

**World Meteorological Organization**

**XV-RA V/INF. 7**

**REGIONAL ASSOCIATION V  
(SOUTH-WEST PACIFIC)**

Date: 27.IV.2010

**FIFTEENTH SESSION**

Language: English only

Bali, Indonesia

30 April to 6 May 2010

---

## **CONSOLIDATED SUMMARY REPORTS ON THE ACTIVITIES OF RA V SUBSIDIARY BODIES (2006-2010)**

Summary reports of Chairpersons of Working Groups and Rapporteurs of RA V on the respective activities are attached herewith.

---

**Appendix:** Reports of Chairpersons of Working Groups and Rapporteurs of RA V

**LIST OF REPORTS OF CHAIRPERSONS OF WORKING GROUPS AND  
RAPPORTEURS OF RA V**

- Annex 1**      **Working Group on Planning and Implementation of the WWW in Region V**  
1.1 Rapporteur on Regional Aspects of Public Weather Services
- Annex 2**      **Co-Rapporteurs on Regional Aspects of Instrument Development, Related  
Training and Capacity-Building**
- Annex 3**      **RA V Tropical Cyclone Committee for the South Pacific and South-East Indian  
Ocean** (*The report will be provided after the Thirteenth Session of the Committee,  
Bali, Indonesia, 26 – 29 April 2010*)
- Annex 4**      **Working Group on Climate-Related Matters**  
4.1      **Rapporteur on Statistical and Dynamical Climate Monitoring and  
Downscaling**
- Annex 5      Rapporteur on the Global Atmosphere Watch (*not available*)
- Annex 6      Rapporteur on WWRP-THORPEX (*not available*)
- Annex 7      Working Group on Agricultural Meteorology (*not available*)
- Annex 8**      **Rapporteur on Regional Aspects of the Aeronautical Meteorology Programme  
in Region V**
- Annex 9      Co-Rapporteurs on Regional Marine Meteorological and Oceanographic Services  
(*not available*)
- Annex 10**      **Working Group on Hydrology**
- Annex 11      Rapporteur on Education and Training Matters (*not available*)
- Annex 12**      **Working Group on Natural Disaster Prevention and Mitigation in Regional  
Association V (South-West Pacific)** (*not available*)
- Annex 13      Rapporteur on the WMO Space Programme (*not available*)
- Annex 14**      **Rapporteur for the Global Earth Observation System of Systems**

## ANNEX 1

### REPORT OF THE CHAIRPERSON OF THE WORKING GROUP ON PLANNING AND IMPLEMENTATION OF THE WWW IN REGION V (*Terry Hart, Australia*)

The Working Group was re-established at the meeting of the Regional Association in 2006 with the following members:

- (1) Mr Terry Hart (Australia, Chair);
- (2) Mr Kevin Alder (New Zealand), Coordinator of the Sub-group on Regional Aspects of the Information Systems and Services;
- (3) Mr Sunarjo (Indonesia), Rapporteur on Regional Aspects of the Integrated Observing System;
- (4) Mr Choo Huat Aik (Singapore), Rapporteur on Regional Aspects of the Data-processing and Forecasting System;
- (5) Mr Kang Theng Shong (Malaysia), Rapporteur on Regional Aspects of Public Weather Services;
- (6) Mr Yves Gregoris (French Polynesia), Rapporteur on Regional Aspects of AMDAR;
- (7) Mr Michel Argent (New Caledonia), Rapporteur on Regional Aspects of GEOSS; and
- (8) Mr Weiqing Qu (Australia), Rapporteur on Migration to Table-driven Code Forms.

All members of the Working Group have participated, through Expert Teams or Implementation/Coordination Teams (ICT) established under CBS Open Program Area Groups or by offering technical expertise. This participation has been an opportunity to represent the needs of RA V to the work of the CBS and also of gaining knowledge and experience that can be used within the Region. I express my gratitude to them all, on behalf of the Regional Association, for their contribution.

The Working Group held one meeting, generously hosted by USA in Honolulu in December 2009. The Sub-group on Regional Aspects of the Information Systems and Services was scheduled to meet in 2007 but, in fact, met just before the full Working Group meeting.

Specific tasks had been assigned to the Working Group by the Fourteenth Session of Regional Association V (RA V – XIV) held in Adelaide, in May 2006. Overall there had been good progress across all aspects of World Weather Watch as outlined below and in other related documents presented to the Session.

There has been significant activity through leveraging off other organizational arrangements and the actions of individual NMHSs. One example has been the development of strong cooperation with the Tropical Cyclone Committee (TCC) for the South Pacific and South-east Indian Ocean. A meeting of the TCC in Niue in 2008 was a key meeting in the initiation of the Severe Weather and Disaster Risk Reduction Demonstration (SWFDDP).

Links with other key stakeholders such as Natural Disaster Management Offices and regional organizations such as SOPAC and SPREP have been strengthened through planning for the SWFDDP and coordination on tsunami warnings (even if tsunamis are not strictly a World Weather Watch activity).

Projects of individual NMHS and regional groupings have brought developments to the WWW. Continued improvements in the availability of satellite data are examples, as are individual projects such as the Radio and Internet for the Communication of Hydro-Meteorological Information for Rural Development (RANET), the Low Resolution Information Transmission (LRIT) upgrade, greater availability of Numerical Weather Prediction (NWP) products and the support for SWFDDP. The Finnish-Pacific Project for Increased Capacity for SPREP and NMS Staff to Meet the Growing Demand of Meteorological and Climatological Information for Society (FFPICS) would benefit WWW through enhancing strategic planning and the extension of the Quality Management System Framework (QMF). WWW activities would also benefit from the outcome of the Urgent Review of Meteorological Services initiated by the Pacific Islands Forum Leaders 2008 Communiqué and being organized through SPREP.

### **Overall effectiveness and opportunities for re-structure**

The lack of resources to hold sessions has been a barrier to the effectiveness of the Working Group as a whole to make progress on the work plan. The RA V Subgroup/ISS only met very close to the end of the four-year inter-sessional period, just prior to the only meeting of the full Working Group since 2005.

Options for restructuring Working Groups in Region V to achieve greater effectiveness and more alignment with the Strategic Thrusts and Expected Results of the WMO Strategic Plan will be considered at the meeting of the Regional Association. Such a review and re-structure is timely and appropriate. There are several opportunities that can be grasped if we have flexible and agile structures.

It is important that any restructuring should ensure a continued coordination group for regional ICT infrastructure as strong cooperation and coordination are essential for developing an effective communication network. In particular, there appears to be a window of opportunity to develop a satellite-based communications system over the Pacific that could fill a long-standing gap.

The Working Group highlights the SWFDDP as a project with great potential benefit to the region and a model of effective support from the designated regional centres to the smaller NMHSs. It is hoped that any restructure will provide an effective framework that ensures the success of this Project.

Any restructure should aim to improve the collection and dissemination of observations, the use of meteorological information in NMHSs, the translation of that information into service delivery, and reduction of the impact of natural disasters.

### **Highlights**

Developments in the World Weather Watch are covered in the documents presented to the session. A few specific **highlights** are:

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

- Preparation of a draft template plan for the Evolution of the GOS applicable to Members of the Region. It concentrates on the surface-based network which is within the capabilities of NMHSs. To the extent that NMHS can contribute to the improvement of the GOS, their own communities will benefit from improved services.

