

WORLD METEOROLOGICAL ORGANIZATION

RA IV HURRICANE COMMITTEE

**FINAL REPORT
OF THE
TWENTY-FIFTH SESSION**

**MEXICO CITY, MEXICO
31 MARCH TO 3 APRIL AND 7 APRIL 2003**

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION (Agenda item 1)

1.1 Opening of the session (agenda item 1.1)

1.1.1 At the kind invitation of the Government of Mexico, the twenty-fifth session of the RA IV Hurricane Committee was held at the Conference Hall of the Ministry of Foreign Affairs in Mexico City from 31 March to 3 April and 7 April 2003. The opening ceremony commenced at 0915 hours on Monday, 31 March 2003.

1.1.2 On behalf of Professor G.O.P. Obasi, Secretary-General of WMO, Mr Katsuhiko Abe, the WMO Secretariat representative, welcomed the participants and expressed the appreciation of WMO to the Government of Mexico for the kind invitation to host the annual session of the Committee. He stated that the Secretary-General had expressed his view that special efforts are needed to develop and improve the capabilities of National Meteorological and Hydrological Services in developing countries in the light of the importance for national sustainable development. Mr Abe pointed out that a well-functioning early- and timely – tropical cyclone warning system is one of the most effective measures for tropical cyclone disaster reduction.

1.1.3 The Chairman of the Hurricane Committee, Mr Max Mayfield (USA), expressed his welcome to participants. He thanked Mexico for hosting the session of the RA IV Hurricane Committee in 1979, 1993 and this year in Mexico City. He expressed his sincere appreciation to the President of RA IV and WMO for the support to the Hurricane Committee. Mr Mayfield was very proud that all 25 Members of the Hurricane Committee were working together as one harmonized team under the well coordinated Hurricane Operational Plan.

1.1.4 The General Coordinator of the Civil Protection of Government, Ms Carmen Segura Rangel, expressed her welcome to participants in the Hurricane Committee. She believed that timely and early hurricane warning services working together among National Meteorological Service, National Disaster Prevention and Preparedness Agency, and National Civil Defense would significantly contribute to hurricane disaster reduction and consequently to encourage national sustainable development.

1.1.5 The Deputy Director General of the National Water Technical Commission, Mr Felipe Arreguin Cortés, welcomed the participants, and pointed out that major natural disasters were caused by hurricanes in Mexico. He stated that good assistance being provided by Mexican Meteorological Service and RSMC Miami-Hurricane Center is essential to mitigate hurricane damage. He wished the participants every success in their deliberations.

1.1.6 The session was attended by 43 participants, including those from 24 Members of WMO and observers from Bermuda, and six Regional and International Organizations. The list of participants with the capacities in which they attended is given in Appendix I.

1.2 Adoption of the agenda (agenda item 1.2)

The Committee adopted the agenda for the session as given in Appendix II.

1.3 Working arrangements for the session (agenda item 1.3)

The Committee decided on its working hours and the arrangements for the session.

2. REPORT OF THE CHAIRMAN OF THE COMMITTEE (Agenda item 2)

2.1 The Chairman reported to the Committee that RSMC Miami continued to assist the RA IV Members in the coordination of watches and warnings in the Tropical Cyclone bulletins during 2002. RSMC Miami will begin issuing five-day hurricane forecasts this year, extending the three-day forecasts issued since 1964. RSMC Miami is charged with protecting life and property against tropical cyclones by issuing timely and accurate hurricane forecasts, watches and warnings for the U.S. The agency is extending the forecasts to five days after a two-year test. The agency cited customer needs for longer-range forecasts, and major improvements in track forecasting skill over the past few decades as reasons for lengthening the forecasts. RSMC Miami continues to encourage the use of software like HURREVAC to display the RSMC Miami forecasts.

2.2 In the U.S., tropical cyclone forecasts are coordinated with the U.S. National Weather Service (NWS) Weather Forecast Offices and the Department of Defense (DOD) via a dedicated hotline. The Hurricane Liaison Team is activated to assist with the coordination among Emergency Managers. Activation of a media pool during hurricane events continues to be a very efficient way of communicating the tropical cyclone forecasts in the U.S. The NOAA Hydrometeorological Prediction Center (HPC) in Washington is the backup for the RSMC Miami.

2.3 One meteorologist from Mexico, one from Costa Rica and one from the Netherlands Antilles were part of the RSMC Miami attachment in 2002. They were helpful in improving hurricane warning and coordination in the region while gaining valuable training in hurricane forecasting. This programme continued to be successful and the Chairman hopes to continue with this programme during the 2003 hurricane season. RSMC Miami and the WMO Secretariat will again advertise the programme before the 2003 season.

2.4 In addition to the participants from these countries, three meteorologists from the Mexican Air Force were stationed at the RSMC Miami during 2002. They provided assistance to the Hurricane Warning Program primarily by helping to coordinate timely clearances that allowed hurricane surveillance and reconnaissance flights over Mexico during potential land falling tropical cyclone events.

2.5 The 2002 RA IV Workshop on Hurricane Forecasting and Warning took place at RSMC Miami from 17-27 April. The 2003 RA IV Hurricane Forecasting and Warning workshop started 24 March and is currently ongoing. These workshops were conducted in English only. The Chairman hopes that the English-Spanish version of the course will be restored.

2.6 A Caribbean Hurricane Awareness Tour (CHAT) took place during 18-23 March 2002 and consisted of a U.S. Air Force C-130 hurricane hunter plane visiting the Yucatan Peninsula, Mexico (Chetumal), Belize City, Belize, Tegucigalpa, Honduras, Santo Domingo, Dominican Republic and San Juan, Puerto Rico. The CHAT was very successful in conveying the hurricane problem to communities at high risk and in promoting the team effort involved in the hurricane program. The CHAT also enhanced the visibility of the individual country weather forecasting and emergency management offices. See Fig.1. Another Hurricane Awareness Tour (HAT) took place along the U.S. coast of the Gulf of Mexico during 5-10 May 2002. Unfortunately, the CHAT for 2003 was cancelled.

2.7 Satellite imagery continues to be the primary observing tool in the tropics. A new generation of U.S. satellites is expected to provide more coverage in the future. Reconnaissance aircraft has continued to play an important role in monitoring track and intensity of tropical cyclones. A new tool, the Stepped-Frequency Microwave Radiometer (SFMR) will soon be operational onboard the NOAA P-3 reconnaissance aircraft to provide surface winds. Rawinsonde data are very important observations used not only to initialize numerical models, but also to calibrate satellite data.

2.8 As part of the United States Weather Research Program (USWRP), there is a Joint Hurricane Testbed (JHT). The JHT is a mechanism for evaluating research projects with the goal of transitioning successful projects into operations.

2.9 The American Meteorological Society (AMS) 25th Conference on Hurricanes and Tropical Meteorology took place in San Diego, California from 29 April to 3 May. Lixion Avila continues as a member of the AMS tropical committee and will chair the next meeting which will take place 26-30 April 2004 at Miami Beach, Florida. The Chairman recommends that the WMO consider combining the 2004 WMO RA IV Hurricane Committee meeting with the AMS Tropical conference.

2.10 Max Mayfield and Lixion Avila participated in the RSMC Directors' meeting, which took place in Fiji during 26-29 November 2002.

2.11 The Fifth International Workshop on Tropical Cyclones (IWTC-V) took place in Cairns, Australia from 3-12 December 2002. Max Mayfield and Lixion Avila represented the WMO RA IV and the National Hurricane Center. Eleven candidates from RA IV (three by WMO; five by the U.S. NWS; two by Canada; and one by Mexico) were sponsored to participate in the workshop. The IWTC organizing committee (Lixion Avila represents RA IV) has decided to bring the meeting to RA IV. The next IWTC workshop is scheduled to take place in Costa Rica in 2006. The exact dates are yet to be determined.

2.12 U.S. Air Force Reconnaissance Hurricane flights over and near Cuba during Hurricanes Isidore and Lili provided very useful data coverage not previously obtained. Cooperation by all parties involved is fully appreciated.

2.13 Radar imagery received operationally via the internet from Cuba and Mexico was extremely useful to the RSMC Miami during Hurricanes Isidore and Lili.

