems they faced as regards the collection and storage of their climate data. All participants had problems with the storage of their historical data since they lacked appropriate places to store them. As regards technological developments, participants commented on their difficulties in rescuing data when using old equipment which made the digitisation process increasingly difficult.

It should be noted that all participants were very interested in the results obtained by using digital cameras to rescue climate and meteorological data. Participants then completed a survey on climate data management and rescue (see Annex 3) in their countries and participated in group activities, during which they commented on their need and desire to preserve their historical data develop and storage methods.

Lastly, the following recommendations were made to address particular regional needs:

- To request Cuba to implement programmes for interpreting digital images using digital cameras, and to provide the country with the necessary equipment and support through WMO; this knowledge could later be shared with other countries of the region,
- To provide Argentina with support to continue its programme for reading images that could be used by the entire region,
- That WMO help to provide all countries with a digital camera and to train staff in capturing images,
- That WMO and UNESCO work with the Latin American Archives Association so that national archivists could participate in meteorological data rescue activities, with training given to NMS staff in archiving techniques,
- Database administrators should submit a national data rescue plan to their directors (through the appropriate supervisory channels), to be sent later to WMO/WCDMP for subsequent review (by 15 June 2003),
- A computer should be provided or assigned for the collection and storage of digital images,
- WMO should help Members of the region to chose and/or use digital cameras and scanners.

## **5. THE INTERNATIONAL RESEARCH CENTRE ON EL NIÑO (CIIFEN)**

5.1 Dr Santos, Director of CIIFEN, gave a detailed explanation of the Centre's structure and identified members of the International Council and of the National Technical Committee. He indicated that CIIFEN would focus its activities on four areas at regional and global level:

- An early warning system for disaster mitigation,
- Adapting to climate change and variability,
- The comprehensive management of transnational water resources,
- Institutional capacities for sustainable development.

He also mentioned proposals made by CIIFEN:

- To generate specific products according to user needs (agriculture, water resources, fishing, etc),
- To promote the practical use of climate outlook fora in decision-making procedures,
- To strengthen collaboration between National Meteorological Services of the region, including in the area of data collection and exchange,
- Strengthening relations with other scientific fields (health, sociology, economy, etc.).

## **6. CLIMATE DATABASE MANAGEMENT SYSTEMS (CDMSs) AND CLICOM**

6.1 Mr Luis Carrasco reviewed in detail the history of CDMSs, focussing mainly on the development and implementation of CLICOM software in the countries of Regions III and IV. He then described climate database management (data entry, quality control, the import of digital data, data export, etc.). He finished his presentation by summarizing a technical meeting organized by WMO during which seven CDMSs had been assessed and approved.

6.2 Participants described the types of CDMSs they used to store their data and were working on at that moment. Some Central American countries had limited opportunities to acquire modern equipment, such as Oracle software, which had excellent features and met the needs of Meteorological Services; however it was very expensive to maintain the software, provide training and buy the licences.

The following is a list of recommendations made by participants by consensus on the use of, and requirements for national CDMSs:

- ❖ National CDMS administrators must make an assessment of their systems to document their capacities, functionalities, problems, etc.,
- ❖ National CDMSs must adhere to WMO standards for data import and export in accordance with CLICOM,
- ❖ Meteorological Services that have already developed CDMSs in Spanish are requested to share their systems with RA III and RA IV Members,
- ❖ To fulfil the previous recommendation, support and assistance is required from WMO for conducting assessments and producing the relevant documentation,
- ❖ It is recommended that participants adopt a modern CDMS and that when the system is up and running, they stop working on the CLICOM system,
- ❖ That Costa Rica and Brazil be designated as focal points for training in the management of CDMSs and their various functionalities,
- ❖ To establish a working group coordinated by CIIFEN to determine the requirements (hardware, software and human resources) of a national CDMS which could be used at regional level, and to request WMO's assistance in resource management for the development and implementation of this system,
- ❖ To request WMO for assistance to create favourable economic conditions for the use of licences, maintenance of Oracle software and related training for CDMS users in the region,
- ❖ That WMO prepare and conduct seminars in the region focussing on CDMSs.

## **7. CLIMATE DATA APPLICATION AND PREDICTION (CLIPS)**

This part of the seminar aimed at providing an introduction to climate variability, climate prediction models and their applications. It also established an initial contact with experts from the region on activities of the WMO World Climate Applications and Services Programme through the CLIPS Project.

7.1 Ms Bárbara Tapia gave an introduction to how CLIPS develops its activities and operates, and described training activities and climate warning fora in Africa and other regions. She also referred to the first contact points established in Regional Association III such as the appointment of focal points, climate warning fora in Central and South America, etc.