#### *Information Systems and Services*

- Improvements in the Regional Meteorological Data Connection Network (RMDCN) in RA V by the use of managed network services;
- Continued contribution of RANET and the LRIT upgrade;

- Progress on the migration to Table Driven Code Forms (TDCF);
- The RA II, RA V, VPN Pilot Project is now in an advanced stage of demonstration of internet based technologies as a component of WIS.

*Data-Processing and Forecasting Systems, Public Weather Services and Disaster Risk Reduction*

- A major highlight has been the start of the Severe Weather Forecasting and Disaster Risk Reduction Demonstration Project (SWFDDP). This has already generated great enthusiasm for the potential it offers. The web portal developed by RSMC Wellington (called MetConnect Pacific) has been operational since November 2009 as a single point of access for global and regional products. The demonstration phase over the 2010/2011 summer will give more countries access to the guidance products after training is provided during 2010. Options to extend the project to other areas will be considered based on the results of the demonstration phase.
- Increase in the number of centres operating NWP systems.
- Designation of Melbourne as a Global Producing Centre (GPC) for seasonal to inter-annual forecasts based on ensemble predictions from a coupled ocean-atmosphere model.
- Further development of the capabilities of the RSMCs for Environmental Emergency Response at RSMC Melbourne including **backtracking** from the operational atmospheric transport model (ATM), an initiative that arose from collaboration between WMO and CTBTO.
- Contribution of NMHSs to development of tsunami warning systems for their countries.
- Many valuable training opportunities and capacity building activities in Public Weather Services, and the extensive publications on PWS developed by the Secretariat for the benefit of Members.
- Continued development of the World Weather Information Service (WWIS) hosted by the Hong Kong Observatory, Hong Kong, China. As of 1 September 2009, 17 Members from RA V participate in the WWIS and Severe Weather Information Centre (SWIC) programmes.

**Challenges**

- Maintaining, enhancing and gaining full benefit from surface-based observation networks;
- Continuing communications limitations (As an example, Timor Leste has recently become a member of WMO and does not have access to the GTS);
- Need for continuing support for alternative mechanisms such as satellite distribution systems (LRIT, EMWIN), as well as RANET and Digital HF radio networks;
- Lack of coverage for the central Pacific region in proposals for GEONETCAST global broadcasts;
- Development of a Pacific-wide satellite, 2-way broadcast service to provide a regional satellite service capable of delivering reliable 2-way GTS Services to Small Island Developing States (SIDS) to complement existing communications systems, a replacement platform for the GOES 7 re-broadcast of EMWIN and LRIT, and a mechanism to deliver advanced services such as SWFDDP to the region;
- Need for training and development in communications technologies;
- Development of a Regional WIS implementation strategy;
- Making the SWFDDP a success from NMHS to emergency services and the community;
- Media broadcasting training and resources such as presentation software to improve the visibility of NMHSs;
- Adoption of the Common Alerting Protocol (CAP) which has emerged as the standard for public alerting of hazards through multiple communications media ranging from sirens to cell phones, radio, television and various digital communication networks;
- Further work in developing effective communications and procedures for tsunami warnings.

## **Acknowledgements**

As Chair of the Working Group I would like to acknowledge the support I have received from all members. They have undertaken their individual tasks conscientiously and have contributed to the Regional performance of the World Weather Watch. I am particularly grateful to the willing support and help that the Working Group and I have received from the WMO Secretariat, especially from Dr Toya, Henry Taiki, Jean-Michel Rainer, David Thomas and Peter Chen.

I would also like to acknowledge the support from WMO Members, some from outside RA V, who have contributed to the effective operation and development of the World Weather Watch in RA V, both through new projects and support for existing systems. The World Weather Watch continues to develop in many ways in its contribution to the well-being of communities in our region through the support and development of the systems that comprise the WWW.

-----

## **Report of the Rapporteur on the Regional Aspects of Public Weather Services (Kang Thean Shong, Malaysia)**

### **1. INTRODUCTION**

The Fourteenth session of Regional Association V (South-West Pacific) held in Adelaide, Australia, from 9 to 16 May 2006, reiterated that the end result of the provision of public weather services to the national community is to enhance and ensure public safety and welfare. Since the provision of high-quality public weather service is a fundamental function of NMHSs, there is an urgent need to assist Members of RA V to effectively deliver quality products to ensure the protection of life and people's livelihood and contribute to sustainable development.

### **2. STATUS OF IMPLEMENTATION AND OPERATION OF PUBLIC WEATHER SERVICES**

A range of initiatives had been carried out or planned by the NMHSs of the region to enhance their PWS programme, including providing broad-scale severe weather and localized severe thunderstorm warning services to the public, aviation and marine sectors, such as:

- Expanding the network of automatic weather stations;
- Addition and upgrading of various remote sensing observation platforms including, the upgrading of conventional weather radar to Doppler weather radar and enhancing its software tools, as well as enhancing human capacity on the interpretation of the products generated and the maintenance of the various systems;
- Enhancing their forecasting expertise, including better understanding of different weather systems, NWP capacity and ensemble forecasting;
- Monitoring, verification and improving accuracy of weather forecast and warnings, including thunderstorm forecasting methods;
- Use of websites, email and SMS (some with graphic and animation) for public weather forecast and warning information;
- Disaster Alert System (DAS), whereby the fixed line telephone of certain affected regions would be activated, as well as direct access to television broadcasting through special

arrangement to promptly warn the public, especially the local community, of threat from severe weather;

- Improve public awareness of its services and to maintain close rapport and interactions with its clients and users, including institutions of higher learning, government agencies and NGO, through regular forum, so as to improve and enhance the forecast information for specific end-users;
- Improve the communication with end users. To assist this, the pilot phase of the Severe Weather Forecast and Disaster Risk Reduction Demonstration Project (SWFDDP) for the South Pacific was launched operationally on 1 November 2009. Forecaster guidance, updated twice a day by forecasters at Meteorological Service of New Zealand Limited, and supporting numerical model data, are made available via a web site to forecasters in Fiji, the Solomon Islands and Samoa; and
- Implementation of quality management system for the aviation and public weather services.

### **3. CAPACITY BUILDING**

Members from RA V have participated in various PWS capability and capacity building activities, and would like to thank the WMO Members and Secretariat for these training opportunities and for the extensive publications on PWS that have been published. Members have found both the training and the publications very helpful.

The Members are encouraged to make full use of the recently published Guidelines on Communicating Forecast Uncertainty, PWS-18; WMO/TD No. 1422, which is freely available at <http://www.wmo.int/pws>.

The various PWS capability and capacity building activities participated includes the followings:

- The First Meeting of The Task Force on Socio-Economic Applications of Public Weather (PWS), Geneva, Switzerland, 15 -18 May 2006;
- PWS Workshop on Warnings of Real-Time Hazards by Using Nowcasting Technology, Sydney, Australia, 9 -13 October 2006;
- WMO International Training Workshop on Tropical Cyclone Disaster Reduction, Guangzhou, China, 26 - 31 March 2007;
- International Symposium on Global Change, Asian Monsoon and Extreme Weather and Climate, Taipei, Taiwan, 11 - 12 June 2007;
- The Second Meeting of the Task Force on Socio-Economic Applications of Meteorological and Hydrological Services, Geneva, Switzerland, 11 - 13 July 2007;
- RA I/RA V SIDS PWS Workshop (jointly with TCP), Melbourne, Australia, 10 - 14 September 2007;
- The International Symposium on PWS: A Key to Service Delivery, Geneva, Switzerland, 3 - 5 December 2007. 120 participants and speakers attended the event. The main objective of the Symposium was to carry out a thorough review of the achievements of the Public Weather Services Programme during the 13 years of its existence, and to prepare a road map to improve delivery of services by National Meteorological and Hydrological

Services (NMHS) and other entities engaged in weather, climate and water issues for the next decade and beyond;

- Training Workshop on the Assessment of Socio-economic Benefits of Meteorological and Hydrological Services, Nanjing, China, 21 - 28 September 2009; and
- Eighth Southern Hemisphere Workshop on Public Weather Services Melbourne, Australia, 12 to 16 October 2009.

