

**WORLD METEOROLOGICAL ORGANIZATION**

**REGIONAL ASSOCIATION V**

**WORKING GROUP ON THE PLANNING AND  
IMPLEMENTATION OF THE WORLD WEATHER WATCH**

**THIRD SESSION**

**FINAL REPORT**



**SYDNEY, 3 - 7 DECEMBER 2001**



## **DISCLAIMER**

### **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).

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## Executive Summary

The third meeting of the RA V Working Group on the Planning and Implementation of the WWW was held in Sydney, Australia 3 to 7 December 2001.

The group was informed of the history and status of the Strategic Action Plan for the Development of Meteorology in the Pacific region and the consequent Needs Analysis. The group considered the activities needed to improve the probability of securing support for the proposed projects and recommended that the Needs Analysis be widely distributed to aid agencies by WMO. It also suggested that the president of the Association send a copy of the report, with an appropriate cover letter, to potential donors.

The group recommended that the RBSN list adopted by the Association should reflect the actual commitment of Members and that the monitoring should measure the number of reports received against this practical target rather than against an ideal. To support this requirement, the group recommended that the RBSN list have an extra column, which lists exceptions to standard practice that are expected to be a long-term characteristic of the observing program at a station. Members were asked to review their RBSN commitment before the Annual Global Monitoring, particularly regarding any exceptions to the standard observing programme.

The group considered the difficulty in acquiring upper air information across the Region and noted that many NMHSs had been adversely affected by the loss of the Omega radio navigation network. Without financial support for consumables, in some developing countries the observation program could not meet the requirements for either weather forecasting or climate monitoring. Combined bulk purchasing of consumables was suggested as a possible measure to reduce costs. Furthermore AMDAR provided a valuable addition to the observing network in the Region and NMHSs should arrange for additional collection of these observations.

The ISCS, operated by USA, is expected to be replaced by a new system by late 2003. The new system will be broadly compatible with existing VSAT receivers, although some equipment upgrades will be necessary. Likewise, when GOES-N becomes operational within a few years, the power of the EMWIN broadcast will be reduced and the signal modulation will be changed. Existing antennae and receivers will be able to be used but the demodulators in the receivers will need to be replaced.

The meeting endorsed the plans for further upgrade of the RMTN, in particular: upgrade of the links Melbourne-Nadi, Singapore-Kuala Lumpur, Singapore-Manila and Singapore-Bangkok to Frame Relay, upgrade of the link Melbourne-Noumea to TCP/IP, implementation of inter-region link Nadi-Washington and implementation of link between Apia and Pago Pago.

Internet circuits are now used for four RMTN and one inter-region links. The meeting agreed that Internet-based circuits be recognised as an acceptable option for GTS links and invited the CBS OPAG-ISS to develop guidelines for the implementation of Internet based VPNs as part of the GTS. The Regional Association and the secretariat were asked to note that secretariat assistance may be requested at a future time, if there is a consensus to continue with commercial managed networks.

GDPS centres in the Region continue to enhance and improve their forecasting systems and/or computer facilities. WMC Melbourne and NMC Singapore run global models in addition to limited area models.

The RSMCs with geographical specialization, Darwin, Melbourne, and Wellington, provide regional products to assist NMCs in the forecasting of small, meso and large-scale meteorological systems. Darwin and Melbourne have been expanding the number of products available to NMCs in the Region and make specific products available to individual NMCs through their "registered users" pages via the Internet.

CREX format is starting to be used in the Region and this represents an opportunity to gain experience in the use and flexibility of the CREX. Migration to table driven codes will be a complex task that will take many years and must be approached with deliberation and caution.

The working group strongly endorsed the proposal for the Future WMO Information System developed by the Inter-programme Task Team on Future WMO Information Systems and recommended that NMHSs within the Region participate in its further development.

The group agreed that WMO Publications No. 9 (excluding Volume B) and No. 47 should continue to be made available via the WMO Internet server and should also be distributed to NMHSs on a CD-ROM.

Members, who still prefer to receive the paper format, should continue to receive a paper copy if they so request. It also agreed that the distribution of these publications on diskette was no longer necessary.

The meeting also agreed that the Manuals on the GDPS, GOS and GTS and Manual on Codes should be made available in a word-processor compatible format as well as PDF. The electronic copies should be posted on the WMO Server and also made available on CD-ROM. These manuals should also be available in hardcopy to all Members. The group agreed that the WWW Operational Newsletter should be distributed via electronic mail.

The group noted that training in public weather services was critically important to the NMSs of developing countries in the Region. Although a number of Training Workshops on Public Weather Services have been held in the Region since the last session of the Association, additional training workshops are needed. Opportunities for the use of distance learning should also be investigated.

The session discussed arrangements for XIII-RA V and developed a draft resolution for re-establishment of the Working Group as well as draft resolutions for the RBSN and RBCN.

## GENERAL SUMMARY OF THE WORK OF THE MEETING

### **1. ORGANIZATION OF THE MEETING**

#### 1.1 Opening remarks

1.1.1 The third meeting of the RA V Working Group on the Planning and Implementation of the WWW was held in Sydney, Australia 3 to 7 December 2001. Dr R. Brook (Australia) chaired the meeting.

1.1.2 Mr Kevin O'Loughlin, on behalf of Dr Zillman, Permanent Representative of Australia to WMO, welcomed the participants to Sydney and Australia. He introduced the Hon. Dr Sharman Stone, Parliamentary Secretary with responsibility for the Bureau of Meteorology who addressed the group. In her remarks she reiterated the importance of international cooperation in meteorology, particularly for operational forecasting and noted that Australia has always been a strong supporter of the World Weather Watch. She welcomed the participants and wished them a productive meeting and an enjoyable stay in Sydney.

1.1.3 Mr Dieter Schiessl welcomed the participants on behalf of the Secretary-General. He thanked Australia for their generous offer to host the meeting and congratulated them for the excellent facilities they had arranged. He thanked the participants for coming, outlined the main objectives for the week and wished everyone a fruitful and productive meeting.

#### 1.1 Adoption of the agenda (agenda item 1.2)

1.1.1 The group adopted the agenda for the meeting, which is reproduced at the beginning of this report.

#### 1.2 Working arrangements for the meeting (agenda item 1.3)

1.2.1 The working hours and tentative timetable for the meeting were agreed upon.

### **2. REPORT OF THE CHAIRMAN**

2.1 The chairman presented his report, in which he noted that in the four years since the last meeting of the working group there had been considerable progress and change in the areas of responsibility. These are reported under the relevant agenda items in this report.

2.2 He reported that, with the assistance of members of the working group he had prepared annual reports to the President of RA V as required by the Association. He had also attended the extraordinary session of CBS held in Karlsruhe in 1998 and the twelfth session held in Geneva in 2000.

2.3 The last four years had seen considerable restructuring of the working arrangements for CBS. However the chairman noted that the Commission continued to give very strong support to the involvement of Regional Associations in its activities. In particular rapporteurs and the Coordinator attended meetings of the relevant OPAGs. In addition the chairman had the opportunity to nominate two persons from the Region to participate in expert or implementation/coordination teams as a capacity building measure. After consultation with members of the working groups and PRs, four people from the Region took advantage of this process.

2.4 The chairman noted tasks that had been given to the working group by XII-RA V and highlighted progress made on them. He also noted the PWS Programme had become a part of the working group's responsibilities during the period. This is a very important area for the Region and the chairman noted the important contribution made by the RA V rapporteurs to the programme.

2.5 He noted that the members of the working group had a very heavy workload in their day to day activities within their services and that the additional burden of the activities of the group stretched their resources. While all members took on their tasks willingly, as is reflected in the results of the progress of the work of the group, he hoped that at its next meeting of the Association the resource difficulties



would be recognised and guidance would be given as to the areas of priority so that the group could make best use of its resources.

2.6 Finally, the chairman acknowledged the support he had received from all members of the working group and in particular from the Secretariat, particularly David McGuirk and Dieter Schiessl.

### **3. CONSIDERATION OF THE DECISIONS RELATED TO WWW OF XII-RA V, Cg-XIII, CBS-XII AND EC-LIII INCLUDING REQUIREMENTS FOR WWW SUPPORT TO OTHER PROGRAMMES**

3.1 The working group reviewed the decisions made and guidance given by the twelfth session of RA V (September 1998), Cg-XIII (May 1999), CBS-XII (November 2000) and EC-LIII (June 2001), which have relevance to the work programme of the working group and which are not dealt with under other agenda items.

### **4. DEVELOPMENT OF METEOROLOGICAL SERVICES IN THE PACIFIC**

4.1 The group noted that the important role of SPREP and developmental assistance programmes in the development of NMHSs in the Region should be emphasized. It also agreed that the fundamental role that the WWW plays in providing observations for climate should be remembered while seeking sources of support. The importance of the WWW in disaster preparedness, mitigation and response should also be emphasized. Additional issues concerning capacity building and resource mobilisation are discussed in section 4 below.

4.2 The group was informed of the history and status of the Strategic Action Plan for the Development of Meteorology in the Pacific region (SDMP). In early 1999, SPREP began drafting the SDMP (2000-2009) with assistance from the Australian Bureau of Meteorology and the WMO Subregional Office for the South-West Pacific. The draft SDMP (2000-2009) was presented for review and endorsement to the 6th Meeting of Regional Meteorological Service Directors (6RMSD) held in Tahiti, French Polynesia, in July 1999. The 6RMSD endorsed the concept of preparing an integrated regional strategy as outlined in the draft SDMP (2000-2009) forming the basis for the plan.

4.3 SDMP (2000-2009) is the collective result of inputs from SPREP member countries, NMSs, regional and international organizations and donors over the past 6 years and was endorsed by the Ministers for Environment during their meeting in Guam, October 2000.

4.4 SDMP (2000-2009) called for a significant needs analysis to be undertaken under the auspices of WMO in cooperation with SPREP. In response to this, SPREP commissioned a report on the needs of the Pacific region and the Pacific Meteorological Services Needs Analysis Project (PMSNAP) was launched. The goal of the project was to improve the Pacific NMSs and the principal objectives were to:

- Identify national, regional, & international obligations, especially relating to: weather services; climate change and variability; international cooperation; and national development;
- Determine capacity of each service to meet these obligations and related needs; and
- Present a range of options for projects suitable for donor agencies to undertake to address the needs.

4.5 The project was to produce a single comprehensive report identifying:

- National/regional/international obligations and needs relating to meteorological Services and capacity of each NMS to meet these;
- An integrated range of project concepts to address these needs

4.6 Most Pacific island countries may be categorized as microstates and micro-economies with agriculture, forestry, fisheries, tourism, small-scale manufacturing, and mining as the main components of the cash economy. Their economies are characterised by a fairly large subsistence component, mainly agriculture and fishing. While they may all be classified as micro-economies, there is significant

range in the composition and size of the economies – commercial agriculture, forestry and mining is confined largely to the countries with larger, more mountainous islands, while the smaller islands and coral atolls are dependent on tourism and fishing. Foreign aid forms a large part of the annual national public expenditure in most countries.

4.7 The economies and social activities of these countries are highly sensitive to weather and climate. Severe weather phenomena, which adversely affect the economy and the society, include: tropical cyclones, droughts, floods, and prolonged heavy rain (not necessarily associated with cyclones). National activities that are particularly sensitive and need to respond to fluctuations in weather and climate are transportation, disaster management, energy, water resources, agriculture and fisheries. Climate variability (seasonal to interannual in scale) featured strongly as a very significant new area of concern among users of weather and climate information, especially in respect of severe weather. Users generally appear not to be concerned greatly with climate change except in the context of climate variability. Many users do not see a distinction between the two.

4.8 The main concerns of users that surfaced in most countries were:

- Improved cyclone warnings (for public, aviation and marine interests);
- Climate variability and associated seasonal/interannual prediction, particularly of droughts, and cyclone frequency and intensity; and
- Climate change (mainly in relation to climate variability)

4.9 From the perspective of WWW it is noteworthy that observations from the Pacific island countries are of particular significance in monitoring, understanding and predicting climate variability over the entire globe. It is therefore important for the world meteorological community to contribute towards the rehabilitation and upgrading of these observations. Related areas identified for improvement to address these concerns for NMSs were :

- Observations;
- Communications;
- Infrastructure; and
- Human resources development

4.10 The analysis of the needs of users for weather and climate services and products identified the following five common themes:

- a) Severe Weather Warnings
- b) Climate Information and Prediction Services
- c) Upgrade and strengthen observational networks
- d) Upgrading telecommunication systems, and
- e) Infrastructure and institutional strengthening.

4.11 These five themes provide the basis for formulating the proposed development projects recommended in the report. While the need for improvements in aviation and marine weather services were also identified as common themes across the Pacific, these were not specifically singled out as additional broad themes for the purpose of developing separate development projects. However, it should be noted that severe weather warnings rely very heavily on aviation and marine observations, and that severe weather events impact very significantly on aviation and marine operations. Some sub-projects relating to aviation weather services have been included under the severe weather theme. Each theme includes some elements of capacity building and human resource development.

4.12 The report concluded that:

- There is a large range in capacity to maintain networks/provide services;
- Most countries have suffered a decline in resources and capacity over last 2 to 3 decades;
- A lack of resources for ongoing expenditure is a serious problem for many developing countries;
- The main priority needs, common across the region, are cyclone warnings and climate

services (including season/interannual prediction);

- Upgrading basic observations/communications infrastructure is essential for services to be improved;
- External assistance is vital for improvement.

4.13 In March 2001, during the Informal Planning Meeting on the Voluntary Cooperation Programme and related Technical Cooperation Programme, AusAID and SPREP presented the report of the Needs Analysis. SPREP encouraged WMO VCP and its donors to use the Needs Analysis in allocating resources for use in the Pacific region. AusAID indicated that Australia is keen to be further involved in the results of the Needs Analysis and is planning to take up one of the development projects outlined in the report.

4.14 In August 2000, AusAID contracted the Bureau of Meteorology of Australia to prepare full project proposal for one of the proposed projects, particularly Project 4.4 "Expanding and enhancing the prudent use of climate prediction". The full project proposal has been completed and is currently with AusAID for consideration.