3. COORDINATION WITHIN THE WMO TROPICAL CYCLONE PROGRAMME (Agenda item 3)

3.1 The Committee was informed that the TCP Web site is now linked to the TC RSMCs and Tropical Cyclone Warning Centres, which enables the public, including media, quick access to the official cyclone latest information including advisories being provided by those Centres.

3.2 The Committee was also informed that the Fourth Tropical Cyclone RSMCs Technical Coordination Meeting was held at the RSMC Nadi – Tropical Cyclone Centre from 26 to 29 November 2002. Representatives of JCOMM and CBS also attended the Meeting. The major outcome of the meeting was submitted to the Fourteenth WMO Congress (Cg–XIV) (Geneva, May 2003).

3.3 At the last session, the Committee had expressed its strong disappointment that no funds were allotted for the 2003 Hurricane Workshop. The Committee had invited the President of RA IV in consultation with other Executive Council members at the 2002 Executive Council in June to seek a possible way of holding the 2003 Hurricane Workshop. To this end, a minimum of necessary funds for the 2003 Hurricane Workshop was transferred by canceling other TCP activities. The Committee noted with satisfaction that the RA IV Workshop on Hurricane Forecasting and Warning, including topics related to Public Weather Services was being conducted in English at the RSMC Miami from 24 March to 5 April 2003 with 13 trainees from Region IV.

3.4 The Committee at its last session had strongly endorsed the need to have its sessions and the RA IV Workshops on Hurricane Forecasting and Warning annually. The Committee was informed that the 2002 Executive Council stressed that the Tropical Cyclone Programme (TCP) should receive highest priority as part of the World Weather Watch Programme, and budgetary provisions for TCP should, therefore, be increased for the Fourteenth financial period (2004 to 2007) (14th FP). Nevertheless, only three sessions of the RA IV Hurricane Committee and only three RA IV Workshops on Hurricane Forecasting and Warning are being proposed by the Secretary-General of WMO to be budgeted under the Programme and Budget for the 14th FP for consideration at the Cg-XIV.

3.5 With a view to emphasizing the critical nature of these two events to the Region, the Committee requested the Secretary-General of WMO to fully support these extremely important annual events and urged Members of the Region attending the Cg-XIV to actively support the need for four annual sessions of the Hurricane Committee as well as four annual RA IV Workshops on Hurricane Forecasting and Warning, for the 14th FP.

4. REVIEW OF THE PAST HURRICANE SEASON (Agenda item 4)

4.1 Summary of the past season (agenda item 4.1)

4.1.1 A report of the 2002 hurricane season in the Atlantic basin and in the Eastern North Pacific was presented to the Committee by Dr Lixion Avila, Hurricane Specialist, on behalf of RSMC Miami - Hurricane Center.

RSMC Miami 2002 Atlantic Hurricane Season Summary

4.1.2 There were twelve named tropical cyclones in the Atlantic basin in 2002, of which four became hurricanes. Two of these became major hurricanes – Category Three or higher on the Saffir-Simpson Hurricane Scale (111 m.p.h. or higher). Even though the number of named storms in 2002 was above the long-term average (ten), the number of hurricanes was below average (long-term average is six). Another measure of seasonal activity, the “accumulated cyclone energy”, which is the sum of the squares of the maximum wind speeds every six hours, also indicates below normal activity, because there were many weak and short-lived tropical cyclones in 2002. There were also two tropical depressions that did not become storms.

4.1.3 Eight named tropical cyclones formed in September, making it the busiest calendar month on record in the Atlantic. Tropical cyclones caused 22 deaths overall. It is interesting that the first 2002 Atlantic hurricane did not develop until September 11th, the latest date for such an occurrence since the beginning of the reconnaissance aircraft era, 1944. Eight tropical cyclones made direct hits in the United States. Lili was the first U.S. hurricane landfall since Irene in 1999. Total damage in the United States was about 1.2 billion dollars, mostly from Lili and Isidore. There was extensive damage from Isidore in western Cuba and Mexico's Yucatan Peninsula. Just eleven days after Isidore hit extreme western Cuba, Lili struck the same area and produced even greater destruction. Lili also caused extensive flood damage in Jamaica.

RSMC Miami 2002 Eastern Pacific Hurricane Season Summary

4.1.4 Tropical cyclone activity in the eastern North Pacific hurricane basin was below average in the year 2002. There were twelve cyclones of at least tropical storm strength, and of these, six became hurricanes. In an average season, there are fifteen named storms and nine hurricanes. Although the total of six hurricanes was below normal, there were five major hurricanes, one above the long-term average of four (a major hurricane has maximum 1-min average winds greater than 111 m.p.h., corresponding to category three or higher on the Saffir-Simpson Hurricane Scale). Overall activity was fairly evenly distributed over the nominal 15 May - 30 November season, with tropical cyclones forming in each month. Kenna was the strongest hurricane of the season, with 165 m.p.h. peak winds. In addition to the twelve named tropical cyclones in 2002, there were four depressions that did not reach tropical storm strength.

4.1.5 Eastern North Pacific tropical cyclones were directly responsible for 4 deaths in 2002; these resulted from Hurricane Kenna, which made landfall north of Puerto Vallarta, Mexico near San Blas in late October. Tropical Storm Julio also made landfall in Mexico, and rains from Tropical Storm Boris caused damage even though the center of Boris remained offshore.

4.1.6 The summary report on the 2002 hurricane season provided by the RSMC is given in Appendix III.

4.2 Reports on hurricanes, tropical storms, tropical disturbances and related flooding during 2002 (agenda item 4.2)

4.2.1 Many members provided the Committee with reports on the impact of the season's tropical cyclones and other severe weather events such as floods, storm surges and tornadoes in their respective countries. With respect to Hurricanes Isidore, Lili and Kenna, representatives of Barbados, British Caribbean Territories (BCT) (Cayman Islands), Cuba, Jamaica, and Mexico provided the Committee detailed informative reports.

4.2.2 The summary reports on the 2002 hurricane season provided by Member countries are given in Appendix IV.

5. COORDINATION IN OPERATIONAL ASPECTS OF THE HURRICANE WARNING SYSTEM AND RELATED MATTERS (Agenda item 5)

5.1 The Committee designated Mr Tyrone Sutherland of the BCT to serve as rapporteur for the discussions under this agenda item. The Committee discussed several issues relating to the effectiveness of the regional hurricane warning system. These comprised both scientific and technical matters raised by a number of Committee members and by the RSMC Miami.

5.2 In this regard, the Chairman made a presentation on the RSMC's internal coordination mechanism undertaken during the hurricane season. This involved coordination (a) at the national level with multi-federal agencies, (b) within the US National Hurricane Operational Plan, and (c) within the WMO Hurricane Operational Plan for RA IV. The Chairman explained that, at the operational level, the RSMC's coordination was based on:

- A six-hour forecast cycle;
- NWS Hurricane Coordination Hotline for internal agencies, such as the Department of Defense, and the NWS Office in Puerto Rico;
- WMO Region IV coordination;
- A US Media Pool; and
- A Hurricane Liaison Team.

5.3 The RSMC informed the Committee about the continuing difficulties with the coordination with Haiti during the 2002 hurricane season. The Chairman explained that, while there were some promising indicators for improvement in the RSMC-Haiti coordination in the future, the RSMC would continue to issue the coastal watches and warnings for Haiti, as indicated in the RA IV Hurricane Operational Plan.

5.4 The Chairman reminded countries that their Forecast and Warning Offices should not wait for the RSMC Miami to initiate telephone coordination calls when tropical cyclones threaten their territories, but could initiate the calls to the RSMC themselves.

5.5 The RSMC Miami also reminded the Committee of the importance of post-cyclone reports. Countries were urged to collect data and to share this with the RSMC Miami within 15 days of the event, as indicated in the Hurricane Operational Plan. In this regard, the Chairman praised Cuba for the data sent after the 2002 systems.

5.6 In connection with the coordination with disaster officials in the USA, the Chairman explained how the RSMC Miami conducts its briefings for national emergency management teams. He also noted the importance of the US National Hurricane Awareness Week. Information on the Week was posted on the RSMC Miami's Web site, with a different focus on each day of the week, in order to motivate families and others to prepare for tropical storms and hurricanes before the start of the hurricane season. The Committee was also informed that a similar Hurricane Awareness Week is undertaken in Puerto Rico.