#### 4. REGIONAL ISSUES

The Fifth session of the Working Group on Planning and Implementation of the World Weather Watch (WWW) in Region V (RA V WG/PIW) held in Honolulu, Hawaii, from 7 to 10 December 2009 has noted and recommended a number of issues, as follows:

- (i) The PWS Programme is considering the importance of developing forecasting services for road and driving conditions as part of PWS activities to serve both the travelling public and professionals responsible for road safety and maintenance. In this regard, it is recommended that Members of RA V send examples of how they deliver road services in their respective countries, to the Secretariat for inclusion in the Public Weather Services Programme (PWSP) Website (<http://www.wmo.int/pws/>). The aim is to provide information and examples on road forecasting as a reference resource for NMHSs wishing to improve their own road weather services.
- (ii) The need to develop Nowcasting services as was clearly expressed by NMHSs of the RAV through the Survey on Improving the Delivery of Public Weather Services, carried out by the WMO PWS Programme. The Working Group agreed to recommend to Members to consider this stated need when planning the activities of the PWS Programme in Region V.
- (iii) The "Learning through Doing" (LTD) initiative by the PWS Programme, which involves assisting NMHSs to improve their communication with users and to produce and deliver an improved range of services according to user requirements. The Working Group commended the concept to Members of Region V and suggested that individual Members contact the Secretariat to express interest in projects using this approach.
- (iv) The establishment of the Common Alerting Protocol (CAP) as the foundation standard for public alerting in societies worldwide. CAP, formally designated as ITU Recommendation X.1303, is a simple and general format for emergency alerting and public warning. It is designed for "all-hazards", addressing weather events, earthquakes, tsunamis, volcanoes, public health, power outages, and many other emergencies. It was also designed for "all-media", addressing communications media ranging from sirens to cell phones, faxes, radio, television, and various digital communication networks including the Internet. The Working Group recommends that Members in RA V adopt the use of CAP for their domestic warnings as required by NDMOs in their country. It also recommended that warnings currently exchanged internationally on the GTS be also transmitted in CAP. The session had some queries about details on the content of CAP in various warnings settings and will seek clarification from the Secretariat.
- (v) WMO had launched an online WMO Register of Alerting Authorities. This register is designed to provide the opportunity for each WMO Member to identify itself and other alerting authorities in its country or state as an officially recognized alerting authority. The register contains information on each category of alert message issued, and where on the Internet one could find forecasts and CAP messages. In addition to enhancing

information exchange among WMO Members, this facility should be very useful for international aggregators of alert messages. The Working Group invited each RA V Member to ensure that the parts of the Register of Alerting Authorities relevant to them were updated regularly.

- (vi) Members of the Working Group felt that information on socio-economic benefits of forecasts and warnings would be beneficial. The session was advised that the WMO PWS has information on the WMO web site as a resource for users including NMHSs, emergency managers, governments, and weather and climate agencies that may need to develop similar tools.
- (vii) The media presentations were an effective way of improving the visibility of NMHSs and noted the success of recent innovations by some in installing media rooms for producing television weather segments. However, several NMHS represented noted that they needed both training and resources such as media broadcasting training and presentation software. Noting this need, the session recommends that training and resources be addressed under activities of the WMO PWS Programme in coordination with the Voluntary Cooperation Program.

Whereas the Fifth Technical Conference on the Management of Meteorological and Hydrological Services in Regional Association V (South-West Pacific) held in Kuala Lumpur, Malaysia, from 20 to 24 April 2009, with the theme of "Strategic Capacity Development of NMHSs in RA V" also made a series of recommendations to the WMO Secretariat and the Association for ways to improve the Management of Meteorological and Hydrological Services in the region. Some of these recommendations which are applicable to enhance the PWS programmes, including their visibility to its stakeholders, in the region are as follows:

- (i) To prioritize the requirements and expectations of Members, especially LDCs and SIDS, and to enhance effective partnerships within and outside the Region;
- (ii) To incorporate issues on adaptation to climate change and research on extreme weather and climate events, RCCs, long-term sustainable operation of services, and Quality Management Systems (QMS) in the RA V Strategic Plan;
- (iii) Explore possible establishment of a region-wide, multi-hazard warning system, including tsunami;
- (iv) To incorporate recommendations from the Madrid Conference and the WMO Coordination and Capacity Building Workshop for LDCs in Asia-Pacific (Port Vila, Vanuatu, October 2008) are incorporated into Regional Expected Result 9 (Enhance Capabilities of NMHSs) of the draft RA V Strategic Plan (2009-2011), and link it directly to national development priorities of LDCs in Region V;
- (v) To build strong relationships or partnerships between NMHSs, national Governments and all other stakeholders is critical to the success of any warning systems;
- (vi) To enhance ICT facilities in SIDS in Region V and to integrate, as well as to ensure inter-operability and compatibility of ICT and early warning monitoring systems, so that data and products can reach NMHSs and warnings can reach the targeted local people, especially those in remote areas;
- (vii) To take advantage of opportunities and to share existing ICT systems through partnership and collaboration, and to ensure sustainability of existing ICT systems, such as RANET and EMWIN, in view of the tangible benefits delivered by these systems to developing countries, including LDCs and SIDS;

- (viii) More information about QMS should be provided by WMO and the International Civil Aviation Authority (ICAO) to Members of RA V to assist them with the implementation of QMS in their NMHSs by 2010; Members of RA V in particular LDCs and SIDS in the Pacific region should be urged to group together to mobilize resources and implement QMS in their NMHSs, and a similar arrangement could be made for cost recovery;
- (ix) For WMO to provide guidance and collect best practices on Disaster Risk Reduction (DRR) partnerships that are successful in downscaling DRR to the local level, so that warning information and evacuation strategies reflect the best advice by local officials to the local population;
- (x) To closely review the frequency of the occurrence of extreme weather events, to improve disaster risk reduction and mitigation efforts, and help improve warning messages, in particular for locations where the time period between extreme hazard events is long;
- (xi) To strengthen DRR partnerships, in particular the outreach and education aspects of warnings and evacuations related to fires.

## **5. WMO OFFICIAL WEATHER FORECASTS AND SEVERE WEATHER WARNINGS**

The Members would like to extend their deepest appreciation and congratulations to all WMO Members, especially the participating members and the Hong Kong Observatory, Hong Kong, China, as well as WMO Secretariat for the successful implementation of the World Weather Information Service (WWIS) which won the Stockholm Challenge 2008. As of 1 September 2009, 17 Members from RA V participate in the WWIS and Severe Weather Information Centre (SWIC) programmes. There is an urgent need to take actions, especially by providing assistance and partnership to enhance the capability and capacity of LDCs and SIDs, to increase the participation of RA V Members. Members are requested to promote the use of the information on these web sites.

