

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

OPAG ON INTEGRATED OBSERVING SYSTEMS

CBS/GCOS EXPERT MEETING ON COORDINATION OF THE GSN AND GUAN

SECOND SESSION

FINAL REPORT



ASHEVILLE, USA, 28 – 30 SEPTEMBER 2005

WMO General Regulations 42 and 43

Regulation 42

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups, the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

Regulation 43

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

EXECUTIVE SUMMARY

The second CBS/GCOS Expert meeting on the Coordination of the GSN and GUAN was held at the Headquarters of the National Climatic Data Centre (NCDC) in Asheville, USA from 28 to 30 September 2005. The major issues reviewed by the meeting were related to the priorities of the GCOS AOPC concerning the GSN and GUAN networks, as expressed by the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*.

The meeting specifically discussed results of the WWW monitoring of availability of climate reports, implementation of RBCN in all WMO Regions including the Antarctic with particular emphasis on GSN and GUAN, as well as the results of GSN and GUAN monitoring and interaction with countries presented in the reports of GCOS Monitoring Centres and CBS Lead Centres for GCOS data (DWD, JMA, NCDC, ECMWF and Met Office, Hadley Centre). The cooperation between CBS-OPAG/IOS Rapporteur, Rapporteurs/Coordinators on Regional Aspects of the GOS and National Focal Points for GCOS data has been reviewed.

As regards technical support activities, the meeting was briefed on the current status of revitalization of the GSN and GUAN stations including reports on activities by GCOS Technical Support Projects in the Pacific, in the Caribbean and in Africa. The expert meeting discussed expected improvements in generation and exchange of GSN and GUAN data with particular emphasis to the coding and routing of GCOS data over the Global Telecommunication System (GTS) and plans for establishment of additional CBS Lead Centres for GCOS data.

The meeting was briefed on the activities related to the establishment of Regional Climate Centres under WCP. Based upon the above discussions, the Expert meeting developed specific recommendations on actions to be taken to improve the availability and quality of GSN and GUAN data, e.g. by defining regional responsibilities of the CBS Lead Centres for their interaction with countries. These recommendations will be submitted to the upcoming sessions of AOPC and CBS for consideration and approval. The meeting felt that such CBS/GCOS coordination meetings be continued in the future.

1. ORGANIZATION OF THE MEETING

The second session of the CBS/GCOS Expert meeting on the Coordination of the GSN and GUAN was held at the Headquarters of the National Climatic Data Centre in Asheville, USA from 28 to 30 September 2005.

1.1 Opening of the meeting

The meeting was opened at 09.30 a.m. on 28 September 2005. Dr A. Karpov welcomed participants on behalf of the Secretary-General of WMO. After the first expert meeting held in Offenbach in 2002 where a number of recommendations had been developed and successfully accomplished, he stressed the importance of this meeting in continued efforts to further improve the availability of GCOS data. He advised that in addition to the establishment of CBS Lead Centres on GCOS Data and a network of National Focal Points for GCOS data that certainly improve organizational mechanism in solving problems, several projects were under way to revitalize deficient GSN and GUAN stations. The expectation was expressed that this meeting will also provide a valuable input to further enhance coordination between CBS and GCOS in the improvement of quantity and quality of GCOS atmospheric data. Finally he wished the participants every success in accomplishing their busy work schedule during the week.

Dr Sharon LeDuc, Deputy Director of NOAA's NCDC addressed the participants on behalf of the Director, Thomas Karl. Dr. LeDuc stated that it was an honour and privilege for NCDC to host the meeting. She indicated that NCDC takes its role as lead centre quite seriously and that the centre is a big supporter of GCOS. Dr. LeDuc referenced the NOAA strategic plan, which emphasizes the investment "in high-quality, long-term climate observations" and the encouragement of "other national and international investments to provide a comprehensive observing system in support of climate assessments and forecasts." The desired output of the NOAA Strategic Plan is to have "a sustained global infrastructure of complementary in situ and data management and access subsystems, adequate to accurately document the state of the climate system on a global basis that would provide necessary inputs to enable more reliable climate predictions and projections." Consequently, the Deputy Director noted that this meeting of GCOS experts fits well within NOAA's overall strategic goals. Dr. LeDuc expressed her regrets that representatives from all lead centres were not able to attend, but did note the important efforts leading to the establishment of new lead centres in Iran and Australia and she was encouraged to hear that a representative from Iran would join the meeting via telephone. In closing, the Deputy Director thanked the meeting organisers from the WMO Secretariat as well as the local organisers, and wished all the participants a productive meeting.

1.2 Election of the Chairman

Dr Matthew Menne was unanimously elected chairman of the meeting.

1.3 Adoption of the agenda

The meeting adopted the agenda as contained in Annex I.

1.4 Working arrangements

The meeting agreed on its working hours and adopted a tentative work plan for consideration of the various agenda items (See Annex II).

2. GCOS IMPLEMENTATION PLAN AND AOPC PRIORITIES

2.1 GCOS Implementation Plan and AOPC priorities

Dr Stephan Bojinski from the GCOS Secretariat presented a summary of current GCOS activities, an overview of the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* ("GCOS Implementation Plan") and follow-up actions, and priorities of the AOPC as expressed in the Plan. He described that the GCOS Implementation Plan now represented the reference document for both international and national action plans and activities in support of global climate observations, due to its broad acceptance by the climate community. Many recommendations from the Plan are being incorporated into the work plans of technical bodies of the WMO, as have found entry into the GEOSS implementation plan. Satellite agencies under the coordination of CEOS are currently in the process of responding to the needs expressed in the GCOS Implementation Plan related to satellite observations. He concluded his talk by describing the recent initiative by the GCOS Secretariat to distribute certificates of recognition to operators of GSN and GUAN stations.

2.2 Global Observing Systems Information Centre (GOSIC)

Ms Christina Lief presented an overview of the Global Observing Systems Information Centre (GOSIC), including a summary of the history of GOSIC since its inception in 1997, and a detailed report on the usage of the service by various members and countries. Ms Lief showed examples of the various (meta)data sets available through GOSIC, including links to GSN data and monitoring results.. Ms Lief also reported on the cooperation between GOSIC and NASA's Global Change Master Directory (GCMD), and how GOSIC data is available through GCMD portals.

3 CURRENT STATUS OF WWW MONITORING ACTIVITIES

3.1 Results of the WWW monitoring of availability of climate reports

The WMO Secretariat presented a detailed summary on the availability of Climate reports. It was reported that MTN centres received 62% of the CLIMAT reports expected from the RBCN stations in October 2002 and 2003, and 65% in 2004, and that 71% of the CLIMAT TEMP reports expected from the RBCN stations in October 2002, 67% in October 2003 and 68% in October 2004 were received at MTN centres.

The AGM results shows that the availability of CLIMAT and CLIMAT TEMP reports is not satisfactory. The density of reports received in October 2004 was particularly low in Region I for CLIMAT (29%) and CLIMAT TEMP reports (57%), and in Region IV for CLIMAT TEMP reports (45%), going down from 75% in 2002. However, it is noted that in Regions I and IV there were significant changes in the composition of the RBCNs for CLIMAT TEMP reports between 2002 and 2003, which have in some cases not been considered for the monitoring exercises and partly account for the apparent decline in performance.

Concerning the availability of CLIMAT and CLIMAT TEMP reports from GSN and GUAN stations received at MTN centres, the following points are noted; 90% of the GSN stations were included in the RBCNs in July 2005 (87% in July 2004) and 93% of the GUAN stations were included in the RBCNs in July 2005 (84% in July 2004); MTN centres received 77% of the CLIMAT reports expected from the stations included in both GSN and RBCNs, and 83% of the CLIMAT TEMP reports expected from the stations included in both GUAN and RBCNs; CLIMAT and CLIMAT TEMP reports were received from many stations but were not mentioned as being prepared in Volume A; CLIMAT and CLIMAT TEMP reports were received during the October 2004 SMM within bulletins not mentioned in Volume C1.