5.7 Several Committee members compared their own situations concerning tropical cyclone coordination at their national levels, particularly in connection with the issue of warnings and the role of the media. Some Spanish-speaking members referred to problems they encountered because their NMCs did not all have the right to issue advisories and warnings directly to the public, noting that this was done solely by civil defense and disaster agencies. The Meeting agreed that this demonstrated the need for a proper internal coordination to be developed and urged the NMCs to take a lead in this regard.

5.8 In this connection, the Committee called on WMO to increase its Public Weather Services (PWS) activities with respect to media presentation skills in the Spanish-speaking countries. This, it was felt, would help the NMCs in emphasizing and strengthening their role with the local media and civil protection agencies during weather-related emergencies. At the same time, the Committee called for greater collaboration and a team approach between the NMCs and all the agencies involved, instead of competing for the limelight or interfering with the roles of individual agencies.

5.9 In other matters concerning the hurricane warning system, the RSMC Miami indicated that it would make available on its Web site, information on the outputs of the various numerical models used by the RSMC Miami. This was in response to a request from Météo-France, which felt that such information, in real-time, could assist in improving the understanding of the technical discussion in the advisories. The RSMC Miami indicated that the information would be available in ftp format and instructions for the access would be made available.

5.10 Météo-France provided the Committee with updated information on its off-shore weather buoys. It indicated that the buoy, WMO-ID N° 41101, located 14.5°N; 56.2°W, was repaired on October 23, 2002. Data from this, along with buoys No: 41100 and No. 41098 were available on the GTS in the messages SMVD01 LFPW, SIVD21 LFPW, SNVD41 LFPW in SHIP WMO format and SOVD12 LFPW in WAVEOB WMO format.

5.11 Météo-France informed the Committee that its Research and Development Division had adapted a specific cyclonic wave model to provide outputs in the vicinity of Martinique, Guadeloupe and St. Martin. It mentioned that these outputs, currently as gif images only, were only for internal use at the time and needed to be improved. They could be made available on its Web site <http://www.meteo.gp>, if requested, for neighbouring islands such as St. Lucia, Dominica, Antigua, etc., which could take advantage of the results. Météo-France indicated that it would be possible to run the model for other locations but this would require accurate bathymetric data and complementary developments. The Committee was informed that GRIB outputs might be available by the middle or the end of 2003. A presentation on the model can be found under Agenda item 9 "Scientific Lectures and Discussions".

5.12 The Committee recalled that, at its 24th session in 2002, the RSMC Miami circulated a survey on the possibility of issuing an extended tropical cyclone forecasts to 5 days. There was considerable discussion and significantly differing views at the time on the pros and cons of such forecasts, particularly the impact on various countries and sectors of society. At this session, the RSMC Miami made a detailed presentation, led by the Chairman of the Committee, on the extended 5-day forecast. The features of the presentation were:

- The NHC has issued a 3-day forecast since 1964;
- There have been major improvements in the track forecasts over the past few decades, with some improvements in the speed forecast, although little change in the intensity forecasts;
- The 5-day forecast error is about the same as the 3-day forecast error 15 years ago;
- The US Navy and others require a 4 to 5-day forecast for their operations;
- Surveys of the user community in the USA show that 80 % expect a 5-day forecast to be useful or essential;
- NHC/RSMC will issue a 5-day track and intensity forecast for tropical cyclones, starting in the 2003 hurricane season.

5.13 The Committee accepted the RSMC Miami proposal that, from 2003, a 96-hour and 120-hour forecast of cyclone position and wind maximum would be added to their forecast products, but with some text indicating that errors could be large at 4 to 5 days. In the products, therefore, the extended outlook bulletin for days 4 and 5 would look like the old extended outlook to 3 days, while, in the graphic products, a separate extended cone of probability would be added to the normal graphic to 3 days.

5.14 Nonetheless, the RSMC Miami cautioned that it did not want users to focus on the point forecast in the 4-5 day period, but on the cone of probability. It concluded that, while the 4 and 5-day forecast would be useful to many, it should be used with caution, knowing that errors could be large, and that the forecast could not account for the possible formation of new tropical cyclones within the 5-day period. Samples of the new formats for the Tropical Cyclone Discussion (TCD) and the Tropical Cyclone Forecast/Advisory would be included in the new edition of the RA IV Hurricane Operational Plan.

5.15 In response to questions, members were informed that some of the graphics producers/vendors planned to use the new extended forecasts but would likely downplay the 4-5 day period. The RSMC also indicated that several of the best numerical models were being used in generating the 4 to 5-day forecast, including the US Global Forecast System (formerly Aviation Model), the UK Met. Office Model, the US Navy "NOGAPS" Model and the Geophysical Fluid Dynamics Laboratory (GFDL) Model.

5.16 The Committee agreed to changes in the headers of all Tropical Weather Products issued by the RSMC Miami. The change consists of replacing the line "NATIONAL WEATHER SERVICE MIAMI FL" by "NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL". These would also be reflected in the RA IV Hurricane Operational Plan.

5.17 The Committee discussed the access by the RSMC Miami and the NMCs to the radar imagery from each country in the region. It recognized that most radar data was now available via the Internet. However, it agreed that measures should be put in place so that access to this data would be assured, especially during the passage of tropical cyclones, when the Internet access could be made difficult by the high public use. The Committee noted that the Web site (www.caribweather.net) in Curaçao was designed to house radar images of as many regional radars as possible and that this facility could be used as a back-up access to data. The Committee agreed that, while there was no major problem with access to radar imagery at the time, consideration should be given to the creation of password-access Internet mirror sites in the future to ensure the RSMC Miami and NMC access.

5.18 The Meeting was informed that, at the last coordination meeting of Directors of all the tropical cyclone RSMCs around the world, held in Fiji during November 2002, recommendations were made with respect to the implementation of correct formats and data designators in the issuance of the International Civil Aviation Organization (ICAO) messages for tropical cyclones around the world. One of the recommendations was for the deletion of the 18-hour forecast, since none of the RSMCs actually issued a forecast for that time.

5.19 In that regard, the Committee recalled its discussions in 2002 on the ICAO standard format, revised in 2001, for the issue of tropical cyclone advisory messages for international civil aviation. That revised format includes an 18-hour forecast position, used in most airline automated pre-flight planning systems. However, since an 18-hour forecast was not likely to be issued by any of the RSMCs, the Committee noted the proposal by all RSMCs that ICAO should, instead, consider dropping that forecast position from its requirements. The Committee, therefore, suggested that ICAO and the RSMC Miami should urgently discuss ways to reach a solution to this problem.

5.20 The Committee recalled that, at its session in 2002, the delegate from France requested consideration of a change of the name "**Frances**", which is on the list for 2004, to be made at this session. The Committee agreed to change the name after the 2004 hurricane season. The Committee also decided to retire the names of the three hurricanes that caused significant damage and loss of life during 2002. These were *Isidore* and *Lili* in the North Atlantic basin, and *Kenna* in the Eastern North Pacific basin. Regarding a change of the name "Lili", it will be made at the twenty-sixth session of the Committee in April 2004. The other two, i.e. Isidore and Kenna were replaced by the names **Ike** and **Karina** respectively, which will be reflected in the WMO RA IV Hurricane Operational Plan.

6. REVIEW OF THE RA IV HURRICANE OPERATIONAL PLAN (Agenda item 6)

6.1 Under this agenda item, the Committee designated Mr Carlos Fuller (Belize) (Vice-chairman and representative of English speaking members) and Dr José Rubiera (Cuba) (Vice-chairman and representative of Spanish speaking members) to serve as rapporteurs. Mr William Appleby (Canada) accepted to serve as a coordinator for ATTACHMENT 8 A (LIST OF TELEPHONE NUMBERS OF NATIONAL METEOROLOGICAL SERVICES AND KEY OFFICIALS) to the RA IV Hurricane Operational Plan.

6.2 The Committee reviewed in depth the Operational Plan, taking into account changes and additions, which came out from the other agenda items, in particular on item 5 above.

6.3 The Committee was informed that the latest version of the Hurricane Operational Plan is available from the TCP Web site. It noted with concern that the list of telephone numbers of national Meteorological Services and key officials appended as ATTACHMENT 8 A to the Plan should be used only for operational purposes. To this effect, the WMO Secretariat was invited to mask the ATTACHMENT 8 A and inform RA IV Members of its password, if feasible.