## **6. SUMMARY**

The ultimate goal of public weather service is to improve protection of life, livelihoods and property; increased safety on land, at sea and in the air, as well as to contribute towards the sustained economic growth of both developed and developing countries and protection of other natural resources; and improved environmental quality. Members of the region have carried out various activities to improve their weather forecast programmes so as to provide more accurate, timely, relevant and reliable forecasts and warnings and to enhance delivery of information and services. But there is still an urgent need for the NMHSs to plan and implement innovative activities and programmes to enhance their services and visibility to the stakeholders and the public.

-----

## **ANNEX 2**

### **REPORT OF THE CO-RAPPORTEURS ON REGIONAL ASPECTS OF INSTRUMENT DEVELOPMENT, RELATED TRAINING AND CAPACITY BUILDING (John Gorman, Australia and Zahari Abdullah, Malaysia)**

#### **1. INTRODUCTION**

This report gives a brief summary on the information on the regional aspects of capacity building on meteorological instrument development and calibration in the WMO RA V region for 2006-2010.

#### **2. REGIONAL ASPECTS OF INSTRUMENT DEVELOPMENT AND CALIBRATION**

The RA V Regional Instrument Centre (RIC) Melbourne has participated in WMO regional instrument inter-comparisons programme. Inter-comparison between national meteorological instruments with the RA V RIC standard has been conducted so as to establish traceability of the national standards of member countries to the regional standard.

The RIC Melbourne has also assisted Members of the Region in calibrating their national meteorological standards and related environmental monitoring instruments and instrument inter-comparison.

##### **2.1 Inter-comparisons**

In mid 2007, the RA V RIC at Melbourne dispatched the Bureau of Meteorology's small Stevenson screen design to Algiers to take part in the WMO screens inter-comparison.

In 2009, there was an inter-comparison between the Indonesian Meteorological, Climatological and Geophysical Agency (BMKG) and the RA V RIC at Melbourne, in the areas of temperature and global solar radiation. There was also an inter-comparison with the BMKG in the areas of pressure.

In 2008/2009, an inter-comparison in the areas of temperature and pressure was completed between the RIC and the Malaysian Meteorological service and the RA V RIC in Melbourne, in both temperature and barometric pressure.

Following recommendations by WMO, the RA V RIC at Melbourne has also cooperated with other RICs in standardization of meteorological and related environmental measurements. In December 2007, an inter-comparison was completed between the Meteo France Laboratory and RA V RIC Melbourne in the areas of temperature, humidity and pressure. No significant differences were found between the two laboratories.

##### **2.2 Travelling Standards**

Following recommendations by WMO, a responsible RIC must advise Members on inquiries regarding instrument performance, maintenance and the availability of relevant guidance materials. In 2009, the RA V RIC donated travelling calibration standards to the Niue Meteorological Service. These included travelling standard instruments for temperature, barometric pressure, rainfall and humidity. Operational procedures for the use of these instruments were also included.

In 2009, RIC travelling standard instruments were also loaned to the Malaysia and New Zealand Meteorological Services allowing inter-comparisons between their respective instrument standards and the RA V RIC (Melbourne).

### **3. TRAINING**

The RA V RIC at Melbourne has been conducting training sessions for member countries regarding calibration and maintenance procedure.

In 2008, two BMKG staff were trained at the RA V RIC (Melbourne) in traceable measurements and laboratory calibration techniques.

In 2009, another three BMKG staff were trained at the RA V RIC (Melbourne) in traceable measurements and laboratory calibration techniques.

In 2009, one staff from the Malaysian Meteorological Department was trained in meteorological instrumentation, calibration and maintenance techniques through a workshop conducted by the RA I RIC in Cairo, Egypt.

### **4. DRAFT SURVEY**

The RA V RIC at Melbourne has also been conducting inquiries regarding instrument performance, maintenance and the availability of relevant guidance materials

In 2010, the RA V RIC at Melbourne tested the draft RIC survey as proposed by the capacity building expert team. No significant problems were found due the survey and advice was fed back to the Expert Team (Co-chair).

-----

**ANNEX 3**

**REPORT OF THE CHAIRPERSON OF THE RA V TROPICAL CYCLONE COMMITTEE FOR THE  
SOUTH PACIFIC AND SOUTH-EAST INDIAN OCEAN  
(*Mike bergin, Australia*)**

*(The report will be provided after the Thirteenth Session of the Committee,  
Bali, Indonesia, 26 – 29 April 2010)*

-----

## ANNEX 4

### Report of the Rapporteur on Statistical and Dynamical Climate Modelling and Downscaling (*Lim Boon Seng, Malaysia*)

#### 1. INTRODUCTION

This paper presents the information on the status of the Statistical and Dynamical Climate Monitoring and Downscaling Activities in World Meteorological Organization (WMO) Regional Association (RA V).

#### 2. REGIONAL ISSUES

RA V Working Group on Climate-related Matters (WG-CRM) met in Nadi, Fiji, from 8-11 February 2010, and deliberated on the issues of Statistical and Dynamical Climate Monitoring Downscaling. The findings from the meeting are as follows:

- (i) In RA V, only six (6) countries have statistical and dynamical climate monitoring downscaling activities: Australia, Indonesia, Malaysia, New Zealand, New Caledonia and Vanuatu. Most of the other RA V countries refer to the already established websites such as IRI, ECMWF, NCEP, UK Met, TCC and BOAMA for their needs.
- (ii) The models used for the purpose include POAMA in Australia, IPCC AR4 and PRECIS in five countries (Malaysia, Brunei, Indonesia, Philippines and Singapore), WRCP-CMIP3 in New Zealand, ARPEGE of Meteo-France in New Caledonia, and SCOPIC in Vanuatu.
- (iii) The recommendations from the RA V WG-CRM meeting in Fiji on Statistical and dynamical climate monitoring downscaling activities are as follows:
  - (a) To find ways to understand and incorporate the products and results of the Statistical and Dynamical Climate Monitoring Downscaling activities into the management of adaptation and climate matters;
  - (b) To improve the methods of archiving old data, media of storage and the translation of storage for future needs in RA V;
  - (c) To find finances for training and capacity building in RA V;
  - (d) To agreed upon the adaptation activities to climate changes to have a sustainable development in RA V;
  - (e) To study the patterns of rainfall caused by the ENSO;
  - (f) To have water security in RA V;
  - (g) To have food security in RA V;
  - (h) To manage the increasing risks of wild fire;
  - (i) To manage the increasing acidity of the oceans;
  - (j) To be well prepared for the increasing occurrences of natural disasters;

- (k) To improve the climate observations through programmes such as GAW, GCOS, and partnerships with international agencies, other organizations, academia, the media and the private sectors in the developed, developing and underdeveloped countries.

Among the countries in RA V, Australia and New Zealand are doing more advanced work in the statistical and dynamical climate monitoring and downscaling.

### **3. CAPACITY BUILDING**

Most of the countries in RA V lack sufficient technical expertise to carry out statistical and dynamical climate monitoring downscaling activities by themselves. The countries also need funding to acquire the facilities for the activities. It is recommended that more training workshops are conducted for RA V. The training will improve their technical capabilities and knowledge in performing the climate monitoring downscaling activities. Funding also need to be made available to some of the countries in RA V to enable them to acquire the necessary facilities and training for the purpose.