4.15 In September 2000, the Japanese Government and the Government of Fiji jointly supported a Meteorology Level II training course for the Pacific Island Countries, and this training contributed to meeting the objective of Project 1.4 as proposed in the Needs Analysis report. During the meeting Fiji invited suggestions and nominations for participants from NMSs in the Region for further training courses being planned over the next four years. It noted that support for participants might be available through VCP.

4.16 The working group considered the activities needed to improve the probability of securing support for the projects proposed in the Needs Analysis. It noted that this would be a challenge. Aid agencies have their own priorities: capacity building is popular but funding of the basic infrastructure that is so critical to the Region is usually not a priority. The group recommended that the WMO Secretariat examine the proposed projects and that projects involving basic infrastructure, such as Project 1.5 to restore and upgrade the regional upper air networks, be submitted as candidates for funding under VCP.

4.17 The group noted that the approach used to promote the actions recommended in the report "The Changing Climate in Paradise" (1991) had been relatively successful. In that case the WMO Secretariat had distributed the report widely and had used it as a basis for seeking support from aid agencies. The group recommended that the Needs Analysis receive similar treatment.

**The working group recommended that the Needs Analysis be widely distributed to aid agencies by WMO. It also suggested that the president of the Regional Association send a copy of the report, with an appropriate cover letter, to potential donors.**

4.18 The group noted that in the past, successful programmes often benefited from a single organization acting as a focal point and conduit to the aid agencies. However, the operational methods of some of these agencies had changed. It is now often necessary for the national governments of the interested NMSs to formally endorse these projects before they could be seriously considered for possible support. This leads to a need for NMSs to effectively convince their own governments of the importance of their services. To assist NMSs in this task, training in how to educate government ministers and lobby for support should be included in the curriculum of the PWS training workshops.

4.19 The group noted that local emergency management agencies and the media could be valuable partners in demonstrating the need to improve the basic infrastructure in order to provide essential services. This could help to raise the profile of NMSs within their own national governments. The meeting therefore recommended that NMSs cultivate good relationships with these groups.

4.20 It was suggested that since the ultimate goal is to improve the capabilities of all NMSs in the Region, all NMSs in the Region should be made aware of possible sources of support. If any NMS in the Region discovers an opportunity for support from an aid agency it should inform other NMSs in the

Region. The group recommended that the WMO sub-regional office serve as a focal point for such an information sharing activity.

## 5. STATUS OF WWW IMPLEMENTATION AND OPERATION

5.1 The meeting reviewed the present status of WWW implementation and operation of key facilities based on information received from RA V Members and the results of the monitoring of the operation of the WWW, including the annual global monitoring (October 2001) and the Special MTN Monitoring.

5.2 The group noted that the RBSN provided a useful long-range goal for the observing network within the Region but felt it might not be the most useful measure to be used in the monitoring. It was clear that some stations on the list were not yet implemented and that others could not commit to the standard observing program expected in the definition of an RBSN station. Other stations report at non-standard times or only report for some times of the year.

5.3 The group noted that in order for monitoring results to be comparable between Regions, all Regions should follow consistent and similar procedures. Consequently, it understood that proposals for changes in monitoring procedures have global implications, while the working group can only make recommendations to its own Regional Association. Nonetheless, the group felt that since the Association will meet before the next EC and CBS, it was worthwhile to recommend changes in procedures that could then be considered by these groups for possible application on a global scale.

5.4 The reports prepared on the annual monitoring of observations compare the number of reports received with the "expected" rate in which the program of observations listed for each station in Pub. 9, Volume A is used. However, other maps use the ideal of 4 SYNOPs and 2 upper air measurements per day as the benchmark. The failure to meet the full program could be interpreted as a poor reflection on the NMHS concerned. However, given the sparseness of observations over most of the Region even a partial observing program is valuable and these positive contributions should be recognised.

**The group recommended that the RBSN list adopted by the Association should reflect the actual commitment of Members and that the monitoring should measure the number of reports received against this practical target rather than against an ideal. To support this requirement, the group also recommended that the RBSN list have an extra column, which lists exceptions to standard practice that are expected to be a long-term characteristic of the observing program at a station.**

5.5 Exceptions to standard practice may include:

- station planned (not implemented yet)
- reduced daily observing program (e.g. daylight hours only, one sounding per day)
- variations in availability throughout the year
- non-standard reporting hours.

5.6 The meeting recommended that these factors be taken into account in assessing the benchmark number of observations used in reports on the performance of the GOS.

5.7 The meeting also suggested that Members be requested to review their RBSN commitment before the Annual Global Monitoring, particularly regarding any exceptions to the standard observing programme. The Rapporteur on Regional Aspects of the GOS, supported by the Secretariat, should prepare this augmented RBSN list, based on advice from Members and the earlier monitoring statistics.

5.8 The meeting noted that CBS-XII had invited Regional Associations to develop objective criteria for the selection of RBSN stations, based on factors such as spatial distribution, performance and availability of data. The meeting recognised the value in such a set of criteria, but felt that it would not apply to much of Region V where stations are widely distributed in general and very few alternative stations are available to replace non-performing RBSN stations.

## **6. WWW COMPONENTS AND SUPPORT FUNCTIONS, INCLUDING REPORTS OF THE RAPPORTEURS AND COORDINATOR**

### **6.1 Global Observing System (GOS)**

6.1.1 The session considered the report of the Rapporteur on the Regional Aspects of the GOS. It noted that the considerable increase in the number of SYNOP observations indicated by WMO monitoring is due mainly to the commencement of Australian standard hour bulletins based on AWS observations. The exclusion of reports at non-standard hours continues to affect the numbers counted for New Zealand and Papua New Guinea. However, the group was informed that, as of 1 January 2002, the observing stations in Papua New Guinea would begin providing observations at standard hours and New Zealand would begin reporting at standard hours in time for the October 2002 monitoring.

6.1.2 Although beyond its design life, GMS-5 continues to operate well. Reductions in the spatial extent and frequency of images were implemented on 4 July as precautionary measures. The maintenance of Meteosat-5 at 63 degrees East has enhanced the coverage over the Indian Ocean and provides very useful imagery for those countries in the west of Region V.

6.1.3 A recent development has been the Advanced TOVS instrument (ATOVS) on NOAA-15 and NOAA-16 providing microwave temperature soundings under cloudy conditions with comparable accuracy to that available from infrared measurements for clear conditions. Information on parameters such as rain rate and liquid water content from the ATOVS, SSM/I and TRMM microwave instruments are available on several Web sites and could be used by NMHSs in the region. Some of these new parameters are particularly relevant for tropical regions.

6.1.4 China's FY-1c polar orbiter program is also providing valuable data. FY-1c carries a 10-channel radiometer giving high-resolution imagery for meteorological and oceanographic applications.

6.1.5 The group noted that although scatterometer data from European Research Satellite (ERS) ceased early in 2001, satellite measurements of surface wind speed and direction are being made from the SeaWinds instrument on QuikSCAT. The group agreed that the observations provide impressive detail on the structure of weather systems over oceanic areas and encouraged NMHSs to make further use of these data where possible.

6.1.6 The meeting noted that given the expanse of ocean within the Region the observing network is very sparse. Since additional observations are needed the group was pleased that there had been increased emphasis on and availability of marine observations over the past decade and expected this trend to continue.

6.1.7 The Region continues to play an active role in the drifting buoy program through chairing of the Drifting Buoy Cooperation Panel (DBCP) and the Drifting Buoy Panel for the Indian Ocean (DBPIO). The XBT network continues to operate successfully. Ten Argo floats have been deployed in the Indian Ocean between Australia and Indonesia by Australia's government research agency CSIRO. The data from the floats are distributed in TESAC code on the GTS in near real-time.

6.1.8 A new activity has been the commencement of Automated Shipboard Aerological Programme (ASAP) observations in the Southern Hemisphere. The M.V. Palliser Bay (call sign GWAN) operating out of the UK commenced providing twice daily upper air soundings in April 2001.

6.1.9 CBS-XII had noted the need for closer collaboration between Rapporteurs on the GOS and those on Marine Meteorological Services as the Joint Commission on Marine Meteorology establishes its operations. The group agreed that this function should be included in the terms of reference of the Rapporteurs.

6.1.10 Mr Hart also reported briefly on the broader work of the OPAG on IOS, and particularly its Expert Team on Observational Data Requirements and Redesign of the GOS. He recommended that Members take an active interest in the work of this team and provide comment to the Chair of the OPAG on any issues that affect the region.

6.1.11 The meeting noted that in some areas, observations are available from sources outside of the NMHSs, such as from universities, highway departments and other local authorities. These data could be useful to NMHSs wherever they are available. Mr Brockman noted that in the US these sources were providing good quality data from well-exposed sites.

6.1.12 The group considered the difficulty in acquiring upper air information across the Region. It noted that many NMHSs within the Region had been adversely affected by the loss of the Omega radio navigation network. The meeting expressed concern at the state of the upper air network, particularly the extensive areas with poor coverage. It noted that without financial support for consumables, in many developing countries the observation program could not meet the requirements for either weather forecasting or climate monitoring. Combined bulk purchasing of consumables was suggested as a possible measure to reduce costs. The SPREP representative noted that this problem had been recognized in the Needs Analysis, but the problem of identifying a source of financial assistance had not been solved.

6.1.13 It was noted that AMDAR reports were not being processed by many developing countries despite their general availability and usefulness in providing either profiles or over-flight information. Within the past year AMDAR reports have become available within geographically segmented bulletins, making it easier for smaller centres to use these data. The working group agreed that AMDAR provided a valuable addition to the observing network and noted that there was an opportunity for expanded Regional cooperation to arrange for additional collection of these observations.

6.1.14 The South Pacific Applied Geoscience Commission (SOPAC) has defined a strategy for the Global Ocean Observing System (GOOS) for the Pacific. In addition SOPAC calls for stronger coordination between GOOS and GCOS for the Pacific in order to define a single coordinated observing network. The group was pleased to note that a representative from SOPAC has been invited to attend the next GCOS meeting in the Pacific. The working group noted that coordination should be easier with the location of the IOC Regional Office in Perth.

6.1.15 It also noted that the Comprehensive Test Ban Treaty Organization (CTBTO) was installing a world-wide monitoring network that included meteorological observations and was pleased that WMO and CTBTO had signed an agreement to exchange data. Since the CTBTO network was expected to grow to nearly 300 sites with many in remote areas, there would certainly be many sites within the Region. The observations are to be collected by Canada and distributed on the GTS.

6.1.16 The working group noted that the public visibility of the NMS could be affected by the location of observing systems. Observing networks have traditionally been designed according to the need for balanced geographical coverage. However, users expect observations to be available for high-profile locations and this can affect the public perception of the NMS. Therefore, NMSs must balance these competing requirements to determine the most appropriate locations for observing stations within their territory.

## 6.2 Global Telecommunication System (GTS)

6.2.1 The session considered the report of the Coordinator of the Subgroup on regional aspects of the GTS, which covered the status of implementation and operation of the RMTN. The report took note of objectives for the RA V GTS, as given in the WMO Fifth Long-term Plan and the priorities and guidance given by XII-RA V. It considered means of improving the GTS in RA-V where needed, as well as future development and the how to make best use new low-cost technologies that have recently been introduced to the Region.

6.2.2 The status of implementation of the RMTN in Region V is given in the annex to this paragraph.

6.2.3 Significant progress has been made in the implementation of the GTS Point-to-point circuits of the RMTN since RA V-XII. The RMTN comprises circuits distributed as indicated in the table below:

	Frame Relay	Dedicated line, fixed	Internet-based	Not Operational (Not Implemented)	Total

		bandwidth			
MTN		1			1
Inter-regional	1	4	1	1	7
Regional	4	8	4	1	17
Total	5	13	5	2	25

6.2.4 The plan for upgrades to RMTN point to point links and introduction of TCP/IP procedures as adopted by XII-RA V (Denpasar, 1998) has mostly been implemented. TCP/IP, which is the recommended protocol for the GTS, was operating on 12 of the 23 circuits of the RMTN. A Frame Relay network was implemented for linking WMC/RTH Melbourne and NMCs Jakarta and Singapore in July 1999. It was the first operational FR network being part of the GTS. The inter-regional link between Melbourne and Bracknell was added to the network in May 2000. The Frame Relay network has proven to be a reliable, flexible and very cost-effective. Several additional circuits, Melbourne - Honiara, Honolulu - Guam, Honolulu - Pago-Pago and Honolulu - Micronesia that were not included in the RMTN, were playing an important role in the operation of the GTS in Region V.

6.2.5 Four GTS circuits are implemented through the Internet. The Melbourne-Wellington Internet link has an ISDN backup, which is activated when required. RTH Wellington also uses Internet for the collection of observational reports from several Pacific islands.

6.2.6 RTH Melbourne is operating two radio facsimile broadcasts from Darwin and Canberra. RTH Wellington is operating one radio facsimile broadcast from Auckland. Honolulu is also operating a radio facsimile broadcast. These radio facsimile broadcasts are mainly used by maritime users. The two RTHs plan to continue operation of their radio facsimile broadcasts for the foreseeable future. The Australian Bureau of Meteorology has contracted for the construction of two new HF broadcast stations (one in WA and one in Queensland) to transmit radio facsimile and voice marine forecasts and warnings for the Bureau of Meteorology. These stations will also provide HF services supporting marine search and rescue for the Australian Maritime Safety Authority. The new stations are scheduled to commence service in July 2002. The call signs AXM and AXI will be replaced by VMC and VMW respectively. The content of the broadcasts will remain essentially the same as at present. Radio facsimile broadcast frequencies are given in the table below.

Country	Call sign	Frequencies (kHz)
Australia	AXM	2628, 5100, 11030, 13920, 20469
Australia	AXI	5755, 7535, 10555, 15615, 18060
New Zealand	ZKLF	5807, 9459, 13550.5, 16340.1
Honolulu	KVM70	9982.5, 11090, 16135, 23331.5

6.2.7 The International Satellite Communication System (ISCS) operated by USA, was implemented in 1995 to support the WAFS distribution. The ISCS provides a 38.4 kbit/s one-way multipoint telecommunication service via satellite. The ISCS system over the Pacific is already carrying some GTS data, mainly relating to RA III and IV. Some spare capacity is available to accommodate additional RA V data and products. Nine ISCS systems have been installed in RA V in Honolulu, Wellington, Melbourne, Noumea, Pt Vila, Nadi, Jakarta, Manila and Singapore.