6.4 The Committee recommended to the President of RA IV the approval of the amendments to the text of the Plan. The President of RA IV approved these amendments to the RA IV Hurricane Operational Plan. The Committee urged the WMO Secretariat that these amendments and changes made to the Plan should be posted to the TCP Web site both in English and Spanish, before commencement of the 2003 hurricane season.

6.5 Météo-France agreed to update the translation of the new 2003 edition in French and to distribute it to Haiti.

7. REVIEW OF THE COMMITTEE'S TECHNICAL PLAN AND ITS IMPLEMENTATION PROGRAMME FOR 2003 AND BEYOND (Agenda item 7)

(a) The Committee designated Mr C. Fuller (representative of English-speaking members) and Dr J. Rubiera (representative of Spanish-speaking members) to serve as rapporteurs;

(b) A detailed review of all components of the Technical Plan and its Implementation Programme was carried out, taking into account the development and progress made by Members since the twenty-fourth session of the Committee. The President of RA IV approved the updated RA IV Hurricane Committee's Technical Plan and its Implementation Programme, which is given in Appendix V to the report.

7.1 Meteorological Component (agenda item 7.1)

7.1.1 The Committee noted that the review of the meteorological component of the Plan focused on the status of implementation of the World Weather Watch (WWW), the need for additional data, facilities and arrangements for the purpose of tropical cyclone detection, monitoring and forecasting, and on the modernization of the tropical cyclone warning system through regional coordination and cooperation.

OBSERVING SYSTEMS

7.1.2 The Committee was informed that the current Regional Basic Synoptic Network (RBSN) in Region IV, which was adopted by the thirteenth session of RA IV (Maracay, Venezuela, 28 March to 6 April 2001) through its Resolution 2 (XIII-RA IV), comprised 511 surface stations, 143 upper-air stations and 25 automatic marine stations. The RBSN, being a minimum regional requirement to permit Members to fulfill their responsibilities within the WWW, continued to provide essential support for hurricane detection and warning services. It should be noted that during the intersessional period the overall status of implementation of the RBSN in Region IV remained unchanged comprising 90% for surface observations and 91% for upper-air observations.

7.1.3 According to the results of monitoring carried out in October 2002, 435 stations, i.e. almost 85 % (88% was in 2001) out of the total number of RBSN surface stations, were providing more than 50% of expected SYNOP reports. The number of stations providing less than 50% of expected reports had increased from 35 to 48. Another alarming tendency was that the number of "silent" stations increased from 26 stations to 29 stations, constituting almost 6% of the total number of RBSN surface stations. It should be noted those gaps in the SYNOP data coverage exist over certain areas in the southern part of the Region (Guatemala, Haiti, Nicaragua and Venezuela).

7.1.4 The availability of upper-air data from the RBSN stations in 2002 indicated that 122 stations or 85% of the total number of RBSN upper-air stations were providing at least 50% of expected reports which shows some improvement as compared with 2001 (119 stations or 83%). The number of stations providing less than 50% of expected TEMP reports continued to be noticeably high, constituting 11 stations or almost 7% of the total number of RBSN stations. It should be noted, however, that the number of "silent" stations decreased from 13 to 9 stations. There were gaps in TEMP data coverage to be provided by certain RBSN stations in Costa Rica, Cuba, Guatemala, Honduras, Nicaragua and Panama. Many Members informed the Committee that the major difficulties experienced especially by developing countries in maintaining reliable implementation of RBSN stations were due to the high cost of consumables and spare parts.

7.1.5 The exercise of the Special MTN monitoring carried out in 2002 has shown a global satisfactory availability of SYNOP and TEMP reports from Region IV. About 84% of the SYNOP and TEMP reports were received from the stations comprising the RBSN in Region IV. However, it was noted that there were significant differences in the availability of data within the Region, particularly between the northern and southern parts separated by latitude 30°N.

Meteorological Telecommunications

7.1.6 The Committee was informed that the two-way satellite-based Regional Meteorological Telecommunication Network (RMTN), which is integrated with the International Satellite Communication System (ISCS) operated by the USA for ICAO/WAFS Working Group, is fully operational in all countries concerned. The "STAR4" PC-based terminal equipment needs to be changed because of the technology upgrade of the satellite segment, which will necessitate new workstations to handle the protocol advancements.

7.1.7 The telecommunication provider's contract for the present ISCS will terminate at the end of September 2003. The contract for the provider of the successor of the satellite-based telecommunication service of the ISCS was awarded by the US NWS in December 2002. The successor ISCS will significantly improve the data transmission capacity and flexibility of the current system by using Transmission Control Protocol/Internet Protocol (TCP/IP) procedures in place of the current X.25 protocol, including bursting capability to accommodate peak loads. The cost-effectiveness of the satellite-based RMTN will also be improved, with respect to both an increased capacity and reduced recurrent costs. The TCP/IP procedures, as used on the Internet, also greatly facilitate the use of off-the-shelf PC-based terminal equipment.

7.1.8 The transition to the new system will be completed by the end of the year 2003. The Very Small Aperture Terminal (VSAT) stations currently in use in all Member countries will be retained, but will be upgraded by the replacement of some interface components. This upgrade will be carried out by the ISCS telecommunication provider. The currently used data terminal/display equipment (STAR4) must be replaced to accommodate the new RMTN/ISCS technical arrangements, including TCP/IP. The replacement will bring significant benefits to NMSs, as the workstations now available on the market have considerably improved in comparison with the STAR4 equipment. A temporary dual operation (X.25 and TCP/IP) is planned from approximately September 2003-December 2003.

7.1.9 The replacement of the STAR4 data terminal/display equipment is the responsibility of each Member concerned, either from their own funding or with assistance from the WMO Technical Cooperation, in particular the Voluntary Cooperation Programme (VCP). The project for the Sustainable Development of Small Island Developing States (SIDS) for the Caribbean, supported by Finland and implemented by WMO, supports the provision of workstations for most of the Caribbean NMSs. The WMO Secretariat is carrying out the procurement process for the SIDS project. The Committee noted that the project is of critical importance to the Region and it emphasized that all the equipment, operation, maintenance and support aspects should be fully assessed to ensure a successful and sustainable implementation and operation of the new RMTN/ISCS system. It noted with appreciation that informal coordination had already taken place, and it underlined the importance of the involvement of technical regional expertise prior to the selection of a vendor, in particular from the US-NWS which is managing the overall RMTN/ISCS operation.

7.1.10 The Committee urged countries not covered by SIDS project to submit VCP projects to WMO, as appropriate.

7.1.11 The telecommunication arrangements and data display/handling terminals for the Caribbean meteorological offices not connected to the satellite-based RMTN were also planned in the framework of the SIDS project.

7.1.12 Furthermore, RTH/WMC Washington has enhanced Web server services in support of the NMSs in the region, providing access to data and products files as well as procedures for ingesting observational meteorological bulletins via the Internet, as a back-up to the RMTN.

7.1.13 Ms Jennifer Lewis (USA) made a presentation entitled “International Satellite Communication System (ISCS) - Systems Transitions and Workstation Replacements”:

- ISCS System and the RMTN
- ISCS Deployment Goals
- ISCS Transition Time Line
- Plan for Upgrade of VSAT and Ground System
- Funding for Space Segment of Two-way Workstations
- Benefits to Two-way Systems
- Benefits to Common Workstation
- Funding for Ground System of All Two-way Systems
- USA’s Primary Interests for the ISCS Transition
- Important Dates for Workstation Replacement.

7.1.14 The Committee expressed its gratitude for her excellent presentation and requested the text to be given as an Appendix to this report (see Appendix VI).

Satellite Activities

7.1.15 The Committee was informed that during 2002, the most significant and important change since the early 1990s to the WWW occurred – the space-based component of the Global Observing System (GOS) expanded to include appropriate Research and Development (R&D) satellite missions. In 2001, the WMO Executive Council approved the expansion. In 2002, WMO was informed by several R&D space agencies of their commitment to participate in the space-based component of the GOS. In particular, NASA’s Aqua, Terra, National Polar Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP), QuikSCAT and Global Precipitation Mission (GPM) missions, European Space Agency’s (ESA) ENVISAT mission, National Space Development Agency of Japan’s (NASDA) Advanced Earth Observation Satellite (ADEOS) II and Global Change Observation Mission (GCOM) series and Rosavikosmos’s research instruments on board ROSHYDROMET’s operational METEOR 3M N1 satellite as well as on its future Ocean series are all now part of the R&D constellation. The R&D constellation joins the existing geostationary and polar-orbiting constellations.