#### **3.1 Capacity Building on Climate Application Using Downscaling Techniques**

Capacity building on statistical and dynamical downscaling has been carried out in Malaysia. For example, the Training Workshop on Climate Applications in ASEAN hosted by the Malaysian Meteorological Department (MMD) in October 2009 introduced on the theory and techniques on statistical and dynamical downscaling to 21 participants from five RA V Member countries (Brunei, Indonesia, Philippines, Singapore and Malaysia) and 10 participants from five RA II Member countries (Cambodia, Lao PDR, Myanmar, Thailand and Vietnam). The participants were also introduced to downscaling results generated using both the downscaling methods, and showed how a combination of dynamical and statistical downscaling together would generate more useful results for climate applications.

#### **3.2 Dynamical Downscaling Capacity Building**

The Malaysian Meteorological Department (MMD) has hosted a training workshop on dynamical downscaling using the "Providing Regional Climates for Impacts Studies (PRECIS)" regional climate model in ASEAN region. The PRECIS model, which was developed at the UK Met Office, Hadley Centre, was introduced to the ASEAN member countries through a workshop hosted by MMD in 2006, which successfully provided scientific advice, technical support and guidance on appropriate use of PRECIS. The workshop has allowed participants from five RA V Member countries (Malaysia, Philippines, Indonesia, Brunei and Singapore) and two RA II Member countries (Thailand & Vietnam) to undertake dynamical downscaling works in their respective countries. Since the first workshop, the dynamical downscaling of South-East Asian regional climate have been conducted, which successfully produced climate change scenarios for the region. A second follow-up PRECIS workshop in 2009, hosted by MMD, has successfully improved collaboration on this dynamical downscaling using PRECIS with the same five RA V Members (Malaysia, Philippines, Indonesia, Brunei and Singapore) and five RA II members (Thailand, Vietnam, Laos, Cambodia and Myanmar) attended the workshop to enhance the work that is already being done and instigate new climate related research in the region.

### **4. SUMMARY**

Capacity development in statistical and dynamical monitoring and downscaling continue to be an area of priority for most countries in RA V. Some of the countries, especially the Pacific Island countries, require financial assistance to develop further this area.

## ANNEX 8

### REPORT OF THE RAPPORTEUR ON REGIONAL ASPECTS OF AERONAUTICAL METEOROLOGY PROGRAMME IN REGION V (*Tan Huvi Vein, Malaysia*)

#### 1. INTRODUCTION

This paper presents information on the status of the meteorological services for aviation in World Meteorological Organization (WMO) RA V.

#### 2. OPERATIONAL AVIATION METEOROLOGICAL SERVICE ISSUES

##### 2.1 METAR and TAF

There are shortfalls in some METAR and TAF from some states in the Region, in particular with the bulletins from the South-West Pacific Island States which were compiled by Nadi RODB. Also METAR from a number of aerodromes in some ASEAN countries is unavailable.

The International Civil Aviation Organization (ICAO) Technical Cooperation Project Cooperative Agreement for Enhancement of the Meteorological Service for Aviation in the South Pacific (CAEMSA-SP) conducted from August to December 2008, identified several deficiencies in some island states. Among others, no METAR/SPECI observing programme is in place, TAF issuance monitoring and amending is not supported by an observing program, text of METAR is not in accord with ROBEX HB, there are no calibrated meteorological observations (wind, visibility, cloud), there is a lack of agreement between the Meteorological Services and the Civil Aviation Authority, and a lack of, or outdated, WMO and ICAO documents. The monitoring of the availability of METAR and TAF on SADIS by ICAO in March to May 2009 shows that only 61.7% and 86% of aerodrome operational planning (AOP) aerodromes issued METAR and TAF, while 66.1% and 67.7% of non-AOP aerodromes issued METAR and TAF, which are below the targets of 95% and 90%.

The Fifth Technical Conference on Management of Meteorological and Hydrological Services in Region V on "Strategic Capacity Development Of NMHSs In RA V" (Kuala Lumpur, 20-24 April 2009) agreed that the Strategic Plan developed for RA V needs to look into the priority requirements, expectations and needs of the Pacific Islands Meteorological Services. To overcome these deficiencies, through partnerships, funding and resources from donor states, WMO and ICAO are to meet international requirements in the provision of meteorological services which would achieve the necessary safety and efficiency levels for airlines operating in the South Pacific.

Four out of the five countries, which are required to issue new 30-hour TAF, implemented the requirements.

##### 2.2 SIGMET

A 14-day SIGMET monitoring was carried out by the SADIS Gateway Development Team in the ICAO ASIA/PAC Region (where WMO RA V is within the ICAO ASIA/PAC) in January and February 2007. It was found that only 29% of the SIGMET ISSUED complied with the Annex 3 requirement for inclusion of the FIR location indicator before the FIR name in the beginning of the SIGMET body text and also a large number of SIGMET from ASIA/PAC Region was non-compliant with Amendment 73.

The problem of undetected volcanic eruption still persists. On the 17th July 2006, an aircraft experienced a twin-engine flameout while flying over Papua New Guinea at 39,000ft. The cause of

the flame-out to volcanic ash may be from an undetected high-level eruption from Manam, Papua New Guinea.

The non issuance of associated SIGMETs, NOTAMs, and AIREPs still exists in the region where such a case involved the Sopotan Volcano in Sulawesi, Indonesia on 6 October 2008, and the eruption of Semeru in Java, Indonesia, on 6 March 2009, despite the issuance of advisory by Darwin VAAC. The locations of the eruptions were of concern to airlines due to the proximity to air routes.

The volcanic ash chapter of the Australian Bureau of Meteorology's Aeronautical Forecasters Handbook that included satellite analysis techniques for volcanic ash detection which was used for training sessions within the VAAC and was made available on the WMO Commission for Aeronautical Meteorology (CAeM) website.

### **2.3 SIGMET tests**

SIGMET tests were carried by ICAO ASIA/PAC Region in 2005 to February 2009. There has not been significant improvement regarding the availability of test SIGMET during the period. Availability of the SIGMET tests is only about 60% of the selected member states and falls short of the expected performance objective of 95%. It was also found some states in the RA V had no capacity of providing SIGMET service. There are number of errors and discrepancies from the standard formats and persisting syntax errors. Many of these errors may be caused due to the lack of basic quality control procedures at the origin of the OPMET messages.

The latest SIGMET test was carried out in November 2009. In general, the number of participating states increased to above 80% for WC SIGMET and WV SIGMET tests, and 70% for the WS SIGMET test. There was a significant increase in reception of the test SIGMET messages. However, not all the SIGMETs issued reached all RODBs; there were still wrong usages of WMO Headings, and there were wrong settings of priority in use of SIGMET test.

### **2.4 Regional issuance of SIGMET**

The regional issuance of SIGMET through a regional centre was a viable solution to the long standing problems of the issuance of SIGMET by Meteorological Watch Offices (MWOs) identified in the region. In addition, a centralized location would mitigate these current problems and address the modernization of operational needs, such as graphics and gridded data. Legalities were cited as not being an obstruction to developing regional centres for the provision of SIGMET.

## **3. AMDAR**

In RA V, only three countries (Australia, New Zealand and Singapore) have implemented the AMDAR system. Malaysia plans to implement AMDAR with their national air carriers in the near future.