6.2.8 Mr Brockman outlined plans for the further development of the ISCS beyond September 2003, when the contract for the current system is due to expire. The new system will

- be broadly compatible with existing VSAT receivers, although with some equipment exchanges;
- have a minimum data rate of 64Kbps, with potential increase to higher speeds;
- support TCP/IP procedures and for a for a limited period, X.25 also; and
- provide separate data streams over the Atlantic Ocean region and Pacific Ocean region

satellites, appropriate to the countries in these areas.

6.2.9 Mr Brockman made a presentation on the current status and future plans for the Emergency Managers Weather Information Network (EMWIN). EMWIN shares the WEFAX channel of the GOES satellites for the distribution of meteorological information related to emergency situations, including warnings. Over 30 EMWIN systems are implemented in 18 Pacific countries, and additional installations are planned subject to funding in the future. The relatively low cost of the equipment, its simple installation, operation and maintenance had greatly facilitated its implementation. The EMWIN implementation has dramatically improved the distribution of meteorological information and warnings of vital importance for the Pacific countries.

6.2.10 Within a few years, when GOES-N becomes operational, EMWIN will use a dedicated channel at a different frequency and the power of the EMWIN broadcast will be reduced to conform to ITU regulations. At the same time the signal modulation will be changed. With advances in technology it is expected that receiving systems will be no more expensive. Furthermore, existing antennae and receivers are expected to be able to be used. However, the demodulators in the receivers will need to be replaced - at an expected cost of a few hundred dollars US. Well before the new broadcast becomes operational, parallel broadcasts are expected to be made on an experimental basis. The group noted that a mini-EMWIN terminal that will operate without a PC and a manual entry DCP platform for use at remote sites that will allow both reception and transmission of data were being developed.

6.2.11 Recognizing that EMWIN provides products that are essential to the operation of NMHSs in the Region, the group was pleased to note that the United States considered EMWIN as a fully operational system with an assured long-term future. Plans are already in place concerning its operation in subsequent GOES series. With this long-term view in mind, the group recommended that EMWIN systems procured in the future should be robust enough to ensure long-term and reliable operation in the tropical marine environment that is wide-spread in the Region.

6.2.12 An increasing number of DCPs were implemented in Region V, that were transmitting via the GMS satellite, operated by Japan, or via the GOES satellite, operated by the USA. The DCP messages are relayed to Region V and the originating NMC via the GTS.

6.2.13 The Inmarsat system, and in particular Inmarsat C ship earth stations, is increasingly used for the collection of ship reports from voluntary observing ships; At the same time, the number of ship reports collected through the coastal radio stations is regularly decreasing. The Perth and Singapore Land Earth Station receive ship reports from Inmarsat C and A stations at no cost for ships.

6.2.14 The two RTHs in the region were providing their routing catalogue on their FTP server. The routing catalogues are important for ensuring and monitoring the efficient GTS data exchange, and for the NMCs to easily access the information on the availability of bulletins at RTHs.

6.2.15 WMC/RTH Melbourne is the responsible MTN centre for providing the part of the catalogue of meteorological bulletins related to region V, in accordance with the new procedures and it had implemented the necessary arrangements. The necessary co-ordination on bulletins headers and content was carried out between WMC/RTH Melbourne and NMCs in Region V; all RA V NMCs were invited to promptly notify any planned and actual changes of bulletins (header and content) to WMC/RTH Melbourne.

6.2.16 The meeting recommended that the circuits Melbourne - Port Vila, Melbourne - Honiara, Honolulu - Guam, Honolulu - Pago-Pago, Honolulu - Micronesia and Pago-Pago - Apia be included in the RMTN. The importance of the interregional circuit Nadi -Washington, which is included in the RMTN plan, was also underlined in particular for facilitating the insertion of RSMC Nadi products and warnings into the ISCS and EMWIN; RSMC Nadi and WMC/RTH Washington were invited to consider its possible implementation. The meeting took note of the Frame Relay links Toulouse - NMC Noumea and Toulouse - NMC Tahiti.

6.2.17 The meeting endorsed the plans for further upgrade of the RMTN, in particular:

- Upgrade of the link Melbourne-Nadi to Frame Relay;



- Upgrade of the link Melbourne-Noumea to TCP/IP;
- Upgrade of the links Singapore-Kuala Lumpur, Singapore-Manila and Singapore-Bangkok to Frame Relay;
- Implementation of inter-region link Nadi-Washington (via NADIN 2 link to Oakland);
- Implementation of link between Apia and Pago Pago.

The group encouraged the Members concerned to expedite the implementation of these circuits.

6.2.18 Considering the general advances of technology, the group discussed the question as to whether managed networks are the best strategy for the RMTNs (and indeed the MTN) of the future. With the improvement of Internet in its capacity, robustness and reach, there is now a good case to consider reorienting plans around Internet based circuits.

6.2.19 In RA-V, Internet circuits are now used for four RMTN and one inter-region links. Currently, these are TCP/IP socket connections between Centres, with firewalling limited to access list controls in each Centre's routers. Some Centres may consider this does not provide adequate protection for operational systems connected to the Internet. A much greater level of security is possible by the use of Virtual Private Networks (VPN) and IP Security (IPSec). Some important technical issues need to be worked out, such as routing and encryption key management, in order to develop a robust and scalable Internet based GTS. However, Internet-based networks offer advantages such as:

- Reduced cost, compared with Frame Relay networks and fixed bandwidth international circuits; and
- Can be implemented by coordinated technical standards alone, avoiding tendering and contractual processes, which are very cumbersome where many Centres are involved; and
- Offer possibilities for additional links at little or no extra cost.

**The meeting agreed that Internet-based circuits be recognised as an acceptable option for GTS links and invited the CBS OPAG-ISS to develop guidelines for the implementation of Internet based VPNs as part of the GTS.**

6.2.20 The meeting noted that, while some NMHSs in the Region have reliable and affordable communication links, for others the costs of communications are a tremendous burden. The Council of Regional Organizations in the Pacific (CROP) had established an Information and Communication Technology Working Group (ICT-WG) that is working to improve ICT services in the Pacific. The CROP ICT-WG would likely focus its efforts on improving the general connectivity to the Internet in the Region. Noting the importance of this activity, the group suggested that, under existing WMO SPREP working arrangements, SPREP invite WMO to the meeting of the CROP ICT-WG.

6.2.21 The meeting discussed the need for WMO secretariat assistance in future tendering for Frame Relay (or other technology) managed networks in the Region, when the existing arrangements with BT Concert are to be reviewed and put out to tender for a future period. A future tendering process would be more complex than the original process was because there will be a significantly greater number of connected Centres. Noting (a) that there is no fixed date for this at present and (b) the possible shift away from managed networks to Internet based links, the meeting reserved its position on this matter.

**The Regional Association and the secretariat are however asked to note that secretariat assistance may be requested at a future time, if there is a consensus to continue with commercial managed networks.**

### 6.3 Global Data-processing System (GDPS)

6.3.1 The Rapporteur on the Regional Aspects of the GDPS had resigned during the intersessional period and a new rapporteur had only recently been nominated. Therefore, the new rapporteur was not able to prepare a report. Consequently, the group considered a report prepared by the Secretariat.

6.3.2 The group noted that GDPS centres in the Region are still enhancing and improving their forecasting systems and/or computer facilities. WMC Melbourne and NMC Singapore (also ASMC: ASEAN Special Meteorological Centre) are running global models. In addition WMC Melbourne is running limited area models over Australia (over the tropics and extra-tropics) as well as a meso-scale

model. Singapore is also running two limited area models (127 km and 63-km resolution). RSMC Wellington is running an operational mesoscale model over New Zealand.

6.3.3 The group noted that Ensemble Prediction System (EPS) products have proven to be of great value. It was pleased that EPS products from ECMWF were expected to become available to NMCs in the Region beginning in early 2002. It was also pleased to be informed that WMC Melbourne will implement an operational EPS early in 2002 and will make products available as soon as practicable.

6.3.4 The RSMCs with geographical specialization, Darwin, Melbourne, and Wellington, provide regional products to assist NMCs in the forecasting of small, meso and large-scale meteorological systems. The group noted that Darwin and Melbourne have been expanding the number of products available to NMCs in the Region and make specific products available to individual NMCs through their "registered users" pages via the Internet.

6.3.5 RSMC Melbourne has been designated for the provision of transport model products in case of nuclear emergencies and has implemented the regional and global arrangements for the provision of products. Melbourne provides, upon request, specialized transport/dispersion/deposition model products and the meeting was pleased to note that NMCs in the Region are very happy with the responsiveness and level of service provided by the Melbourne centre.

6.3.6 The group noted that RSMC Hawaii has been designated for tropical cyclone forecasting and provides tropical cyclone forecasts for the Pacific from 140 to 180°W, for the Northern Hemisphere. RSMC Nadi has fully upgraded its capabilities (telecommunications, satellite imagery and data processing) and is now fully operational to provide tropical cyclone forecasts over its area of responsibility. Steady progress are observed in all centres for the tropical cyclone track forecasting, but much more remains to be done with respect to forecasting the intensity of cyclones. Statistical models are used to supplement the results of the numerical models.

6.3.7 The group noted that the computer hardware at RSMC Nadi is nearing the end of its operational life and any further upgrades of software will require replacement of the hardware.

6.3.8 The meeting noted that capacity building issues were of particular concern within the Region, particularly related to assuring availability of processing and post processing equipment and facilities at NMCs for:

- Accessing EPS products including medium-range severe weather occurrence guidance and Long-range forecast products which are or will become available at web sites of major Data processing and Forecasting Centres either on a routine basis or in scheduled quasi operational basis.
- Transport and dispersion model products for response to nuclear incident and other emergencies such as large-scale forest fires and/or haze.
- Implementation and operation at NMCs of relevant re-locatable models for response to releases of chemical and biological agents.
- Establishing strong collaborative linkage between the NMHS and national disaster management Agency and assure mechanisms are put in place for co-ordinated community response to severe weather forecasts and warnings.

6.3.9 The group also noted that once MTSAT-IR is operational, many NMCs within the Region will not have access to its high-resolution products unless some specific actions are taken. It recommended that either funding be found to purchase new receiving equipment and workstations or these products be made available for access via the Internet.

## 6.4 WWW Data Management

6.4.1 The session considered the report of the Rapporteur on the Regional Aspects of Data Management and Codes. The working group was advised of the outcomes from the April 2001 meeting of the Expert Team on Data Representation and Codes, including the fact that GRIB Edition 2 be

recommended for use from November 2001, particularly for the exchange of Ensemble Prediction System Products. Other items, included methodologies to fast track code table changes, additions and changes to some codes, discussion on using XML for data exchange and display, and the need to update various Code manuals and Guides, were presented to the group. The need for a new Manual on Reporting Practices was also recommended. In addition the Expert Team discussed the migration to table driven codes to replace the traditional character codes, and a timetable for implementation was proposed.

6.4.2 The Rapporteur also informed the group that CREX format was starting to be used, with RSMC Nadi issuing cyclone trajectory forecasts in CREX and the US NWS issuing automated rainfall reports in CREX. The meeting noted that the use of CREX by some members represented an opportunity to gain experience in the use and flexibility of the CREX table driven format. The meeting recognised that the migration to table driven codes will be a complex task and will take many years. However given that codes are essential to the operations of NMSs the meeting emphasised that the introduction of table driven codes must be approached with deliberation and caution. The group noted that the potential impact and implications for the Region must be determined once the implementation schedule becomes known.

6.4.3 The working group was advised by the Rapporteur of the status of the US NWS Pacific Region Bulletin Headings Update Project. This project, which started in July 1999, is almost finished, and has resulted in a complete update of all bulletin headings for all products issued by all Pacific Island meteorological offices affiliated with the US, with all such headers now being compliant to WMO standards.

6.4.4 The group expressed its appreciation to the Rapporteur for his informative report, and again noted that the introduction of new codes formats will be a challenge for the Region in the coming years.

6.4.5 It was noted that the use of Geographical Information Systems continues to grow. Therefore the need for NMSs to deliver information in a manner that facilitates its use in GIS is becoming increasingly important. The group recommend that the ET on Data Representation and Codes place consideration of this requirement in its future work programme.

6.4.6 The group considered the proposal for the Future WMO Information System developed by the Inter-programme task team with great interest. It recognized that the proposed system would require major changes in operational and institutional arrangements but agreed that it offered significant benefits and opportunities for improved services.

**The working group strongly endorsed the proposal for the Future WMO Information System developed by the Inter-programme Task Team on Future WMO Information Systems and recommended that NMHSs within the Region participate in its further development.**

## 6.5 WWW Systems Support Activity

6.5.1 The group recalled that the objective of the Operational Information Service (OIS) was to collect from and distribute to WMO Members and WWW Centres detailed and up-to-date information on facilities, services and products made available in the day-to-day operation of the WWW. This Service includes WMO Publication No. 9, Vols. A, B, C1, C2 and D as well as WMO Publication No. 47, METNO messages and the Operational Newsletter. Several elements of the operational information related to the WMO Publication No. 9, Volumes. A and C1, WMO Publication No. 47 and RBSN lists are available on the Internet via the WMO home page.

6.5.2 Noting the importance of rapid and reliable access to these files, the group suggested that the possibility of making them available on a "mirror site" within the Region be investigated.

6.5.3 The group noted that CBS had agreed that the objective of the OIS should be to provide improved interactive on-line access services. The use of information technology makes it possible for the WMO Secretariat to quickly receive updates from the WWW centres and update WMO Publications No. 9 and No. 47 in an electronic format. These publications are currently distributed to Members in a paper format. The group agreed that the production and dispatch of these Publications on CD-ROMs

would be much more cost effective. However, it noted that WMO Members, who still prefer to receive the paper format, should be provided with the paper copy upon request.