7.1.16 The meteorological satellites comprising the present space-based component of the Global Observing System, both polar-orbiting and geostationary, have continued to prove invaluable to WMO NMHSs through the provision of a multitude of services including imagery, soundings, data collection and data distribution. For the RA IV region during 2002, the space-based constellation, in addition to the R&D satellites, was comprised of the following geostationary and polar-orbiting satellites: Geosynchronous Operational Environment Satellite (GOES-8), GOES-10, National Oceanic and Atmospheric Administration (NOAA-15), NOAA-16 and NOAA-17 operated by the USA; METEOR 2-20, METEOR 2-21, METEOR 3-5 and METEOR 3M N1 operated by the Russian Federation; Meteosat-5, Meteosat-6, Meteosat-7 operated by EUMETSAT; and Feng Yun (FY) series (FY-1C and FY-1D) operated by the People’s Republic of China. NOAA-15, NOAA-16 and NOAA-17 are the first of the TIROS N series to fly the Advanced TIROS Operational Vertical Sounder (ATOVS) including the Advance Microwave Sounding Unit (AMSU). There were several satellite launches in 2002, the People’s Republic of China launched FY-1D in May, NOAA/National Environmental Satellite, Data, and Information Service (NESDIS) (USA) launched NOAA-17 in June and EUMETSAT launched the first of the Meteosat Second Generation satellites, MSG-1, in August.

7.1.17 The Committee noted that the WMO Satellite Activities web pages have been extensively used to ensure that the latest information is available to users. A summary of the current status on the polar-orbiting and geostationary meteorological satellites for RA IV is given in Appendix VII.

Marine meteorology and oceanography

7.1.18 The Committee recognized that marine observational data were essential to hurricane monitoring, analysis and prediction. In this context, it noted with appreciation the work undertaken under the International South Atlantic Buoy Programme (ISABP) to deploy surface drifters in the tropical North Atlantic Ocean during the hurricane season each year.

7.1.19 The Committee noted with interest that it is a traditional responsibility of National Meteorological Services (NMSs) to provide ocean wave and storm surge analyses and forecasts for a variety of marine user groups. Many different types of numerical models are now available to generate wave and storm surge analyses and prognoses on local, regional and global scales. In this connection, the former Commission for Marine Meteorology (CMM) organized two training workshops on Numerical Wave Analysis and Forecasting in Boulder, December 1995 and in Miami, May 1997.

7.1.20 The Committee was informed that a workshop on wind wave and storm surge analysis and forecasting for Caribbean countries, will be conducted in English at the Maritime Weather Centre, Meteorological Service of Canada in Dartmouth, Canada, from 16 to 20 June 2003. This workshop is designed to provide both technical and practical knowledge on wave and storm surge analysis and forecast modeling techniques, as well as to provide hands-on experience in manipulating and running local and regional scale models on PCs and workstations.

7.2 Hydrological Component (agenda item 7.2)

7.2.1 The Thirteenth Session of the Regional Association IV re-established its Working Group on Hydrology (WGH), and a new Chairman and Vice-chairman were appointed. The Association approved the suggestion of the WGH and moved from report-oriented activities to project-oriented activities, such as implementing flash flood forecasting systems and hydrological observing systems. For this purpose, instead of appointing rapporteurs, five subgroups were established: 1) Training and continuing education; 2) Hydrological warning systems; 3) Integrated water resources assessment; 4) Development of CARIB-HYCOS and 5) Transboundary water resources management.

The terms of reference of the subgroups are documented below:

- I) Training and continuing education:
 - (a) to define the regional needs in relation to education and training activities and to assess the possibilities of establishing an Internet course;
 - (b) to cooperate in the development of computer-aided learning courses in the field of hydrology and water resources at different levels (Hydrologists and Hydrological Technicians);

II) Hydrological warning systems:

- (a) to organize a workshop on hydrological warnings in cooperation with the WMO Commission for Hydrology (CHy). After this workshop the group should assess the possibility of implementing a flash flood forecasting system;
- (b) to maintain updated the report on mathematical models for hydrological forecasting prepared in the previous intersessional period;

III) Integrated water resources management:

- (a) to follow-up the Action Plan of the Conference on Water Resources Assessment and Management Strategies in Latin America and the Caribbean;
- (b) to cooperate in the organization of a Workshop on the Application of the United Nations Educational, Scientific and Cultural Organization (UNESCO)/WMO Handbook on Water Resources Assessment – Handbook for Review of National Capabilities;

IV) Development of CARIB-HYCOS:

- (a) to provide inputs to CARIB-HYCOS. To follow-up the recommendations prepared by the last session of the WGH on the development of CARIB-HYCOS, particularly its division in various components;
- (b) to cooperate on the implementation of this WHYCOS component;

V) Transboundary Water Resources Management:

- (a) to share, among all countries of the region, experiences in the execution of bi and multilateral projects for the use of water resources;
- (b) to promote international agreements for the management of transboundary water resources.

7.2.2 The Vice-chairman of the Working Group participated in the last session of the WMO Executive Council in representation of the Regional Hydrological Adviser to the President of RA IV. In this occasion he took the opportunity to make informal contacts with members of the WGH to select coordinators. Five experts accepted. The Chairman of the WG has started a more formal procedure to appoint experts.

7.2.3 The next session of the WGH is being planned to take place in the Dominican Republic from 14 to 18 July 2003.

7.2.4 The Committee coordinated its work programme with the activities of the RA IV WGH. It was concluded that the participation of representatives of the WGH in the Hurricane Committee session is a good means to exchange information for the benefits of the region.

7.2.5 Recognizing that every year, the Hurricane Committee calls for improvements in the hydrological activities in the region, the Committee was briefed on the status of the Caribbean part of the WMO project called the World Hydrological Cycle Observing System (WHYCOS). The Caribbean project, called CARIB-HYCOS, was developed in a continental component and an island component. The Committee was informed that CARIB-HYCOS had been developed to an advanced stage by WMO but the progress towards its implementation seemed to have come to a halt.

7.2.6 The meeting pointed out that the CARIB-HYCOS Project was of immense importance for the flood forecasting and warning systems and the development of fresh water resources management, among other applications, in the region. In this regard, it noted that several institutions in France had expressed the desire to contribute significantly towards its implementation. These included the French Institute for Research and Development (IRD), Météo-France and the French Regional Authorities in Martinique, including an offer to host the Project Regional Centre at the Météo-France facilities in Martinique.

7.2.7 The Meeting therefore urged the Secretary-General of WMO to pursue the offer of France and any other donors as a matter of urgency, in order to get this important Project off the ground.

7.3 Disaster Prevention and Preparedness Component (agenda item 7.3)

7.3.1 The Committee noted that WMO played a leading role as regards mitigation of and preparedness for natural disasters of meteorological and hydrological origin and had supported the ISDR efforts through its major scientific and technical programmes, in particular the Tropical Cyclone, the Public Weather Services and the Hydrology and Water Resources Programmes.

7.3.2 The Committee noted with interest the following information provided by the WMO Secretariat:

ISDR

1. WMO has long been supportive of the International Strategy for Disaster Reduction (ISDR) even during predecessor IDNDR. The main objectives of ISDR are to enable communities to become resilient to natural hazards and to proceed from an approach of protection against the hazards to the management of the risk. The primary function of the ISDR is to devise strategies and policies for natural disaster reduction by identifying gaps in policies and programmes, ensuring complementary action by agencies, providing policy guidance, and convening expert meetings in these issues.