## **4. WORLD AREA FORECAST SYSTEM**

Findings from the ICAO Technical Co-operation Project *Cooperative Agreement for Enhancement of the Meteorological Service for Aviation in the South Pacific* (CAEMSA-SP) indicate a lack of WAFS forecasts in flight briefings for Nauru, Kiribati, and the Solomon Islands. The ICAO Technical Co-operation Programme (TCB) plans to conduct a workshop that includes actions with donors and states in mitigating the deficiencies and other MET gaps identified.

The SADIS first-generation (SADIS 1G) satellite broadcast was withdrawn from service on 5 January 2009. Malaysia ceased to be the last RA V registered user of SADIS in 2008.

User training for the new WAFS gridded forecasts is expected to be carried out in December 2010.

World Area Forecast Centre (WAFS) Washington plans to implement the ISCS G3 service and to terminate the existing ISCS G2 service by 30 June 2012. Upon advice of the implementation plan from WAFS Washington, states are expected to make the arrangements for the installation of the necessary hardware for transition to the ISCS G3.

## **5. QUALITY MANAGEMENT SYSTEM**

In accordance with Amendment 75 to Annex 3, the provisions related to mandatory quality management system (QMS) for aeronautical meteorology would become applicable in November 2012 and member states are required to obtain formal certification to compliance to the ISO 9001:2008 Quality Management Standard (QMS).

Many of the lessons learnt from the Tanzania Pilot Project, and the many pitfalls and challenges of such a project in a least developed country, were expected to be directly useful for implementation projects in other countries, and could be used to shorten the time needed for these projects.

## **6. QUALIFICATION, TRAINING AND HUMAN CAPACITY DEVELOPMENT**

### **6.1 Two-tier-System**

The introduction of the new two-tier system for the classification of meteorological personnel, as described in WMO-No. 258 and its aeronautical supplement No.1, still requires a significant effort to ensure that aeronautical meteorological personnel fully comply with the new guidelines.

The Competency Standards for aeronautical meteorological forecasters and aeronautical meteorological observers are due to be published in WMO-No. 49 in November 2010 and will become mandatory in November 2013.

### **6.2 WMO, ICAO and NMSs Efforts**

The following are the efforts by WMO, ICAO and some National Meteorological services to enhance the provision of meteorological services to international air navigation in the Asia-Pacific Region, including RA V.

- (a) The 4th International Workshop on Volcanic Ash (VAWS/4):  
The Fourth International Workshop on Volcanic Ash was held at the Rotorua, New Zealand, from 26 to 30 March 2007, and was sponsored by the World Meteorological Organization (WMO), the Civil Aviation Authority of New Zealand (CAA), the Australian Bureau of Meteorology (BoM) and Meteorological Service of NZ Ltd (MetService). The objective of the Workshop was to improve the scientific aspects of the ICAO International Airways Volcano Watch (IAVW) including: the understanding and use of ground-based volcanic monitoring; detecting, analysing and tracking eruption clouds; and forecasting ash cloud dispersion.
- (b) Regional SIGMET Seminar:  
ICAO and WMO (financial support to participants from the developing states were provided by WMO) organised the regional SIGMET Seminar held at the ICAO Regional Office, Bangkok, Thailand, from 11 to 13 July 2007, to enhance the knowledge and capacity of the participants to improve the issuance, the availability and quality of SIGMET information in the Region.

- (c) **Regional Seminar on Enhancing Service Delivery:**  
Regional Seminar on Enhancing Service Delivery by National Meteorological and Hydrological Services in RA V was held in Malaysia, from 2 to 6 April 2007, to enhance the capability of NMHSs to improve observations and provide better services.
- (d) **AMDAR Science and Technology Workshop:**  
The Fifth AMDAR Science and Technology Workshop was held from 17 to 18 November 2008, in Malaysia and brought together leading international experts in AMDAR to exchange information and share experiences amongst participants on the subject.
- (e) **Training Workshop on Aviation Meteorology:**  
The ASEAN-Republic of Korea Training Workshop on Aviation Meteorology was held in Seoul, Republic of Korea, from 9-15 November 2008. Fifteen participants from ASEAN Member Countries (partly from RA II and RA V) attended the workshop to improve basic knowledge of the aviation meteorological services and application of meteorological data to the operational works related to aviation meteorology.
- (f) A workshop organized by the Finnish Meteorological Institute was held from 14-18 September 2009, at the office of the Secretariat of the Regional Environment Programme (SPREP) in Apia, Samoa, to help the implementation of QMS in the Pacific Island States.
- (g) **SIGMET Posters:**  
SIGMET posters (by Australia and Hong Kong, China) to be used as training material and quick reference tools describing the SIGMET procedures for volcanic ash clouds, tropical cyclones and other hazardous meteorological phenomena, will be produced and circulated to all states with MWO responsibilities.
- (h) **SIGMET Website:**  
A SIGMET web page was developed by Hong Kong, China providing real-time information on the valid SIGMETs and advisories issued by the MWOs and advisory centres in the ASIA/PAC Region for monitoring purposes within the ROBEX scheme.

## **7. FUTURE OF AERONAUTICAL METEOROLOGY**

### **7.1 Possible Changes to The FIR**

As WMO Congress XV noted the possibility of ICAO reorganizes in the future the airspace and Flight Information Regions into larger blocks for the sake of harmonizing warnings and reducing costs. It appears that there are serious implications to the MWO for smaller and developing countries. For the airspace over international waters would probably best leave it to the ICAO, however over national sovereign territories it is entirely the right of the nation concern. The single sky policy of the European Community is possible in European Community because the member states are obliged to abide by the law of the European Parliament and is unlikely to be applied to other parts of the world.

### **7.2 Aviation Weather Services in the SESAR and Next Generation Air Traffic System**

SESAR (Single European Sky ATM Research) and the Next Generation Air Traffic System (NGATS) proposed by USA would operate in the near future to achieve greater safety and efficiency. New technologies and processes will be developed for better decision making during all weather related situations. WMO must be prepared to lead and design strategies for the provision of meteorological services in the development of SESAR, NGATS and that national meteorological services especially from the developing countries are able to provide required services to the aviation industry.

**8. COST RECOVERY**

One of the difficulties associated in mitigating the deficiencies in meteorological service in the South Pacific is that cost recovery is not sufficient to cover the costs of meeting Annex 3 requirements.

-----

## ANNEX 10

### REPORT OF THE CHAIRPERSON OF THE WORKING GROUP ON HYDROLOGY (*Charles Perason, New Zealand*)

The RA V Working Group on Hydrology (RA V/WGH) was re-established by Resolution 14 (XIV-RA V) in May 2006. During the intersessional period, there were few opportunities for the RA V WGH members to meet and to have contacts with other experts in the Region through the Pacific-HYCOS meetings and other regional and international events. A joint Flood Forecasting Workshop, Pacific-HYCOS Project launch and RA V/WGH meeting was held in Brisbane, Australia, from 16 to 19 April 2007. The meeting was organized in collaboration with the Australian Bureau of Meteorology (BOM), WMO, NIWA and SOPAC. It was funded by WMO, BOM and SOPAC.

The first day was devoted to a workshop on Flood Forecasting to present and discuss the outcome of the Synthesis Conference on the WMO Flood Forecasting Initiative and the draft Strategy. The second and third days were allocated to the First Meeting of the Steering Committee for Pacific-HYCOS, to officially launch the Pacific-HYCOS project, discuss, identify and agree on issues related to the implementation procedures including workplan and establishment of a Project Steering Committee (PSC). The fourth day of the meeting was devoted to the RA WG/H session to discuss the workplan and agree on specific activities. The meeting also discussed issues related to groundwater in the Region.