It was reported that there are a significant number of CLIMAT and CLIMAT TEMP bulletins that do not comply with the WMO standards. In the October 2004 SMM monitoring this

amounted to deficiencies in 17% of CLIMAT bulletins and 41% of CLIMAT TEMP bulletins. The main reasons identified for these deficiencies include:

- Misspelling or omitting the code name CLIMAT or CLIMAT TEMP in the first line of the text
- Repeating the code name CLIMAT or CLIMAT TEMP in the same bulletin
- Incorrect or omitted group MMJJJ
- Repeating MMJJJ in the same bulletin
- Station index Iliii is not in the beginning of the line or repeated or omitted.

The meeting was advised that these deficiencies could lead to different counting of the bulletins collected in the different monitoring centres depending on the tolerance of their software to the deficiencies. The centres with the more sophisticated software could count more CLIMAT and CLIMAT TEMP reports because they can find the deficiencies and make required corrections. The centres with the less sophisticated software could lose some bulletins with deficiencies and count fewer bulletins.

The first four deficiencies in the list above are generated at the collecting centres and not at the observing stations. These deficiencies are generated manually or automatically during the compilation of the reports from several stations into one bulletin. The necessary assistance should be given to these centres to improve the situation.

Some deficiencies in CLIMAT and CLIMAT TEMP bulletins were generated by the observing stations. Two of these are:

- The data are not presented according to code forms FM 71-XII or FM 75-XII
- The section groups in the CLIMAT reports are incorrect, omitted or incorrectly placed.

These deficiencies are not frequent and they could be eliminated if the necessary training is given to the staff of particular stations.

Several recommendations were made to help alleviate these deficiencies, including additional training of operational staff on the compiling and CLIMAT and CLIMAT TEMP reports and bulletins, e.g. using the CLIREP software. Additional quality control monitoring by climatological centres and the WMO Secretariat to identify deficiencies and to particularly undertake follow-up actions to overcome the deficiencies was also deemed necessary. It was mentioned that financial assistance might be required to implement these recommendations.

The Rapporteurs/Coordinators on Regional Aspects of the GOS informed the meeting on the implementation of WWW observing programmes in their respective regions, with particular emphasis on the GSN and GUAN networks.

3.2 Report on the RBCN/GSN and GUAN in Region I

Mr Saloum informed the meeting of the current status of implementation RBCN and GCOS networks in Africa. Many RBCN stations in Africa carry out an incomplete daily observation programme (3 to 6 observations daily) and as such cannot produce daily or statistics. The performance of the RBCN is quite poor within the African Region. However a substantial increase in the performance of the RBCN has been observed in 2005. The July 2004 monitoring results show that CLIMAT reports are received from only 129 stations out of the 637 stations of the RBCN, corresponding to 20% availability. There were no CLIMAT reports from the remaining 508 stations. This low rate of availability of reports is either related to the lack of monthly averages due to incomplete observation programme, to telecommunication problems including data exchange and to problems with coding.

The upper air component of the RBCN is composed of 28 stations from which CLIMAT TEMP reports were received from 15 stations in July 2004 corresponding to an availability of 53%.

The performance of the surface component of the GCOS (GSN) remains unsatisfactory and irregular at less than 50% implementation. However, a substantial increase in the availability of CLIMAT reports has been observed compared to last year (48% in 2001, 32% in 2004 and 47% in 2005). Similar to RBCN, this unsatisfactory situation of reports from GSN stations is due to the fact that many African stations carry out incomplete observation programmes and therefore cannot issue climate reports.

Contrary to the GSN, the performance of the upper-air component of the GCOS (GUAN) has shown a steady and regular increase over the last years increasing from 13% in 2001 to 42% in 2004 and 74% in 2005. It should be noted that there is a great discrepancy between countries in the performance of both the surface and upper-air components of the GCOS, with many countries being completely silent.

There are several reasons for the low and/or non-availability of CLIMAT and CLIMAT TEMP reports from GSN and GUAN stations from Africa. Many African stations have problems maintaining stations because of insufficient funding to buy new, modern equipment, or the inability to carry out day-to-day operations due to lack of consumables, spare parts and qualified staff. Other problems include reports that are generated but are not properly communicated to the related Regional Telecommunication Hub (RTH); reports that are communicated but with incorrect coding or formatting; reports that are submitted too late in the month to be included in bulletins. Many efforts are underway to improve the GCOS in Africa. Among these are Regional Workshops held in recent years in Kisumu, Kenya, in Niamey, and in Dakar.

3.3 Report on the RBCN/GSN and GUAN in Region II

Mr Yongqing informed the meeting that according to Annual Global Monitoring results in 2004, the availability of CLIMAT and CLIMAT TEMP was at 70% and 69%, respectively, of the reports expected in Region II. The reporting rate of CLIMAT and CLIMAT TEMP reports in Region II continues to be relatively low for many reasons, including the lack of awareness of the importance of the report for climate research and prediction. The density of reports was particularly low in some regions in Central Asia, South West and South-East Asia.

However, progress has been made in Region II in recent years. The availability of CLIMAT reports received by MTN centres have increased from 65% in 2002 to 70% in 2004, while the availability of CLIMAT TEMP reports received by MTN centres have increased from 61% in 2002 to 69% in 2004.

An example of activities to improve the availability of both CLIMAT and CLIMAT TEMP reports were the efforts of the China Meteorological Administration to train relevant staff in how the perform, compile and transmit reports required for the implementation of RBCN in China. As a result all RBCN stations in China have begun to transmit CLIMAT and CLIMAT TEMP reports over the GTS.

It was also mentioned that the best practice set for GCOS upper-air stations is often not carried out due to the high cost of 5 hPa radiosondes.

The meeting welcomed the Rapporteurs' proposal to develop a questionnaire to carry out a survey on the availability of reports from GCOS atmospheric (GSN and GUAN) networks. It agreed that for this purpose all CBS Lead Centres for GCOS should use as a basis the questionnaire developed by JMA for further investigation in the availability of reports from GCOS stations.

3.4 Report on the RBCN/GSN and GUAN in Region III

Mr Torres informed the meeting that there has been a significant increase of the availability of CLIMAT and CLIMAT TEMP messages from the RBCN in Region III in recent years, and as of May 2005 reached 70% and 65% respectively of reports expected in the Region. This represents 12.5% of the CLIMAT reports and 9.5% the CLIMAT TEMP reports received globally from RBCN stations.

Mr Torres reported that there has been a decrease in the GSN in Region III from 113 stations in 2002 to 102 stations in 2005, but the GUAN has remained constant at 58 stations over the last three years. However only 15 upper-air stations (26%) carry out the required programme of two observations daily. To improve this situation it is suggested that Regional workshops on CLIMAT and CLIMAT TEMP reporting and telecommunications training, as well as assistance in procurement and maintenance of the equipment and consumables could improve GSN and GUAN performance considerably in Region III.

3.5 Report on the RBCN/GSN and GUAN in Region IV

The meeting was informed by Mr Stolz that the contribution of Region IV to the global RBCN constituted 298 stations (12% of the total) providing CLIMAT reports and 58 stations (11% of the total providing CLIMAT TEMP reports.