6.5.4 Parts of the WWW operational information have been dispatched to subscribers on diskettes with a view to satisfying the requirements of users to receive the information in an electronic format. As the requirements of the subscribers of the diskette service can be best satisfied through direct access to the WMO server, backed-up by an annual CD-ROM, it is planned to discontinue the diskette subscription service.

**The meeting agreed that WMO Publications No. 9 (excluding Volume B) and No. 47 should continue to be made available via the WMO Internet server and should also be distributed to NMHSs on a CD-ROM as from 2002. WMO Members, who still prefer to receive the paper format, should continue to receive a paper copy if they so request. It also agreed that the distribution of these publications on diskette was no longer necessary.**

6.5.5 The Manuals on the GDPS, GOS and GTS and Manual on Codes, which are annexes to the WMO Technical Regulations, are currently not made available in electronic format. This makes it difficult for experts to work on changes to the Manuals, including experts from CBS and Regional working groups. Availability of the manuals in a word processor format would greatly facilitate this work.

**The meeting agreed that the Manuals on the GDPS, GOS and GTS and Manual on Codes should be made available in a word-processor compatible format as well as PDF. The electronic copies should be posted on the WMO Server and also made available on CD-ROM. However, the group felt that these manuals should also be available in hardcopy to all Members.**

**The working group agreed that the WWW Operational Newsletter should be distributed via electronic mail, preferably as an announcement that the latest edition is available on the WMO Internet Server.**

6.5.6 The working group noted that RTH Melbourne is the designated focal point in the Region for updates to Publication 9, Volume C1. It urged all NMHSs in the Region to pass their updates concerning Volume C1 to RTH Melbourne.

6.5.7 The group noted that no UNDP/Trust Funds projects were implemented in the Region during the period 1999-2001. However, UNDP is currently conducting the Common Country Assessment for Pacific island countries. Also UN Development Assistance Framework is being developed for some Pacific island countries. The group urged NMSs in the Region to ensure their needs are reflected in their country's assessment.

## **7. PUBLIC WEATHER SERVICES**

7.1 The session considered information on the activities of the CBS OPAG-PWS as well as the report of the RA V Rapporteur on Regional Aspects of Public Weather Services. It noted that international television weather broadcasts remain a concern from the point of view of consistency with local warnings and also recognition of the role of NMSs. Discussions with international media representatives undertaken by WMO indicated a willingness to cooperate in principle but identified practical problems of the TV networks obtaining access to locally issued warnings. Consideration of a WMO Web site for warnings is part of the response to identification of this problem.

7.2 The group noted a trial of a Web site to act as a collective point for city forecasts is being coordinated through the Public Weather Services Programme and implemented by the Observatory, Hong Kong, China. A proposal for a similar site for the placement of official warnings is also being developed with the assistance of Hong Kong, China.

7.3 Warnings often include detailed local information that might make them difficult for international media to use. The working group suggested that warnings posted to the WMO warning web site be specifically tailored to the requirements of these media.

7.4 The rapid development of the Internet continues to provide challenges and opportunities for NMSs in the Region. On the one hand the availability of a wide range of weather information on the Internet has presented a threat to NMSs in some countries in that the meteorological user community can access this information. On the other hand the users often require some analysis and interpretation of the information and this can enhance the role of the NMS if it has access to the information and can add the interpretation. Most NMSs have had to address the issues of suitable hardware, software and communications capability to take advantage of the Internet. The standard of Internet sites operated by NMSs has risen substantially and there are now numerous excellent examples.

7.5 The group noted that public weather aspects of the Sydney 2000 Olympics had proved popular and a link to the WMO Web site provided access to the sites of all Members who maintain a Web site link to the WMO site. The conduct of a Forecast Demonstration Project on Nowcasting under the World Weather Research Programme has given some interesting indications of the kind of forecast and warning products that NMSs will need to consider for possible operational use in the future. These developments will have implications for both national and WWW information systems.

7.6 The needs of the Public Weather Services Programme were identified as an issue at the technical conference on a new WMO Information System held in conjunction with the CBS twelfth session. It is usually easier and less expensive to build in anticipated system capability to enable end user needs different types of public weather services, than to add these on to the infrastructure at a later stage.

7.7 A further issue for consideration by WWW is that raised by the most recent session of Executive Council concerning the need for some standardization of formats for public weather forecasts and warnings to facilitate greater international exchange of these products. At the moment there are few standards or agreed formats even for something as simple as city précis forecasts.

7.8 Another emerging issue for likely consideration by WWW regionally is the increased interest in and capability to produce air quality forecasts, derived in part from NWP output. While they are mostly experimental several examples now exist of operational services with publicly available information.

7.9 In the area of public weather services for emergency management, needs are emerging for improved access to and presentation of weather information in actual or potential disaster situations. In particular there is a rising demand for graphical information and for presentation of data and forecast products in formats compatible with geographic information systems.

7.10 The meeting noted the important contribution the EMWIN system had made to the improvement of public weather services and also noted that the introduction of digital radio broadcasts via satellite offered some interesting opportunities. These broadcasts are currently available over Africa and Southeast Asia and it was hoped that the coverage would expand to cover significant portions of the Region in the near future.

7.11 The development of the Internet in the Region is a public weather services, as well as a telecommunications issue. Since the Internet is global there is a growing need for warnings and forecasts to be made available in additional languages. The group recognized that this was a serious issue that merited further investigation, possibly including the use of automatic generation of multi-lingual forecast text or automatic translation systems.

7.12 Since the Public Weather Services are the most visible aspect of NMSs, the importance of linking the requirements for WWW infrastructure with the requirements for delivering services to the public was recognized.

7.13 The group noted that training in public weather services was critically important to the NMSs of developing countries in the Region. It was pleased that a number of Training Workshops on Public Weather Services have been held in the Region since the last session of the Association. These included:

- a Workshop on Public Weather Services for RA I and RA V held in Melbourne in October 1998;

- the second Fiji Workshop on Public Weather Services in Nadi in October 1999; and
- a Workshop on Public Weather Services for Small Island Developing States in Melbourne in October 2000.

However, additional training workshops are needed. Opportunities for the use of distance learning should also be investigated. The updated Guide on PWS Practices, accompanying CDs, and other specific guidelines available for introduction through the PWS Programme were of value in this regard.

7.14 During its discussions on PWS the group noted that there was growing interest in the Region for air-quality forecasts. These require very fine-scale models and a high-density observing network over the region of interest. It was also noted that there is a need for assistance for NMHSs in acquiring and using GIS software, as it could be applied to many aspects of emergency management and hazard mitigation.

## **8. SPECIFIC INPUT TO XIII-RA V**

8.1 The session discussed arrangements for XIII-RA V including a recommendation for the next session of the Regional Association on a resolution for re-establishment of the Working Group. In this regard, the working group recommended appropriate changes in its structure to harmonise with the new working structure of CBS, in particular with regard to the CBS Open Programme Area Group on Information Systems and Services. The draft resolution is given in the annex to this paragraph.

8.2 The group, noting that there are certain advantages in ensuring that the working group has broad regional representation, felt that it was important that members of the group be drawn from the largest possible pool of highly qualified experts. The group also expressed the hope that at future meetings of the working group, Members who are able, should endeavour to support the participation of their members. This would free resources that could then be used to ensure participation of the most representative group possible.

8.3 During its deliberations on the draft terms of reference of the rapporteurs, the group noted that the tasks of the Rapporteur on Public Weather Services were extensive. It recommended that the Regional Association seriously consider the possibility of establishing a Subgroup on the Regional Aspects of Public Weather Services rather than a rapporteur.

8.4 The working group considered a proposal for the RBSN. It agreed on a draft recommendation for the RBSN. The recommended list is slightly modified from the current RBSN. The modifications represent:

- Changes to the network where these have been or should have been advised
- Changes where there appears to be an active station very close to a station which does not report
- A few deletions where no observing program is listed in Vol. A and no reports have been received
- Changes to the country headings under which stations were listed to account for geographic location and national boundaries.

8.5 The group noted that the concept of a Regional Basic Climatological Network had been adopted by several Regional Associations and was supported by CBS and CCI. This development recognizes that it is not practicable to have the network of CLIMAT reporting stations identical to the Regional Basic Synoptic Network (RBSN). Some CLIMAT reporting stations are not in the RBSN, including some GSN stations, and cannot meet RBSN requirements. Conversely, some RBSN stations are not ideally suited for climate reporting.

8.6 The RBCN is intended to be a separate network of CLIMAT and CLIMAT TEMP reporting stations and should include GSN and GUAN stations, supplemented by other CLIMAT and CLIMAT TEMP reporting stations needed for description of regional climate features. These supplemental stations should be selected under the same criteria used for GSN stations. Non-RBSN stations reporting

CLIMAT messages should be considered, particularly those with long records, as well as any Reference Climatological Stations.

8.7 The working group considered a proposal for the RBCN. The proposal recommended some modifications to the GSN and GUAN, some of which had already been reported to the GCOS Atmospheric Observation Panel for Climate (AOPC). However, it should be noted that the RBCN list developed during the meeting is very much a draft. When the list is distributed to Members for comment, Members should be made aware that there are implications to their NMS for including stations in the RBCN. These stations should be operated and maintained in a manner that reflects the rigorous requirements of climate monitoring, such as long-term operation, collection and maintenance of comprehensive metadata about the station, parallel operations to assess changes in instrumentation, etc.

8.8 The draft lists of stations for the RBSN and RBCN are given in the annex to this paragraph.

## **9. OTHER BUSINESS**

9.1 The group noted that there were several National Meteorological Services within the Region that were not Members of WMO. It was suggested that the membership of the working group might include some of these services.

9.2 The group also noted that the changing institutional arrangements affecting NMSs (commercialization, privatization, etc) were also affecting other organizations and that these changes could in turn affect the NMS. For example, some agencies have traditionally operated climatological stations and have shared these data with the NMS. These agencies may be less willing or able to share these data in the future.

9.3 The group also noted the continuing issue of the relationship between NMSs and private sector providers of meteorological services, operating both within the country and internationally. It recognized that this issue has been addressed by Congress and Resolution 40 (Cg-XII) and was continuing to be debated at high levels within WMO.

## **10. FUTURE WORK PROGRAMME**

10.1 The meeting reviewed the work accomplished with regard to activities and objectives set by the twelfth session of RA-V and CBS-XII. It developed recommendations for the Chairman in defining the future work plan of the working group. It should be noted that many of the actions outlined below are more fully described under the relevant sections of the report above.

- 1) The conclusions and recommendations of the Strategic Action Plan for the Development of Meteorology in the Pacific region and the consequent Needs Analysis should be brought to the attention of the Association. (Action: Chairman)
- 2) Use the Needs Analysis for guidance in executing the group's work programme. In particular, identify those projects in the Analysis that are relevant to its terms of reference and pursue implementation of those projects. The group should develop an implementation plan for the most important and achievable projects. (Action: All members of the working group)
- 3) Review the analysis and reporting procedures of the WWW monitoring to ensure that the results of the monitoring accurately reflect the actual observations made, and not just those made at standard hours. (Action: Rapporteur on Data Management and Codes, coordinator of the Subgroup on Regional Aspects of the GTS)
- 4) Monitor the performance of the surface and upper air observational networks and support initiatives to enhance the program, such as through identifying needs and priorities, and providing background information and advice in support of requests for financial assistance. (Action: Rapporteur on Regional Aspects of the GOS)

- 5) Review and refine the definition of the RBSN and, in consultation with the Working Group on climate, the RBCN. (Action: Rapporteur on Regional Aspects of the GOS)
- 6) Promote the use of a broader range of satellite data for operational purposes, such as through promoting the strategies identified at relevant fora such as the meetings on Asia-Pacific Satellite Data Exchange and Utilisation. (Action: Rapporteur on Regional Aspects of the GOS)
- 7) Cooperate with other related agencies and programs in developing the capabilities of the GOS in support of marine meteorological services and GCOS. (Action: Rapporteur on Regional Aspects of the GOS)
- 8) Continue to explore options for incorporating non-NMS surface observations in support of the GOS. (Action: Rapporteur on Regional Aspects of the GOS)
- 9) Contribute regional views to the OPAG on the Integrated Observing System, particularly in relation to the Redesign of the GOS. (Action: Rapporteur on Regional Aspects of the GOS)
- 10) Continue to upgrade telecommunications circuits in the Region. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 11) Contribute to the CBS effort to develop guidelines for use of the Internet and Virtual Private Networks. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 12) Examine the requirement for retendering the Frame Relay network in the Region. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 13) Investigate possible sources of funding for additional EMWIN installations and upgrades to existing installations in response to modifications to the broadcast. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 14) Investigate possible sources of funding for additional ISCS systems and upgrades to existing systems in response to planned changes in the broadcast. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 15) Determine the implications for NMSs in the Region of the planned migration to table-driven data representation forms. Assist NMSs to plan resources (staff and finances), to nominate a national migration focal point, and to develop a national migration project and schedule, based on CBS directives that have been approved. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 16) Develop advice on standard software to be used in the preparation and delivery of meteorological products and investigate means of assisting NMSs in acquiring this software. (Action: coordinator of a Sub-group on Regional Aspects of the GTS and Data Management)
- 17) Monitor developments in the Environmental Emergency Response system and contribute suggestions to enhance its effectiveness in meeting the needs of Members in the Region, including the possibility of a direct user-interface. (Action: Rapporteur on Regional Aspects of the GDPS)
- 18) Assess the ensemble prediction products which are becoming available for both medium-range and short-range prediction and to provide comments to producing centres on ways of enhancing the usefulness of such products in the Region. (Action: Rapporteur on Regional Aspects of the GDPS)
- 19) Review the products available from NWP centres providing guidance for forecasting of severe weather, including tropical cyclones and to provide suggestions on appropriate products in support of the needs of countries in the Region. (Action: Rapporteur on Regional Aspects of the GDPS)
- 20) Review the techniques and models available for providing trajectory and dispersion forecasts in cases of release of chemical or biological agents and to make recommendations on the range of options available to Members for this purpose. (Action: Rapporteur on Regional Aspects of the GDPS)



- 21) Keep informed on the developing infrastructure in support of seasonal to interannual predictions and to collaborate with other programs and groups such as the climate working group in promoting the understanding and informed use of these products and to advise on the appropriate regional infrastructure. (Action: Rapporteur on Regional Aspects of the GDPS)
- 22) Contribute to the development and practical implementation of the trial Web sites for city forecasts and warnings. (Action: Rapporteur on Regional Aspects of PWS in collaboration with other relevant rapporteurs)
- 23) Formulate and provide a regional perspective on development of standard formats for the exchange of PWS products. (Action: Rapporteur on Regional Aspects of PWS in cooperation with the coordinator of a Sub-group on Regional Aspects of the GTS and Data Management).
- 24) Monitor the development of the use of the Internet for delivery of services to the public and promote increased awareness among NMSs. (Action: Rapporteur on Regional Aspects of PWS)
- 25) Monitor the concerns of NMSs regarding the activity of the international media in the provision of official weather information, especially warnings. (Action: Rapporteur on Regional Aspects of PWS)
- 26) Monitor and provide advice on emerging service delivery issues, specifically air quality forecasts and the use of weather information in GIS for emergency management. (Action: Rapporteur on Regional Aspects of PWS)
- 27) Strengthen training activities in the Region, especially through roving seminars. (Action: Rapporteur on Regional Aspects of PWS)

## **11. CLOSURE OF THE MEETING**

- 11.1 The meeting closed on Friday, 7 December 2001.