7.2 Mr José Daniel Pabón explained the physical and geographical factors determining the region's climate, and he showed the special distribution patterns of variables such as air temperature, atmospheric pressure, wind and precipitation. Furthermore, he gave an explanation of climate variability associated with El Niño and La Niña phenomena and the resulting extreme weather events in Colombia and the Andean region. In addition, he showed the presence of a quasi-biennial oscillation in regional precipitation and demonstrated the intra-seasonal variability in precipitation in the tropical American region. He concluded that, although indicators of El Niño and La

Niña phenomena were more pronounced in the regional climate, other elements of climate variability were also important in the region and deserved greater attention in studies aimed at improving climate prediction models.

7.3 Mr Christopher Cunningham Castro commented in detail on the activities and products developed by CPTEC both within Brazil and at regional level. He then presented the main features of statistical and numerical models and the products developed by CPTEC, mainly for Brazil.

7.4 Lieutenant Rodney Martínez presented the relevant oceanic and atmospheric parameters and monitoring in South American coastal regions in recent months, as well as the prediction models used to monitor El Niño. Lastly, he explained why global and regional predictions were unable to resolve the steep thermal gradient produced in the subsurface water and in precipitation in the Equatorial Pacific, particularly the south-east Pacific.

7.5 Mr Enrique Palacios presented changes in, and the development of, the MM5 numerical model (version 2) being developed in Ecuador. He commented on the products that had been developed using national and regional real data (observations) with a resolution of 45 km and taking account of the topography and conditions of the ground.

7.6 Mr José Daniel Pabón gave a detailed explanation of how to apply climate variability to forecasts and described useful features for developing prediction models at both the local and regional level using global models. Furthermore, he gave information on the Tercile Method used to develop climate prediction in a given region. Lastly, he commented on the type of information needed by users, emphasizing the care that must be taken by experts when disseminating climate prediction information among users, particularly as regards the scope and limitations of this information and the language used.

7.7 Mr Christopher Cunningham Castro explained the climate prediction model and the statistical modelling system, and how those tools made it possible to make predictions for a specific region. He also indicated the products supplied by CPTEC to users such as INFOCLIMA, whereby quarterly climate forecasts for Brazil and the monitoring of global and local parameters were carried out.

## **8. RECOMMENDATIONS**

After completion of the section on climate data application and prediction, participants made the following recommendations:

- That countries of the region familiarize themselves with the CLIPS Project and use it to improve their climate applications,
- To promote the incorporation of knowledge on various components of climate variability other than the El Niño/La Niña Southern Oscillation into prediction models for countries of the region,
- To use the CLIPS Project to exchange ideas and experiences concerning interaction with climate prediction information users, above all as regards the language used and dissemination methods (experts) and the assimilation (users) of this information,

- That CIIFEN be viewed as a regional coordinating body for channelling initiatives of interest to the region into the two areas of training programmes and promotion of the use of a regional database.

## **9. CLOSURE OF THE SEMINAR**

The International Seminar on Climate Data Rescue, Management, Applications and Prediction was closed on 4 April 2003 at 2.10 p.m.

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**PROVISIONAL AGENDA****MONDAY, 31 March**

1. Opening of the seminar, welcoming remarks, approval of the agenda and working timetable.
2. Overview of the WMO Data Rescue (DARE) Project (*Paul Llansó*)
3. Overview of data rescue in South America and Central America (*Alain Gioda and Rodolfo Sanchez*)
4. Data Rescue of manuscript data in National Meteorological Service archives.
5. ARCHISS for non-National Meteorological Service (NMS) archives.
6. Description of the use of digital camera and storage and digitization of digital images (*Rodolfo Sanchez*)

**TUESDAY, 1 APRIL**

7. Participants' reports on the status of their NMS archives (*Rodolfo Sanchez*)
8. Developing a national DARE project (*Gioda, Llansó and Sanchez*)
9. Participants draft their national DARE projects.

**WEDNESDAY, 2 APRIL**

10. Participants present their draft national DARE projects, discussion of the draft projects.
11. Discussion of the next steps, including the potential role of the CIIFEN in assisting the national DARE activities and issues regarding CIIFEN's establishing its regional climate database.
12. CIIFEN (*José Luis Santos*)
13. Concept of the Climate Computing (CLICOM) Project, tasks of climate database management, and brief history of implementation of CLICOM software and equipment in the 2 regions (RA III and IV) (*Luis Carrasco*)
14. Transition to the future Climate Database Management Systems (CDMSs), including the Evaluation meeting in Geneva last year, and summarization of the results for each of the seven CDMSs (*Luis Carrasco*)

#### **THURSDAY, 3 APRIL**

15. Discussion of the participants' systems and needs, and the next steps-including the potential role of the CIIFEN in assisting the national CDMS activities, and issues regarding CIIFEN's establishing its regional climate database (*Luis Carrasco*)
16. Introduction to CLIPS Activities (*Barbara Tapia*)
17. Aspects of Regional Climate Variability (General) (*José Daniel Pabón*)
18. Introduction to Seasonal Forecasting (*Christopher Cunningham Castro*).