2. WMO is currently a member of the Inter-Agency Task Force for the ISDR, and plays a prominent role in implementation of the strategy by providing assistance with science and technology and the operational activities of NMHSs. In the Inter-Agency Task Force, there are four Working Groups (WGs). The first WG on Climate and Disasters is chaired by WMO. The second WG on Early Warnings is chaired by UNEP. The third WG on Risk, Vulnerability and Impact Assessment is chaired by UNDP. The Global Fire Monitoring Centre located in Freiburg, Germany chairs the fourth WG on Wild Land Fires. The first WG on Climate and Disasters has taken over the responsibilities of the UN Task Force on El Niño with an expanded mandate to consider all climate-related aspects of disasters. WMO actively participates in all WGs. It is encouraged that NMHSs contribute to the work of ISDR because there would be

considerable advantages for NMHSs in developing close relationship with the groups. For example, joint projects may be planned at regional level to mitigate the effects of natural disasters.

Living with Risk

3. WMO closely worked with ISDR to publish "Living with Risk, a global review of disaster reduction activities." "Living with Risk" was released before the World Summit on Sustainable Development (WSSD) in 2002. It has been elaborated with a strong collaboration of WMO and the Asian Disaster Reduction Center (ADRC). Following the feedback to the preliminary version, a revision will be released in 2003.

World Bank's ProVention Consortium

4. The World Bank has launched the ProVention Consortium. It is a global coalition of governments, international organizations, academic institutions, the private sector, and civil society organizations. It aims at reducing disaster impacts in developing countries. WMO is a member of the Consortium and represented in the Consortium Steering Committee. More active collaboration between WMO and the Consortium is expected in 2003.

World Summit on Sustainable Development (WSSD)

5. WMO played a key role during the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa where the disaster management issue became a key topic in its main outcomes. Natural disaster prevention and mitigation were included in WSSD's Plan of Implementation as essential elements for a safer world in the 21st century. The Summit agreed that actions were required to improve surface-based monitoring systems and to increase the use of satellite data. The goal is to improve early warning systems.

WMO's Inter-Departmental Disaster Reduction Activity, Emergency and Disaster Response Group (EDRG)

6. The Emergency and Disaster Response Group (EDRG) was renovated in 2002. The goal is for the WMO Secretariat to take quick and effective actions in case of major disasters in developing countries. The task of EDRG is to collect and provide detailed disaster information when necessary so that the WMO Secretariat can make decisions on further assistance to the affected NMHSs.

7.3.3 The representative of the Caribbean Disaster Emergency and Response Agency (CDERA) submitted a document entitled "CDERA Initiatives in support of RA IV Technical Plan". He stressed the need for supporting and promoting the development of stronger regional and national institutions, research and training, preparedness and mitigation as well as the more effective use of hazard information with a view to promoting sustainable development in the region.

7.3.4 The Committee was informed that CDERA has fully engaged the Caribbean Institute for Meteorology and Hydrology (CIMH) in its Flood Management Capacity Enhancement Programme (CADM). General information on CDERA Programmes can be obtained from the Web site: www.cdera.org.

7.3.5 The Committee noted with interest a table that identified how the CDERA ongoing initiatives can support or reinforce the RA IV Hurricane Technical Plan. In anticipation of opportunities for further strengthening the cooperation with the Hurricane Committee, it was invited to reflect these CDERA initiatives in the updated RA IV Technical Plan, if feasible.

7.3.6 The representative of Office of U.S. Foreign Disaster Assistance (OFDA), informed the Committee that he is attending as a user of the Hurricane Committee's initiatives and briefed the Committee of his Office's interest in disaster risk reduction activities. He pointed out that most of people do not know how to reduce natural hazards risk and the lack of expertise available in the region. To this end, he proposed timely action to promote hazard vulnerability reduction activities in the region.

7.3.7 The Committee expressed its appreciation for their attendance at the session and for their informative presentations at the session. It requested CDERA and OFDA to continue to participate in the future sessions in view of very limited participants of DPP experts available in the sessions while the DPP component is one of the major three components.

Training (agenda item 7.4)

7.4.1 The Committee was pleased to note the involvement of its Members in the major education and training activities that have taken place since its last session.

7.4.2 The Committee expressed appreciation for the number of training events that were organized by WMO and Member countries during 2002, especially those events that were of direct relevance to tropical cyclones. The Tropical Desks in Washington and Montreal were valuable components for further education and training in tropical meteorology.

7.4.3 The Committee expressed its appreciation to WMO and those Members, which offered their national training facilities to other Members under bilateral and multilateral arrangements. These co-operative efforts have been found by the recipient countries to be very useful and the Committee strongly recommended that such endeavours should continue in the future and be strengthened.

7.4.4 The Committee noted that WMO continued to assist RMTCs to improve their training programmes by provision of financial support to purchase textbooks and to staff members for attending specialized training courses and scientific events abroad. The Committee urged its Members to make maximum use of the training programmes offered by these Centres. It also requested its Members to consider ways and means of assisting the RMTCs in organizing regular and specialized courses of interest to the Committee's activities, using such ways and means as the provision of instructors for short-term assignments, provision of relevant training materials and teaching aids through bilateral and multilateral arrangements.

7.4.5 The Committee noted with satisfaction the information on the activities of the Training Library and the use made of its services by the Members. It also appreciated the continuous updating of the Virtual Training Library (VTL) in an effort to provide the latest and most suitable available training material through the Internet and recommended that those actions should be encouraged and continued.

7.4.6 The Committee noted the number of fellows from its Members under training during 2002. It further noted the new scientific and technological developments in the application of meteorology and hydrology. The Committee therefore urged WMO and donor Members to continue arranging for relevant training at all levels to enable personnel from its Member countries to utilize more effectively the new technologies in these specialized fields.

7.4.7 The Committee requested its Members to take full advantage of the WMO fellowship programme by selecting well-qualified candidates for training, bearing in mind the requirements for academic qualifications, relevant experience, language proficiency, age limit and other specific requirements, as stipulated by the host training institutions concerned.

7.4.8 The Committee expressed its appreciation for WMO and the USA for their continued support in the organization of annual workshops on Hurricane Forecasting and Warning at the RSMC Miami. The Committee strongly endorsed the need to provide the same support for these workshops during the fourteenth WMO financial period (2004-2007).

7.4.9 The Committee noted that participants from Spanish-speaking countries are limited in their ability to participate at the RSMC Miami workshops mainly due to the fact that they are offered in English only. The Committee requested that with a view to facilitating Spanish-speaking hurricane forecasters to attend the Workshops, consideration be given to provide these workshops with interpretation services in English and Spanish.

7.4.10 The Committee noted with concern that financial constraints are limiting the number of long-term fellowships for meteorologists, affecting the capacity and efficiency of NMSs. In this regard, the Committee recommended the creation of a small group to study this issue and identify possible solutions.

7.4.11 The Committee acknowledged with satisfaction that the University of Puerto Rico at Mayaguez is planning to establish an Atmospheric Science Program and is presently offering courses in Basic Meteorology and Atmospheric Dynamics. The Committee also noted that a project called "Jetstream" focused on education and information for school teachers is available, only in English, at <http://www.srh.noaa.gov> and that a Spanish version is expected to be available soon.

7.4.12 The Committee recognized the importance of the relationship between NMHSs and customers such as emergency managers (civil protection) and the media. However, it also recognized the difficulties that might be involved in dealing with them and recommended that in future meetings of the Committee, time be allocated to address this issue.

7.4.13 The Committee acknowledged the difficulties that some Members have to send candidates to study at international universities and institutions, and recommended that efforts be made to collaborate with these institutions in order to help them develop structured courses on the Internet so that the classroom is brought closer to the students.

7.4.14 The Committee expressed its appreciation to France for its offer to continue supporting Haiti, through Météo-France, in the framework of the SIDS-Caribbean project training activities.

7.5 Research (agenda item 7.5)

7.5.1 The Committee noted with satisfaction that the Fifth WMO International Workshop on Tropical Cyclones (IWTC-V) was successfully held in Cairns, Australia from 3 to 12 December 2002 with Professor R.L. Elsberry (USA) as the chairman of the International Committee (IC). The Committee was also pleased that it was well represented at the workshop.

7.5.2 While awaiting the final report of IWTC-V, the Committee noted that part of the recommendations of the Workshop concerns proposals for the revision of the publication "Global Guide to Tropical Cyclone Forecasting".