Following the Brisbane meeting in April 2007, WMO Congress in Geneva in May 2007, the Chairperson communicated with RAV WG/H members by email on the 5<sup>th</sup> of November 2007 inviting them to provide input into WMO's Commission for Hydrology (Chy) long-term planning, for the next four years and beyond. A document prepared by the Chy president, Mr Bruce Stewart was circulated to collect views and contribution as input from Pacific Island Countries (PICs) for consideration in the Chy activities.

The Pacific-HYCOS project has been executed by SOPAC with WMO as technical supervising agency. To date it has managed to achieve some of its objectives despite the limited infrastructure support to National Hydrological Services (NHSs) in the participating countries. There is concern about the countries ability to sustain operations and to maintain the surface and groundwater monitoring network. The project has been considered as an important cornerstone on which other projects have been initiated, such as flood forecasting. There is a need for developing SEA-HYCOS and to be linked to other HYCOS projects to avoid future implementation obstacles.

Major challenges facing the the region including maintenance and operating hydrological networks, training, instruments and equipment, flood forecasting and drought prediction, water resources assessment, communications with other service providers, users and decision makers, the regional presence of WMO and the funding of NMHs.

The Seventh session of RA V WG/H in December 2009, reviewed the objectives set in the hydrological part of the draft RA V Strategic Plan 2009-2011. While acknowledging the work that has already been put into developing the Plan, the RA V WG/H members requested that the regional expected results could be reviewed in the context of developing the RA V Action Plan, taking into consideration the identified regional priority needs in hydrology and water resources and Work Plan (2010-2013) for the RA V WG/H.

The participants at the session Working Group discussed at length and identified eight issues as regional priority needs for hydrology and water resources: (i) Education, training and capacity building (ii) HYCOS projects: (iii) Adaptation to climate change in water sector; (iv) Water quality monitoring and assessment; (v) Sustainable maintenance and calibration of equipment for

hydrology and water resources; (vi) Flood forecasting; (vii) Echanging and sharing of hydrological data and information; and (viii) Quality management framework.

Realizing the importance of hydrological issues in the Region and the vital role of Working Groups on Hydrology in the Region in water issues, the participants strongly emphasized the need, felt by all NHSs in the region of having a forum for networking, discussing and coordinating their activities as an integral part of RA V activities. In this regard, at the Seventh session RA V WG/H, the participants agreed and recommended to the Regional Association V that the Working Group on Hydrology be re-established by XV-RA V for the next intersessional period to implement the Work Plan (2010-2013) in accordance with priority needs.

Based on the discussions during the Seventh session of RA V WG/H, the participants proposed that the structure for the Working Group on Hydrology included the Chairperson and experts to coordinate activities related to the identified regional priority needs. The proposed structure and Terms of Reference (TOR) would be as follows:

### **GENERAL RESPONSIBILITIES (TERMS OF REFERENCE):**

#### **CHAIRPERSON**

##### GENERAL TERMS OF REFERENCE:

The Chairperson, in his capacity as the Regional Hydrological Adviser to the president of RA V and as Chairperson of the Working Group on Hydrology, will:

- Establish, in consultation with the president of RA V, the Working Group core members corresponding to the identified priority areas and the proposed coordinators and their Terms of Reference or responsibilities to assist in implementing the Work Plan (2010-2013);
- Coordinate the education, training and capacity building in hydrology and water resources with the aim to improve human resources capability in Region V; and
- Coordinate activities to raise the profile of National Hydrological Services (NHSs) and hydrology and water resources in the Region.

##### SPECIFIC TERMS OF REFERENCE:

In his capacity as Regional Hydrological Adviser, will:

- Assist the president of RA V in accordance with the duties stipulated in WMO General Regulation 167(b);
- Participate in Executive Council sessions, when invited representing regional interests in hydrology and water resources; and
- Coordinate the works of the Working Group on Hydrology with the Commission for Hydrology (Chy) and other regional Working Groups on Hydrology.

In his capacity as Chairperson of the Working Group

- Coordinate the works of the Working Group on Hydrology among experts for each of the priority areas; and
- Coordinate the implementation of the Work Plan (2010-2013).

**COORDINATOR RESPONSIBLE FOR WYCOS**

SPECIFIC TERMS OF REFERENCE:

- Coordinate the regional and sub-regional components of WHYCOS in RA V; and
- Support the development of the SEA HYCOS and strengthening Pacific HYCOS.

**COORDINATOR RESPONSIBLE FOR CLIMATE CHANGE IMPACT ON THE WATER SECTOR**

SPECIFIC TERMS OF REFERENCE:

- Coordinate activities on climate change and climate variability related to hydrology and water resources sector including drought and flood forecasting in Region V; and
- Support development of national and regional strategies for adaptation to climate change in the water sector.

**COORDINATOR RESPONSIBLE FOR QMF- HYDROLOGY**

SPECIFIC TERMS OF REFERENCE:

- Coordinate with the implementation of QMF-Hydrology in Region V;
- Promote the use of WMO manuals and Guidelines in Region V; and
- Assist in standardization measures in Region V.

**COORDINATOR RESPONSIBLE FOR WATER QUALITY ASSESSMENT**

SPECIFIC TERMS OF REFERENCE:

- Coordinate activities on water quality monitoring and assessment in Region V; and
- Support raising awareness on issues related to water quality.

**COORDINATOR RESPONSIBLE FOR HYDROLOGICAL FORECASTING AND DROUGHT PREDICATION**

SPECIFIC TERMS OF REFERENCE:

- Coordinate activities on hydrological forecasting in Region V; and
- Take the lead in identifying available tools or methodologies including Geographic Information System (GIS), satellite information and hazard mappings for flash flood forecast.

-----

## **ANNEX 14**

### **REPORT OF THE RAPPORTEUR ON THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS**

*(Agnes Lane, Australia)*

#### **Introduction to GEOSS and GEO**

The Global Earth Observation System of Systems (GEOSS) is a coordinating and integrating network of Earth observing and information systems, contributed to on a voluntary basis by Members and Participating Organizations of the intergovernmental Group on Earth Observations (GEO). GEOSS is intended to build on and strengthen existing global observing systems, with the aim of extending the benefits of earth observations across a broader community than have been traditionally served by them. To this end, GEO has identified nine “Societal Benefit Areas” of disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity. As well as facilitating interoperability between, access to and use of existing observations and information systems, the GEOSS implementation strategy also features comprehensive gap analysis and gap filling, integrated across all Societal Benefit Areas (SBA).

GEO was launched in response to calls for action by the 2002 World Summit on Sustainable Development and by the G8 (Group of Eight) leading industrialized countries. GEO is a voluntary partnership of governments and international organizations. It provides a framework within which these partners can develop new projects and coordinate their strategies and investments in earth observing and associated information systems. As well as building on systems and developing strategies to meet the needs of the nine SBA, GEOSS has defined four ‘building block’ areas of activity that cross-cut all SBA – architecture and data; capacity building; user interface; and science and technology. These are key elements of the integrating and interoperability approach of GEOSS, at the heart of which is the GEOSS Common Infrastructure.