Monitoring reports indicate that CLIMAT reports have been decaying progressively over the past few years, from 80% in 2002 to 73% in 2003 to 69% in 2004. The number of CLIMAT TEMP reporting stations in the RBCN in Region IV has decreased since 2002 to 2004, from 72 to 58, a net decreased of 14 stations. The availability of CLIMAT TEMP reports has also decreased during this period, from 75% in 2002 to 45% in 2004.

The implementation of CLIMAT reports from GSN stations was 79% according to the 2004 AGM, while the level of implementation of CLIMAT TEMP reports was 65% during the same monitoring period.

Major reasons for the poor implementation of CLIMAT and CLIMAT TEMP reports include the lack of consumables, both sondes and hydrogen, communications and transmission problems causing reports not be received at MTN centres and the lack of suitable trained staff at some stations.

3.6 Report on the RBCN/GSN and GUAN in Region V

Unfortunately, Mr C. Iroi was unable to attend the meeting. Region V issues related to GSN and GUAN have partly been covered by Mr Clarke in his report on the Pacific Technical Support Project in section 5.2.

3.7 Report on the RBCN/GSN and GUAN in Region VI

Mr Douglas informed the meeting that the number of CLIMAT and CLIMAT TEMP reporting stations in the RBCN in Region VI increased from 614 in 2004 to 640 in July 2005, an increase of 26 stations. A survey conducted at RTH Exeter in July 2005 showed an implementation of close to 87% for CLIMAT reports. Regarding CLIMAT TEMP alone, there has been a corresponding increase from 88 stations in 2004 to 101 in July 2005 (a net increase of 23) with just over 82% of the expected reports being received at RTH Exeter during July 2005.

The meeting was further informed that following a recent review within the Region, in June 2004 there were 124 registered GSN stations, compared to 101 stations in June 2003. Some stations that could not meet the required minimum standards were removed from the list. There are 16 stations where reports are still not being received on a regular basis, but those Members are being urged to recognize the importance of committing to making and releasing the required information on a regular basis. Following the review exercise, not only did the number of stations increase, but so did the percentage of reports received.

There has been minimal change to the GUAN network and the number of stations remains at 16. All these stations have reported consistently throughout 2005 (based on at least 1 ascent per day) and across the region the average is over 2 ascents per day from the designated stations. Mr Douglas stressed that good consistent returns from the higher levels are important for

monitoring climate trends, and advised that the number of ascents from Region's GUAN stations that had reached the higher levels had increased during the past 12 months in Region VI.

3.8 Report on the ABCN/GSN and GUAN in the Antarctic

The WMO secretariat reported to the meeting that there has been a substantial decrease in the ABCN list of stations reporting CLIMAT during the past few years, from 72 in 2001 to 29 in 2004. This was the result of network rationalization and establishment of the new (reduced) ABCN in November 2002. The current ABCN of 29 stations includes 21 GSN stations. The level of implementation of these stations is around 79% in 2004 showing a positive increase in comparison to 33% in 2001. The results of the Annual Global Monitoring (AGM) show that the number of CLIMAT reports actually received compared to the number of reports expected increased from 29% in 2001 to 69% in 2004.

Since its establishment in late 2002, the ABCN is comprised of 13 upper-air stations (including 12 GUAN stations) producing CLIMAT TEMP reports. The current level of implementation of these stations in comparison to 2001 remains at around 77%. However, the results of the Annual Global Monitoring (AGM) show that the number of reports actually received compared to the number of expected reports increased from 67% in 2001 to 77% in 2004.

The number of CLIMAT reports available from the Antarctic during the last decade was not satisfactory and reached only about 30% of the total number of RBSN (ABSN) stations with CLIMAT TEMP reports reaching around 60%. In addition, a substantial number of stations initially selected for the GSN were not in the RBSN (ABSN) and consequently were not monitored during WWW monitoring exercises. The establishment of the new RBCN (ABCN), which are now included in the WWW monitoring, is expected to increase the availability of CLIMAT and CLIMAT TEMP reports, both overall and for GSN and GUAN requirements. Comparison with previous years is difficult, but there does appear to be a considerable improvement especially in the number of CLIMAT reports received in 2003 - 2004 compared to previous years.

4 MONITORING OF GCOS ATMOSPHERIC NETWORKS AND INTERACTIONS WITH COUNTRIES¹

4.1 Report of the CBS-OPAG/IOS Rapporteur on GCOS matters

Dr. Menne referred to the report prepared by the GCOS Secretariat entitled *Analysis of Data Exchange Problems in Global Atmospheric and Hydrological Networks* (WMO/TD No. 1255; GCOS-96; 2005). He noted that one of the goals of the meeting should be to provide recommendations for resolving some of the issues discussed in the GCOS report, many of which are also discussed in the reports by the participants. Summaries of the meeting recommendations would be forwarded to the Chair of the CBS-OPAG for Integrated Observing Systems.

4.2 National Focal Points (FPs) for GCOS data

The Secretariat reported on the list of to designated National Focal Points for GCOS and related climatological data, maintained by WWW, who could be directly contacted by the appropriate CBS Lead Centre on matters relating to the availability and quality of GSN and GUAN. The meeting reviewed the list and recommended to update it on yearly basis (see Annex IV).

4.3 Report of GSN Monitoring Centres (JMA and DWD)

¹ Please note also the relevant sections on GSN and GUAN data exchange and archiving issues in *Analysis of Data Exchange Problems in Global Atmospheric and Hydrological Networks* (WMO/TD No. 1255; GCOS-96; 2005)

Mr. Nakamigawa presented a joint report on both the JMA and DWD Centres for monitoring the GSN data. He advised that the GCOS Surface Network Monitoring Centre (GSNMC), jointly operated by Japan Meteorological Agency (JMA) and Deutscher Wetterdienst (DWD), started its activities in 1999 by monitoring the availability of CLIMAT messages from GSN stations distributed via GTS (the GSNMC's website is operated by DWD). In January 2000, monitoring of the quality of temperature and precipitation data was started at JMA and DWD, respectively. Following a 2002 recommendation on the establishment of Lead Centres for GCOS data, JMA took on the responsibility of Lead Centre of GSN.

The annual-averaged availability of CLIMAT messages from the GSN stations from August 2003 to July 2005 was 66%. The availability has increased gradually through this period. GSNMC updated the GSN station list in its database in March 2005, based on the update of the official list of GSN stations as of 1 January 2005. The sudden change of availability in some RAs may partly be influenced by this replacement.

There has been a significant increase in data receipt in RA II in August 2004 from less than 70% to around 80% and to even more than 85% since March 2005. This is mainly due to an increase in messages received from the Russian GSN stations, which has also led to an increase in data receipt in RA VI (Europe) to almost 90% in the months since August 2004.

Together with the observed decrease in data receipt in RA IV (North and Central America) since September 2004, this has led to RA VI replacing RA IV as the region with the highest percentage of CLIMAT messages received from the GSN stations from August 2004 onwards. This sudden decrease of reception rate in RA IV is mainly due to a change of format of CLIMAT bulletins for Canadian stations (Section 0 has been omitted in a segmented bulletin.)

Data receipt has not changed much in RA V (South West Pacific) during the period. The reception rate has been around 75%. In South America (RA III) the CLIMAT receipt has been generally below 60% of the possible data receipt. It has increased to 70% in May and July 2005. The percentage of messages received is still lowest in RA I (Africa) with about 40%.

A continued discrepancy in the receipt of CLIMAT messages at DWD (RTH Offenbach) and JMA (RTH Tokyo) was noted and illustrated. Mr Nakamigawa further reported on the timeliness, correctness and the data quality of CLIMAT messages as received by the GSNMCs.