**LIST OF PARTICIPANTS**

<p>Robert R. Brook (Chairman)</p>	<p>Bureau of Meteorology P.O. Box 1289K MELBOURNE, VIC. 3001 Australia</p> <p>Tel: (613) 9669 4222 Fax: (613) 9669 4168 E-mail: r.brook@bom.gov.au</p>
<p>William Brockman</p>	<p>National Weather Service W/OPS3, Room 5214 1325 East-West Highway Silver Spring, MD 20910 U.S.A.</p> <p>Tel: (1-301) 713 0859 Ext. 103 Fax: (1-301) 608-0911 E-mail: william.brockman@noaa.gov</p>
<p>Terry Hart</p>	<p>National Meteorological and Oceanographic Centre Bureau of Meteorology P.O. Box 1289K MELBOURNE, VIC 3001 Australia</p> <p>Tel: (613) 9669 4030 Fax: (613) 9662 1222 E-mail: t.hart@bom.gov.au</p>
<p>Michael J. Hassett</p>	<p>Bureau of Meteorology P.O. Box 1289K MELBOURNE, VIC 3001 Australia</p> <p>Tel: (613) 9669 4224 Fax: (613) 9669 4673 E-mail: m.hassett@bom.gov.au</p>
<p>Justina Kameata</p>	<p>PNG National Weather Service P.O. Box 1240 BOROKO Papua New Guinea</p> <p>Tel: (675) 325 2788 Fax: (675) 325 5201 E-mail: jkameata@pngmet.gov.pg jkameata@yahoo.com</p>

<p>Xavier Marescot</p>	<p>Météo-France                  B.P. 6005                  98702 Faa'a Airport                  TAHITI                  French Polynesia</p> <p>Tel: (689) 80 33 00                  Fax: (689) 80 33 09                  E-mail: xavier.marescot@meteo.fr</p>
<p>Gilles Montesquieu</p>	<p>Météo France                  B.P. 151                  98845 NOUMEA CEDEX                  Nouvelle-Calédonie</p> <p>Tel: (687) 27 93 00                  Fax: (687) 27 93 27                  E-mail: gilles.montesquieu@meteo.fr</p>
<p>Muhadi</p>	<p>Department of Communications                  Meteorological and Geophysical Agency                  Indonesia</p> <p>Tel: +62 21 424 6321 Ext. 177                  Fax: +62 21 424 6703</p>
<p>Jotham Napat</p>	<p>Vanuatu Meteorological Service                  Private Mail Bag 054                  PORT VILA                  Republic of Vanuatu</p> <p>Tel: (00678) 22331                  Fax: (00678) 22310                  E-mail: jnapat@meteo.vu</p>
<p>Arona Ngari</p>	<p>Director, Cook Islands Met Service                  P.O. Box 127                  RAROTONGA                  Cook Islands</p> <p>Tel: (682) 20603                  Fax: (682)21603                  E-mail: angari@met.gov.ck</p>
<p>Kim Nitschke</p>	<p>ARM/TWP Project Coordinator                  South Pacific Regional Environment Programme                  P.O. Box 240                  APIA, Samoa</p> <p>Tel: (685) 21929                  Fax: (685) 20231                  E-mail: kimn@sprep.org.ws</p>

<p>Kevin O'Loughlin</p>	<p>Bureau of Meteorology  P.O. Box 413  DARLINGHURST NSW 1300  Australia</p> <p>Tel: (612) 9296 1500  Fax: (612) 9296 1506  E-mail: k.oloughlin@bom.gov.au</p>
<p>Rajendra Prasad</p>	<p>Fiji Meteorological Service  Private Mail Bag, NAP 0351  NADI AIRPORT  Fiji Islands</p> <p>Tel: (679) 724 888  Fax: (679) 720 430  E-mail: Rajendra.Prasad@met.gov.fj</p>
<p>Jailan Simon</p>	<p>Malaysian Meteorological Service  Jalan Sultan  46667 PETALING JAYA, Selangor  Malaysia</p> <p>Tel: (+603) 7956 9422 Ext. 314  Fax: (+603) 7958 2778  E-mail: jailan@kjc.gov.my</p>
<p>Rod Stainer</p>	<p>Meteorological Service of New Zealand Ltd.  P.O. Box 722  WELLINGTON  New Zealand</p> <p>Tel: (644) 470 0744  Fax: (644) 473 5231  E-mail: stainer@metervice.com</p>
<p>Bruce Sumner</p>	<p>Bureau of Meteorology  P.O. Box 1289K  MELBOURNE, VIC 3001  Australia</p> <p>Tel: (613) 9669 4349  Fax: (613) 9662 1222  E-mail: b.sumner@bom.gov.au</p>
<p>Lloyd Tahani</p>	<p>Meteorological Service  P.O. Box 21  Honiara  Solomon Islands</p> <p>Tel: +677 217 57  Fax: +677 200 46  E-Mail: climate@met.gov.sb  L_Tahani@hotmail.com</p>

<p>Imelda Valeroso</p>	<p>Philippine Atmospheric Geophysical &amp; Astronomical Services Administration (PAGASA) 1424 Quezon Avenue Quezon City, Metro Manila Philippines</p> <p>Tel: (+632) 922 1992 / 926 7695 Fax: (+632) 926 7695 / 922 1992 E-mail: imeeval@hotmail.com imee_val@yahoo.com</p>
<p><b>WMO Secretariat</b></p>	
<p>David McGuirk</p>	<p>World Meteorological Organization Case Postale No. 2300 1211 GENEVA 2 Switzerland</p> <p>Tel: (41) 22 730 8241 Fax: (41) 22 730 8021 E-mail: mcguirk_d@gateway.wmo.ch</p>
<p>Dieter Schiessl</p>	<p>World Meteorological Organization Case Postale No. 2300 1211 GENEVA 2 Switzerland</p> <p>Tel: (41) 22 730 8369 Fax: (41) 22 733 8021 E-mail: schiessl@wmo.ch schiessl_d@gateway.wmo.ch</p>
<p>Henry Taiki</p>	<p>World Meteorological Organization Sub-Regional Office for the South-West Pacific P.O. Box 3044 Apia, Samoa</p> <p>Tel: +685 25706 Fax: +685 25706 E-mail: wmo.srop@sprep.org.ws</p>

**Status of the implementation of the GTS in RA V and plans for the near future**

Link	Speed (Kbit/s)	Type	Communication Protocol	MSS Application Protocol	Future plans, comments
<b>MTN and Inter-regional</b>					
Melbourne-Tokyo	64	LL	IP	Sockets	Frame Relay in 2002
Melbourne-Bracknell	128/32	FR <sup>1</sup>	IP	Sockets and FTP	
Melbourne-New Delhi		Internet		Sockets	
Washington-Honolulu	19.2	LL	X.25		56Kbps, TCP/IP
Washington-Nadi	n/o				9.6, X.25 on existing 56 kb/s NADIN 2 link through connection between RSMC Nadi with AFTN centre, Oakland
Kuala Lumpur-Bangkok	1.2	LL	Async		4.8, TCP/IP – 64/4 FR upon agreement of both centres
Singapore-Bangkok	2.4	LL	X.25	PVC	TCP/IP – 64/4 FR upon RTH Bangkok agreement
Manila-Tokyo	0.2	LL	Async		64/4 FR, TCP/IP upon RTH Tokyo agreement
<b>RMTN</b>					
Melbourne-Wellington	*	Internet+	IP	Sockets	
Melbourne-Singapore	64/8	FR <sup>1</sup>	IP	Sockets	
Melbourne-Jakarta	64/4	FR <sup>1</sup>	IP	Sockets	
Melbourne-Noumea	9.6	LL	X.25	PVC	64/8 FR, TCP/IP mid 2002. Noumea also connected to RTH Toulouse via FR 128/32
Melbourne-Nadi	9.6	LL	IP	Sockets	FR 64/8 planned 2002
Melbourne-Port Moresby	*	Internet	IP	FTP	
Melbourne-Honiara	*	Internet	IP		Formal inclusion in RMTN recommended
Melbourne - Pt Vila	*	Internet	IP		Formal inclusion in RMTN recommended
Noumea - Papeete	128/32	FR	IP	FTP	FR, TCP/IP via RTH Toulouse
Honolulu - Guam	56	LL	X.25		Formal inclusion in RMTN recommended
Honolulu - Pago-Pago	9.6	LL	X.25		Formal inclusion in RMTN recommended
Honolulu - Micronesia	9.6	LL	X.25		Formal inclusion in RMTN recommended
Pago-Pago - Apia	n/o				56, TCP/IP early 2002, Formal inclusion in RMTN recommended
Singapore-Manila	9.6	LL	X.25	PVC	64/8 FR 2002
Singapore-Jakarta	64/8	FR <sup>1</sup>	IP	Sockets	
Singapore-Brunei	2.4	LL	X.25	PVC	
Singapore-Kuala Lumpur	1.2	LL	Async		64/8 FR 2002

**Legend** n/o: Not in operation

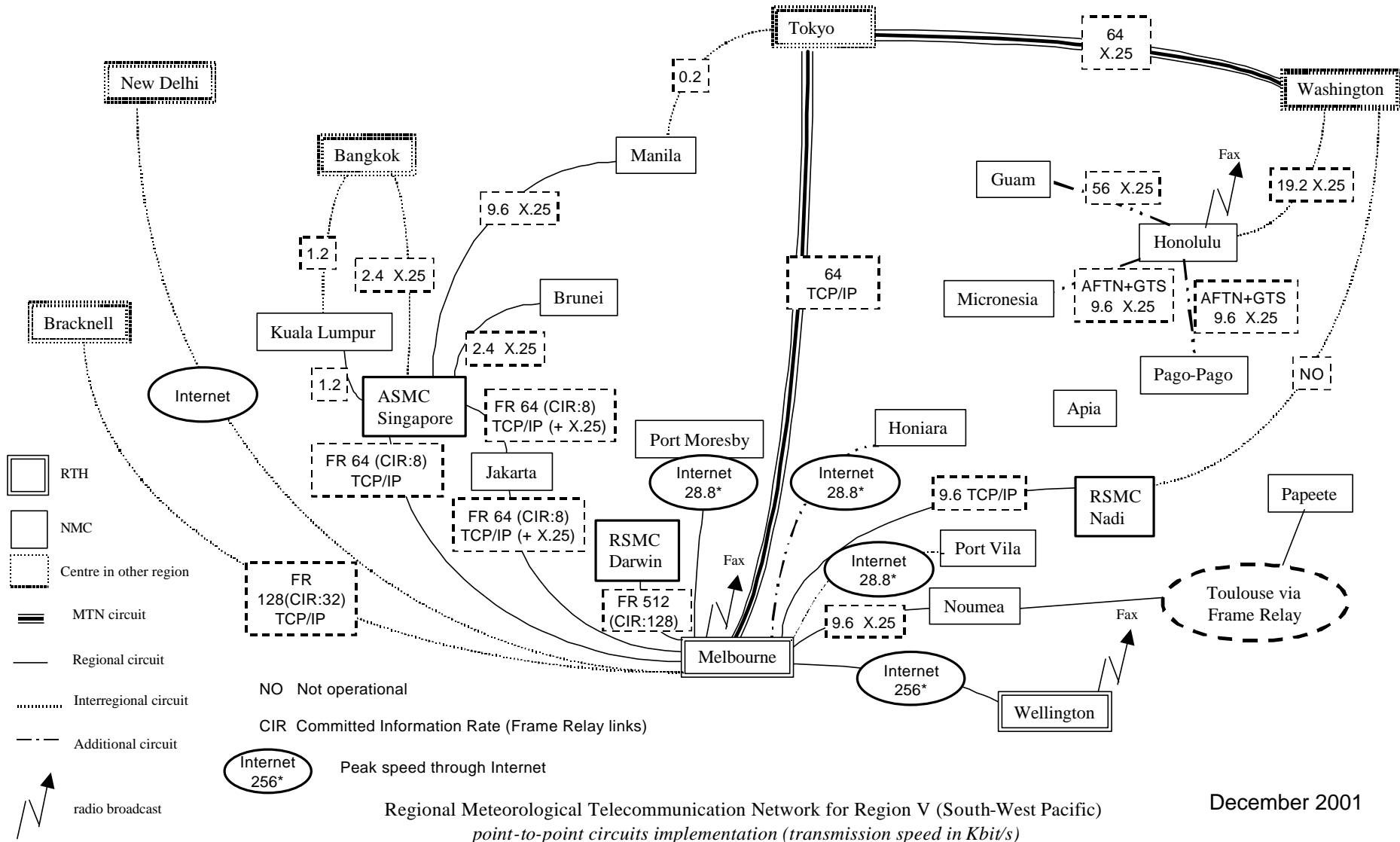
LL: Leased line

FR: Frame Relay: Access speed/Committed Information Rate, e.g 128/32

<sup>1</sup> Operated by BT Australasia

\* Speed depends on Internet access at each end.