As of April 2010, GEO’s Members include 80 Governments and the European Commission. In addition, 58 intergovernmental, international, and regional organizations with a mandate in Earth observation or related issues have been recognized as Participating Organizations.

#### **RA V participation in GEO**

The GEO Members are attributed to five geographic regions (Africa, Americas, Asia-Oceania, Europe and Russian Federation). The WMO RA V is enclosed within the Asia-Oceania GEO region, which currently comprises 16 GEO members in total, five of which are from RA V (Australia, Indonesia, Malaysia, New Zealand and Philippines). Excluding USA and UK, which are GEO members associated with other GEO regions, only 25% of RA V countries have decided to become members of GEO, with no Pacific Island Countries amongst them.

The GEO Executive Committee (ExCom), which oversees the work of the GEO secretariat and guides the GEOSS work program between GEO Plenary sessions, comprises 13 members, elected to represent the GEO regions – Africa (2 ExCom seats), Asia-Oceania (4), Americas (3), Europe (3), Russian Federation (1). The current ExCom members representing Asia-Oceania (and hence the GEO members in RA V) are Australia, China, Japan and Republic of Korea. Notably, the Principal Delegate to GEO for three of these four countries (Australia, China and Korea) is from their NMHS.

Following decisions of WMO Executive Council, WMO is a Participating Organization in GEO and contributes, through its Members, the observing and information systems that are intended to meet the needs of the Weather SBA, as well as contributing to the Water, Disasters and Climate SBAs. Cg-XV Congress reaffirmed the Executive Council decisions: to endorse GEOSS and its 10-Year Implementation Plan; to provide full support for the GEO process and resulting GEOSS; to support

its implementation to the maximum extent possible within the WMO mandate; and to make available all essential data as defined in WMO Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities, through the GEO interoperable arrangements to serve the needs of the global community. In doing so, WMO Members would have access to other GEO data and products available through the GEO interoperable arrangements.

Further, the WMO-UNEP-FAO-ICSU Global Climate Observing System (GCOS) provides the GEOSS framework for the Climate SBA. Accordingly, all RA V countries, whether explicitly GEO members or not, are contributing to some extent to GEO and GEOSS, and gaining benefits in return.

### **GEOSS activities in RA V**

The GEOSS work plan, which can be viewed on the GEO website at [http://earthobservations.org/documents/work%20plan/geo\\_wp0911\\_rev2\\_091210.pdf](http://earthobservations.org/documents/work%20plan/geo_wp0911_rev2_091210.pdf) comprises 44 overarching tasks, spread across the nine SBAs and the four GEOSS building blocks. Staff from the WMO Secretariat, together with GEO Members from within Asia-Oceania and other GEO regions, are engaged in a large number of GEOSS tasks and associated coordinating activities, most of which will benefit Members across all WMO regions. These include the development of the WMO Information System (WIS), a WMO contribution to the GEOSS Common Infrastructure, and capacity building for water resource management, which builds on the Asian Water Cycle Initiative, in which several RA V countries participate; global carbon observation and analysis system, including the forest carbon tracking task, co-lead by Australia; and GEONETcast, co-lead by WMO, which is a distribution system for GEOSS related data, information and products using communication satellites and low cost, self contained, stand alone, off-the-shelf reception stations.

The implementation of the GEOSS work plan is facilitated through the work of four GEO standing committees, each affiliated with one of the GEOSS building blocks. All of the GEOSS tasks are assigned to one of the committees for coordination purposes and the committees bring the valuable cross-cutting perspective which aims to break down the silos of specific applications areas and maximise opportunities to share systems and data, to understand and address user requirements across all sectors, and to communicate the benefits of GEOSS to all possible constituents.

The Committees meet three times per year, and try to co-locate their meetings at least once a year. In September 2009, Australia hosted the combined GEO Committee meetings at the Bureau of Meteorology, in Melbourne. This provided an opportunity to showcase some Australian GEOSS contributions, to draw attention to RA V issues for future GEO consideration and to raise awareness amongst Australian institutions of the relevance of GEOSS.

In March 2010, the Fourth Asia-Pacific GEOSS Symposium was held in Bali, Indonesia. This annual event has been held in Japan previously and the move to Bali was aimed at widening attendance to a greater number of regional representatives. The themes of the symposium were climate change, disasters and water, all of high relevance to NMHSs in RA V but unfortunately there were no NMHS representatives in attendance.

### **GEO/GEOSS Issues for RA V**

A major focus of GEOSS to date has been on harnessing satellite-based resources to address global concerns, especially in relation to disaster risk reduction, climate change and other global environmental concerns. While NMHS's have always understood the true complementary nature of space-based and in situ observations, and the essentiality of both, there now is increasing awareness in GEO of the critical need to sustain and improve in situ observing systems, not just

because of the requirement for 'ground-truthing' of satellite data, but because of the intrinsic value of in situ observations themselves, especially for SBAs dependent on terrestrial sensing.

The GEO VII Plenary and Fifth Ministerial Summit will be held in Beijing, from 3-5 November 2010, and the event will mark the half-way point in the 10-year implementation of GEOSS. The agenda for the Ministerial is still being developed but it is likely that it will focus on how GEOSS can contribute to addressing critical societal needs, especially in relation to food security, biodiversity, and carbon monitoring, with a cross-cutting emphasis on data sharing and the coordination and sustainability of in-situ observations.

GEONETCast has the potential to be particularly useful in distributing operational or project data where a large number of users can benefit and where Internet access has low bandwidth or is non-existent. With contributions from space-based platforms provided by EUMETSAT, USA's NOAA and China's FENGYUNG, GEONETCast now covers 99% of the world's population. However, the missing 1% largely comprises the Pacific Island Countries of RA V. A greater membership by countries in this region may increase the attention to this missed opportunity and encourage the development of a solution to fill this important gap.

GEOSS is about observations and information, and in some instances may seek to facilitate delivery of information services to some types of users, such as providers of humanitarian relief after large scale disasters, such as the Haiti earthquake. It is important, however, to distinguish the delivery of local, national and regional services at a scale provided by NMHSs, such as for climate, weather and warning services. GEOSS, especially through the contributions of WMO, can facilitate increased data sharing and access to a greater variety of information but it will not replace the direct engagement that NMHSs have with end-users and the provision of services that follow from that engagement and understanding, not least the need for a 'one voice' approach to warnings.

There are no fees levied for GEO membership, although voluntary cash contributions are welcomed to support the operation of the GEO secretariat, which is hosted at the WMO building in Geneva. Contributions of observations and data sets that can be shared by other users through the GEOSS Common Infrastructure are especially sought and, of course, GEO Members have ready access to all such resources. Recognising the importance of capacity building to build and implement GEOSS for all users, some travel support is provided to encourage developing country participation in GEO meetings and GEOSS tasks, both through the GEO Trust Fund and bilaterally from GEO donor countries, as opportunity permits.

## **Conclusions**

Many of the benefits of GEOSS will flow to RA V countries that are not members of GEO, but without active participation through taking up GEO membership, there will be lost opportunities to influence the development of specific GEOSS initiatives.

For those RA V countries that are members of GEO, it is important to establish and participate in national coordination mechanisms to bring together the GEOSS contributors and beneficiaries across all SBAs, across government, academia and industry sectors. As well as maximising the national benefits that may be provided and opening up opportunities for NMHS engagement in GEOSS activities, this will assist in ensuring that the role of NMHSs is acknowledged and strengthened, both as observations providers and as services deliverers.

---