4.4 Report of GUAN Monitoring Centre (ECMWF)

Mr Garcia-Mendez recalled the meeting that the GUAN data have been monitored at ECMWF since 2002. The number of TEMP reports from GUAN stations has shown a smooth positive trend over recent years. The percentage of reports reaching 100 hPa remains stable and fluctuates between 92% and 95%. A comparison between 1998 and 2004 shows that the frequency of TEMP reports received shows definite increases in North and South America, south western Asia and Australia.

The quality of data received has also been analysed and it could be demonstrated that the degree of systematic biases and seasonal trends in the sounding data critically depends on the equipment used. An assessment of the temperature quality data for the GUAN stations shows that MEISEI and VAISALA sondes show good quality data, that VIZ shows larger random deviation values than the previous two in the stratosphere; that MRZ shows a strong seasonal trend in the stratosphere and that SHANG shows the seasonal trend also and a strong random deviation above the tropopause. A similar assessment of the quality of the humidity data has been carried out computing vertical statistics and using the same group of stations as in the case of the temperature. The results show that the VRS80 sondes show the well known negative humidity bias below 700 hPa and that this negative bias is reduced in the VRS90-92 group and actually the bias is gone for relative humidity values above 50%; that MEISEI sondes show a reversed signal at low levels, which is a humidity positive bias; and that MRZ and SHANG sondes show a seasonal trend in the statistics displaying in general positive humidity biases

4.5 Report on GUAN Monitoring/Analysis Centre (Met Office, Hadley Centre)

Dr McCarthy informed the meeting that current monitoring procedures carried out at the Met Office, Hadley Centre are the monitoring of the CLIMAT TEMP bulletins that are received at the Met Office routinely each month via the GTS, email, post, and fax. These bulletins and reports pass through in-house decode and hydrostatic quality control procedures and are maintained on the Hadley Centre archive. The monthly receipt of CLIMAT TEMP bulletins from GUAN stations is monitored as part of this process. Monitoring statistics are made available through the GUAN website (<http://www.guanweb.com>) and are updated on a monthly basis.

GUAN performance based on CLIMAT TEMP receipt for June 2005 shows a total of 117, or 73%, of GUAN stations reported CLIMAT TEMP bulletins that were received and successfully decoded at the Met Office (UK) for this month. A total of 121, or 75%, of GUAN stations have reported CLIMAT TEMP bulletins in at least six of the last 12 months. Asia and the South West Pacific (Regions II and V) have the most reliable reporting rate, and are also the regions containing the largest number of stations. Africa and South America (Regions I and III) have the poorest performance records.

The region with the most number of improving stations is North America, Central America and the Caribbean (Region IV), in particular Canada, followed by the South West Pacific (Region V) and Russia. The region with the most stations in decline is Africa (Region I) followed by South America (Region III), in particular Brazil. From this it would appear that Africa and South America are the weakest performing regions, in terms of data receipt, and are continuing to decline. These are particularly important regions for climate monitoring.

Longer-term availability of GUAN data from the CLIMAT TEMP archive held at the Met Office, Hadley Centre highlights the improvement in data availability in Asia and the South West Pacific, and the decline in performance in Africa and South America. Overall 70-75% of the GUAN currently provide CLIMAT TEMP bulletins. This is an improvement since the creation of the GUAN, when the availability of CLIMAT TEMP bulletins was at approximately 65%.

4.6 Report of CBS Lead Centre for GSN data (JMA)

Mr Nakamigawa informed the meeting that since January 2004, the JMA Lead Centre has communicated with Focal Points of the Philippines, Vietnam, Thailand, Indonesia, Myanmar, India, Kiribati, Laos, Tadjikistan and the Republic of Korea. In order to find causes of not receiving CLIMAT or receiving insufficient CLIMAT reports, the Lead Centre sent a questionnaire regarding the status of GSN stations which have reported no CLIMAT report for six months or more. Several replies have been received, including the fact that Tan Son Hoa (48900), a GSN station, does no longer belong to the NMS, Hinatuan (98755) in the Philippines which the member recommends does not perform adequately to be a GSN station and has proposed a replacement station for the GSN, two GSN stations in Thailand, Chiang Rai (48303) and Ubon Ratchathani (48407), that do not send CLIMAT reports because the Thailand Meteorological Department (TMD) has no policy to send CLIMAT reports from these stations as they are not marked as CLIMAT (C) stations in Weather Reporting No.9 Volume A (Observing Stations). The Lead Centre also got responds from several other countries. Often the Focal Point does not appear to be the correct person to handle such a query, or the Focal Point completely fails to reply.

There are several main reasons identified as to why CLIMAT reports are not received including silent stations, where many registered GSN stations simply do not report any observation. Some stations are not registered as CLIMAT reporting stations, even though they are on the GSN list. Communications problems have been identified in several cases as stopping reports getting on to the GTS. Trained staff and procedures problems have also been identified in

a few cases, including some cases of systematic format errors. And lastly timeliness is an issue, in that approximately 5% of stations send in their CLIMAT reports after the eighth day from the beginning of the month, as is the requirement, and these reports may not be included in compiled bulletins.

4.7 Report of CBS Lead Centre for GSN and GUAN data (NCDC)

Dr. Thomas Peterson, Mr. Larry Griffin, Mr. Ron Ray, Mr. Greg Hammer, Mr. Larry Nicodemus and Dr. Matt Menne reported on numerous activities at the CBS Lead Centre for GSN and GUAN at NCDC. Dr. Peterson described the special analyses done for GCOS such as the compiling the historical and real-time reporting information on GSN and GUAN stations that were used by the GCOS Secretariat in producing the station certificates and creating a GSN poster for a recent UNFCCC meeting as a means for highlighting the need for Members to provide their GSN data if they haven't already. Mr. Griffin described the monitoring reports that are produced monthly for the GSN and GUAN networks. These differ from the GSN Monitoring Centre reports in that (a) they do not evaluate the quality of the data and (b) they summarize synoptic and hourly transmissions as well as CLIMAT reports. Mr. Ray discussed the challenges involved in reading the historical daily GSN data, which arrive at the Lead Centre in a wide variety of formats following the requests made by Mr. Hammer. Since January 2004, Mr. Hammer has succeeded in acquiring historical GSN data from approximately 40 member states. Mr. Hammer has also received updates to metadata for approximately 40 GUAN stations. These updates have been added to the GUAN metadata archive. Mr. Nicodemus elaborated on the use of GSNMC monitoring results with a view to improve real-time receipt of GSN and GUAN data, and his strategy to contact countries to that effect. Dr. Menne described the connections between historical data set development at NCDC and activities in support of GCOS. Recent and historic GUAN soundings are treated as part of the more comprehensive radiosonde data set called IGRA (Integrated Global Radiosonde Archive). The results of the IGRA QC and updating system are fed to a network monitoring system which inventories both the raw and quality controlled GUAN archives current to the last data month. A similar approach is planned to for the processing of GSN data.

4.8 Cooperation between CBS-OPAG/IOS Rapporteur, Rapporteurs/Coordinators on Regional Aspects of the GOS and National Focal Points for GCOS data

Dr Menne discussed the possibility of increasing the participation of the Rapporteurs/Coordinators on Regional Aspects of the GOC when problems are encountered in GCOS data exchange. The Rapporteurs agreed to investigate data exchange and receipt problems when other means, such as contacting National Focal Points for GCOS Data, are unsuccessful.

5 GCOS TECHNICAL SUPPORT ACTIVITIES

5.1 Revitalization of the GSN and GUAN stations

Mr. Thigpen presented a report on the revitalization activities to improve GUAN and GSN station reporting. Thus far 18 GUAN stations have received assistance ranging from complete renovation to a supply of radiosondes. Activities are focused on 4 African nations for renovation of their GSN station.