Internet+: Internet + ISDN back-up



**Draft resolution**

**Res. 4.1/1 (XIII-RA V) - WORKING GROUP ON PLANNING AND IMPLEMENTATION OF THE WWW IN REGION V**

**THE REGIONAL ASSOCIATION FOR THE SOUTH-WEST PACIFIC,**

**NOTING:**

- (1) Resolution 2 (Cg-XIII) - World Weather Watch Programme;
- (2) That major developments in science and technology have taken place which need to be introduced into the WWW system;
- (3) That WWW data and products are of vital importance to Members of RA V for meeting the increasing requirements of users for meteorological services and for tailored products;

**CONSIDERING:**

- (1) That the implementation of the WWW in the Region should be kept under constant review;
- (2) That the introduction of the new WWW concepts will be of great benefit to all Members in the Region;
- (3) That full integration of the WWW functional components requires careful coordination among Members of RA V and constant evaluation of the related projects;
- (4) That the range of applications of the products of the WWW to socio-economic life and development and to the physical environment in the Region is continually evolving;
- (5) That the WMO Long-term Plan needs regular updating from the point of in view of regional requirements;

**DECIDES:**

- (1) To establish a Working Group on Planning and Implementation of the WWW in Region V (RA V/WG-PIW) with the following terms of reference:
  - (a) To monitor the progress made in the implementation and operation of the WWW in the Region and advise on possible improvements and priorities for appropriate actions to be carried out under the WWW Programme and the need for external support, where required;
  - (b) To keep under review the actions taken under the required WWW Implementation Programme of the Fifth and Sixth WMO Long-term Plans with a view to updating and further developing the Programme relating to RA V;
  - (c) To develop proposals for the further development and full integration of the WWW components and functions with a view to achieving a cost-effective operation and



a better supply of WWW data and products throughout the Region;

- (d) To keep abreast of new developments in the field of meteorological data processing, observing techniques, telecommunications and Public Weather Services and to make recommendations for their application in the Region;
  - (e) To study the possible impact of new methods and techniques on the regional structure and functions of the WWW with a view to developing proposals for optimizing the Global Data-processing System, the Global Observing System and the Global Telecommunications System in the Region;
  - (f) To develop an action programme for the improved exchange of WWW data and products on the basis of stated regional requirements which would include provisions for the generation of high-quality products by Global Data-processing System centres in the Region as well as making available data and products from other Regions;
  - (g) To keep abreast of developments in public weather services and develop proposals for regional activities to improve the provision of public weather services by NMSs in the Region;
  - (h) To advise the president of the Association on all matters concerning the WWW;
  - (i) To keep under review education and training requirements related to the implementation and operation of the WWW and Public Weather Services in the Region;
  - (j) To keep under constant review the Regional Telecommunication Plan and its implementation, including developments in the use of satellites for data collection and distribution;
  - (k) To maintain close liaison with those bodies responsible for the implementation of IGOSS and related oceanographic programmes, other WWW-related coordination bodies in the Region, such as SPREP and SOPAC and the Pacific Islands Forum;
- (2) That the working group should be composed of the following core members:
- (a) The chairman;
  - (b) A co-ordinator of a Sub-group on Regional Aspects of the Global Telecommunication System and Data Management;
  - (c) A Rapporteur on Regional Aspects of the Global Observing System;
  - (d) A Rapporteur on Regional Aspects of the Global Data-processing System;
  - (e) A Rapporteur on Regional Aspects of Public Weather Services;
- and other experts as nominated by Members;

The terms of reference of the sub-group and the rapporteurs are indicated in the annex to this resolution;

- (3) To designate in accordance, with Regulation 32 of the WMO General Regulations, ..... as chairman of the working group;
- (4) To designate ..... as co-ordinator of the sub-group;
- (5) To invite:
  - (a) ..... to serve as Rapporteur on the Regional Aspects of the Global Observing System;
  - (b) ..... to serve as Rapporteur on the Regional Aspects of the Global Data-processing System;
  - (d) ..... to serve as Rapporteur on Regional Aspects of Public Weather Services;
- (6) To invite Members of the Association to nominate experts to serve on the working group and on the sub-group;
- (7) To request the chairman of the working group to submit progress reports at yearly intervals to the president of the Association and a final report not later than six months before the fourteenth session of the Association.

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Annex: 1

Note: This resolution replaces Resolution 1 (XII-RA V) which is no longer in force.

**Annex to draft Resolution 4.1/1 (XIII-RA V)**

**WORKING GROUP ON PLANNING AND IMPLEMENTATION OF THE WWW IN REGION V**

The terms of reference for the subgroup and rapporteurs nominated under Resolution 4.1/1 (XIII-RA V) are as follows:

(a) **Sub-group on Regional Aspects of the Global Telecommunication System and Data Management**

- (i) To keep under review the status of implementation and operation the Regional Meteorological Telecommunication Network, particularly as regards developments in the capabilities of satellites for data collection and distribution and formulate recommendations with a view to remedying shortcomings;
- (ii) To study problems and develop improved and cost-effective arrangements relating to the exchange of observational data and processed information, both in pictorial and digital form, within Region V and outside it and formulate recommendations for the coordination of the implementation of telecommunication facilities and techniques;
- (iii) To keep under review data and information representation, including character and bit-oriented exchange formats and codes and conversion between formats and codes as required and to keep under review the existing regional meteorological codes for Region V and to develop new codes or recommend changes to existing regional codes, as required;
- (iv) To keep under review data and product generation, selection and presentation to recipients (NMCs), including storage and retrieval of data and products and recovery procedures in case of major outages of key facilities;
- (v) To keep abreast of developments in information and telecommunication technology, procedures, services and equipment, including in particular satellite-based telecommunication services, the Internet and related equipment, and to advise on their applicability, as appropriate, to the Region;
- (vi) To keep under review and coordinate both real-time and non-real-time monitoring of the WWW Programme in the Region, including quantity and quality aspects;
- (vii) To identify the training requirements of Members in the Region relating to relevant information and communication techniques;
- (viii) To advise and report to the chairman of the working group on all matters concerning regional aspects of the Global Telecommunication System and Data Management;
- (ix) To represent RA V on the CBS Implementation/Coordination Team on Information Systems and Services.

(b) **The Rapporteur on Regional Aspects of the Global Observing System**

- (i) To review and advise on the observational data requirements of Members of the regional association in the context of the WWW Programme in the Fifth WMO Long-term Plan;
- (ii) To review and advise on the design of observing systems in the Region, in particular the Regional Basic Synoptic Network of surface and upper-air stations and the Regional Basic Climatological Network, including GCOS;

- (iii) To keep abreast of matters related to the development and introduction of new observing systems and advise on their application in the Region;
- (iv) To advise and report to the chairman of the working group on all matters concerning regional aspects of the Global Observing System;
- (v) To liaise with the Rapporteur on Marine Meteorological Services of the Joint Commission on Marine Meteorology on the development and operation of the GOS in support of marine services;
- (vi) To represent the Region on the CBS Implementation/Coordination Team on Integrated Observing Systems

(c) **The Rapporteur on Regional Aspects of the Global Data-processing System**

- (i) To keep abreast of developments in data-processing equipment and techniques which could be beneficially introduced at national and regional centres to improve their forecast and warning capability;
- (ii) To formulate recommendations for coordinated implementation of data-processing facilities and techniques at GDPS, GTS and other centres and, if required, for these facilities to serve both GDPS and telecommunication purposes;
- (iii) To identify the training requirements of Members in the Region relating to relevant data processing and forecasting techniques;
- (iv) To advise and report to the chairman of the working group on all matters concerning data processing and forecasting activities in the Region;
- (v) To represent the Region on the CBS Implementation/Coordination Team on Data Processing and Forecasting Systems.

(d) **Rapporteur on Regional Aspects of Public Weather Services**

- (i) To keep under review the implementation of the Public Weather Services Programme in Region V;
- (ii) To advise the chairman of the working group on matters relating to formulation, presentation and dissemination of forecasts and warnings and establishing good relations with emergency managers, the media and the private sector;
- (iii) To keep abreast of activities in the Region related to broadcast of weather information by international media and advise on issues such as consistency with official information;
- (iv) To keep under review education and training requirements related to the Public Weather Services Programme;
- (v) To keep under review, in coordination with the Rapporteur on Regional Aspects of the GDPS, aspects relating to improved regional exchange of public weather services;
- (vi) To represent the Region on the CBS Implementation/Coordination Team on Public Weather Services.

## Proposed List of Stations comprising the RBSN in Region V

Index	Name	Obs.Type	Non-standards
<b>AMERICAN SAMOA</b>			
91764	CAPE TAPUTAPU AWS	S	
91765	PAGO PAGO	S R	
91766	CAPE MATATULA AWS	S	
91768	TA'U AWS	S	
<b>AUSTRALIA</b>			
94102	TROUGHTON ISLAND	S	
94103	BROWSE ISLAND AWS	S	
94120	DARWIN AIRPORT	S R	
94122	CAPE FOURCROY	S	
94131	TINDAL AWS	S	
94147	CAPE WESSEL AWS	S	
94150	GOVE AIRPORT	S R	00Z sonde only
94151	NORTH EAST ISLAND	S	
94170	WEIPA AMO	S W	
94183	COEN AIRPORT AWS	S	
94200	MANDORA AWS	S	
94203	BROOME AMO	S R	
94206	FITZROY CROSSING AERO	S	
94207	ROWLEY SHOALS AWS	S	
94211	MOUNT BARNETT MOUNT ELIZABETH	S	Non-standard hours
94212	HALLS CREEK AMO	S W	
94216	KUNUNURRA AERO	S	
94236	ELLIOTT	S	Non-standard hours
94238	TENNANT CREEK MET OFFICE	S W	
94248	CENTRE ISLAND AWS	S	
94255	CAMOOWEAL TOWNSHIP	S	Non-standard hours
94268	KOWANYAMA AIRPORT	S	
94275	GEORGETOWN	S	Non-standard hours
94283	COOKTOWN MISSION STRIP	S	
94287	CAIRNS AIRPORT	S W	
94290	FLINDERS REEF	S	
94294	TOWNSVILLE AERO	S R	00Z sonde only
94296	LIHOU REEF	S	
94298	MARION REEF	S	
94299	WILLIS ISLAND	S R	00Z sonde only
94300	CARNARVON AIRPORT	S W	
94302	LEARMONTH AIRPORT	S R	
94312	PORT HEDLAND AMO	S R	
94313	WITTENOOM	S	Non-standard hours
94317	NEWMAN AERO	S	
94319	TELFER AERO	S	
94324	YUENDUMU	S	Non-standard hours
94326	ALICE SPRINGS AERO	S R	Non-standard hours
94327	JERVOIS AWS	S	Non-standard hours
94332	MOUNT ISA AMO	S R	
94333	BOULIA AIRPORT	S	Non-standard hours
94341	RICHMOND AIRPORT	S	
94346	LONGREACH AMO	S W	
94363	EMERALD AIRPORT	S	

<b>Index</b>	<b>Name</b>	<b>Obs.Type</b>	<b>Non-standards</b>
94366	BOWEN AIRPORT	S	Non-standard hours
94367	MACKAY MO	S W	
94374	ROCKHAMPTON AERO	S R	00Z sonde only
94388	LADY ELLIOT ISLAND AWS	S	
94393	FREDERICK REEF	S	
94394	CATO ISLAND	S	
94403	GERALDTON AMO	S R	
94429	MT MAGNET AERO	S	
94430	MEEKATHARRA AMO	S R	
94449	LAVERTON AWS	S	
94451	CARNEGIE (CARNEGIE)	S	Non-standard hours
94461	GILES	S R	00Z sonde only
94462	YULARA AERO	S	
94477	MARLA POLICE STATION	S	Non-standard hours
94488	WINDORAH	S	Non-standard hours
94500	CUNNAMULLA POST OFFICE	S	Non-standard hours
94510	CHARLEVILLE AMO	S R	
94515	ROMA AIRPORT	S	
94552	OAKEY AERO	S	
94578	BRISBANE AIRPORT AERO	S R	
94584	DOUBLE ISLAND POINT LIGHTHOUSE	S	
94601	AUGUSTA CAPE LEEUWIN	S	
94610	PERTH AIRPORT	S R	
94637	KALGOORLIE-BOULDER AMO	S R	
94638	ESPERANCE MO	S R	
94642	BALLADONIA	S	Non-standard hours
94643	RAWLINNA BALGAIK	S	Non-standard hours
94647	EUCLA AMO	S R	
94651	NULLARBOR	S	
94653	CEDUNA AMO	S W	
94659	WOOMERA AERODROME MO	S R	
94672	ADELAIDE AIRPORT	S R	
94691	BROKEN HILL AIRPORT	S	
94693	MILDURA AIRPORT	S W	
94700	HILLSTON AIRPORT	S	Non-standard hours
94703	BOURKE AIRPORT AWS	S	
94710	COBAR AIRPORT	S	
94711	COBAR MO	R	
94729	BATHURST AIRPORT AWS	S	
94750	NOWRA RAN AIR STATION	S R	
94767	SYDNEY AIRPORT AMO AWS	S	
94776	WILLIAMTOWN AMO RAAF	S R	00Z sonde only
94791	COFFS HARBOUR MO/AWS	S W	
94802	ALBANY AIRPORT	S R	
94804	NEPTUNE ISLAND	S	
94821	MOUNT GAMBIER AERO	S R	
94842	CAPE OTWAY LIGHTHOUSE	S	
94850	KING ISLAND AIRPORT	S	
94866	MELBOURNE AIRPORT	S R	
94875	SHEPPARTON AIRPORT	S	
94893	WILSONS PROMONTORY LIGHTHOUSE	S	
94907	EAST SALE AIRPORT	S W	
94910	WAGGA WAGGA AMO/AWS	S R	

Index	Name	Obs.Type	Non-standards
94926	CANBERRA AMO AWS	S W	
94935	MALLACOOTA	S	
94954	CAPE GRIM B.A.P.S.	S	
94956	STRAHAN AERODROME	S	
94968	LAUNCESTON AIRPORT	S W	
94975	HOBART AIRPORT	S R	
94983	EDDYSTONE POINT	S	
94995	LORD HOWE ISLAND	S R	
94996	NORFOLK ISLAND AERO	S R	00Z sonde only
94997	HEARD ISLAND (THE SPIT)	S	Irregular
94998	MACQUARIE ISLAND	S R	
95111	PORT KEATS AERO	S	
95146	NARAWILLI AWS	S	Non-standard hours
95205	DERBY AERO	S	
95322	RABBIT FLAT AWS	S	Non-standard hours
95448	LEINSTER AERO	S	
95458	COOBER PEDY AIRPORT	S	
95480	MARREE AERO	S	
95481	MOOMBA AIRPORT	S	
95482	BIRDSVILLE POLICE STATION	S	
95485	TIBOOBURRA AIRPORT	S	
95492	THARGOMINDAH AIRPORT	S	
95527	MOREE MO	S R	
95634	SOUTHERN CROSS AIRFIELD	S	
95637	LAKE GRACE	S	
95646	FORREST	S	
95666	PORT AUGUSTA ARID LANDS	S	
95719	DUBBO AIRPORT	S	
95762	TAMWORTH AIRPORT AWS	S	
95839	HORSHAM AERODROME	S	
96995	CHRISTMAS ISLAN AERO	S	
96996	COCOS ISLAND AERO	S R	
<b>BRUNEI DARUSSALAM</b>			
96315	BRUNEI AIRPORT	S R	
<b>COOK ISLANDS</b>			
91802	PENRHYN	S W	00Z wind only
91809	MANIHIKI AWS	S	
91812	PUKAPUKA AWS	S	
91831	AITUTAKI AWS	S	
91841	MAUKE AWS	S	
91843	RAROTONGA	S W	00Z wind only
91848	MANGAIA AWS	S	
<b>EAST TIMOR</b>			
97385	OE-CUSSIE	S	Planned
97390	DILLI/DILLI AIRPORT	S	Planned
<b>FEDERATED STATES OF MICRONESIA</b>			
91203	FALALOP ISLAND, ULITHI ATOLL	S	
91204	ULITHI ATOLL AWS	S	
91317	WOLEAI ATOLL	S	
91328	ULUL AWS	S	
91334	CHUUK	S R	

Index	Name	Obs.Type	Non-standards
91338	SATAWAN ATOLL AWS	S	
91339	LUKUNOR ATOLL	S	
91343	OROLUK ATOLL AWS	S	
91348	PONAPE	S R	
91352	PINGELAP ATOLL AWS.	S	
91355	KOSRAE ATOLL AWS	S	
91356	LELU, KOSRAE ATOLL	S	
91411	NGULU AWS	S	
91413	YAP	S R	
91425	NUKUORO ATOLL	S	
<b>FIJI</b>			
91650	ROTUMA	S	
91652	UDU POINT AWS	S	
91659	NABOUWALU	S	
91660	YASAWA-I-RARA AWS	S	
91670	VIWA AWS	S	
91676	VANUA BALAVU AWS	S	
91680	NADI AIRPORT	S R	00Z sonde only
91683	NAUSORI	S	
91691	LAKEBA AWS	S	
91693	VUNISEA	S	
91697	MATUKU AWS	S	
91699	ONO-I-LAU AWS	S	
<b>FRENCH POLYNESIA</b>			
91925	ATUONA	S R	
91929	BORA-BORA	S	
91938	TAHITI-FAAA	S	
91938	TAHITI-FAAA	W R	
91943	TAKAROA	S R	00Z sonde only
91944	HAO AWS	S	
91945	HEREHERETUE	S	
91948	RIKITEA	S	
91948	RIKITEA	W R	
91954	TUBUAI	S R	00Z sonde only
91958	RAPA	S R	
<b>GUAM</b>			
91212	NWSO AGANA, GUAM.	S R	
<b>INDONESIA</b>			
96009	LHOKSEUMAWE/MALIKUSSALEH	S W	18Z synop not taken
96011	BANDA ACEH/BLANG BINTANG	S W	18Z synop not taken
96035	MEDAN/POLONIA	S R	00Z sonde only
96073	SIBOLGA/PINANGSORI	S W	
96091	TANJUNG PINANG/KIJANG	S W	
96109	PEKAN BARU/SIMPANGTIGA	S W	
96145	TAREMPA	S W	18Z synop not taken
96147	RANAI	S W	00Z sonde only
96163	PADANG/TABING	S R	00Z sonde only
96179	SINGKEP/DABO	S W	
96195	JAMBI/SULTAN TAHA	S W	
96221	PALEMBANG/ST. M. BADARUDIN II	S W	
96237	PANGKAL PINANG	S R	



Index	Name	Obs.Type	Non-standards
96249	TANJUNG PANDAN/BULUH TUMBANG	S W	
96253	BENGKULU/PADANG KEMILING	S W	
96295	TANJUNG KARANG/RADIN INTEN II	S W	
96509	TARAKAN/JUWATA	S W	
96581	PONTIANAK/SUPADIO	S W	
96633	BALIKPAPAN/SEPINGGAN	S W	
96645	PANGKALAN BUN/ISKANDAR	S W	18Z synop not taken
96655	PALANGKA RAYA/TJILIK RIWUT	S W	18Z synop not taken
96685	BANJARMASIN/SYAMSUDIN NOOR	S W	
96749	JAKARTA/SOEKARNO-HATTA	S R	
96781	BANDUNG/HUSEIN	S W	
96805	CILACAP	S W	
96839	SEMARANG/AHMAD YANI	S W	
96933	SURABAYA/PERAK I	S W	
96935	SURABAYA/JUANDA	S W	00Z sonde only
97014	MENADO/ SAM RATULANGI	S W	00Z sonde only
97028	TOLI-TOLI/LALOS	S W	
97048	GORONTALO/JALALUDDIN	S W	
97072	PALU/MUTIARA	S R	00Z sonde only
97086	LUWUK/BUBUNG	S W	
97096	POSO/KASIGUNCU	S W	18Z synop not taken
97120	MAJENE	S W	
97146	KENDARI/WOLTER MONGINSIDI	S W	
97180	UJUNG PANDANG/HASANUDDIN	S R	00Z sonde only
97192	BAU-BAU/BETO AMBARI	S W	
97230	DENPASAR/NGURAH RAI	S W	
97260	SUMBAWA BESAR/BRANGBIJI	S W	
97270	BIMA/M.SALAHUDDIN	S W	
97300	MAUMERE/WAI OTI	S W	
97340	WAINGAPU/MAU HAU	S W	
97372	KUPANG/ELTARI	S R	00Z sonde only
97430	TERNATE/BABULLAH	S W	
97460	LABUHA/OESMAN SADIK	S W	18Z synop not taken
97502	SORONG/JEFMAN	S W	
97530	MANOKWARI/RENDANI	S W	
97560	BIAK/FRANS KAISIEPO	S R	00Z sonde only
97580	SARMI/MARARENA	S	18Z synop not taken
97600	SANANA	S W	
97686	WAMENA	S W	
97690	JAYAPURA/SENTANI	S W	
97724	AMBON/PATTIMURA	S R	12 Z & 18Z synop not taken. 00Z sonde only
97748	GESER	S W	18Z synop not taken
97760	KAIMANA/UTAROM	S W	18Z synop not taken
97796	TIMIKA	S W	
97810	TUAL/DUMATUBUN	S W	
97876	TANAH MERAH	S	18Z synop not taken
97900	SAUMLAKI/OLILIT	S W	
97980	MERAUKE/MOPAH	S R	00Z sonde only
<b>KIRIBATI</b>			
91492	CHRISTMAS ISLAND	S	
91533	BANABA	S	Not received

Index	Name	Obs.Type	Non-standards
91601	BUTARITARI	S	
91610	TARAWA	S R	00Z sonde only
91623	BERU	S	06Z & 12Z synop not taken
91629	ARORAE	S	
91701	KANTON ISLAND	S R	No sonde program
<b>MALAYSIA</b>			
48601	PENANG/BAYAN LEPAS	S R	
48615	KOTA BHARU	S R	
48620	SITIAWAN	S	
48647	KUALA LUMPUR/SUBANG	S	
48650	SEPANG	R	
48657	<u>KUANTAN</u>	S R	<b><u>Radiosonde observation is temporarily down</u></b> due to technical problem (only pilot at the moment due to technical problem)
48665	MALACCA	S	
96413	KUCHING	S R	
96421	SIBU	S	
96441	BINTULU	S R	
96449	MIRI	S	
96465	LABUAN	S	
96471	KOTA KINABALU	S R	
96481	TAWAU	S R	
96491	SANDAKAN	S	
<b>MARSHALL ISLANDS</b>			
91251	ENIWETAK ATOLL AWS.	S	
91258	UTIRIK ATOLL AWS.	S	
91365	UJAE ATOLL AWS	S	
91366	KWAJALEIN/BUCHOLZ AAF	S R	
91367	AILINGLAPALAP ATOLL	S	
91369	JALUIT ATOLL	S	
91371	WOTJE ATOLL	S	
91374	MALOELAP ATOLL AWS	S	
91376	MAJURO	S R	
91377	MILI ATOLL AWS	S	
91442	EBON ATOLL AWS	S	
<b>NAURU</b>			
91530	NAURU AIRPORT	R	No program
91531	NAURU	S	
<b>NEW CALEDONIA</b>			
91570	ILE SURPRISE AWS	S	
91574	CHESTERFIELD	S	
91577	KOUMAC	S	
91582	OUANAHAM (ILE LIFOU)	S	
91592	NOUMEA	S R	
91598	MATTHEW AWS	S	

Index	Name	Obs.Type	Non-standards
<b>NEW ZEALAND</b>			
93004	CAPE REINGA AWS	S	
93023	PURERUA AWS	S	
93069	MOKOHINAU AWS	S	
93110	AUCKLAND AERO AWS	S	
93112	WHENUAPAI	R	
93186	TAURANGA AERO AWS	S	
93196	HICKS BAY AWS	S	
93245	TAUPO AWS	S	
93291	GISBORNE AERODROME	W	
93292	GISBORNE AERODROME AWS	S	
93305	MAUI A PLATFORM	S	
93308	NEW PLYMOUTH AERODROME	W	
93309	NEW PLYMOUTH AWS	S	
93373	NAPIER AERODROME AWS	S	
93404	PALMERSTON NORTH AWS	S	
93417	PARAPARAUMU AERODROME	R	
93420	PARAPARAUMU AWS	S	
93498	CASTLEPOINT AWS	S	
93527	FAREWELL SPIT AWS	S	
93614	HOKITIKA AERODROME	W	
93615	HOKITIKA AERODROME AWS	S	
93678	KAIKOURA AWS	S	
93709	HAAST AWS	S	
93773	TIMARU AERODROME AWS	S	
93781	CHRISTCHURCH AERO AWS	S	
93800	SECRETARY ISLAND AWS	S	
93805	PUYSEGUR POINT AWS	S	
93831	QUEENSTOWN AERODROME AWS	S	
93844	INVERCARGILL AERODROME	R	
93845	INVERCARGILL AIRPORT AWS	S	
93896	TAIAROA HEAD	S	
93909	SOUTH WEST CAPE AWS	S	
93929	ENDERBY ISLAND AWS	S	
93947	CAMPBELL ISLAND AWS	S	
93986	CHATHAM ISLAND	R	00Z sonde only
93987	CHATHAM ISLANDS AWS	S	
93994	RAOUL ISLAND, KERMADEC IS. AWS	S	
93997	RAOUL ISLAND, KERMADEC IS.	R	00Z sonde only
<b>NIUE</b>			
91824	HANAN AIRPORT	S	
<b>NORTHERN MARIANA ISLANDS</b>			
91221	ROTA	S	
91222	PAGAN ISLAND AWS	S	
91231	TINIAN	S	
<b>PALAU</b>			
91408	KOROR	S R	
<b>PAPUA NEW GUINEA</b>			
92001	KIUNGA W.O.	S	
92003	DARU W.O.	S	
92004	WEWAK W.O.	S	

<b>Index</b>	<b>Name</b>	<b>Obs.Type</b>	<b>Non-standards</b>
92014	MADANG W.O.	S R	No sondes
92035	PORT MORESBY W.O.	S R	No sondes
92044	MOMOTE W.O.	S R	
92047	NADZAB W.O.	S	
92076	KAVIENG W.O.	S	
92077	GURNEY W.O.	S	
92087	MISIMA W.O.	S	
92100	TOKUA W.O.	S	
<b>PHILIPPINES</b>			
98133	CALAYAN	S	
98135	BASCO	S	
98223	LAOAG	S R	
98232	APARRI	S	
98325	DAGUPAN	S	
98328	BAGUIO	S W	
98329	MUNOZ	S	
98336	CASIGURAN	S	
98429	NINOY AQUINO INTERNATIONAL AIRPORT	S R	
98431	CALAPAN	S	
98440	DAET	S	
98444	LEGASPI	S W	
98526	CORON	S	
98531	SAN JOSE	S	
98536	ROMBLON	S	
98543	MASBATE	S	
98550	TACLOBAN	S	
98618	PUERTO PRINCESA	S W	
98630	CUYO	S	
98637	ILOILO	S	
98646	MACTAN	S R	
98653	SURIGAO	S	
98741	DIPOLOG	S	
98747	LUMBIA AIRPORT	S	
98748	CAGAYAN DE ORO	S	
98753	DAVAO AIRPORT	S W	
98755	HINATUAN	S	
98836	ZAMBOANGA	S	
<b>SAMOA</b>			
91762	APIA	S	
<b>SINGAPORE</b>			
48698	SINGAPORE/CHANGI AIRPORT	S R	
<b>SOLOMON ISLANDS</b>			
91503	MUNDA	S	
91507	AUKI	S	
91517	HONIARA	R	
91520	HONIARA/HENDERSON	S	
91541	SANTA CRUZ	S	
<b>TOKELAU</b>			
91720	ATAFU	S	
91723	NUKUNONU AWS	S	
91724	NUKUNONO	S	