7.5.3 With respect to revision of the Global Guide to Tropical Cyclone Forecasting, the IWTC-V recommended:

- *The revised Guide should be published primarily as a Web version, with a limited Hard Copy and a CD ROM version;*
- *Subject to volunteer translators being available, Chinese, French and Spanish versions should be provided on the Web.*

The structure of the Guide was revised slightly with some name changes, amalgamation of two chapters, and addition of a new chapter. The final content is recommended to be:

- *Global Overview,*
- *Tropical Cyclone Formation, Intensity and Structure,*
- *Tropical Cyclone Motion,*
- *The Tropical Cyclone and Landfall,*
- *Seasonal Forecasting,*
- *The Total Warning System,*
- *Numerical Prediction Models,*
- *Forecast and Observing Technology,*
- *Ready Reckoner,*
- *Bibliography.*

The bibliography will be expanded to become a general, tropical bibliographical resource, with submitted references being added if they are in the correct format.

It was further recommended that a forecaster's Web site be established as part of the Guide Web site on which operational studies, forecasting rules and other relevant material could be posted.

7.5.4 The Committee agreed with the recommendation of IWTC-V that the publication was a valuable forecast reference, and strongly supported the recommendation that this guide should undergo an evolutionary revision and be reissued. To this effect, it urged WMO that a hard copy and a CD-ROM should be provided to operational forecasters.

7.5.5 There was a short discussion concerning the chairmanship of the International Committee (IC) for ITWC-VI (Costa Rica, 2006). It noted that the chairman was not yet selected. Dr Lixion Avila (USA) was invited to continue to serve as the regional focal point for IWTC-VI, who will be a member of the IC.

7.5.6 The Committee supported the establishment of a joint (WWRP/TMRP) ad hoc Science Working Group for the International Tropical Cyclone Landfall Programme (ITCLP) chaired by Dr G. Foley (Australia). The Committee urged participating countries and relevant scientific organizations to support the project which, if fully implemented, will no doubt reduce substantially the disastrous impact of tropical cyclones on coastal communities.

7.5.7 With regards to the ad hoc Science Working Group for the ITCLP, the IWTC-V recommended that WMO should encourage further development and improvement of observing networks in countries affected by TC landfall through such programmes as the WMO VCP. In addition, WMO should also encourage all countries to make freely available the highest resolution observations of TC landfall, including rainfall data, for research, and model development and verification.

7.5.8 Canada announced that the Second International Workshop on Extratropical Transition (IWEC-2), would be held from 17 to 21 November 2003 in Halifax, Nova Scotia, Canada. This is one of a series of thematic workshops coming out of the IWTC meeting in Cairns, Australia and is a follow up to IWET-1 held in Germany in 1999. The objectives of the conference are to develop a clear definition of extra tropical transition; to exchange new scientific developments in extratropical transition; to provide a training opportunity for operational forecasters; and to develop an extratropical transition component to Hurricane Landfall 2004 and **THE Observing system Research and Predictability EXperiment (THORPEX)**. Submissions of papers focusing directly on extratropical transition and operationally focused hands-on labs are welcome and can be sent to **Peter.Bowyer@ec.gc.ca** by 1 September 2003.

8. ASSISTANCE REQUIRED FOR THE IMPLEMENTATION OF THE COMMITTEE'S TECHNICAL PLAN AND STRENGTHENING OF THE OPERATIONAL PLAN (Agenda item 8)

8.1 The Committee reviewed the assistance, pertinent to the implementation of the Technical Plan or strengthening of the operational plan, provided to Members since the Committee's twenty-fourth session and considered the plan for future action.

Assistance to Central America and Caribbean countries

8.2 Hurricanes Isidore and Lili, severely affected Cuba, showing almost the same track over the island and striking practically the same area in a time interval of 11 days. WMO, through its Subregional Office, made a post-storm evaluation of the meteorological infrastructure in order to obtain precise information on the damages and urgent requirements of the NMS.

8.3 The Committee noted that WMO continued to be involved in several actions concerning the assistance for NMHSs in Central America and the Caribbean during 2002. As a direct consequence of the above, WMO established the short and medium term requirements for the NMHS of those countries. The requirements were aimed mainly at obtaining equipment to re-establish operations of the hydrological and meteorological networks at the level they were before being affected. In this way, requirements were already presented to potential donors.

8.4 The Committee further noted that WMO, through the Technical Cooperation Department's (TCO) North, Central America and the Caribbean (NCAC) Trust Fund, with the support of the WMO Subregional Office in Costa Rica has continued developing TCO activities to ensure cost-effective services to Members. Activities have focused mainly on the promotion of technical projects in the Region, as well as on the follow-up of ongoing ones. The Subregional Office has also provided support to regional activities and assistance in the implementation of WMO Programmes in the Region.

8.5 The Committee was informed that WMO, Cooperative Institute for Research in the Atmosphere (CIRA)/NOAA-NESDIS developed a regional project on Satellite Meteorological Applications through the RMTCs of Barbados and Costa Rica, using Regional and Mesoscale Meteorology Team Advanced Meteorological Demonstration and Interpretation System (RAMSDIS) and internet for satellite data ingest. The seven Central American countries that participate in the project have RAMSDIS systems that are receiving digital imagery and are using this capability for weather analysis and forecasting on a daily basis. The National Meteorological Institute of Costa Rica is focal point for the distribution of satellite images. The Central American countries have expressed their satisfaction with the project and the opportunity of having this important, handy and reliable tool.

8.6 The Committee noted that WMO continued with the assistance to the National Meteorological Office (ONAMET) of the Dominican Republic in the rehabilitation and recovery of the meteorological infrastructure damaged as a result of the impacts caused by Hurricane Georges in 1998. WMO has assisted ONAMET in the preparation of technical specifications for equipment, evaluation of bidding and supervision during installation of stations and training to staff.

8.7 The Committee was also informed that the Government of Panama requested WMO's assistance for the preparation of a project to improve and reorganize the hydrometeorological activities in Panama. For the development of the feasibility study for the project a WMO team of consultants was organized to cover the technical, institutional, socio-economic and legal aspects. This initiative between WMO and the Inter-American Development Bank (IDB) is funded by the IDB under the framework of the IDB/WMO ENSO Study and is expected to be completed in early 2003.

8.8 The Committee expressed its serious concern about the lack of funds to have four annual workshops on Hurricane Warnings and Forecasting at the RSMC Miami. Assistance is required for continuation of this important activity.

8.9 The Committee recognized the importance of the attachments of bilingual operational forecasters during the hurricane season at RSMC Miami. In this regard, the Committee expressed the need for continued assistance for this activity.

8.10 The Committee was informed of the highly successful activities of the Regional Maintenance Center in providing assistance to many Members with respect to maintenance support to their infrastructure and also of the growing success of the ongoing Internet projects in the Region, which are being executed with the support and funding from the USA VCP. The Committee expressed the need for continued support for these activities.

8.11 The Committee was informed of the following projects:

Trust Fund Projects

SIDS Project for the Caribbean

8.12 The Committee was informed that implementation of the project "Preparedness to Climate Variability and Global Change in Small Island Developing States, Caribbean Region" funded by the Government of Finland, continued satisfactorily. Fourteen students from the English speaking Caribbean commenced training at the Caribbean Institute for Meteorology and Hydrology (CIMH) in the 18 months' "SIDS-Caribbean Project sponsored BIP-MT (Class II)" course of 2003. A similar training programme for 3 candidates from Dominican Republic is

taking place at the University of Costa Rica. Two training courses for instrument technicians of Haiti were also organized in collaboration with Météo-France in Toulouse, France, and three forecasters are being trained in Toulouse for a duration of 11 months until late November 2003. WMO has initiated the procurement of the workstations for existing VSAT countries to replace the STAR4 systems and also has started the procurement and installation of 29 Automatic Weather Stations (AWSs) and conventional meteorological instruments for all participating countries. The database CLIDATA (an ORACLE-based software developed by the Meteorological Service of the Czech Republic) is being tested or possible adoption as the DBMS for climatological work in the region. Participating countries in the SIDS- Caribbean project include Cuba, Dominican Republic, Haiti and Caribbean Meteorological Organization (CMO) Countries (Guyana, Trinidad and Tobago, Grenada, St. Vincent and the Grenadines, Barbados, St. Lucia, Commonwealth of Dominica, Montserrat, Antigua and Barbuda, St. Christopher and Nevis, Anguilla, Jamaica, Turks and Caicos). The first Supervisory Board and the second Steering Committee meetings were held in Trinidad and Tobago on 31 October and 1 November 2002.