In addition, the results of activities to analyze the performance of the GUAN and GSN were discussed and included the development of the CLIREP software for producing the CLIMAT and CLIMAT TEMP monthly summary reports. A series of workshop is planned by WWW/GCOS to provide training. The meeting was also informed on the establishment of the GCOS Technical Support Projects. Three projects have already been established and a fourth, in South America, is being established. Reports from two of the TSP follow.

5.2 Report on activities by the GCOS Technical Support Project in the Pacific

Mr G. Clarke presented a status of the GCOS Technical Support Project (TSP) in the Pacific. He commented that the developing countries in the region, while ideally located in the tropics, do not have the resources, the technical infrastructure or funds to sustain sophisticated upper air measurement programs. The only stations that have survived in the GUAN network in the Pacific are in small developing countries that are externally supported.

The meeting noted that progress has been made by utilizing engineering and other infrastructure that is already established, rather than establishing a separate facility with the associated set-up costs. A further benefit lies in being able to draw from a pool of engineers and other experts with specialization in specific equipment, and meteorological and management fields.

Stations that have been supported to assist with their GUAN responsibilities include Funafuti, Tuvalu (91643), Tarawa, Kiribati (91610) and Penrhyn, Cook Islands (91801) but some assistance available on an "as required" basis to Honiara, Solomon Islands (91517), Port Moresby, Papua New Guinea (92035), Bauerfield, Vanuatu (91557).

Maintenance and technical support for GSN involve the establishment of three inspectors' kits, which include a lockable carry case with blank record sheets (each kit dispatch), instructions, disposable camera, inspectors instruments to field check, barometers, thermometers, rain-gauges, tool set to effect any immediate on-site repairs, compass / clinometer, tape measure, freight costs to each country for dispatch of the kit (one time), establishment of a station record database at the TSP Centre, filing of returned completed station inspection data in the metadata database, providing the metadata information to GCOS Monitoring and Archive Centres, training course for one inspector from each participating country, freight for return of the kit. Participating countries include Kiribati, Solomon Islands, Vanuatu, Tuvalu, Fiji, Tokelau Islands, Tonga, Cook Islands, Niue and Papua New Guinea

Mr Clarke reported on some of the progress to date, including calibration and checking of the hydrogen generator at Tarawa and installing HF radio digital email systems at Funafuti and Tarawa to overcome communications problems. The efforts from the Technical Support Project have resulted in less missing data from the GUAN stations, higher bursting heights achieved, and CLIMAT TEMP messages now being sent on the GTS.

The GSN inspection kits are being sent from country to country. Niue has just returned their kit after inspecting its GSN station. The returned kit has now been recalibrated and is ready to send to another participating country to undertake inspections of their GSN stations.

5.3 Report on activities by the GCOS Technical Support Project in the Caribbean

Mr Foster representing Technical Support Center (TSC) for the GCOS in the Caribbean region provided a brief summary of the status of the GUAN and GSN networks and of the support they provided during the past 15 months.

The TSC reported that their efforts helped to improve the performance of the GUAN sites in terms of the number of observations received on-time at NOAA/NCEP with a significant increase in completeness and accuracy. TSC reported the number of observations received during their participation (July 04 through June05) increased by 430 reports or 29% as compared to the previous 12 months when the TSC was not involved. In addition, the receipt of complete observations increased by 76% during the same 12 month period of the TSC's involvement.

The contractor initiated efforts for the GUAN sites to create and transmit CLIMAT TEMP messages to Hadley Centre by introducing and teaching the CLIREP software as well arranging for a Spanish-speaking international workshop on CLIMAT TEMP data assimilation, creation and transmission. TSP also advised the meeting that the Caribbean Institute for Meteorology and Hydrology (CIMH) expressed an interest in conducting workshops/classes on the CLIREP software.

The TSC described the GSN network in terms of the receipt of hourly and synoptic observations at NCEP. The TSC pointed to successes in eliminating silent stations and increasing the reliability of GSN data to the centres. The TSC took actions to increase the 2001-2004 CLIMAT data base at the centres from 64% of total possible to 84% with expectations of achieving 100% in the very near future. TSC showed an increase in the reliability of reporting CLIMAT reports during their tenure and expressed confidence this increase will continue for some time to come.

The TSC advised the meeting of the large amount of Historical Monthly Data collected in the past 15 months. The TSC was advised to forward this data to the NCDC.

A considerable amount of effort was put into determining the specific content and format for the submission of GSN Metadata information to NCDC. The TSC presented examples of their Metadata files along with several descriptive digital photos of each GSN site. The TSC has completed Metadata files for all 16 GSN sites plus 3 additional sites that may become part of the GSN. These files will be forwarded to NCDC. TSC advised the meeting that the requirements for GUAN metadata information are not clear and TSC is not currently pursuing this type of information.

TSC advised the meeting that the improvement in the integrity of the GCOS networks during the past 15 months are very good, but these improvements are fragile and that the GCOS observations and their NMHSs will continue to need hands-on and proactive support to maintain these gains.

5.4 Report on activities by the GCOS Technical Support Project in Africa

Mr. Thigpen provided a report on the establishment of the TSP in the SADC region of Africa. It was established at the Botswana Meteorological Service in Gaborone, Botswana. They had hosted the WMO Regional Instrument Calibration for nearly 10 years and have been awarded a contract by the WMO to operate the TSP. They have already conducted 3 missions for GCOS including the site survey of the GUAN station at Luanda, Angola and the equipment installation at Windhoek, Namibia.

6 EXPECTED IMPROVEMENTS IN GENERATION AND EXCHANGE OF GSN AND GUAN DATA

6.1 Coding and routing of GCOS data over the Global Telecommunications System (GTS)

Problems with the coding and routing of GCOS data over the GTS were discussed. Monitoring of the CLIMAT and CLIMAT TEMP bulletins shows deficiencies in the application of WMO standards for the presentation of CLIMAT and CLIMAT TEMP bulletins in accordance with code forms FM 72-XII CLIMAT and FM 75-XII CLIMAT TEMP. In 2004, the WMO Secretariat carried out a study on these deficiencies. Accordingly, WMO Members were informed by the secretariat of the deficiencies found for each country and invited to take action in order to eliminate the deficiencies. The meeting was also informed that the WMO Secretariat issued in four languages (E,F,R and S) a Handbook for CLIMAT and CLIMAT TEMP reporting (WMO/TD No. 1188), which should guide the WMO Members in preparing and formatting CLIMAT and CLIMAT TEMP reports and bulletins. The meeting was briefed on the activities related to the migration from Traditional Alphanumeric Codes (TAC) to Table Driven Code Forms (TDCF) during the period 2005-2010 and also on the development of the WMO Information System (WIS; see <http://www.wmo.int/web/www/WISweb/home.html>), which is intended to serve all relevant WMO programmes. The meeting agreed that there is a strong need to coordinate the evolution of the GCOS baseline systems with development of the WIS.

6.2 Plans for establishment of additional CBS Lead Centres for GCOS data

Mr R. Thigpen advised the meeting of recent activities for the establishment of additional CBS Lead Centres for GCOS data. He advised that the PR of Iran had recently approved a CBS Lead Centre in Iran. Australia has been also invited to assume responsibilities of additional CBS Lead Centre.

6.3 Activities on the establishment of Regional Climate Centres

The WMO secretariat presented a summary of activities on the establishment of Regional Climate Centres (RCCs). It was recalled that the concept of RCCs was considered and approved by the thirteen session of the WMO congress in 1999, to more fully meet regional needs in the emerging climate products especially within the context of the development of seasonal to inter-annual prediction and WMO CLIPS activities. Since then, a process toward the establishment of RCCs has been started and went through various steps including a development of a Guideline to assist WMO Regional Associations in the implementation and institutional procedures. The RCC' terms of reference include operational production of seasonal to Inter-annual Prediction (SIP) and climate products, coordination and communications support, data management services, Training and Capacity building, research and development activities. Each region will select a structure to meet the needs determined by its Members. The implementation process of RCCs is ongoing in all WMO regions. It was noted that some regions (RA II, IV, and VI) are in an advanced stage, where the demonstration phase (Pilot experiment) is underway or under establishment. RA I and RA III are at the early stage of definition; in Region V, the ad-hoc working group had delivered its report in June 2005 to be considered by the upcoming session of RA V in March 2006.

7 CONCLUSIONS AND RECOMMENDATIONS FOR SUBMISSION TO CBS AND AOPC

Based on the results of discussions under various agenda items, the meeting developed recommendations on improvements in climatological data availability for submission to the next session of CBS and AOPC for consideration and approval. These are summarized in Annex IV.

8 CLOSURE OF THE MEETING

There being no further business to come before the meeting, the chairman closed the session at 12.15 p.m. on Friday, 30 September 2005.

AGENDA

1. ORGANIZATION OF THE MEETING

- 1.1. Opening of the meeting
- 1.2. Election of the chairman
- 1.3. Adoption of the agenda
- 1.4. Working arrangements

2. GCOS IMPLEMENTATION PLAN AND AOPC PRIORITIES

- 2.1 GCOS Implementation Plan and AOPC priorities
- 2.2 Global Observing Systems Information Centre (GOSIC)

3. CURRENT STATUS OF WWW MONITORING ACTIVITIES

- 3.1 Results of the WWW monitoring of availability of climate reports
- 3.2 Report on the RBCN/GSN and GUAN in Region I
- 3.3 Report on the RBCN/GSN and GUAN in Region II
- 3.4 Report on the RBCN/GSN and GUAN in Region III
- 3.5 Report on the RBCN/GSN and GUAN in Region IV
- 3.6 Report on the RBCN/GSN and GUAN in Region V
- 3.7 Report on the RBCN/GSN and GUAN in Region VI
- 3.8 Implementation of ABCN/GSN and GUAN in the Antarctic

4. MONITORING OF GCOS ATMOSPHERIC NETWORKS AND INTERACTION WITH COUNTRIES

- 4.1 Report of the CBS-OPAG/IOS Rapporteur on GCOS matters
- 4.2 National Focal Points (FPs) for GCOS data
- 4.3 Report of GSN Monitoring Centres (JMA and DWD)
- 4.4 Report of GUAN Monitoring Centre (ECMWF)
- 4.5 Report of GUAN Monitoring/Analysis Centre (Met Office, Hadley Centre)
- 4.6 Report of CBS Lead Centre for GSN data (JMA)
- 4.7 Report of CBS Lead Centre for GSN and GUAN data (NCDC)
- 4.8 Cooperation between CBS-OPAG/IOS Rapporteur, Rapporteurs/Coordinators on Regional Aspects of the GOS and National Focal Points for GCOS data

5. GCOS TECHNICAL SUPPORT ACTIVITIES

- 5.1 Revitalization of the GSN and GUAN stations
- 5.2 Report on activities by the GCOS Technical Support Project in the Pacific
- 5.3 Report on activities by the GCOS Technical Support Project in the Caribbean
- 5.4 Report on activities by the GCOS Technical Support Project in Africa

6. EXPECTED IMPROVEMENTS IN GENERATION AND EXCHANGE OF GSN AND GUAN DATA

- 6.1 Coding and routing of GCOS data over the Global Telecommunications System (GTS)
- 6.2 Plans for establishment of additional CBS Lead Centres for GCOS data
- 6.3. Activities on the establishment of Regional Climate Centres

7. CONCLUSIONS AND RECOMMENDATIONS FOR SUBMISSION TO CBS AND AOPC

8. CLOSURE OF THE MEETING

WORK PLAN**Second CBS/GCOS Expert Meeting on Coordination of the GSN and GUAN
Asheville, USA, 28 – 30 September 2005**

	Wednesday 28 Sept	Thursday 29 Sept	Friday 30 Sept
09h00 – 09h30 09h30 – 10h30	Registration Items 1 & 2	Item 4 (cont'd)	Drafting groups and draft review
10h30 – 10h45	Coffee Break	Coffee Break	Coffee Break
10h45 – 12h30	Item 2 (cont'd) Item 3	Item 5	Approve Draft of Final Report
12h30 – 13h30	Lunch	Lunch	Item 8
13h30 – 15h30	Item 3 (cont'd)	Item 6	
15h30 – 15h45	Coffee Break	Coffee Break	
15h45 – 17h30	Item 3 (cont'd) Item 4	Item 7	

PROVISIONAL AGENDA

1. ORGANIZATION OF THE MEETING
 - 1.1 Opening of the meeting
 - 1.2 Election of the chairman
 - 1.3 Adoption of the agenda
 - 1.4 Working arrangements
2. GCOS IMPLEMENTATION PLAN AND AOPC PRIORITIES
 - 2.1 GCOS implementation Plan and AOPC priorities
 - 2.2 Global Observing Systems Information Centre (GOSIC)
3. CURRENT STATS AND RESULTS OF WWW MONITORING ACTIVITIES
 - 3.1 Results of WWW monitoring of availability of climate reports
 - 3.2 Report on the RBCN/GSN and GUAN in RA I
 - 3.3 Report on the RBCN/GSN and GUAN in RA II
 - 3.4 Report on the RBCN/GSN and GUAN in RA III
 - 3.5 Report on the RBCN/GSN and GUAN in RA IV
 - 3.6 Report on the RBCN/GSN and GUAN in RA V
 - 3.7 Report on the RBCN/GSN and GUAN in RA VI
 - 3.8 Implementation of ABCN/GSN and GUAN in the Antarctic
4. MONITORING OF GCOS ATMOSPHERIC NETWORKS AND INTERACTIONS WITH COUNTRIES
 - 4.1 Report of the CBS-OPAG/IOS Rapporteur on GCOS matters
 - 4.2 National Focal Points (FPs) for GCOS data
 - 4.3 Report of GSN Monitoring Centres (JMA and DWD)
 - 4.4 Report of GUAN Monitoring Centre (ECMWF)
 - 4.5 Report of GUAN Monitoring/Analysis Centre (Met Office, Hadley Centre)
 - 4.6 Report of CBS Lead Centre for GSN data (JMA)
 - 4.7 Report of CBS Lead Centre for GSN and GUAN data (NCDC)
 - 4.8 Cooperation between CBS-OPAG/IOS Rapporteur, Rapporteurs/Coordinators on Regional Aspects of the GOS and National Focal Points for GCOS data
5. TECHNICAL SUPPORT ACTIVITIES.
 - 5.1 Revitalization of the GSN and GUAN stations
 - 5.2 Report by the GCOS Technical Support Project in the Pacific
 - 5.3 Report by the GCOS Technical Support Project in the Caribbean
 - 5.4 Report by the GCOS Technical Support Project in Africa
6. EXPECTED IMPROVEMENTS IN GENERATION AND EXCHANGE OF GSN AND GUAN DATA
 - 6.1 Coding and routing of data over the Global Telecommunications System (GTS)
 - 6.2 Plans for the establishment of additional CBS Lead Centres for GCOS data
 - 6.3 Activities on the establishment of Regional Climate Centres.
7. CONCLUSIONS AND RECOMMENDATIONS FOR SUBMISSION TO CBS AND AOPC
8. CLOSURE OF THE SESSION