Index	Name	Obs.Type	Non-standards
91727	FENUAFALA/FAKAOFO	S	
<b>TONGA</b>			
91776	KEPPEL	S	
91780	VAVAU	S	
91784	HAAPAI	S	
91792	FUA'AMOTU	S W	
<b>TUVALU</b>			
91631	NANUMEA	S	
91636	NUI	S	
91643	FUNAFUTI	S R	00Z sonde only
91648	NIULAKITA	S	
<b>UNITED KINGDOM</b>			
91961	PITCAIRN ISLAND AWS	S	
<b>USA</b>			
91066	MIDWAY ISLAND	S	
91158	PRINCEVILLE, KAUAI	S	
91159	KEKAHA, KAUAI	S	
91163	PORT ALLEN AIRPORT, KAUAI	S	
91165	LIHUE, KAUAI	S R	
91166	MAKAHUENA POINT, KAUAI	S	
91168	KAPAA, KAUAI	S	
91182	HONOLULU, OAHU	S	
91190	KAHULUI AIRPORT, MAUI	S	
91194	KAHOOLAWE	S	
91275	JOHNSTON ISLAND	S	
91285	HILO/GEN. LYMAN	S R	
91287	CAPE KUMUKAHI	S	
91294	SOUTH POINT	S	
<b>VANUATU</b>			
91551	SOLA (VANUA LAVA)	S	
91554	PEKOA AIRPORT (SANTO)	S	
91555	LAMAP (MALEKULA)	S	
91557	BAUERFIELD (EFATE)	S R	00Z sonde only
91565	WHITE GRASS AIRPORT	S	
91568	ANEITYUM	S	
<b>WALLIS AND FUTUNA</b>			
91753	HIHIFO (ILE WALLIS)	S	
91754	MAOPOOPO (ILE FUTUNA)	S	

## Proposed List of Stations comprising the RBCN in Region V

INDEX NUMBER	NAME	GSN	GUAN	CLIMAT	CLIMAT TEMP
<b>AMERICAN SAMOA</b>					
91765	PAGO PAGO	X	X	X	X
<b>AUSTRALIA</b>					
94101	KALUMURU	X		X	
94120	DARWIN AIRPORT	X	X	X	
94131	TINDAL AWS			X	
94150	GOVE AIRPORT	X		X	X
94170	WEIPA AMO	X		X	X
94203	BROOME AMO	X	X	X	X
94212	HALLS CREEK AMO	X		X	
94238	TENNANT CREEK MET OFFICE	X		X	
94259	BURKETOWN	X			
94275	GEORGETOWN	X		X	
94287	CAIRNS AIRPORT	X		X	
94294	TOWNSVILLE AERO		X	X	X
94299	WILLIS ISLAND	X		X	X
94300	CARNARVON AIRPORT	X		X	
94302	LEARMONTH AIRPORT	X	X	X	X
94312	PORT HEDLAND AMO	X		X	X
94317	NEWMAN AERO	X		X	
94326	ALICE SPRINGS AERO	X		X	X
94332	MOUNT ISA AMO	X		X	X
94340	RICHMOND	X			
94346	LONGREACH AMO	X		X	
94367	MACKAY MO	X		X	
94374	ROCKHAMPTON AERO			X	X
94380	GLADSTONE	X			
94403	GERALDTON AMO	X		X	X
94430	MEEKATHARRA AMO	X		X	X
94461	GILES	X	X	X	
94476	ODNADATTA AIRPORT	X			
94480	MARREE	X			
94482	BIRDSVILLE POLICE STATION	X		X	
94485	TIBOOBURRA	X			
94492	THARGOMINDAH	X			
94510	CHARLEVILLE AMO	X	X	X	X
94517	ST GEORGE	X			
94541	INVERELL	X			
94570	TEWANTIN	X			
94578	BRISBANE AIRPORT AERO			X	X
94589	YAMBA	X			
94601	AUGUSTA CAPE LEEUWIN	X		X	
94610	PERTH AIRPORT		X	X	X
94626	CUNDERDIN	X			
94637	KALGOORLIE-BOULDER AMO	X		X	X
94638	ESPERANCE MO	X		X	X
94647	EUCLA AMO			X	X
94653	CEDUNA AMO	X		X	
94659	WOOMERA AERODROME MO		X	X	X
94670	SNOWTOWN	X			

INDEX NUMBER	NAME	GSN	GUAN	CLIMAT	CLIMAT TEMP
94672	ADELAIDE AIRPORT			X	X
94689	BROKEN HILL	X			
94693	MILDURA AIRPORT	X		X	
94710	COBAR AIRPORT			X	X
94711	COBAR	X			
94767	SYDNEY AIRPORT AMO AWS			X	
94776	WILLIAMTOWN AMO RAAF			X	X
94784	TAREE	X			
94791	COFFS HARBOUR MO/AWS			X	
94802	ALBANY AIRPORT	X		X	X
94805	CAPE BORDA	X			
94821	MOUNT GAMBIER AERO	X		X	X
94842	CAPE OTWAY LIGHTHOUSE	X		X	
94866	MELBOURNE AIRPORT			X	X
94869	DENILQUIN	X			
94907	EAST SALE AIRPORT	X		X	
94910	WAGGA WAGGA AMO/AWS	X		X	X
94926	CANBERRA AMO AWS			X	
94937	MORUYA HEADS	X			
94967	CAPE BRUNY	X			
94968	LAUNCESTON AIRPORT			X	
94975	HOBART AIRPORT		X	X	X
94995	LORD HOWE ISLAND	X	X	X	X
94996	NORFOLK ISLAND AERO	X	X	X	X
94998	MACQUARIE ISLAND	X	X	X	X
95322	RABBIT FLAT	X		X	
95527	MOREE MO			X	X
95646	FORREST	X		X	
95719	DUBBO AIRPORT	X		X	
95753	RICHMOND AWS	X			
95916	CABRAMURRA	X			
95964	LOW HEAD	X			
96995	CHRISTMAS ISLAND AERO	X		X	
96996	COCOS ISLAND AERO	X	X	X	X
<b>BRUNEI DARUSSALAM</b>					
96315	BRUNEI AIRPORT		X	X	X
<b>COOK ISLANDS</b>					
91802	PENRHYN AWS	X	X		
91812	PUKAPUKA AWS	X		X	
91831	AITUTAKI AWS	X		X	
91843	RAROTONGA	X		X	
91848	MANGAIA AWS			X	
<b>EAST TIMOR</b>					
97385	OE-CUSSIE			X	
97390	DILLI AIRPORT			X	
97395	BAUCAU	X			
<b>FEDERATED STATES OF MICRONESIA</b>					
91328	ULUL AWS		X	X	
91334	CHUUK	X		X	X
91348	PONAPE	X		X	X
91413	YAP	X		X	X

INDEX NUMBER	NAME	GSN	GUAN	CLIMAT	CLIMAT TEMP
<b>FIJI</b>					
91650	ROTUMA	X		X	
91652	UDU POINT AWS	X		X	
91680	NADI AIRPORT	X	X	X	X
91683	NAUSORI			X	
91699	ONO-I-LAU AWS	X		X	
<b>FRENCH POLYNESIA</b>					
91954	TUBUAI	X		X	X
91958	RAPA	X	X		X
91925	ATUONA	X	X	X	X
91938	TAHITI-FAAA	X	X	X	X
91943	TAKAROA	X		X	
91945	HEREHERETUE	X		X	
91948	RIKITEA	X		X	X
<b>GUAM</b>					
91212	NWSO AGANA, GUAM	X			
91217	WSMO, GUAM		X	X	
<b>INDONESIA</b>					
96035	MEDAN/POLONIA	X		X	
96073	SIBOLGA/PINANGSORI			X	
96109	PEKAN BARU/SIMPANGTIGA			X	
96145	TAREMPA	X			
96163	PADANG/TABING	X			
96195	JAMBI/SULTAN TAHA			X	
96249	TANJUNG PANDAN/BULUH TUMBANG			X	
96745	JAKARTA/OBSERVATORY	X			
96253	BENGKULU/PADANG KEMILING			X	
96805	CILACAP	X		X	
96839	SEMARANG/AHMAD YANI			X	
96925	SANGKAPURA/BAWEAN IS.	X			
96935	SURABAYA/JUANDA		X	X	
96633	BALIKPAPAN/SEPINGGAN			X	
96645	PANGKALAN BUN/ISKANDAR			X	
97014	MENADO/ SAM RATULANGI	X		X	
97072	PALU/MUTIARA			X	
97086	LUWUK/BUBUNG			X	
97120	MAJENE			X	
97146	KENDARI/WOLTER MONGINSIDI	X		X	
97192	BAU-BAU/BETO AMBARI			X	
97230	DENPASAR/NGURAH RAI				
97240	AMPENAN SELAPARRANG	X		X	
97340	WAINGAPU/MAU HAU	X		X	
97430	TERNATE/BABULLAH			X	
97502	SORONG/JEFMAN	X		X	
97530	MANOKWARI/RENDANI			X	
97560	BIAK/FRANS KAISIEPO	X		X	X
97600	SANANA			X	
97686	WAMENA	X		X	
97690	JAYAPURA/SENTANI	X		X	
97724	AMBON/PATTIMURA	X		X	X



INDEX NUMBER	NAME	GSN	GUAN	CLIMAT	CLIMAT TEMP
97796	TIMIKA			X	
97900	SAUMLAKI/OLILIT	X		X	
97980	MERAUKE/MOPAH	X		X	X
<b>KIRIBATI</b>					
91490	CHRISTMAS ISLAND	X			
91533	BANABA	X			
91610	TARAWA	X	X	X	X
91701	KANTON ISLAND	X			
<b>MALAYSIA</b>					
48601	PENANG/BAYAN LEPAS			X	X
48615	KOTA BHARU			X	X
48620	SITIAWAN	X		X	
48647	KUALA LUMPUR/SUBANG			X	
48650	SEPANG				X
48657	KUANTAN	X		X	X
48665	MALACCA			X	
96413	KUCHING	X		X	X
96421	SIBU			X	
96441	BINTULU	X		X	X
96449	MIRI			X	
96465	LABUAN	X		X	
96471	KOTA KINABALU			X	X
96481	TAWAU			X	X
96491	SANDAKAN	X		X	
<b>MARSHALL ISLANDS</b>					
91366	KWAJALEIN	X		X	X
91376	MAJURO	X	X	X	X
<b>NAURU</b>					
91531	NAURU			X	
<b>NEW CALEDONIA</b>					
91577	KOUMAC	X		X	
91592	NOUMEA	X	X	X	X
<b>NEW ZEALAND</b>					
93012	KAITAIA	X			
93110	AUCKLAND AERO AWS			X	
93112	WHENUAPAI				X
93292	GISBORNE AERODROME AWS	X		X	
93309	NEW PLYMOUTH AWS	X		X	
93417	PARAPARAUMU AERODROME	X	X		X
93420	PARAPARAUMU AWS			X	
93615	HOKITIKA AERODROME AWS	X		X	
93678	KAIKOURA			X	
93747	OMARAMA TARA HILLS	X			
93844	INVERCARGILL AERODROME	X	X		X
93945	CAMPBELL ISLAND	X			
93947	CAMPBELL ISLAND AWS			X	
93986	CHATHAM ISLAND		X		X
93987	CHATHAM ISLANDS AWS	X		X	
93994	RAOUL ISLAND, KERMADEC IS	X		X	
93997	RAOUL ISLAND, KERMADEC IS	.	X		X

INDEX NUMBER	NAME	GSN	GUAN	CLIMAT	CLIMAT TEMP
<b>NIUE</b>					
91822	ALOFI	X			
91824	HANAN AIRPORT	X			
<b>PALAU</b>					
91408	KOROR	X	X	X	X
<b>PAPUA NEW GUINEA</b>					
92001	KIUNGA W.O.			X	
92003	DARU W.O.			X	
92004	WEWAK W.O.			X	
92014	MADANG W.O.	X		X	
92035	PORT MORESBY W.O.	X	X	X	
92044	MOMOTE W.O.	X		X	
92047	NADZAB W.O.			X	
92076	KAVIENG W.O.			X	
92077	GURNEY W.O.			X	
92087	MISIMA W.O.			X	
<b>PHILIPPINES</b>					
98223	LAOAG		X	X	
98232	APARRI	X		X	
98429	NINOY AQUINO INT. APT.	X		X	
98444	LEGASPI	X		X	
98637	ILOILO	X		X	
98653	SURIGAO	X		X	
98836	ZAMBOANGA	X		X	
98851	GENERAL SANTOS	X		X	
<b>SINGAPORE</b>					
48698	SINGAPORE/CHANGI AIRPORT		X	X	X
<b>SAMOA</b>					
91762	APIA			X	
<b>SOLOMON ISLANDS</b>					
91503	MUNDA	X			
91517	HONIARA	X	X		
<b>TOKELAU</b>					
91724	NUKUNONO	X			
<b>TONGA</b>					
91799	LUPEPAU'U	X			
91780	VAVAU	X			
91788	NULUALOFA	X			
<b>TUVALU</b>					
91631	NANUMEA	X			
91643	FUNAFUTI	X	X	X	
<b>UNITED KINGDOM</b>					
91960	PITCAIRN ISLAND	X			
<b>USA</b>					
91165	LIHUE	X		X	X
91285	HILO	X	X	X	X
91182	HONOLULU			X	

<b>INDEX NUMBER</b>	<b>NAME</b>	<b>GSN</b>	<b>GUAN</b>	<b>CLIMAT</b>	<b>CLIMAT TEMP</b>
<b>VANUATU</b>					
91554	PEKOA AIRPORT (SANTO)	X			
91557	BAUERFIELD (EFATE)		X	X	
91568	ANEITYUM	X			
91555	LAMAP (MALEKULA)			X	
<b>WALLIS AND FUTUNA</b>					
91753	HIHIFO	X			