Study on the Prediction and Amelioration of Socio-economic Impacts of El Niño / Southern Oscillation (ENSO) in Latin America and the Caribbean

8.12* The Committee was informed that the last phase of the IDB/WMO ENSO Study included the preparation of project proposals for countries/regions that expressed interest in the implementation of Early Warning Systems to ameliorate the socio-economic impacts of ENSO. Project proposals were prepared for Colombia, Central America (Belize, Costa Rica, Guatemala, El Salvador, Honduras, Nicaragua and Panama) and Mexico. The project proposals took into account previous studies carried out by WMO in the ENSO study with the collaboration of International Food Policy Research Institute (IFPRI), the International Research Institute for Climate Prediction (IRI) and NOAA/Office of Global Programs (OGP)/Oregon State University College of Oceanic and Atmospheric Sciences (OCE). Project proposals on Climate information systems for decision-making on vulnerable socio-economic sectors to ENSO and other climate anomalies, for Colombia, Central America and Mexico were developed as part of the IDB/WMO ENSO Study that is being concluded. The project proposals were presented and discussed with representatives of relevant institutions in Colombia, Central America and Mexico that included NMHS, Ministries of Agriculture, Civil Defense, Universities and Water Resources Agencies, and sub-regional bodies in the case of Central America, such as Sistema de Integración Centroamericana (SICA), Comité Regional Recursos Hidráulicos (CRRH) and Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPREDENAC). WMO will continue in coordination with relevant NMHS the promotion for funding and execution of these projects.

Mexico Water Resources Management Project

8.13 The Committee noted that under the Agreement between WMO and the National Water Commission (CNA) of Mexico, the implementation of the large scale Water Resources Management Project (PROMMA), funded by the World Bank and the Mexican Government, has made a significant progress. In 2002 a total of 36 international and 35 national consultants, including 2 firms were engaged, who carried out some 105 missions to cover the areas of meteorology, operational hydrology, telecommunications, groundwater, water quality, water resources planning and administration and River Basins Councils. Training of personnel through international fellowships, local training courses on-the-job training and study tours were also completed. A total of 45 participants received training. A multidisciplinary team of 11 WMO experts, whose specialties and experience corresponded to the various components of the PROMMA project, carried out the Fifth Technical Evaluation of the project during the period from

4 to 15 November 2002. The implementation of the PROMMA project was extended until the end of 2003 in order to complete the planned activities and achieve the objectives of the project. The work plan for the year 2003 foresees the implementation of activities by WMO with a total estimated cost of US\$ 2.0 million.

Caribbean Radar Network

8.14 The Committee looked forward to the speedy implementation of the radar networking system project supported by the European Union, which is being coordinated by the CMO. The project will benefit the Caribbean region providing early warnings on hurricanes and severe weather. After an increase of the budget allocation of the project, the site preparation and construction of the radar buildings is expected to commence during 2003.

8.15 The Committee noted with concern that in Central America, with the exception of Belize, no other NMS has radar. In this regard, the Central American Members requested that the WMO, through the Hurricane Committee, help facilitate the radar projects that are being considered by Japan and the European Union through SICA.

VCP Projects

8.16 The Committee noted that in 2002, three VCP project requests were submitted by three Members of the Committee for the provision of an automatic weather station and upper-air consumables, and for the rehabilitation of meteorological observing network. Ten Members received support for a total of 10 VCP projects for equipment and services. In spite of the support obtained during 1998-2002, 25 valid projects have not received support as of 31 December 2002.

8.17 During 2002, 27 requests for fellowships were received from 15 Members. Nine fellowships were newly awarded in 2002 within the framework of the VCP.

9. SCIENTIFIC LECTURES (Agenda item 9)

9.1 The following scientific lectures were presented during the session:

- Tropical Waves and their behaviour over the Caribbean and Mexico, Jose Antonio Salinas , Mexican Institute of Water Technology
- The Reconstruction and Extreme Statistics of Windfields Over the Caribbean and Mexico, Jorge Sanchez Sesma, Mexico
- Cyclonic Wave Model of Météo-France, Max Reyal, Météo-France
- Forecasting in the Venezuelan Navy, Alfredo J. Pinero, Venezuela
- Mapping Tools on the Web, Max Mayfield, RSMC Miami, USA
- Hurricane Track Map in Braille, Israel Matos, NWS Weather Forecast Office, Puerto Rico
- Tsunami Video, Israel Matos, NWS Weather Forecast Office, Puerto Rico
- The US Weather Research Program Joint Hurricane Testbed, Max Mayfield, RSMC Miami, USA

9.2 The lectures were followed by discussions in which all participated actively.

10. DATE AND PLACE OF THE TWENTY-SIXTH SESSION (Agenda item 10)

10.1 The delegate from the USA informed the Committee that his country would consider hosting the twenty-sixth session of the RA IV Hurricane Committee in Miami, Florida, from 21 to 24 April 2004 in conjunction with the AMS tropical committee (Miami, Florida, 26 to 30 April 2004).

10.2 The Committee, in welcoming the information and accepting this offer, expressed its warm appreciation to the Government of the USA.

10.3 The Committee was noted that the twenty-seventh session of the Committee would be held in conjunction with the Fourteenth session of Regional Association IV in 2005. It invited Members, wishing to host, to consult with Government concerned by taking into account the combined two very important events to be hosted at a same time.

11. CLOSURE OF THE SESSION (Agenda item 11)

The report of the twenty-fifth session of the Committee was adopted at its final meeting at 1130 hours on 7 April 2003.

APPENDIX I

LIST OF PARTICIPANTS

PRESIDENT OF RA IV	Mr Arthur John DANIA
MEMBERS:	
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Caribbean Disaster Emergency Response Agency (CDERA)	Mr Jeremy COLLYMORE
Caribbean Meteorological Organization (CMO)	Mr Tyrone SUTHERLAND
International Civil Aviation Organization (ICAO)	Mr Guillermo VEGA
Office of U.S. Foreign Disaster Assistance (OFDA)	Mr Paul BELL
RA IV Working Group on Hydrology	Mr Eduardo PLANOS GUTIÉRREZ
Technical Expert	Mr Donald WINTER
Working Group on Planning and Implementation of the WWW in RA IV	Mr Carlos FULLER
WMO SECRETARIAT:	
Tropical Cyclone Programme Division	Mr Katsuhiko ABE
WMO Regional Office	Mr Ramon SONZINI
WMO Sub-regional Office	Mr Oscar ARANGO B.
Translator	Mr Javier GOMEZ-MARTINEZ
LOCAL SECETARIAT:	Ms Oliva PARADA

APPENDIX II

AGENDA

1. ORGANIZATION OF THE SESSION
 - 1.1 Opening of the session
 - 1.2 Adoption of the agenda
 - 1.3 Working arrangements for the session
 2. REPORT OF THE CHAIRMAN OF THE COMMITTEE
 3. COORDINATION WITHIN THE WMO TROPICAL CYCLONE PROGRAMME
 4. REVIEW OF THE PAST HURRICANE SEASON
 - 4.1 Summary of the past season
 - 4.2 Reports of hurricanes, tropical storms, tropical disturbances and related flooding during 2002
 5. COORDINATION IN OPERATIONAL ASPECTS OF THE HURRICANE WARNING SYSTEM AND RELATED MATTERS
 6. REVIEW OF THE RA IV HURRICANE OPERATIONAL PLAN
 7. REVIEW OF THE COMMITTEE'S TECHNICAL PLAN AND ITS IMPLEMENTATION PROGRAMME FOR 2003 AND BEYOND
 - 7.1 Meteorological component
 - 7.2 Hydrological component
 - 7.3 Disaster prevention and preparedness component
 - 7.4 Training
 - 7.5 Research
 8. ASSISTANCE REQUIRED FOR THE IMPLEMENTATION OF THE COMMITTEE'S TECHNICAL PLAN AND STRENGTHENING OF THE OPERATIONAL PLAN
 9. SCIENTIFIC LECTURES AND DISCUSSIONS
 10. DATE AND PLACE OF THE TWENTY-SIXTH SESSION
 11. CLOSURE OF THE SESSION
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