LIST OF PARTICIPANTS

Mr Mahaman SALOUM <i>(representing RA I)</i>	Service météorologique du Niger B.P. 218 NIAMEY Niger Tel.: +227 89 82 38 Fax: +227 73 55 12 E-mail: saloum@acmad.ne or nigermtto@asecna.org
Mr Yongqing CHEN <i>(representing RA II)</i>	China Meteorological Administration 46 Zhongguancunnandajie BEIJING China Tel.: +86 10 684 064 21 Fax: +86 10 621 742 41 E-mail: chenyq@cma.gov.cn
Mr Gaston TORRES <i>(representing RA III)</i>	Direccion Meteorologica de Chile Aeropuerto Internacional Arturo Merino Benitez Interior (Sin Numero) SANTIAGO Chile Tel.: +56 2 436 3444 Fax: +56 2 601 9590 E-mail: gtorres@meteochile.cl
Mr Werner STOLZ <i>(representing RA IV)</i>	Instituto Meteorologico Nacional (IMN) Apartado Postal 5583 1000 SAN JOSE Costa Rica Tel.: +506 222 5616 Fax: +506 257 8287 E-mail: wstolz@imn.ac.cr
Mr Chanel IROI <i>(representing RA V)</i> <u>Unable to attend</u>	Solomon Islands Meteorological Service P.O. Box 21 HONIARA Solomon Islands Tel.: +677 27658 Fax: +677 28054 E-mail: C.Iroi@yahoo.com.au
Mr Alan DOUGLAS <i>(representing RA VI)</i>	Met Office FitzRoy Road EXETER EX1 3PB United Kingdom Tel.: +44 1392 885600 Fax: +44 1392 88 5681 E-mail: alan.douglas@metoffice.gov.uk

Mr Garry CLARKE	MetService New Zealand Ltd. PO Box 722 WELLINGTON New Zealand. Tel.: +64 4 4700774 Fax: +64 4 4735231 Mobile: +64 21 880707 E-mail: garry.clarke@metservice.com
Dr Michael COUGHLAN	Bureau of Meteorology GPO Box 1289K MELBOURNE VIC 3001 Australia Tel.: +61 3 9669 4444 Fax: +61 3 9669 4660 E-mail: m.coughlan@bom.gov.au
Mr Howard DIAMOND	U.S. GCOS Program Manager NOAA/NESDIS 1335 East-West Highway, Room 7214 SILVER SPRING MD 20910 USA Tel.: +1 301 713 1283 Fax: +1 301 713 0819 Cell: +1 301 801 4855 E-mail: Howard.Diamond@noaa.gov
Mr Danny FOSTER	Internet, Inc 7732 Castleisland Dr. SARASOTA, FL 34240 USA Tel.: +1 941 379 3536 Fax: +1 941 379 3536 Cell +1 540 420 2255 E-mail: infotiempo@comcast.net
Mr Antonio GARCIA-MENDEZ	European Centre for Medium-Range Weather Forecasts (ECMWF) Shinfield Park READING Berkshire. RG2 9AX United Kingdom Tel.: +44 118 949 94 24 Fax: +44 118 986 94 50 E-mail: antonio.garcia@ecmwf.int
Ms Mina JABBARI <u>Unable to attend</u>	Islamic Republic of Iran Meteorological Organization P.O. Box 13185-461 TEHRAN Islamic Republic of Iran Tel.: +98 21 6001230 Fax: +98 21 6035416 E-mail : jabbari@irimet.net

Mr Fred BRANSKI	Team Leader for Data Management NOAA /NWS RTH Washington 1325 East West Highway, Room 5347 SILVER SPRING MD 20910 USA Tel.: +1 301-713-0864 Fax: +1 301-713-1469 E-mail : Fred.Branski@noaa.gov
Ms Christina LIEF	NOAA/National Climatic Data Center 151 Patton Avenue, Room 447 ASHEVILLE, NC 28801 USA Tel.: +1 828 271 4101 Fax: +1 828 271 4328 E-mail: Christina.Lief@noaa.gov
Dr Mark McCARTHY	Hadley Centre for Climate Prediction and Research Fitzroy Road EXETER Devon EX1 3PB United Kingdom Tel.: +44(0)1392 884672 Fax: +44(0)1392 885681 E-mail: mark.mccarthy@metoffice.gov.uk
Dr Matthew MENNE	NOAA/National Climatic Data Center 151 Patton Avenue ASHEVILLE, NC 28806 USA Tel.: +1 828 271 4449 Fax: +1 828 271 4328 E-mail: matthew.menne@noaa.gov
Mr Hiroshi NAKAMIGAWA	Japan Meteorological Agency Climate Prediction Division 1-3-4 Otemachi Chiyoda-Ku TOKYO 100 81 22 Japan Tel.: +81 3 3211 4966 Fax: +81 3 3211 8406 Email: lf_d_clim@hq.kishou.go.jp
Dr Thomas PETERSON	National Climatic Data Center/NOAA 151 Patton Avenue ASHEVILLE, NC USA Tel.: + 1 828 271 4287 Fax: + 1 828 271 4328 E-mail: Thomas.C.Peterson@noaa.gov

Mr Richard THIGPEN	GCOS Secretariat consultant Tel.: +1 301-598-5683 Fax: +1 301-452-7669 Tel.: +41 22 730-8012 (in Geneva) E-mail: thigpen@erols.com RThigpen@wmo.int
---------------------------	---

WMO SECRETARIAT 7 bis, avenue de la Paix CH-1211 Geneva 2 Switzerland	WWW website www.wmo.int/web/www/www.html
Mr Omar BADDOUR	Chief, World Climate Data and Monitoring Programme World Climate Programme Tel.: +41 22 730 8268 Fax: +41 22 730 8042 E-mail: OBaddour@wmo.int
Dr Alexander V. KARPOV	Chief, Observing System Division World Weather Watch Department Tel.: +41 22 730 8222 Fax: +41 22 730 8021 E-mail: AKarpov@wmo.int
Dr Stephan BOJINSKI	Junior Professional Officer GCOS Secretariat Tel.: +41 22 730 8150 Fax: +41 22 730 8052 E-mail: SBojinski@wmo.int

EMCGG-2: RECOMMENDATIONS

The second CBS/GCOS Expert meeting on the Coordination of the GSN and GUAN proposed the following actions to be taken to improve the availability and quality of GCOS atmospheric data. The meeting recommended that:

I. Recommendations by Regional Rapporteurs/Coordinators on Regional Aspects of the GOS

(i) Each Region be invited to consider incorporating responsibility for co-ordinating the delivery of GCOS requirements to the existing Rapporteurs/Coordinators on Regional Aspects of the GOS, though it was recognised that Regional Associations may elect to appoint a separate Regional Rapporteur/Coordinator for the GCOS. [Action: CBS Rapporteur for GCOS matters]

(ii) GCOS Secretariat, and CBS Lead Centres for GCOS data, inform Rapporteurs/Coordinators on Regional Aspects of the GOS (and regional GCOS rapporteurs when elected) on the information/requests being sent to National Focal Points for GCOS data, so they be involved in helping to resolve issues. [Action: CBS Lead Centres and GCOS secretariat].

(iii) The CBS Lead Centres for GCOS data be encouraged to use the questionnaire developed by JMA as a guideline for further investigation in the availability of reports from GSN and GUAN networks, and the reasons for underperformance. [Action: CBS Lead Centres for GCOS data]

(iv) GCOS, through the AOPC, consider reviewing the existing minimum and target requirements for upper air observations in terms of spatial resolution, frequency and quality, and recommend, if considered necessary, a revised but realistic targets (based on scientific evidence and technological capabilities). Clear requirements are essential in a cost benefit analysis necessary to gain and sustain the required resources. [Action: AOPC/AGG]

(v) Taking into account that CBS has already developed and distributed a plan for the migration to table-driven codes (CREX and BUFR) and established within its OPAG-ISS the ET on Migration to Table-driven Code Forms (ET-MTCF), GCOS, CBS Lead Centres and GCOS Monitoring Centres coordinate monitoring exercise with the ongoing migration process. [Action: GCOS secretariat, CBS Lead Centres, GCOS Monitoring Centres, ET-MTCF]

(vi) Taking into account the results of survey on the possible impact of the replacement of certain RSO systems initiated by CBS, GCOS, continue the accepted task of funding the replacement of equipment at some GUAN stations. [Action: GCOS secretariat]

(viii) WMO and GCOS continue to organise Sub-Regional Training Seminars on CLIMAT and CLIMAT TEMP reporting to help Members understand the implications of GCOS requirements, provide training in delivery and support to the existing network and upgrade plans. The next Workshop should be in Region III (South America). [Action: WWW, WCP, GCOS secretariat]

(ix) Experts continue to visit countries that have GCOS network-related problems. [Action: GCOS secretariat, WWW]

(x) Entries in the list of National Focal Points for GCOS Data be reviewed on an annual basis. [Action: WWW, in collaboration with CBS Lead Centres and Rapporteurs/Coordinators on the Regional Aspects of the GOS]

II. Specific recommendations by the Regions

(RA I, agenda item 3.2)

- (i) Emphasis be given to the revitalization of GSN and GUAN stations, particularly in west and central Africa, in accordance with the GCOS Regional Action Plan. [Action: GCOS and partners]
- (ii) A full TSP be implemented to support GUAN, GSN stations in west and central Africa, in order to increase availability of CLIMAT messages. [Action: GCOS and partners]
- (iii) The telecommunications facilities for the exchange of climate information in the region be improved/upgraded. [Action: WWW]

(RA II, agenda item 3.3)

See section I. item iii. above.

(RA III, agenda item 3.4)

- (iv) The importance of a TSP for RA III be emphasized, and the regional training seminar be organized on CLIMAT and CLIMAT TEMP reporting and telecommunication (see section I. item viii. above). [Action: WWW, WCP, GCOS secretariat]
- (v) Support of international entities be obtained to assist countries of the region, for maintaining their stations in operation and to increase the number of them, in accordance with the GCOS Regional Action Plan for South America. [Action: GCOS and partners]

(RA IV, agenda item 3.5)

- (vi) Emphasis be given to the revitalization and support particularly in Mexico, Central America and the Caribbean countries of GSN and GUAN stations in accordance with GCOS Regional Action Plan. [Action: GCOS and partners]

(The Antarctic, agenda item 3.6)

- (vii) GCOS provide a document describing its needs and requirements in the Antarctic, to a coordination meeting on Antarctic meteorology and related IPY activities taking place in St Petersburg (21 – 23 November 2005). [Action: GCOS secretariat]

III. Recommendations from the WWW study

- (i) Operational staff at the compiling centres and at the CLIMAT reporting stations be trained in applying the WMO standards for the presentation of the CLIMAT and CLIMAT TEMP reports and bulletins, e.g. by using the CLIREP software. For this purpose, the regular evaluation of the collected bulletins should be done. The National Focal Points for GCOS data should be informed interactively about deficiencies in the bulletins from their countries. It is necessary to address this issue in the regional and sub-regional workshops. [Action: WCP and WWW, GCOS secretariat]
- (ii) WMO standards to improve the quality and reliability of the CLIMAT and CLIMAT TEMP bulletins be re-considered, taking into account the advantages in using computers for coding and decoding the meteorological data. [Action: WCP and WWW]
- (iii) WMO Members and WMO Secretariat share the responsibilities to further monitor the presentation of CLIMAT and CLIMAT TEMP bulletins, using in particular the SMM data, and to

further undertake the follow-up actions to overcome the deficiencies. Automatic detection of the deficiencies in the SMM bulletins should be envisaged. [Action: WCP and WWW].

(iv) Finally, financial support be found from the WMO budget and from the international community to continue and expand the activities in improving the quantity and quality of the CLIMAT and CLIMAT TEMP reports from the observing stations, e.g. in order to implement recommendation III. iii. above. [Action: WCP and WWW]

IV. Coding and routing of GCOS data over the WIS-GTS

(i) When experiencing difficulties in the reception of data from the GTS, the GCOS Monitoring Centres should contact the GTS centres, which they are connected to. WMO Members operating RTHs have designated RTH focal points (see <http://www.wmo.int/web/www/ois/ois-home.htm>, then Volume C1 and then click on List of RTH Centres and MTN Centres). The Expert Team on GTS-WIS Operations and Implementation (ET-OI) of the CBS OPAG-ISS was tasked by CBS to Monitor the GTS-WIS operational information flow and coordinate management of operational information exchange procedures, routing and traffic. [Action: GCOS Monitoring/Analysis Centres]

V. Recommendations by GCOS Monitoring /Analysis Centres and CBS Lead Centres for GCOS data

Responsibilities of CBS Lead Centres and Monitoring/Analysis Centres:

In order to make the CBS Lead Centre activities more effective, their responsibilities be partitioned as follows:

(i) CBS Lead Centres for GCOS data and GCOS Monitoring/Analysis Centres coordinate their activities, including the assessment of data receipt results. [Action: CBS Lead Centres for GCOS data, GCOS Monitoring/Analysis Centres]

(ii) No global lead centre;

(iii) Division of responsibilities between CBS Lead Centres (within WMO Regions/sub-regions) be the following:

JMA (GSN): *Region II, including Republic of Korea, China, Mongolia, India, Sri Lanka, Nepal, Myanmar, Viet Nam, Bhutan, Laos, Thailand, Cambodia, Bangladesh, Maldives;*

Australia (GSN & GUAN): *Region V, including Indonesia, Singapore, Malaysia, Philippines;*

Iran (GSN & GUAN): *Region II (western part, not including Russia), start with neighbouring countries;*

NCDC (GSN & GUAN): *all other Regions/sub-regions.*

(iv) **Contacting countries for improvements in real-time data quantity and quality**

Japan, Australia and Iran each do this for their region and within their remit (see iii) and NCDC address the rest of the world.

(v) Monitoring/Analysis:

- GSN data quality and quantity reports be continued by the combined JMA/DWD GSN Monitoring reports;
- GUAN CLIMAT TEMP (monthly summaries) monitoring be continued by the Met Office, Hadley Center;
- GUAN TEMP reports (individual soundings) monitoring be continued by ECMWF;
- GSN and GUAN historical data monitoring (which will include up to current but not duplicate the monitoring centers' reports) be done by NCDC;
- Centres accomplish monitoring and analysis of CLIMAT, TEMP and CLIMAT TEMP messages only.

(vi) Contacting countries for historical data:

Actively done by NCDC only, although other Lead Centers will mention this during their contacts and refer the countries to Mr Hammer at NCDC; regarding process, NCDC's requests for historic data follow the order (e-mail preferred; then faxes):

1. National Focal Points for GCOS,
2. Other Lead Centres,
3. Regional rapporteurs/coordinators for the GOS/GCOS.

(Hadley centre, agenda item 4.5)

(vii) The provision of CLIMAT TEMP bulletins be supported, since they are still used in the generation of some climate products. RTH Washington will routinely produce CLIMAT TEMP messages when requested by the operating country.

(viii) Follow-up meeting

A follow-up meeting is proposed for the spring of 2006, tentatively to be held in Geneva. A discussion of the cooperation between TSPs and Lead Centres should also be part of the agenda for this meeting.