#### **FRIDAY, 4 APRIL**

19. Regional Scale Evolutions of Climate Anomalies (with examples from recent events) (*Rodney Martínez*)
20. Numerical Predictions in Ecuador (*Enrique Palacios*)
21. Climate Variability for Climate Prediction and Application (*José Daniel Pabón*)
22. Seasonal Forecasting - Applications (*Christopher Cunningham Castro*)

## SURVEY ON CLIMATE DATA MANAGEMENT, AND DATA RESCUE

Country:.....

Organization:.....

Name of the contact person:.....

Position:.....

Address:.....

Telephone:.....Fax:.....

E-mail:.....

**1. How many agencies collect meteorological and hydrological data in your country?**

Government agencies

Private agencies

**2. Is there a centralized meteorological and hydrological data archive in your country?**

Yes

No

**Station history:**

**3. How many observing stations have been operating in your country?**

Station type	Approximate mean length of Records (Years)		
	<10	10-30	>30
Raingauge			
Climatological			
Agromet			
Synoptic			
Upper Air			
Automatic			
Other			

**4. What percentage of your data stored on paper and on electronic media?**

Station type	Paper (%)					Electronic (%)				
	Paper sheets	Registers	Strip charts	Other	Computer tapes and cartridges	Optical disk	CD ROM	Microfiche	Diskettes microfilm	Other
Raingauge										
Climatological										
Agromet										
Synoptic										
Upper Air										
Automatic										
Other										

**MANAGEMENT OF DIGITAL DATA**

**5. What Climate Data Management System is used in your country?**

**6. Are all of the current data routinely digitized?**

Yes

No

Describe problems encountered.

**7. Do you have your past data digitized?**

Yes

No

Describe problems encountered.

**8. Are data quality controlled?**

Yes

No

Describe problems encountered.

**9. What methods are used for this purpose?**

- Statistically
- Empirical
- Others (please list)

**10. On what media is the digitized data field stored?**

- Hard disks
- Diskettes
- Optical disks
- CD-ROM's
- Computer tapes and cartridges
- Other (please name it)

Describe problems encountered.

**11. What is the level of expertise of the System Administrator and the Database Manager?**

**DATA RESCUE**

**12. Do you have special rooms to archive the climate and hydrological documents?**

- Yes
- No

**13. Are humidity and temperature in the archive rooms controlled?**

- Yes
- No

**14. Are the archives managed by a professional archivist?**

- Yes
- No

Describe problems encountered.

**15. Have you had paper archives destroyed so far?**

- Yes
- No

If yes, please describe how it happened

**16. Are your data quality controlled before being archived?**

- Yes  
 No

If the response is NO, explain why and skip to question 11.

**17. What methods are used for this purpose?**

- Statistically methods  
 Empirical methods  
 Other (Please list.)

**18. Do you experience problems in archiving paper document (humidity, temperature, termites...) in you country?**

- Yes  
 No

If Yes, describe briefly.

**Data Rescue Activities**

**19. What actions have already been taken in your country to rescue your climate and hydrological data?**

**20. Which methods have been used for data rescue in your county?**

- Key-entering       Digital scanner       Digital camera  
 Microfiche       Microfilm       Other (please name it).

**21. Does your country need assistance to rescue the paper archives?**

- Yes  
 No

Describe problems encountered.

**22. Does your country have plans to implement data rescue project?**

- Yes  
 No

If answer is yes, please describe these plans

**23. Could you suggest priority actions to rescue data according to your country needs**

Actions

Objective

**LIST OF ACRONYMS**

<b>RA</b>	Regional Association
<b>ARCHISS</b>	Archival Climate History Survey
<b>CCI</b>	Commission for Climatology
<b>CDMS</b>	Climate Database Management System
<b>CIIFEN</b>	International Research Centre on El Niño
<b>CLIPS</b>	Climate Information and Prediction Services
<b>CPTEC</b>	Center for Weather Forecasts and Climate Studies
<b>DARE</b>	Data Rescue
<b>ERFEN</b>	Regional Study of the Phenomenon El Niño
<b>OMM</b>	World Meteorological Organization
<b>OPAG</b>	Open Programme Area Group
<b>NMS</b>	National Meteorological Service
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization